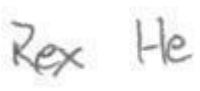




|                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                        |                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Test Report Number:</b>                                                                                                                                                                                                                                                                                                                                                    | <b>LCZE25050060</b>                                                                                                                                    | <b>Total Page(s):</b> 34 |
| <b>Applicant Name:</b>                                                                                                                                                                                                                                                                                                                                                        | Jiangmen Lecolux Lighting Appliance Co.,LTD                                                                                                            |                          |
| <b>Applicant Address:</b>                                                                                                                                                                                                                                                                                                                                                     | A building 3rd Floor, No.11 Xinyi Road, Jianghai High-tech Zone, Jiangmen City                                                                         |                          |
| <b>Test item:</b>                                                                                                                                                                                                                                                                                                                                                             | Solar camping light - Bluetooth model                                                                                                                  |                          |
| <b>Model / Type Reference:</b>                                                                                                                                                                                                                                                                                                                                                | LYD-LY-4                                                                                                                                               |                          |
| <b>FCC ID:</b>                                                                                                                                                                                                                                                                                                                                                                | 2BPSF-LYD-LY-4                                                                                                                                         |                          |
| <b>Date of Issue:</b>                                                                                                                                                                                                                                                                                                                                                         | 2025-05-26                                                                                                                                             |                          |
| <b>Testing Laboratory:</b>                                                                                                                                                                                                                                                                                                                                                    | LCTECH Guangdong Testing Services Co., Ltd.<br>2/F.,Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China |                          |
| <b>Test Specification:</b>                                                                                                                                                                                                                                                                                                                                                    | FCC 47 CFR Part 15 Subpart C: Section 15.247                                                                                                           |                          |
| <b>Test Result:</b>                                                                                                                                                                                                                                                                                                                                                           | Passed                                                                                                                                                 |                          |
| <b>Compiled by:</b>                                                                                                                                                                                                                                                                                                                                                           | <b>Reviewed by:</b>                                                                                                                                    |                          |
| 2025-05-26 Rex He                                                                                                                                                                                                                                                                                                                                                             |                                                                     | 2025-05-26 Tension Li    |
| <i>Date</i>                                                                                                                                                                                                                                                                                                                                                                   | <i>Name</i>                                                                                                                                            | <i>Signature</i>         |
|                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                        | <i>Date</i>              |
|                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                        | <i>Name</i>              |
|                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                        | <i>Signature</i>         |
| <b>Remark:</b>                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                        |                          |
| N/A                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                        |                          |
| <p>The duplication of this report or parts of it and its use for advertising purposes is only allowed with permission of the testing laboratory. This report contains the result of the examination of the product sample submitted by the applicant. A general statement concerning the quality of the products from the series manufacture cannot be derived therefore.</p> |                                                                                                                                                        |                          |

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## 1 Summary of Test Results

| Description of Test Item                                | Standard                                      | Result |
|---------------------------------------------------------|-----------------------------------------------|--------|
| Antenna Requirement                                     | FCC Part 15 Subpart C:15.203/247(c)           | PASS   |
| AC Power Line Conducted Emission                        | FCC Part 15 Subpart C:15.207                  | PASS   |
| Conducted Peak Output Power                             | FCC Part 15 Subpart C:15.247(b)               | PASS   |
| 6 dB Bandwidth                                          | FCC Part 15 Subpart C:15.247(a)(2)(iii)       | PASS   |
| Power Spectral Density                                  | FCC Part 15 Subpart C:15.247(e)               | PASS   |
| Band Edge                                               | FCC Part 15: 15.209<br>FCC Part 15: 15.247(d) | PASS   |
| Spurious Emission                                       | FCC Part 15: 15.247(d)                        | PASS   |
| Note:<br><br>N/A is an abbreviation for Not Applicable, |                                               |        |

**Test Standard Used:**47 CFR Part 15 Subpart C: Section 15.247

**Test procedure used:** ANSI C63.10:2020

## 2 General test information

### 2.1 Description of EUT

|                          |                                               |
|--------------------------|-----------------------------------------------|
| Product Name             | : Solar camping light - Bluetooth model       |
| Model Number             | : LYD-LY-4                                    |
| EUT function description | : Please reference user manual of this device |
| Power supply             | : DC5V, 2A                                    |
| FCC ID                   | : 2BPSF- LYD-LY-4                             |
| Radio Specification      | : Bluetooth V5.3                              |
| Operation frequency      | : 2402MHz -2480MHz                            |
| Modulation               | : GFSK                                        |
| Data rate                | : 1Mbps                                       |
| Antenna Type             | : PCB antenna                                 |
| Antenna Gain             | : -0.58dBi                                    |

Remark:The device meets the requirements stated within Parts 15.247(g)&(h) in that they were Developed under the Bluetooth protocol and operate as a true frequency hopping system.The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

According to the declaration from the applicant, this report covers the model as below: LYD-LY-4. Therefore only one model LYD-LY-4 was fully tested in the report.

## 2.2 Operation channel list

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 1       | 2402            | 11      | 2422            | 21      | 2442            | 31      | 2462            |
| 2       | 2404            | 12      | 2424            | 22      | 2444            | 32      | 2464            |
| 3       | 2406            | 13      | 2426            | 23      | 2446            | 33      | 2466            |
| 4       | 2408            | 14      | 2428            | 24      | 2448            | 34      | 2468            |
| 5       | 2410            | 15      | 2430            | 25      | 2450            | 35      | 2470            |
| 6       | 2412            | 16      | 2432            | 26      | 2452            | 36      | 2472            |
| 7       | 2414            | 17      | 2434            | 27      | 2454            | 37      | 2474            |
| 8       | 2416            | 18      | 2436            | 28      | 2456            | 38      | 2476            |
| 9       | 2418            | 19      | 2438            | 29      | 2458            | 39      | 2478            |
| 10      | 2420            | 20      | 2440            | 30      | 2460            | 40      | 2480            |

## 2.3 Test channel list

| Channel | Frequency (MHz) |
|---------|-----------------|
| 1       | 2402            |
| 20      | 2440            |
| 40      | 2480            |

## 2.4 Testing

Date of receipt of test item :2025-05-20

Date (s) of performance of tests :2025-05-21 to 2025-05-26

## 2.5 Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

|                    |           |
|--------------------|-----------|
| Temperature range: | 15-35°C   |
| Humidity range:    | 20-75%    |
| Pressure range:    | 98-101kPa |

## 2.6 Test laboratory

LCTECH Guangdong Testing Services Co.,Ltd.

Add: 2/F.,Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China

Test Sites: 1/F., Building I, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China

## 2.7 Measurement uncertainty

| Test Item                                            | Uncertainty |
|------------------------------------------------------|-------------|
| Uncertainty for Conduction emission test             | 3.74dB      |
| Uncertainty for Radiation Emission test(30MHz-1GHz)  | 4.92dB      |
| Uncertainty for Radiation Emission test (Above 1GHz) | 4.23dB      |

Note□ This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3 Equipment list

| Item                                       | Test Equipment                                               | Manufacturer          | Model No.       | Serial No.             | Cal.Date<br>(yyyy-mm-dd) | Cal.Due date<br>(yyyy-mm-dd)        |
|--------------------------------------------|--------------------------------------------------------------|-----------------------|-----------------|------------------------|--------------------------|-------------------------------------|
| <b>Radiated Emission (30 MHz–1000 MHz)</b> |                                                              |                       |                 |                        |                          | <input checked="" type="checkbox"/> |
| 1                                          | EMI Test Receiver                                            | R&S                   | ESCI 7          | 100965                 | 2024-06-26               | 2025-06-25                          |
| 2                                          | Log-periodic Dipole Antenna                                  | Schwarzbeck           | VULB 9162       | 058                    | 2022-07-03               | 2025-07-02                          |
| 3                                          | 3m Semi-anechoic                                             | Zhongshuo Electronics | 9mx6mx6m        | N/A                    | 2024-12-17               | 2027-12-16                          |
| 4                                          | RF Cable                                                     | R&S                   | R01             | 10403                  | 2024-12-09               | 2025-12-08                          |
| 5                                          | EMI Test Software                                            | AUDIX                 | E3              | Version No: 6.111221a  | N/A                      | N/A                                 |
| <b>Disturbance Voltage</b>                 |                                                              |                       |                 |                        |                          | <input checked="" type="checkbox"/> |
| 6                                          | EMI Test Receiver                                            | Rohde&Schwarz         | ESCI            | 100939                 | 2024-12-09               | 2025-12-08                          |
| 7                                          | Artificial Mains Network                                     | Rohde&Schwarz         | ENV216          | 3560655012             | 2024-12-09               | 2025-12-08                          |
| 8                                          | Shield Room                                                  | Rongxiang             | 8X5X3.5         | 992276296              | 2022-07-01               | 2025-06-30                          |
| 9                                          | Conducted Emission Test Software                             | FALA                  | EZ-EMC          | Version No: LCTECH-03A | N/A                      | N/A                                 |
| <b>Radiated Emission (Above 1 GHz)</b>     |                                                              |                       |                 |                        |                          | <input checked="" type="checkbox"/> |
| 10                                         | EMI Test Receiver                                            | R&S                   | ESCI 7          | 100965                 | 2024-06-26               | 2025-06-25                          |
| 11                                         | Log-periodic Dipole Antenna                                  | Schwarzbeck           | VULB 9162       | 058                    | 2022-07-03               | 2025-07-02                          |
| 12                                         | 3m Semi-anechoic                                             | Zhongshuo Electronics | 9mx6mx6m        | N/A                    | 2024-12-17               | 2027-12-16                          |
| 13                                         | RF Cable                                                     | R&S                   | R01             | 10403                  | 2024-12-09               | 2025-12-08                          |
| 14                                         | CDNE                                                         | KeHuan                | KH3663E         | 36630822               | 2024-06-26               | 2025-06-25                          |
| 15                                         | Doppelsteg Breitband Hornantenne Double Ridge Broadband Horn | Schwarzbeck           | BBHA 9120 D     | N/A                    | 2024-12-11               | 2025-12-10                          |
| 16                                         | Signal Analyzer                                              | Keysight              | N9020A          | SER MY52220373         | 2024-12-09               | 2025-12-08                          |
| 17                                         | Pre-amplifier                                                | sinancidian           | COP-01G18G-45dB | N/A                    | 2024-12-09               | 2025-12-08                          |

## 4 Test Results

### 4.1 Antenna requirement

#### Standard requirement:

##### 15.203 requirement:

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

##### 15.247(c) (1)(i) requirement:

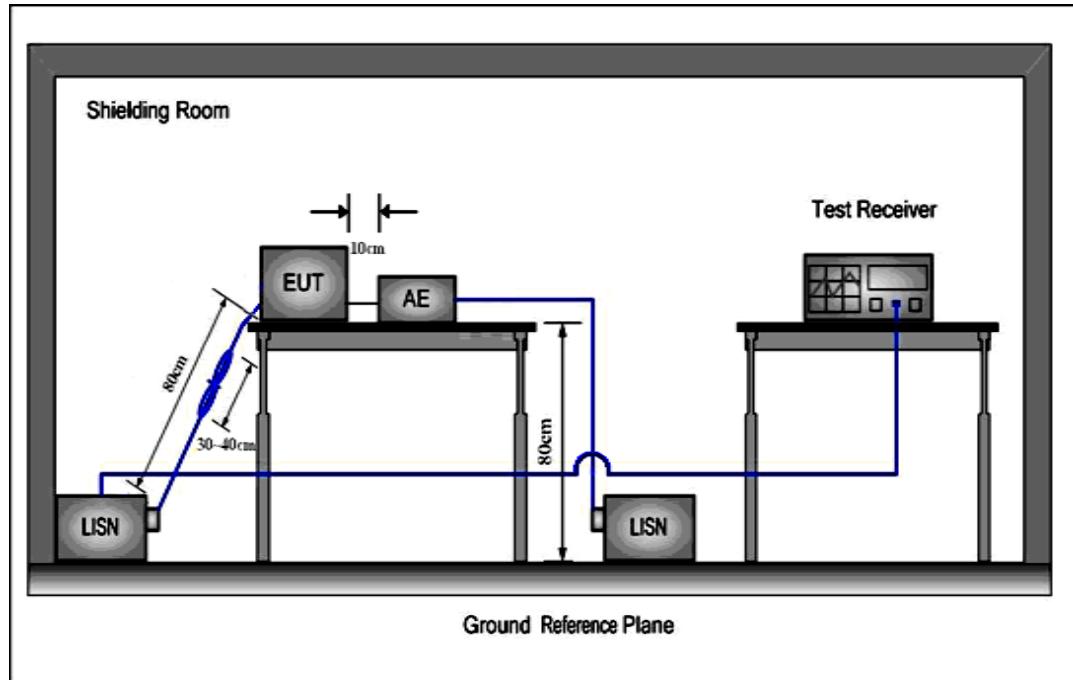
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

#### E.U.T Antenna:

The antenna is PCB antenna. It comply with the standard requirement.

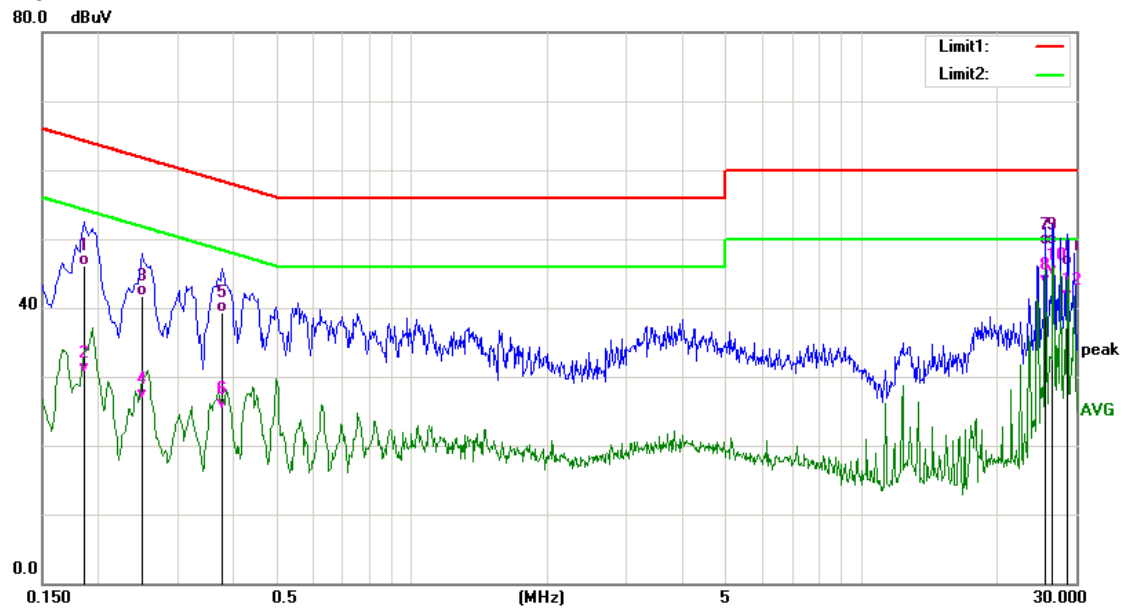
## 4.2 AC Power Line Conducted Emission

### Test Connection Diagram



Charging mode

Live:

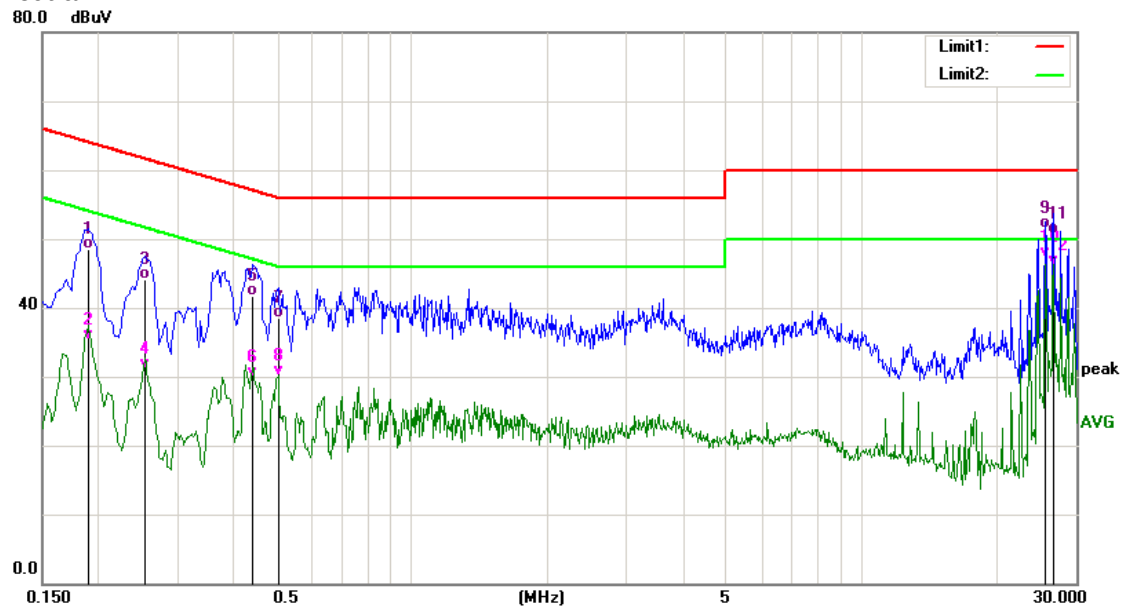


Quasi-peak and Average measurement:

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 0.1860             | 36.35             | 9.76                  | 46.11            | 64.21           | -18.10         | QP     |
| 2   | 0.1860             | 20.66             | 9.76                  | 30.42            | 54.21           | -23.79         | AVG    |
| 3   | 0.2500             | 31.81             | 9.84                  | 41.65            | 61.75           | -20.10         | QP     |
| 4   | 0.2500             | 16.95             | 9.84                  | 26.79            | 51.75           | -24.96         | AVG    |
| 5   | 0.3780             | 29.22             | 10.02                 | 39.24            | 58.32           | -19.08         | QP     |
| 6   | 0.3780             | 15.31             | 10.02                 | 25.33            | 48.32           | -22.99         | AVG    |
| 7   | 25.6700            | 36.79             | 12.22                 | 49.01            | 60.00           | -10.99         | QP     |
| 8   | 25.6700            | 31.05             | 12.22                 | 43.27            | 50.00           | -6.73          | AVG    |
| 9   | 26.6940            | 36.68             | 12.42                 | 49.10            | 60.00           | -10.90         | QP     |
| 10  | 26.6940            | 32.28             | 12.42                 | 44.70            | 50.00           | -5.30          | AVG    |
| 11  | 28.7500            | 33.30             | 12.84                 | 46.14            | 60.00           | -13.86         | QP     |
| 12  | 28.7500            | 28.28             | 12.84                 | 41.12            | 50.00           | -8.88          | AVG    |

Charging mode

Neutral:

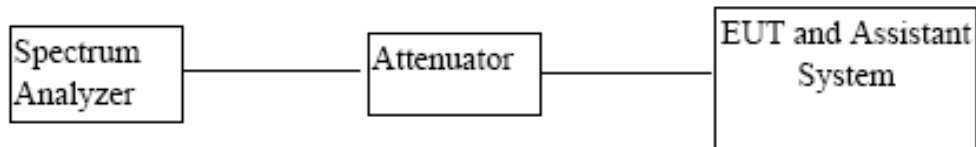


Quasi-peak and Average measurement:

| No. | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>Factor(dB) | Result<br>(dBuV) | Limit<br>(dBuV) | Margin<br>(dB) | Remark |
|-----|--------------------|-------------------|-----------------------|------------------|-----------------|----------------|--------|
| 1   | 0.1904             | 38.73             | 9.76                  | 48.49            | 64.02           | -15.53         | QP     |
| 2   | 0.1904             | 25.63             | 9.76                  | 35.39            | 54.02           | -18.63         | AVG    |
| 3   | 0.2540             | 34.17             | 9.85                  | 44.02            | 61.63           | -17.61         | QP     |
| 4   | 0.2540             | 21.23             | 9.85                  | 31.08            | 51.63           | -20.55         | AVG    |
| 5   | 0.4420             | 31.56             | 10.07                 | 41.63            | 57.02           | -15.39         | QP     |
| 6   | 0.4420             | 19.75             | 10.07                 | 29.82            | 47.02           | -17.20         | AVG    |
| 7   | 0.5020             | 28.42             | 10.10                 | 38.52            | 56.00           | -17.48         | QP     |
| 8   | 0.5020             | 20.04             | 10.10                 | 30.14            | 46.00           | -15.86         | AVG    |
| 9   | 25.6900            | 39.21             | 12.22                 | 51.43            | 60.00           | -8.57          | QP     |
| 10  | 25.6900            | 35.16             | 12.22                 | 47.38            | 50.00           | -2.62          | AVG    |
| 11  | 26.7140            | 38.27             | 12.43                 | 50.70            | 60.00           | -9.30          | QP     |
| 12  | 26.7140            | 33.68             | 12.43                 | 46.11            | 50.00           | -3.89          | AVG    |

### 4.3 Conducted Peak Output Power

#### Test Connection Diagram



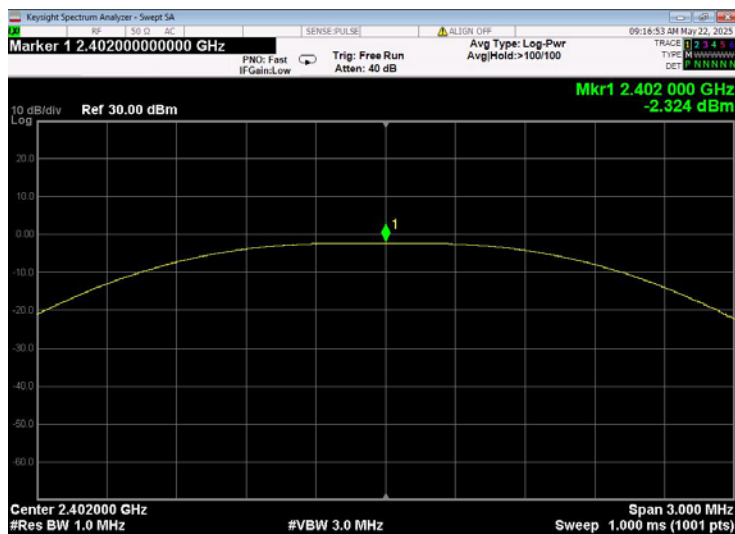
#### Test Procedure

- (1) Configure EUT and assistant system according clause 2.3 and 3.2
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (3) Configure EUT work in test mode as stated in clause 2.3.
- (4) Measure the maximum output power of EUT by spectrum analyzer with PK detector and RBW=2MHz(above 20dB bandwidth of measured signal), VBW=3MHz

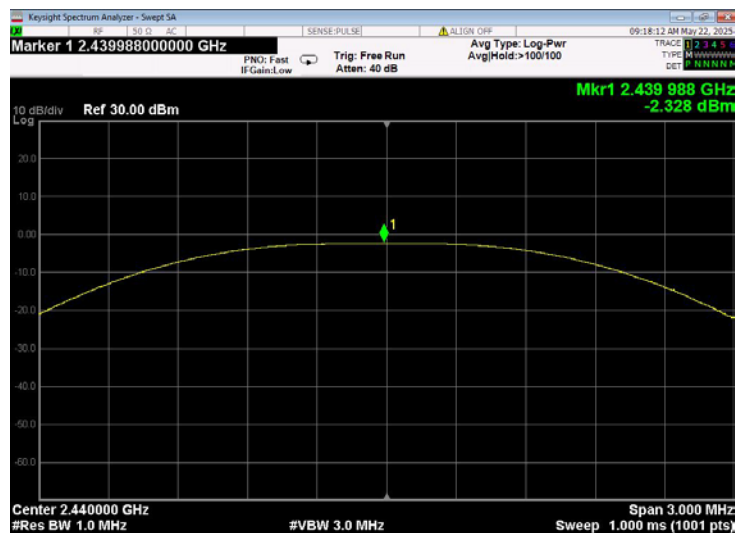
Note: The attenuator loss was inputted into spectrum analyzer as amplitude offset.

#### Test Result:

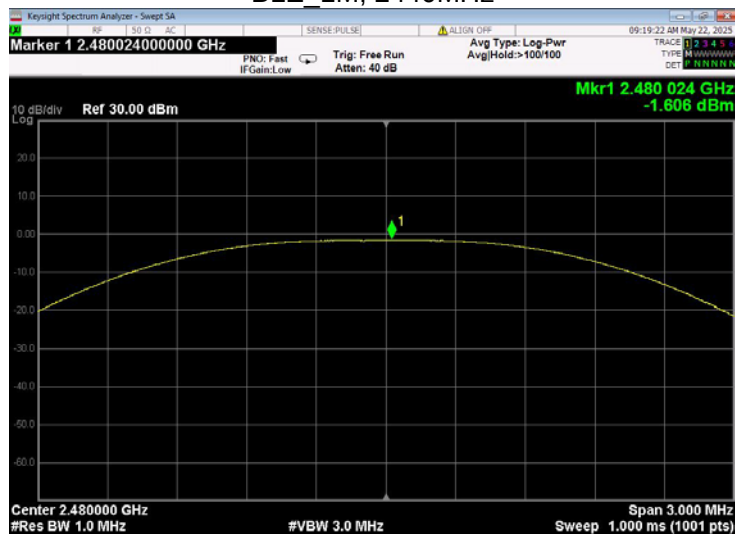
| Test Mode | Antenna | Frequency (MHz) | Conducted Peak Power (dBm) | Conducted Limit (dBm) | Verdict |
|-----------|---------|-----------------|----------------------------|-----------------------|---------|
| BLE_1M    | Ant1    | 2402            | -2.324                     | ≤30                   | PASS    |
| BLE_1M    | Ant1    | 2440            | -2.328                     | ≤30                   | PASS    |
| BLE_1M    | Ant1    | 2480            | -1.606                     | ≤30                   | PASS    |



BLE\_1M, 2402MHz



BLE\_1M, 2440MHz



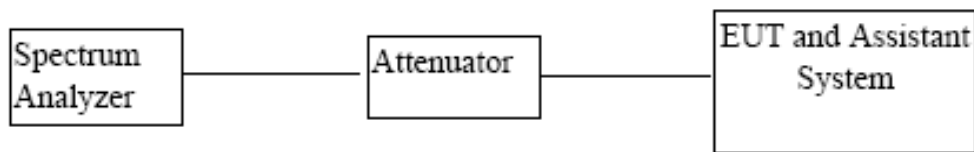
BLE\_1M, 2480MHz

#### 4.4 6 dB Bandwidth

Limit:

| Frequency range (MHz) | Standard requirement                     | Limit                |
|-----------------------|------------------------------------------|----------------------|
| 2402-2480             | FCC Part 15 Subpart C: 15.247(a)(2)(iii) | $\geq 500\text{kHz}$ |

Test setup:



Test procedure:

Set the spectrum analyzer:

- Set RBW = 100 kHz
- Set the VBW  $\geq [3 \times \text{RBW}]$
- Detector = peak.
- Trace mode = max hold.
- Sweep = auto couple
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
- Span =  $2 \times \text{BW} \sim 5 \times \text{BW}$

Test results:

| Test Mode | Frequency (MHz) | Measured 6dBbandwidth (MHz) | Limit                | Result |
|-----------|-----------------|-----------------------------|----------------------|--------|
| BLE_1M    | 2402            | 0.649                       | $\geq 500\text{kHz}$ | Pass   |
| BLE_1M    | 2440            | 0.648                       | $\geq 500\text{kHz}$ | Pass   |
| BLE_1M    | 2480            | 0.647                       | $\geq 500\text{kHz}$ | Pass   |

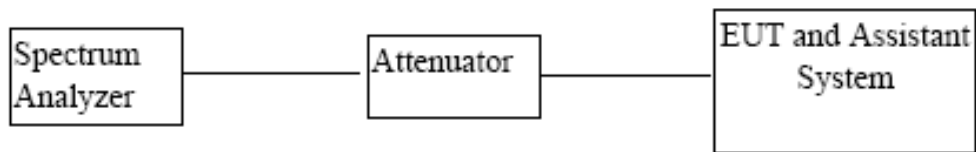


## 4.5 Power Spectral Density

Limit:

| Frequency range (MHz) | Standard requirement             | Limit               |
|-----------------------|----------------------------------|---------------------|
| 2402-2480             | FCC Part 15 Subpart C: 15.247(e) | 8 dbm (in any 3kHz) |

Test setup:



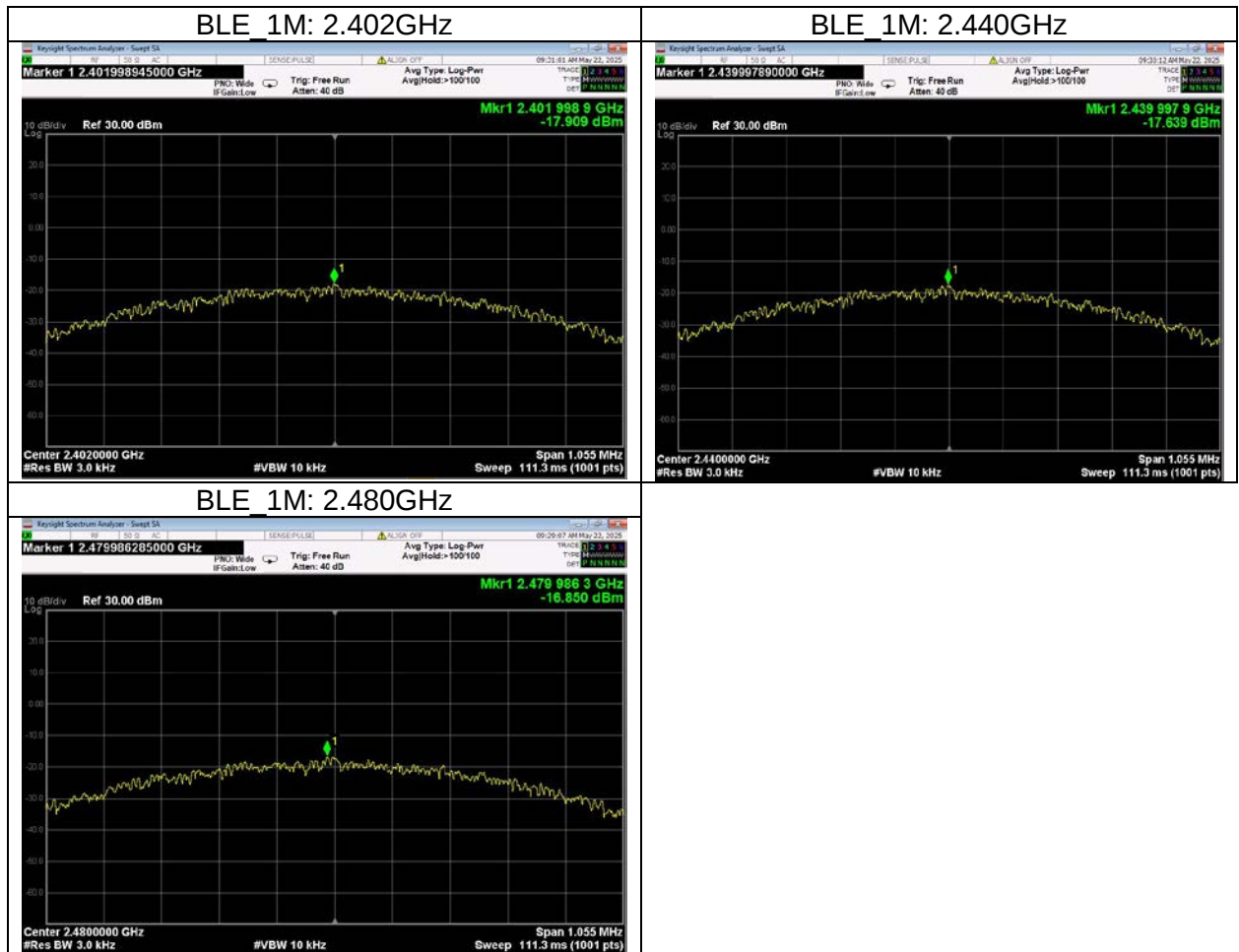
Test procedure:

Set the spectrum analyzer:

- Set analyzer center frequency to DTS channel center frequency.
- Set the span=  $1.5 \times \text{DTS bandwidth}$ .
- Set the RBW to  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set the VBW  $\geq [3 \times \text{RBW}]$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

Test results:

| Test Mode | Frequency (MHz) | Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|-----------|-----------------|-----------------------------------|------------------|--------|
| BLE_1M    | 2402            | -17.909                           | 8                | Pass   |
| BLE_1M    | 2440            | -17.636                           | 8                | Pass   |
| BLE_1M    | 2480            | -16.850                           | 8                | Pass   |

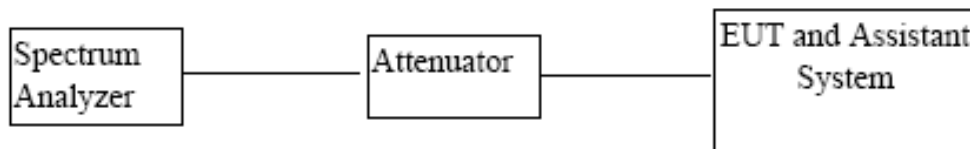


## 4.6 Band Edge

### Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.

### Test setup:

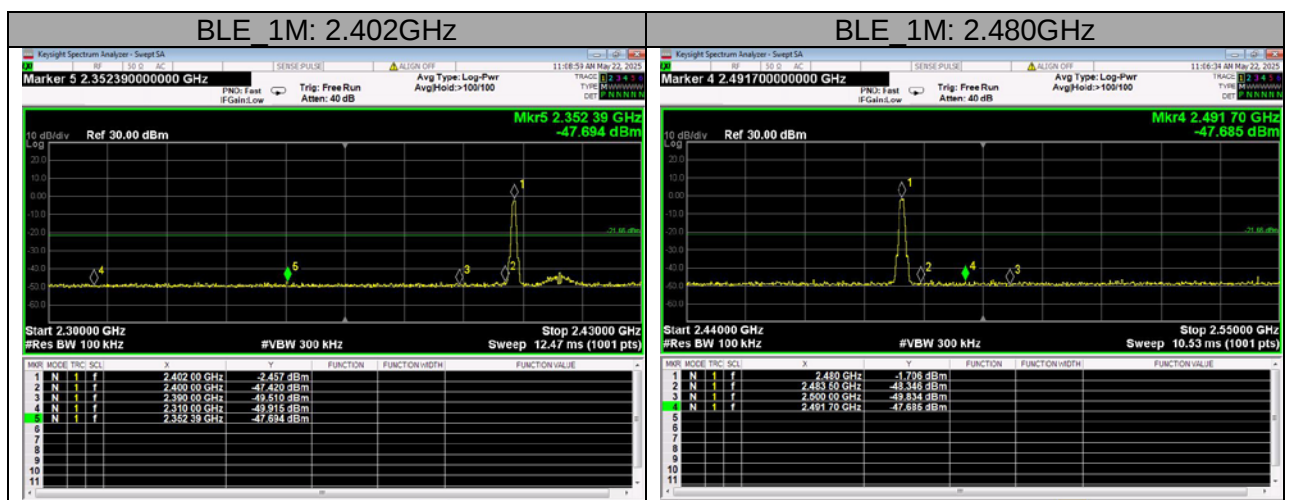


### Test procedure:

Set the spectrum analyzer:

- Set analyzer center frequency to DTS channel center frequency.
- Set the span= 1.5 × DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW  $\geq [3 \times \text{RBW}]$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

### Test results:



LCTECH Guangdong Testing Services Co.,Ltd.

Add:2/F.,Technology and Enterprise Development Center,  
Guangyuan Road,Xiaolan, Zhongshan, Guangdong, China

Tel:+86-760-22833366

Fax:+86-760-22833399

E-mail:Service@lccert.com

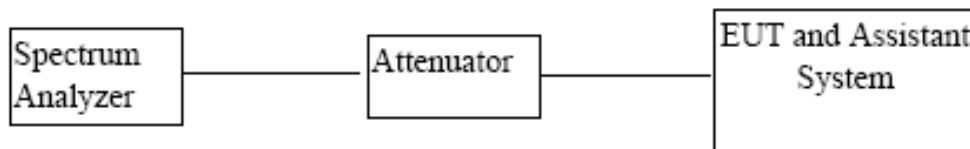
<http://www.lccert.com>

## 4.7 Spurious RF conducted emissions

### Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.

### Test setup:

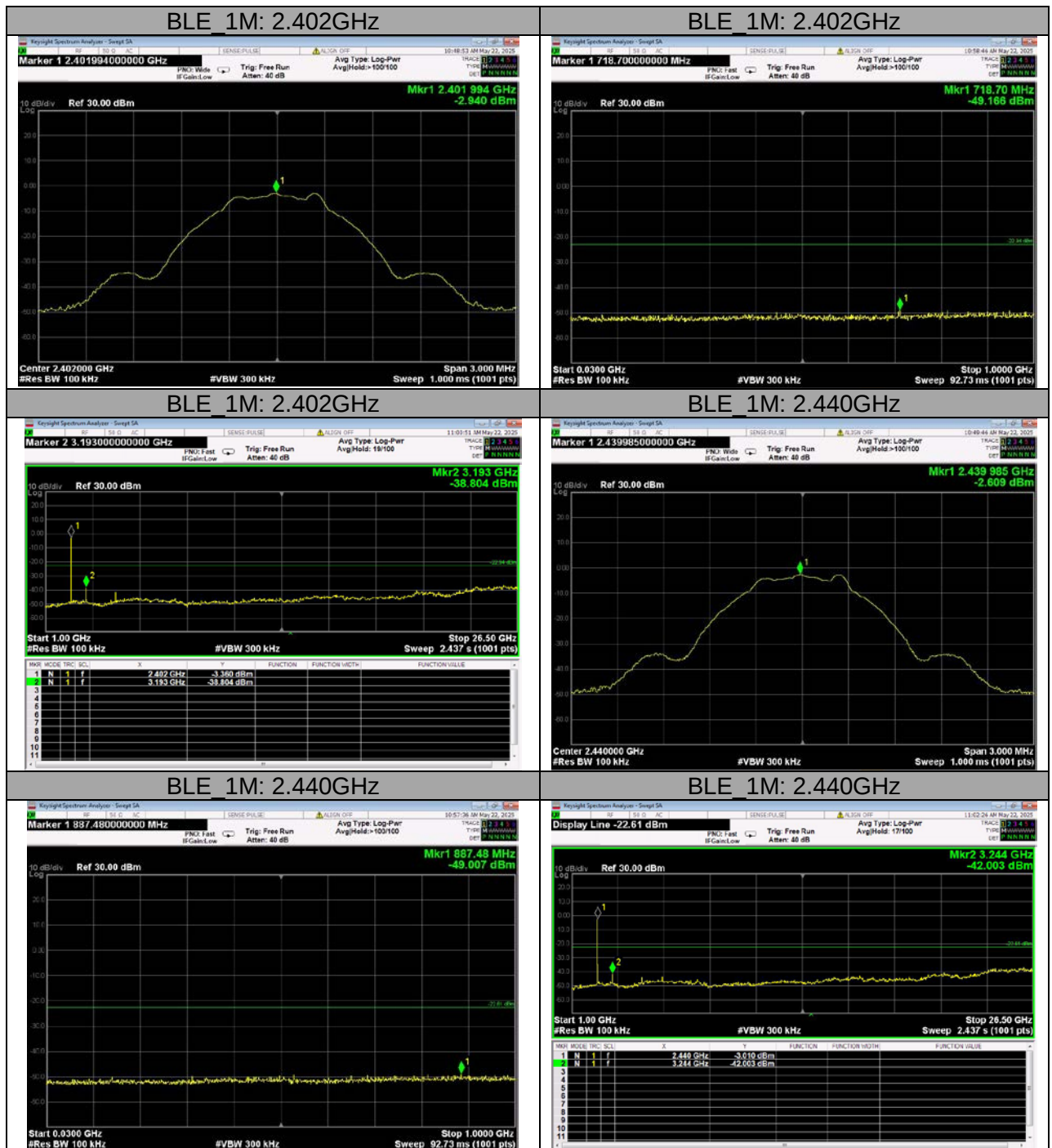


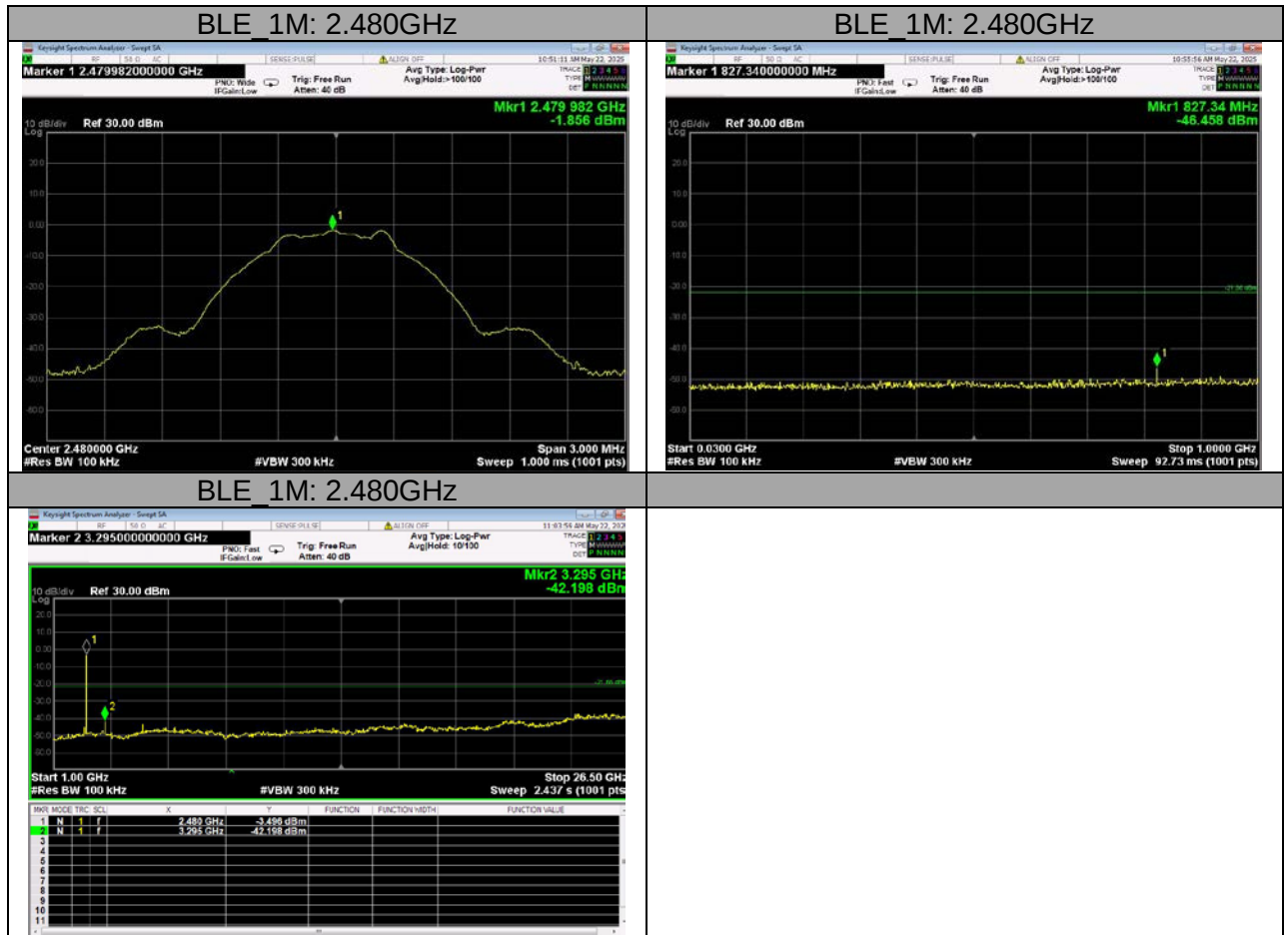
### Test procedure:

Set the spectrum analyzer:

- Set analyzer center frequency to DTS channel center frequency.
- Set the span=  $1.5 \times \text{DTS bandwidth}$ .
- Set the RBW = 100 kHz.
- Set the VBW  $\geq [3 \times \text{RBW}]$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

Test results:

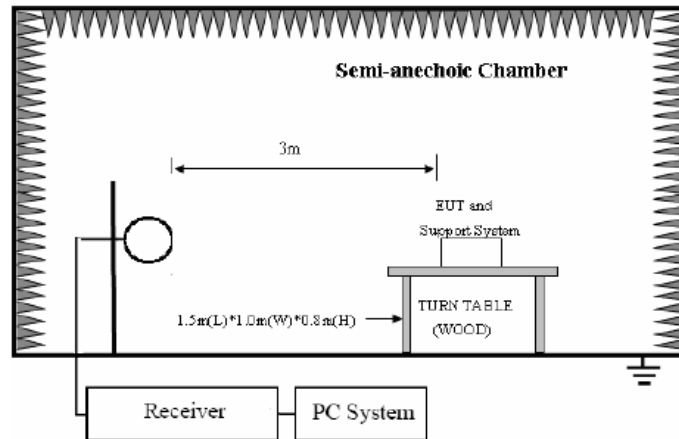




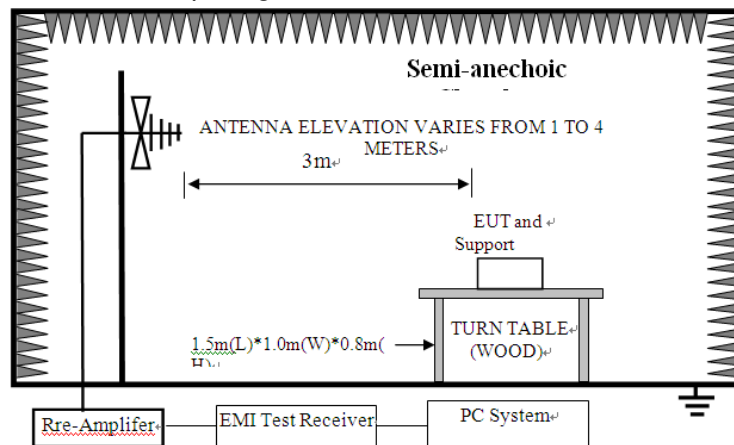
## 4.8 Spurious Radiated emission

### Test setup:

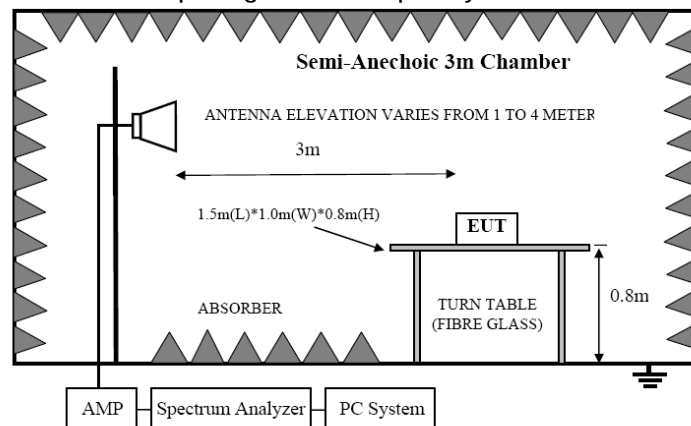
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

## Limit

## FCC 15.205 Restricted frequency band

| MHz                        | MHz                   | MHz             | 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 - 156.52525 | 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              |                       |                 |                  |

## FCC 15.209 Limit.

| Frequency (MHz) | DISTANCE<br>Meters | FIELD STRENGTHS LIMIT                           |          |
|-----------------|--------------------|-------------------------------------------------|----------|
|                 |                    | uV/m                                            | dB(uV)/m |
| 0.009 ~ 0.490   | 300                | 2400/F(KHz) 67.6                                | 20log(F) |
| 0.490 ~ 1.705   | 30                 | 24000/F(KHz) 87.6                               | 20log(F) |
| 1.705 ~ 30.0    | 30                 | 30                                              | 29.54    |
| 30 ~ 88         | 3                  | 100                                             | 40.0     |
| 88 ~ 216        | 3                  | 150                                             | 43.5     |
| 216 ~ 960       | 3                  | 200                                             | 46.0     |
| 960 ~ 1000      | 3                  | 500                                             | 54.0     |
| Above 1000      | 3                  | 74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) |          |

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPRQP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3m}(\text{dBuV/m}) = \text{Limit}_{30m}(\text{dBuV/m}) + 40\text{Log}(30m/3m)$$

#### Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

#### Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.3 and 8.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

| Test frequency range | Test antenna used                      |
|----------------------|----------------------------------------|
| 9KHz-30MHz           | Active Loop antenna                    |
| 30MHz-1GHz           | Trilog Broadband Antenna               |
| 1GHz-18GHz           | Double Ridged Horn Antenna(1GHz-18GHz) |
| 18GHz-40GHz          | Horn Antenna(18GHz-40GHz)              |

According ANSI C63.10:2009 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. For measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

- (4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 25GHz:
  - (a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m (Except loop antenna, it's fixed 1m above ground.)
  - (b) Change work frequency or channel of device if practicable.
  - (c) Change modulation type of device if practicable.
  - (d) Change power supply range from 85% to 115% of the rated supply voltage
  - (e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions. Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18GHz to 25GHz, so below final test was performed with frequency range from 9KHz to 18GHz.

(5) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 on Radiated Emission test.

(6) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz, 110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(7) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

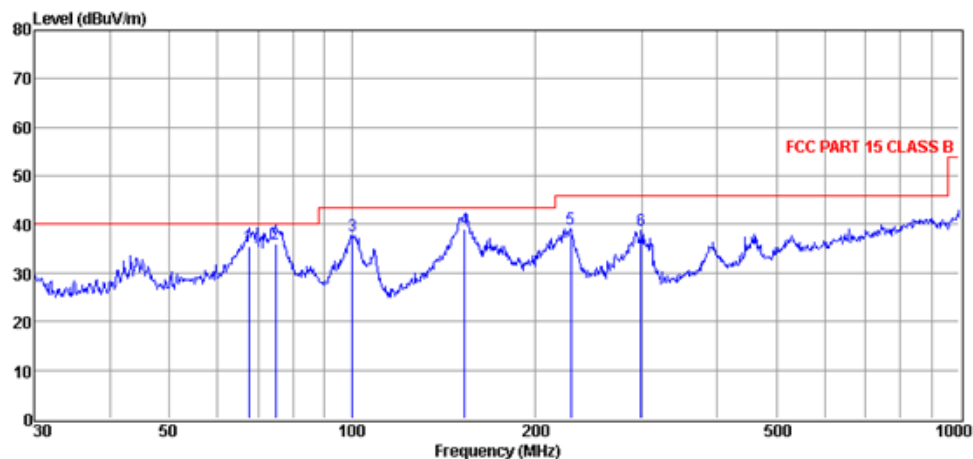
| Frequency Band | RBW    |
|----------------|--------|
| 9KHz-150KHz    | 200Hz  |
| 150KHz-30MHz   | 9KHz   |
| 30MHz-1GHz     | 120KHz |

(8) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure (according to ANSI C63.10:2009 clause 4.2.3.2.3 procedure for average measure). Both PK and AV level test, PK detector is used.

### Test result:

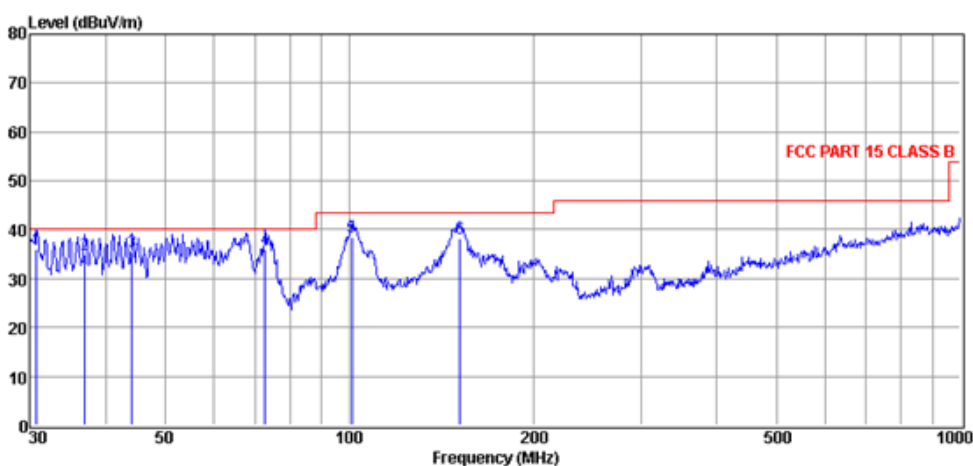
Pre-scan all test modes, found worst case at 2480MHz, and so only show the test result of 2480MHz,  
Below 1G:

Horizontal:



| Item<br>(Mark) | Freq<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | PRM<br>Factor<br>dB | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polarization |
|----------------|---------------|-------------------------|-----------------------------|---------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|--------------|
| 1              | 67.68         | 24.25                   | 10.48                       | 0.00                | 0.67                | 35.40                       | 40.00                     | -4.60                 | QP       | HORIZONTAL   |
| 2              | 74.92         | 25.92                   | 9.21                        | 0.00                | 0.77                | 35.90                       | 40.00                     | -4.10                 | QP       | HORIZONTAL   |
| 3              | 100.23        | 27.62                   | 9.28                        | 0.00                | 0.84                | 37.74                       | 43.50                     | -5.76                 | Peak     | HORIZONTAL   |
| 4              | 153.20        | 29.46                   | 8.43                        | 0.00                | 1.25                | 39.14                       | 43.50                     | -4.36                 | QP       | HORIZONTAL   |
| 5              | 229.29        | 25.73                   | 11.77                       | 0.00                | 1.67                | 39.17                       | 46.00                     | -6.83                 | Peak     | HORIZONTAL   |
| 6              | 299.32        | 22.59                   | 14.07                       | 0.00                | 2.09                | 38.75                       | 46.00                     | -7.25                 | Peak     | HORIZONTAL   |

Vertical:



| Item<br>(Mark) | Freq<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | PRM<br>Factor<br>dB | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polarization |
|----------------|---------------|-------------------------|-----------------------------|---------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|--------------|
| 1              | 30.75         | 24.91                   | 10.69                       | 0.00                | 0.48                | 36.08                       | 40.00                     | -3.92                 | QP       | VERTICAL     |
| 2              | 36.90         | 22.42                   | 11.98                       | 0.00                | 0.61                | 35.01                       | 40.00                     | -4.99                 | QP       | VERTICAL     |
| 3              | 44.12         | 17.97                   | 16.84                       | 0.00                | 0.68                | 35.49                       | 40.00                     | -4.51                 | QP       | VERTICAL     |
| 4              | 72.85         | 25.91                   | 9.37                        | 0.00                | 0.72                | 36.00                       | 40.00                     | -4.00                 | QP       | VERTICAL     |
| 5              | 100.93        | 28.43                   | 9.18                        | 0.00                | 0.83                | 38.44                       | 43.50                     | -5.06                 | QP       | VERTICAL     |
| 6              | 151.60        | 29.35                   | 7.66                        | 0.00                | 1.25                | 38.26                       | 43.50                     | -5.24                 | QP       | VERTICAL     |

Above 1G:

BLE\_1M  
2402MHz:

| Item<br>(Mark) | Freq<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | PRM<br>Factor<br>dB | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polari<br>zation |
|----------------|---------------|-------------------------|-----------------------------|---------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|------------------|
| 1              | 2310          | 54.15                   | 27.34                       | 53.97               | 4.35                | 31.87                       | 54.00                     | -22.13                | Average  | H                |
| 2              | 2310          | 64.26                   | 27.34                       | 53.97               | 4.35                | 41.98                       | 74.00                     | -32.02                | Peak     | H                |
| 3              | 4825          | 51.86                   | 32.43                       | 53.30               | 5.00                | 35.99                       | 54.00                     | -18.01                | Average  | H                |
| 4              | 4825          | 62.65                   | 32.43                       | 53.30               | 5.00                | 46.78                       | 74.00                     | -27.22                | Peak     | H                |
| 5              | 2310          | 48.69                   | 27.34                       | 53.97               | 4.35                | 26.41                       | 54.00                     | -27.59                | Average  | V                |
| 6              | 2310          | 59.72                   | 27.34                       | 53.97               | 4.35                | 37.44                       | 74.00                     | -36.56                | Peak     | V                |
| 7              | 4842          | 47.87                   | 32.47                       | 53.30               | 5.00                | 32.04                       | 54.00                     | -21.96                | Average  | V                |
| 8              | 4842          | 58.03                   | 32.47                       | 53.30               | 5.00                | 42.20                       | 74.00                     | -31.80                | Peak     | V                |

2440MHz:

| Item<br>(Mark) | Freq<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | PRM<br>Factor<br>dB | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polari<br>zation |
|----------------|---------------|-------------------------|-----------------------------|---------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|------------------|
| 1              | 4842          | 48.17                   | 32.47                       | 53.30               | 5.00                | 32.34                       | 54.00                     | -21.66                | Average  | H                |
| 2              | 4842          | 58.10                   | 32.47                       | 53.30               | 5.00                | 42.27                       | 74.00                     | -31.73                | Peak     | H                |
| 3              | 4859          | 47.17                   | 32.52                       | 53.29               | 5.00                | 31.40                       | 54.00                     | -22.60                | Average  | V                |
| 4              | 4859          | 57.56                   | 32.52                       | 53.29               | 5.00                | 41.79                       | 74.00                     | -32.21                | Peak     | V                |

2480MHz:

| Item<br>(Mark) | Freq<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | PRM<br>Factor<br>dB | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polari<br>zation |
|----------------|---------------|-------------------------|-----------------------------|---------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|------------------|
| 1              | 2496          | 52.53                   | 27.77                       | 53.95               | 4.55                | 30.90                       | 54.00                     | -23.10                | Average  | H                |
| 2              | 2496          | 63.11                   | 27.77                       | 53.95               | 4.55                | 41.48                       | 74.00                     | -32.52                | Peak     | H                |
| 3              | 4978          | 45.69                   | 32.82                       | 53.23               | 5.00                | 30.28                       | 54.00                     | -23.72                | Average  | H                |
| 4              | 4978          | 56.47                   | 32.82                       | 53.23               | 5.00                | 41.06                       | 74.00                     | -32.94                | Peak     | H                |
| 5              | 2496          | 50.70                   | 27.77                       | 53.95               | 4.55                | 29.07                       | 54.00                     | -24.93                | Average  | V                |
| 6              | 2496          | 60.25                   | 27.77                       | 53.95               | 4.55                | 38.62                       | 74.00                     | -35.38                | Peak     | V                |
| 7              | 4944          | 47.25                   | 32.74                       | 53.25               | 5.00                | 31.74                       | 54.00                     | -22.26                | Average  | V                |
| 8              | 4944          | 57.73                   | 32.74                       | 53.25               | 5.00                | 42.22                       | 74.00                     | -31.78                | Peak     | V                |

## 5 Test Setup Photo

Refer to <Setup Photos>

## 6 Test Setup of EUT

Refer to <External Photos and Internal Photos>

-----End of test report-----