

# FCC Test Report

**FCC ID** : 2AQYEFMP176  
**Equipment** : Mobile Phone  
**Model No.** : F-51A  
**Brand Name** : FUJITSU  
**Applicant** : FUJITSU CONNECTED TECHNOLOGIES Ltd.  
**Address** : Chuorinkan 7-10-1 Yamato, Kanagawa  
242-0007, Japan.  
**Standard** : 47 CFR FCC Part 15.247  
**Received Date** : Mar. 06, 2020  
**Tested Date** : Mar. 12 ~ Apr. 29, 2020

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



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## Table of Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>GENERAL DESCRIPTION .....</b>                            | <b>5</b>  |
| 1.1      | Information.....  | 5         |
| 1.2      | Local Support Equipment List .....                          | 7         |
| 1.3      | Test Setup Chart .....                                      | 7         |
| 1.4      | Test Equipment List and Calibration Data.....               | 8         |
| 1.5      | Test Standards .....  | 9         |
| 1.6      | Deviation from Test Standard and Measurement Procedure..... | 9         |
| 1.7      | Measurement Uncertainty .....                               | 9         |
| <b>2</b> | <b>TEST CONFIGURATION .....</b>                             | <b>10</b> |
| 2.1      | Testing Condition .....                                     | 10        |
| 2.2      | The Worst Test Modes and Channel Details .....              | 10        |
| <b>3</b> | <b>TRANSMITTER TEST RESULTS.....</b>                        | <b>11</b> |
| 3.1      | Conducted Emissions.....                                    | 11        |
| 3.2      | 6dB and Occupied Bandwidth .....                            | 14        |
| 3.3      | RF Output Power.....  | 20        |
| 3.4      | Power Spectral Density .....                                | 23        |
| 3.5      | Emissions in Restricted Frequency Bands.....                | 29        |
| 3.6      | Emissions in non-restricted Frequency Bands.....            | 39        |
| <b>4</b> | <b>TEST LABORATORY INFORMATION .....</b>                    | <b>44</b> |

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## Release Record

| Report No. | Version | Description   | Issued Date  |
|------------|---------|---------------|--------------|
| FR011605AE | Rev. 01 | Initial issue | May 18, 2020 |

## Summary of Test Results

| FCC Rules           | Test Items                        | Measured   | Result |
|---------------------|-----------------------------------|--|--------|
| 15.207              | AC Power Line Conducted Emissions | [dBuV]: 0.502MHz<br>29.29 (Margin -16.71dB) - AV         | Pass   |
| 15.247(d)<br>15.209 | Radiated Emissions                | [dBuV/m at 3m]: 70.85MHz<br>29.64 (Margin -10.36dB) - PK | Pass   |
| 15.247(b)(3)        | Maximum Output Power              | Power [dBm]: 3.36  | Pass   |
| 15.247(a)(2)        | 6dB Bandwidth                     | Meet the requirement of limit                            | Pass   |
| 15.247(e)           | Power Spectral Density            | Meet the requirement of limit                            | Pass   |
| 15.203              | Antenna Requirement               | Meet the requirement of limit                            | Pass   |

### Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

### Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

# 1 General Description

## 1.1 Information

### 1.1.1 Product Details

|                     |                                   |
|---------------------|-----------------------------------|
| <b>Product Name</b> | Mobile Phone                      |
| <b>Brand Name</b>   | FUJITSU                           |
| <b>Model Name</b>   | F-51A                             |
| <b>IMEI Code</b>    | 353704110013257 / 353704110013364 |
| <b>H/W Version</b>  | v2.1.0                            |
| <b>S/W Version</b>  | R047.4                            |

### 1.1.2 Specification of the Equipment under Test (EUT)

| RF General Information |                |                 |                |           |
|------------------------|----------------|-----------------|----------------|-----------|
| Frequency Range (MHz)  | Bluetooth Mode | Ch. Freq. (MHz) | Channel Number | Data Rate |
| 2400-2483.5            | V5.1 LE        | 2402-2480       | 0-39 [40]      | 125 kbps  |
|                        |                |                 |                | 500 kbps  |
|                        |                |                 |                | 1 Mbps    |
| 2400-2483.5            | V5.1 LE        | 2402-2480       | 0-39 [40]      | 2 Mbps    |

Note 1: Bluetooth LE (Low energy) uses GFSK modulation.

### 1.1.3 Antenna Details

| Ant. No. | Type     | Connector | Gain (dBi) | Remarks |
|----------|----------|-----------|------------|---------|
| 1        | Monopole | No        | -6.0       | ---     |

### 1.1.4 Power Supply Type of Equipment under Test (EUT)

|                       |   |
|-----------------------|---|
| <b>Supply Voltage</b> | 3.83Vdc from battery:<br>9Vdc, 1.5A from adapter (No bundle, support unit only) |
|-----------------------|---|

### 1.1.5 Accessories

| Accessories |                     |   |
|-------------|---------------------|---|
| No.         | Equipment           | Description   |
| 1           | Battery             | Brand: FUJITSU CONNECTED TECHNOLOGIES LIMITED<br>Model: CA54310-0079-A1<br>Rated: 4000mAh, 15.4Wh<br>Typ. 4070mAh, 15.6Wh |
| 2           | Type-C <-> Earphone | 9.5cm non-shielded without core   |

### 1.1.6 Channel List

| Frequency band (MHz) |                 |         |                 | 2400~2483.5 |                 |         |                 |
|----------------------|-----------------|---------|-----------------|-------------|-----------------|---------|-----------------|
| Channel              | Frequency (MHz) | Channel | Frequency (MHz) | Channel     | Frequency (MHz) | Channel | Frequency (MHz) |
| 37                   | 2402            | 9       | 2422            | 18          | 2442            | 28      | 2462            |
| 0                    | 2404            | 10      | 2424            | 19          | 2444            | 29      | 2464            |
| 1                    | 2406            | 38      | 2426            | 20          | 2446            | 30      | 2466            |
| 2                    | 2408            | 11      | 2428            | 21          | 2448            | 31      | 2468            |
| 3                    | 2410            | 12      | 2430            | 22          | 2450            | 32      | 2470            |
| 4                    | 2412            | 13      | 2432            | 23          | 2452            | 33      | 2472            |
| 5                    | 2414            | 14      | 2434            | 24          | 2454            | 34      | 2474            |
| 6                    | 2416            | 15      | 2436            | 25          | 2456            | 35      | 2476            |
| 7                    | 2418            | 16      | 2438            | 26          | 2458            | 36      | 2478            |
| 8                    | 2420            | 17      | 2440            | 27          | 2460            | 39      | 2480            |

### 1.1.7 Test Tool and Duty Cycle

| Test Tool       | QDART, V00071                 |                  |
|-----------------|-------------------------------|------------------|
| Modulation Mode | Duty Cycle Of Test Signal (%) | Duty Factor (dB) |
| GFSK-125kbps    | 84.09%                        | 0.75             |
| GFSK-500kbps    | 57.82%                        | 2.38             |
| GFSK-1Mbps      | 65.68%                        | 1.83             |
| GFSK-2Mbps      | 34.81%                        | 4.58             |

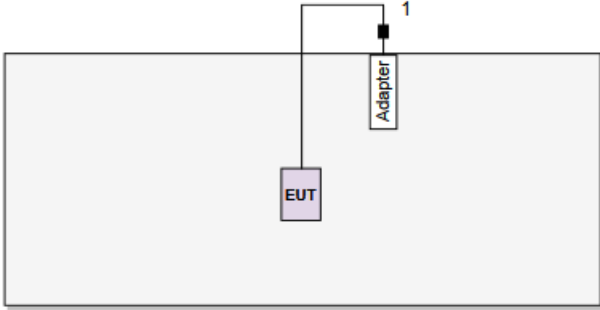
### 1.1.8 Power Index of Test Tool

| Modulation Mode | Test Frequency (MHz) |         |         |
|-----------------|----------------------|---------|---------|
|                 | 2402                 | 2440    | 2480    |
| GFSK/125kbps    | Default              | Default | Default |
| GFSK/500kbps    | Default              | Default | Default |
| GFSK/1Mbps      | Default              | Default | Default |
| GFSK/2Mbps      | Default              | Default | Default |

## 1.2 Local Support Equipment List

| Support Equipment List |            |            |                |         |                        |
|------------------------|------------|------------|----------------|---------|------------------------|
| No.                    | Equipment  | Brand      | Model          | S/N     | Remarks                |
| 1                      | AC Adapter | NTT docomo | AC Adapter 06  | ---     | Provided by applicant. |
| 2                      | Notebook   | DELL       | Latitude E5470 | 7BMHVF2 | ---                    |

## 1.3 Test Setup Chart

| Test Setup Diagram  |                                       |
|---|---------------------------------------|
|  |                                       |
| No.   | Signal cable / Length (m)             |
| 1   | USB, 1.2m non-shielded with one core. |

Note: The support notebook is disconnected from EUT and removed from test table after sending command to EUT to control EUT to transmit continuously.

## 1.4 Test Equipment List and Calibration Data

| Test Item            | Conducted Emission            |           |               |                  |                   |
|----------------------|-------------------------------|-----------|---------------|------------------|-------------------|
| Test Site            | Conduction room 1 / (CO01-WS) |           |               |                  |                   |
| Instrument           | Manufacturer                  | Model No. | Serial No.    | Calibration Date | Calibration Until |
| Receiver             | R&S                           | ESR3      | 101658        | Dec. 12, 2019    | Dec. 11, 2020     |
| LISN                 | R&S                           | ENV216    | 101579        | Mar. 12, 2020    | Mar. 11, 2021     |
| RF Cable-CON         | Woken                         | CFD200-NL | CFD200-NL-001 | Oct. 22, 2019    | Oct. 21, 2020     |
| Measurement Software | AUDIX                         | e3        | 6.120210k     | NA               | NA                |

Note: Calibration Interval of instruments listed above is one year.

| Test Item            | Radiated Emission          |                      |                  |                  |                   |
|----------------------|----------------------------|----------------------|------------------|------------------|-------------------|
| Test Site            | 966 chamber1 / (03CH01-WS) |                      |                  |                  |                   |
| Instrument           | Manufacturer               | Model No.            | Serial No.       | Calibration Date | Calibration Until |
| Spectrum Analyzer    | R&S                        | FSV40                | 101498           | Dec. 17, 2019    | Dec. 16, 2020     |
| Receiver             | R&S                        | ESR3                 | 101657           | Feb. 14, 2020    | Feb. 13, 2021     |
| Bilog Antenna        | SCHWARZBECK                | VULB9168             | VULB9168-522     | Jul. 12, 2019    | Jul. 11, 2020     |
| Horn Antenna 1G-18G  | SCHWARZBECK                | BBHA 9120 D          | BBHA 9120 D 1096 | Dec. 12, 2019    | Dec. 11, 2020     |
| Horn Antenna 18G-40G | SCHWARZBECK                | BBHA 9170            | BBHA 9170517     | Nov. 15, 2019    | Nov. 14, 2020     |
| Loop Antenna         | R&S                        | HFH2-Z2              | 100330           | Nov. 13, 2019    | Nov. 12, 2020     |
| Loop Antenna Cable   | KOAX KABEL                 | 101354-BW            | 101354-BW        | Oct. 07, 2019    | Oct. 06, 2020     |
| Preamplifier         | EMC                        | EMC02325             | 980225           | Jul. 09, 2019    | Jul. 08, 2020     |
| Preamplifier         | Agilent                    | 83017A               | MY39501308       | Oct. 08, 2019    | Oct. 07, 2020     |
| Preamplifier         | EMC                        | EMC184045B           | 980192           | Aug. 01, 2019    | Jul. 31, 2020     |
| RF Cable             | EMC                        | EMC104-SM-SM-8000    | 181106           | Oct. 07, 2019    | Oct. 06, 2020     |
| RF Cable             | HUBER+SUHNER               | SUCOFLEX104          | MY16019/4        | Oct. 07, 2019    | Oct. 06, 2020     |
| RF Cable             | HUBER+SUHNER               | SUCOFLEX104          | MY16014/4        | Oct. 07, 2019    | Oct. 06, 2020     |
| LF cable 1M          | EMC                        | EMCCFD400-NM-NM-1000 | 160502           | Oct. 07, 2019    | Oct. 06, 2020     |
| LF cable 3M          | Woken                      | CFD400NL-LW          | CFD400NL-001     | Oct. 07, 2019    | Oct. 06, 2020     |
| LF cable 10M         | Woken                      | CFD400NL-LW          | CFD400NL-002     | Oct. 07, 2019    | Oct. 06, 2020     |
| Measurement Software | AUDIX                      | e3                   | 6.120210g        | NA               | NA                |

Note: Calibration Interval of instruments listed above is one year.



|   |                     |                  |                   |                         |                          |
|---|---------------------|------------------|-------------------|-------------------------|--------------------------|
| <b>Test Item</b>  | RF Conducted        |                  |                   |                         |                          |
| <b>Test Site</b>  | (TH01-WS)           |                  |                   |                         |                          |
| <b>Instrument</b>   | <b>Manufacturer</b> | <b>Model No.</b> | <b>Serial No.</b> | <b>Calibration Date</b> | <b>Calibration Until</b> |
| Spectrum Analyzer   | R&S                 | FSV40            | 101499            | Jan. 09, 2020           | Jan. 08, 2021            |
| Power Meter   | Anritsu             | ML2495A          | 1241002           | Oct. 23, 2019           | Oct. 22, 2020            |
| Power Sensor  | Anritsu             | MA2411B          | 1207366           | Oct. 23, 2019           | Oct. 22, 2020            |
| AC POWER SOURCE   | APC                 | AFC-500W         | F312060012        | Dec. 02, 2019           | Dec. 01, 2020            |
| Measurement Software  | --                  | SENSE-15247_FS   | V5.10.1           | NA                      | NA                       |
| Note: Calibration Interval of instruments listed above is one year. |                     |                  |                   |                         |                          |

## 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

## 1.6 Deviation from Test Standard and Measurement Procedure

None

## 1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

| Measurement Uncertainty  |             |
|--------------------------|-------------|
| Parameters               | Uncertainty |
| Bandwidth                | ±34.130 Hz  |
| Conducted power          | ±0.808 dB   |
| Power density            | ±0.583 dB   |
| Conducted emission       | ±2.715 dB   |
| AC conducted emission    | ±2.92 dB    |
| Radiated emission ≤ 1GHz | ±3.41 dB    |
| Radiated emission > 1GHz | ±4.59 dB    |

## 2 Test Configuration

### 2.1 Testing Condition

| Test Item          | Test Site | Ambient Condition | Tested By              |
|--------------------|-----------|-------------------|------------------------|
| AC Conduction      | CO01-WS   | 23°C / 58%        | Alex Tsai              |
| Radiated Emissions | 03CH01-WS | 20-23°C / 65-69%  | Roger Lu<br>Akun Chung |
| RF Conducted       | TH01-WS   | 24°C / 68%        | Aska Huang             |

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

### 2.2 The Worst Test Modes and Channel Details

| Test item   | Mode  | Test Frequency (MHz) | Data Rate                            | Test Configuration |
|---|-------|----------------------|--------------------------------------|--------------------|
| AC Power Line Conducted Emissions<br>Radiated Emissions $\leq$ 1GHz | BT LE | 2402                 | 1Mbps                                | ---                |
| Maximum Output Power<br>6dB bandwidth<br>Power spectral density     | BT LE | 2402, 2440, 2480     | 125kbps<br>500kbps<br>1Mbps<br>2Mbps | ---                |
| Radiated Emissions > 1GHz   | BT LE | 2402, 2440, 2480     | 1Mbps                                | ---                |

**NOTE:**

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

## 3 Transmitter Test Results

### 3.1 Conducted Emissions

#### 3.1.1 Limit of Conducted Emissions

| Conducted Emissions Limit |            |           |
|---------------------------|------------|-----------|
| Frequency Emission (MHz)  | Quasi-Peak | Average   |
| 0.15-0.5                  | 66 - 56 *  | 56 - 46 * |
| 0.5-5                     | 56         | 46        |
| 5-30                      | 60         | 50        |

Note 1: \* Decreases with the logarithm of the frequency.

#### 3.1.2 Test Procedures

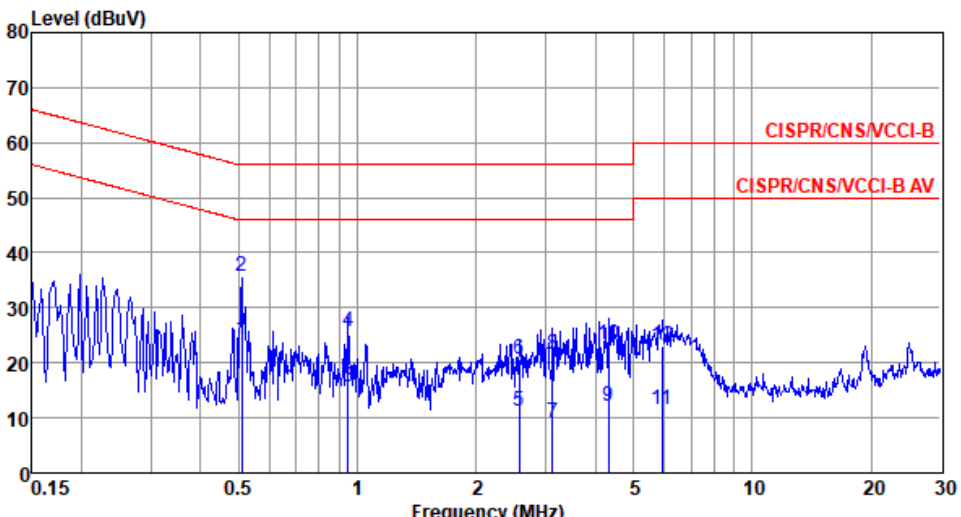
1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

#### 3.1.3 Test Setup

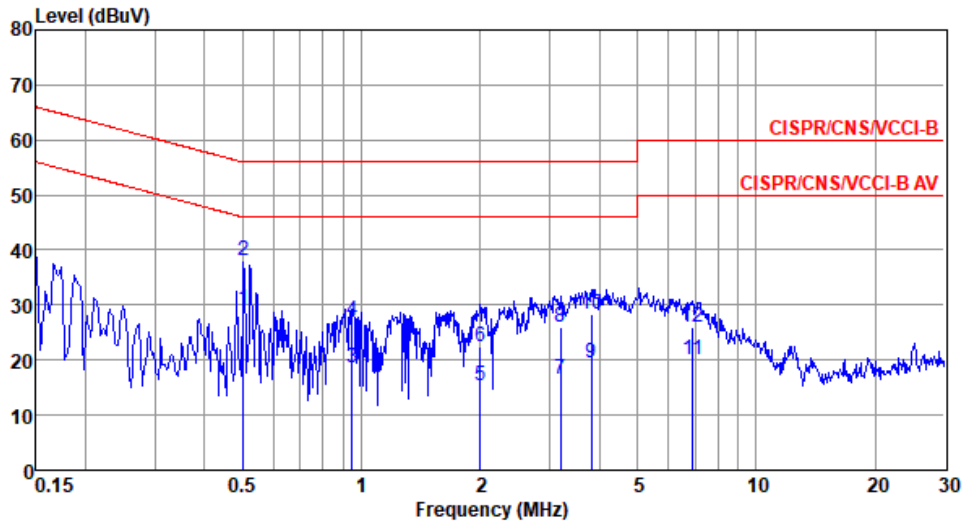


- Note: 1. Support units were connected to second LISN.  
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.4 Test Result of Conducted Emissions

| Modulation Mode   | BT LE-1Mbps | Test Freq. (MHz) | 2402                  |                     |                       |                      |                       |                     |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
|---|-------------|------------------|-----------------------|---------------------|-----------------------|----------------------|-----------------------|---------------------|-----------------------|----------------------|---------------------|--------|---|-------|-------|-------|--------|-------|------|------|---------|----|-------|-------|-------|--------|-------|------|------|----|---|-------|-------|-------|--------|------|------|------|---------|---|-------|-------|-------|--------|-------|------|------|----|---|-------|-------|-------|--------|------|------|------|---------|---|-------|-------|-------|--------|-------|------|------|----|---|-------|------|-------|--------|-------|------|------|---------|---|-------|-------|-------|--------|-------|------|------|----|---|-------|-------|-------|--------|------|------|------|---------|----|-------|-------|-------|--------|-------|------|------|----|----|-------|-------|-------|--------|------|------|------|---------|----|-------|-------|-------|--------|-------|------|------|----|
| Power Phase   | Line        |                  |                       |                     |                       |                      |                       |                     |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
|    |             |                  |                       |                     |                       |                      |                       |                     |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| <table border="1"> <thead> <tr> <th></th> <th>Freq<br/>MHz</th> <th>Level<br/>dBuV</th> <th>Limit<br/>Line<br/>dBuV</th> <th>Over<br/>Limit<br/>dB</th> <th>Read<br/>Level<br/>dBuV</th> <th>LISN<br/>factor<br/>dB</th> <th>cable<br/>loss<br/>dB</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.510</td> <td>24.20</td> <td>46.00</td> <td>-21.80</td> <td>14.21</td> <td>9.63</td> <td>0.09</td> <td>Average</td> </tr> <tr> <td>2*</td> <td>0.510</td> <td>35.58</td> <td>56.00</td> <td>-20.42</td> <td>25.59</td> <td>9.63</td> <td>0.09</td> <td>QP</td> </tr> <tr> <td>3</td> <td>0.948</td> <td>15.67</td> <td>46.00</td> <td>-30.33</td> <td>5.60</td> <td>9.63</td> <td>0.12</td> <td>Average</td> </tr> <tr> <td>4</td> <td>0.948</td> <td>25.66</td> <td>56.00</td> <td>-30.34</td> <td>15.59</td> <td>9.63</td> <td>0.12</td> <td>QP</td> </tr> <tr> <td>5</td> <td>2.567</td> <td>11.33</td> <td>46.00</td> <td>-34.67</td> <td>1.12</td> <td>9.64</td> <td>0.22</td> <td>Average</td> </tr> <tr> <td>6</td> <td>2.567</td> <td>20.71</td> <td>56.00</td> <td>-35.29</td> <td>10.50</td> <td>9.64</td> <td>0.22</td> <td>QP</td> </tr> <tr> <td>7</td> <td>3.123</td> <td>9.22</td> <td>46.00</td> <td>-36.78</td> <td>-1.04</td> <td>9.65</td> <td>0.25</td> <td>Average</td> </tr> <tr> <td>8</td> <td>3.123</td> <td>21.59</td> <td>56.00</td> <td>-34.41</td> <td>11.33</td> <td>9.65</td> <td>0.25</td> <td>QP</td> </tr> <tr> <td>9</td> <td>4.315</td> <td>12.04</td> <td>46.00</td> <td>-33.96</td> <td>1.72</td> <td>9.65</td> <td>0.30</td> <td>Average</td> </tr> <tr> <td>10</td> <td>4.315</td> <td>23.37</td> <td>56.00</td> <td>-32.63</td> <td>13.05</td> <td>9.65</td> <td>0.30</td> <td>QP</td> </tr> <tr> <td>11</td> <td>5.898</td> <td>11.61</td> <td>50.00</td> <td>-38.39</td> <td>1.23</td> <td>9.67</td> <td>0.33</td> <td>Average</td> </tr> <tr> <td>12</td> <td>5.898</td> <td>23.11</td> <td>60.00</td> <td>-36.89</td> <td>12.73</td> <td>9.67</td> <td>0.33</td> <td>QP</td> </tr> </tbody> </table> |             |                  |                       |                     | Freq<br>MHz           | Level<br>dBuV        | Limit<br>Line<br>dBuV | Over<br>Limit<br>dB | Read<br>Level<br>dBuV | LISN<br>factor<br>dB | cable<br>loss<br>dB | Remark | 1 | 0.510 | 24.20 | 46.00 | -21.80 | 14.21 | 9.63 | 0.09 | Average | 2* | 0.510 | 35.58 | 56.00 | -20.42 | 25.59 | 9.63 | 0.09 | QP | 3 | 0.948 | 15.67 | 46.00 | -30.33 | 5.60 | 9.63 | 0.12 | Average | 4 | 0.948 | 25.66 | 56.00 | -30.34 | 15.59 | 9.63 | 0.12 | QP | 5 | 2.567 | 11.33 | 46.00 | -34.67 | 1.12 | 9.64 | 0.22 | Average | 6 | 2.567 | 20.71 | 56.00 | -35.29 | 10.50 | 9.64 | 0.22 | QP | 7 | 3.123 | 9.22 | 46.00 | -36.78 | -1.04 | 9.65 | 0.25 | Average | 8 | 3.123 | 21.59 | 56.00 | -34.41 | 11.33 | 9.65 | 0.25 | QP | 9 | 4.315 | 12.04 | 46.00 | -33.96 | 1.72 | 9.65 | 0.30 | Average | 10 | 4.315 | 23.37 | 56.00 | -32.63 | 13.05 | 9.65 | 0.30 | QP | 11 | 5.898 | 11.61 | 50.00 | -38.39 | 1.23 | 9.67 | 0.33 | Average | 12 | 5.898 | 23.11 | 60.00 | -36.89 | 12.73 | 9.67 | 0.33 | QP |
|   | Freq<br>MHz | Level<br>dBuV    | Limit<br>Line<br>dBuV | Over<br>Limit<br>dB | Read<br>Level<br>dBuV | LISN<br>factor<br>dB | cable<br>loss<br>dB   | Remark              |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 1   | 0.510       | 24.20            | 46.00                 | -21.80              | 14.21                 | 9.63                 | 0.09                  | Average             |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 2*  | 0.510       | 35.58            | 56.00                 | -20.42              | 25.59                 | 9.63                 | 0.09                  | QP                  |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 3   | 0.948       | 15.67            | 46.00                 | -30.33              | 5.60                  | 9.63                 | 0.12                  | Average             |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 4   | 0.948       | 25.66            | 56.00                 | -30.34              | 15.59                 | 9.63                 | 0.12                  | QP                  |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 5   | 2.567       | 11.33            | 46.00                 | -34.67              | 1.12                  | 9.64                 | 0.22                  | Average             |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 6   | 2.567       | 20.71            | 56.00                 | -35.29              | 10.50                 | 9.64                 | 0.22                  | QP                  |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 7   | 3.123       | 9.22             | 46.00                 | -36.78              | -1.04                 | 9.65                 | 0.25                  | Average             |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 8   | 3.123       | 21.59            | 56.00                 | -34.41              | 11.33                 | 9.65                 | 0.25                  | QP                  |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 9   | 4.315       | 12.04            | 46.00                 | -33.96              | 1.72                  | 9.65                 | 0.30                  | Average             |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 10  | 4.315       | 23.37            | 56.00                 | -32.63              | 13.05                 | 9.65                 | 0.30                  | QP                  |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 11  | 5.898       | 11.61            | 50.00                 | -38.39              | 1.23                  | 9.67                 | 0.33                  | Average             |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| 12  | 5.898       | 23.11            | 60.00                 | -36.89              | 12.73                 | 9.67                 | 0.33                  | QP                  |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |
| <p>Note 1: Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB).<br/>           2: Over Limit (dB) = Level (dBUV) – Limit Line (dBUV).</p>   |             |                  |                       |                     |                       |                      |                       |                     |                       |                      |                     |        |   |       |       |       |        |       |      |      |         |    |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |   |       |       |       |        |       |      |      |    |   |       |      |       |        |       |      |      |         |   |       |       |       |        |       |      |      |    |   |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |    |       |       |       |        |      |      |      |         |    |       |       |       |        |       |      |      |    |

|                        |             |                         |      |
|------------------------|-------------|-------------------------|------|
| <b>Modulation Mode</b> | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2402 |
| <b>Power Phase</b>     | Neutral     |                         |      |



|    | Freq<br>MHz | Level<br>dBuV | Limit<br>Line<br>dBuV | Over<br>Limit<br>dB | Read<br>Level<br>dBuV | LISN<br>factor<br>dB | cable<br>loss<br>dB | Remark  |
|----|-------------|---------------|-----------------------|---------------------|-----------------------|----------------------|---------------------|---------|
| 1* | 0.502       | 29.29         | 46.00                 | -16.71              | 19.37                 | 9.65                 | 0.09                | Average |
| 2  | 0.502       | 38.19         | 56.00                 | -17.81              | 28.27                 | 9.65                 | 0.09                | QP      |
| 3  | 0.948       | 18.62         | 46.00                 | -27.38              | 8.65                  | 9.65                 | 0.12                | Average |
| 4  | 0.948       | 27.12         | 56.00                 | -28.88              | 17.15                 | 9.65                 | 0.12                | QP      |
| 5  | 2.001       | 15.29         | 46.00                 | -30.71              | 5.19                  | 9.66                 | 0.18                | Average |
| 6  | 2.001       | 22.53         | 56.00                 | -33.47              | 12.43                 | 9.66                 | 0.18                | QP      |
| 7  | 3.190       | 16.66         | 46.00                 | -29.34              | 6.48                  | 9.67                 | 0.25                | Average |
| 8  | 3.190       | 26.10         | 56.00                 | -29.90              | 15.92                 | 9.67                 | 0.25                | QP      |
| 9  | 3.820       | 19.37         | 46.00                 | -26.63              | 9.16                  | 9.67                 | 0.28                | Average |
| 10 | 3.820       | 28.38         | 56.00                 | -27.62              | 18.17                 | 9.67                 | 0.28                | QP      |
| 11 | 6.914       | 20.06         | 50.00                 | -29.94              | 9.70                  | 9.71                 | 0.35                | Average |
| 12 | 6.914       | 26.01         | 60.00                 | -33.99              | 15.65                 | 9.71                 | 0.35                | QP      |

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).  
 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

## 3.2 6dB and Occupied Bandwidth

### 3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

### 3.2.2 Test Procedures

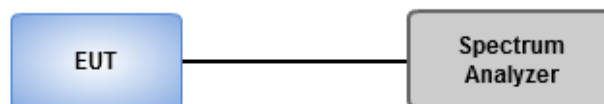
#### 6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

#### Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
2. Detector = Sample, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

### 3.2.3 Test Setup



### 3.2.4 Test Result of 6dB and Occupied Bandwidth

#### Summary

| Mode                | Max-N dB<br>(Hz) | Max-OBW<br>(Hz) | ITU-Code | Min-N dB<br>(Hz) | Min-OBW<br>(Hz) |
|---------------------|------------------|-----------------|----------|------------------|-----------------|
| 2.4-2.4835GHz       | -                | -               | -        | -                | -               |
| BT-LE0.125_Nss1_1TX | 655.797k         | 1.046M          | 1M05F1D  | 626.812k         | 1.045M          |
| BT-LE0.5_Nss1_1TX   | 666.667k         | 1.016M          | 1M02F1D  | 648.551k         | 1.014M          |
| BT-LE(1Mbps)        | 670.29k          | 1.021M          | 1M02F1D  | 663.043k         | 1.02M           |
| BT-LE(2Mbps)        | 1.159M           | 1.991M          | 1M99F1D  | 1.138M           | 1.99M           |

**Max-N dB** = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;  
**Min-N dB** = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

#### Result

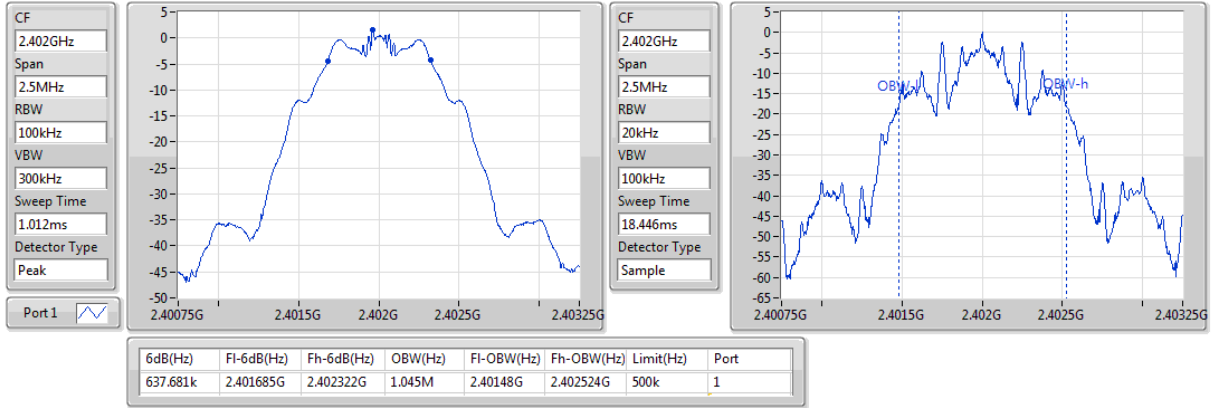
| Mode                | Result | Limit<br>(Hz) | Port 1-N dB<br>(Hz) | Port 1-OBW<br>(Hz) |
|---------------------|--------|---------------|---------------------|--------------------|
| BT-LE0.125_Nss1_1TX | -      | -             | -                   | -                  |
| 2402MHz             | Pass   | 500k          | 637.681k            | 1.045M             |
| 2440MHz             | Pass   | 500k          | 626.812k            | 1.045M             |
| 2480MHz             | Pass   | 500k          | 655.797k            | 1.046M             |
| BT-LE0.5_Nss1_1TX   | -      | -             | -                   | -                  |
| 2402MHz             | Pass   | 500k          | 648.551k            | 1.015M             |
| 2440MHz             | Pass   | 500k          | 655.797k            | 1.014M             |
| 2480MHz             | Pass   | 500k          | 666.667k            | 1.016M             |
| BT-LE(1Mbps)        | -      | -             | -                   | -                  |
| 2402MHz             | Pass   | 500k          | 670.29k             | 1.021M             |
| 2440MHz             | Pass   | 500k          | 663.043k            | 1.02M              |
| 2480MHz             | Pass   | 500k          | 663.043k            | 1.02M              |
| BT-LE(2Mbps)        | -      | -             | -                   | -                  |
| 2402MHz             | Pass   | 500k          | 1.159M              | 1.991M             |
| 2440MHz             | Pass   | 500k          | 1.138M              | 1.99M              |
| 2480MHz             | Pass   | 500k          | 1.152M              | 1.99M              |

**Port X-N dB** = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

### BT-LE0.125\_Nss1\_1TX

EBW

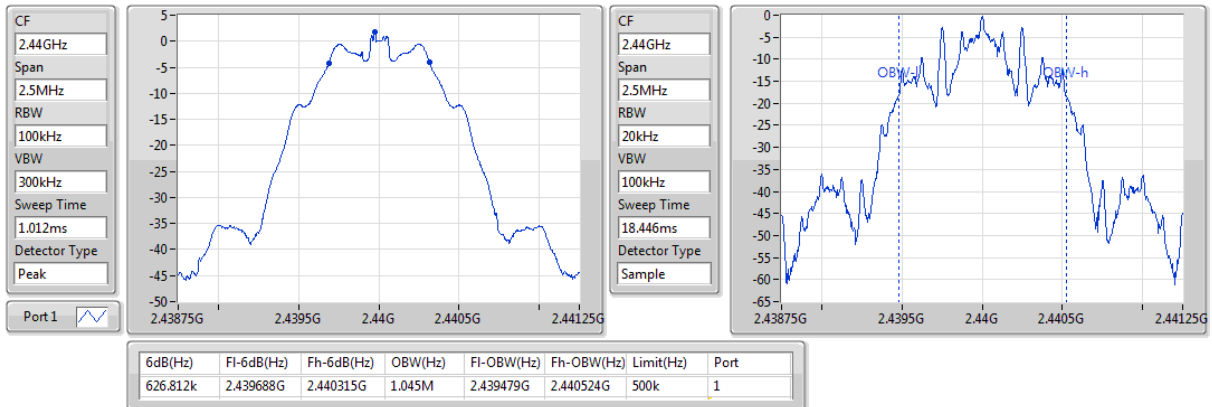
#### 2402MHz



### BT-LE0.125\_Nss1\_1TX

EBW

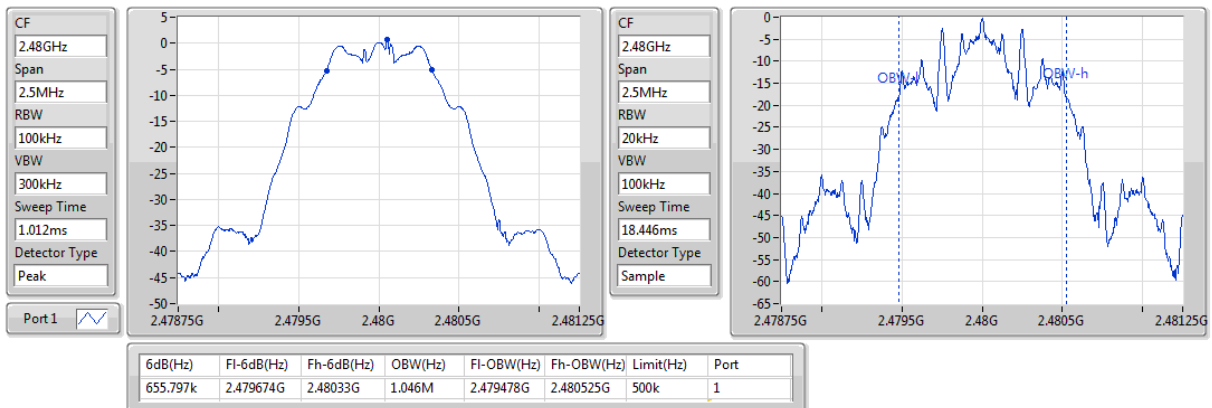
#### 2440MHz



### BT-LE0.125\_Nss1\_1TX

EBW

#### 2480MHz

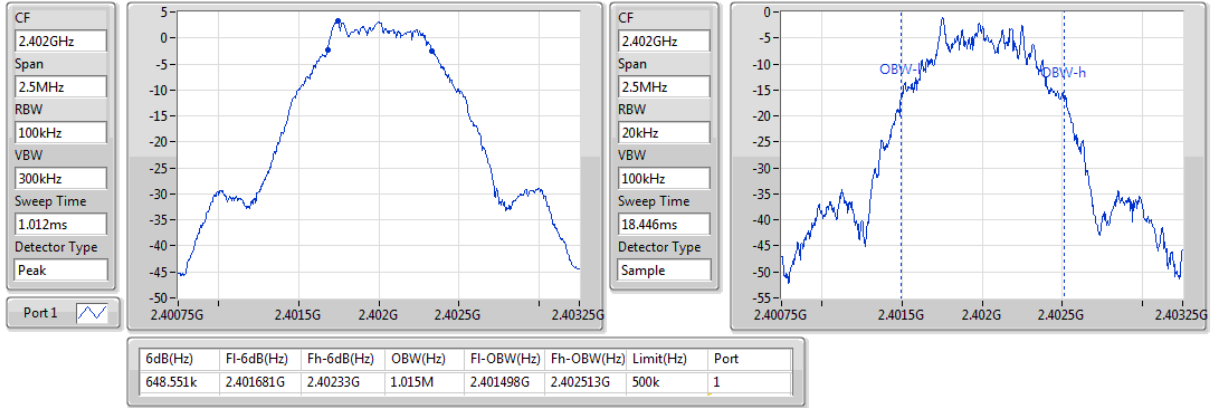




### BT-LE0.5\_Nss1\_1TX

EBW

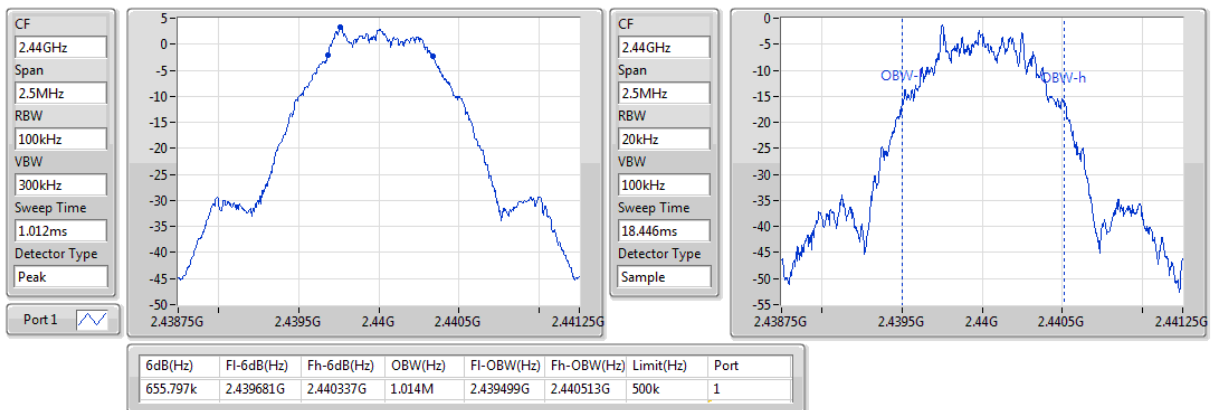
2402MHz



### BT-LE0.5\_Nss1\_1TX

EBW

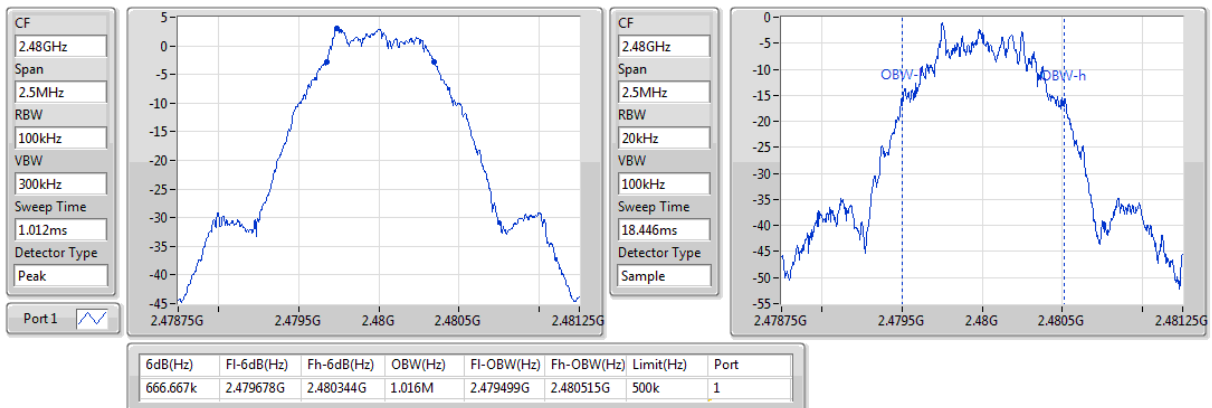
2440MHz



### BT-LE0.5\_Nss1\_1TX

EBW

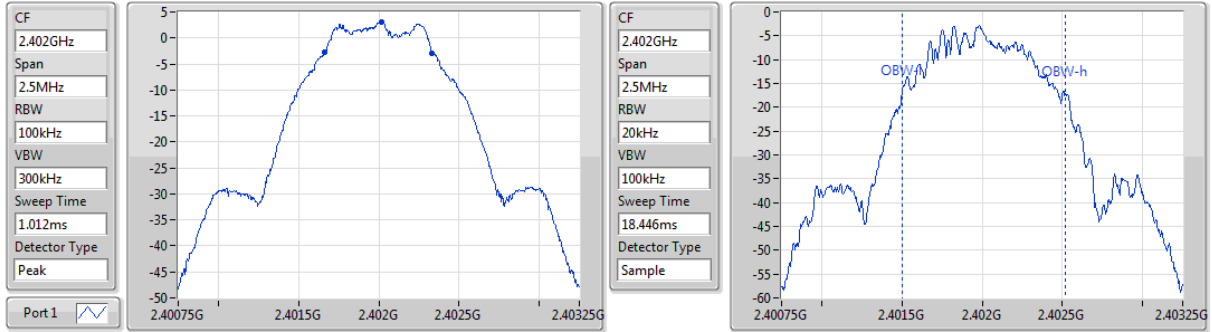
2480MHz



### BT-LE(1Mbps)

EBW

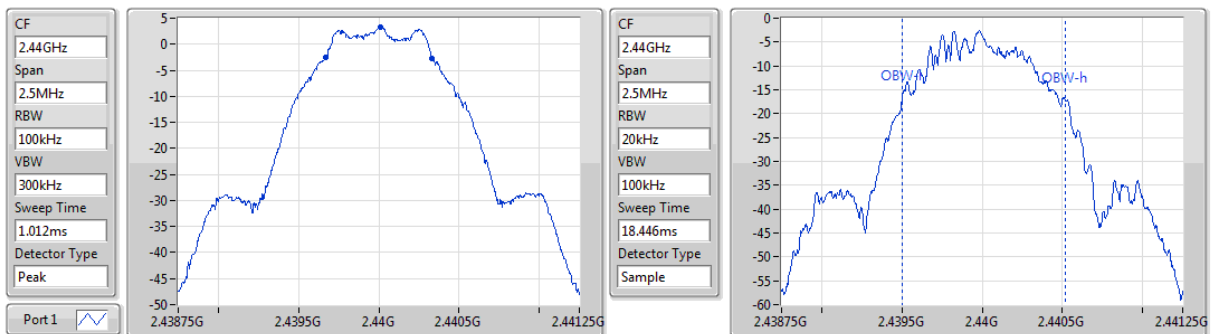
#### 2402MHz



### BT-LE(1Mbps)

EBW

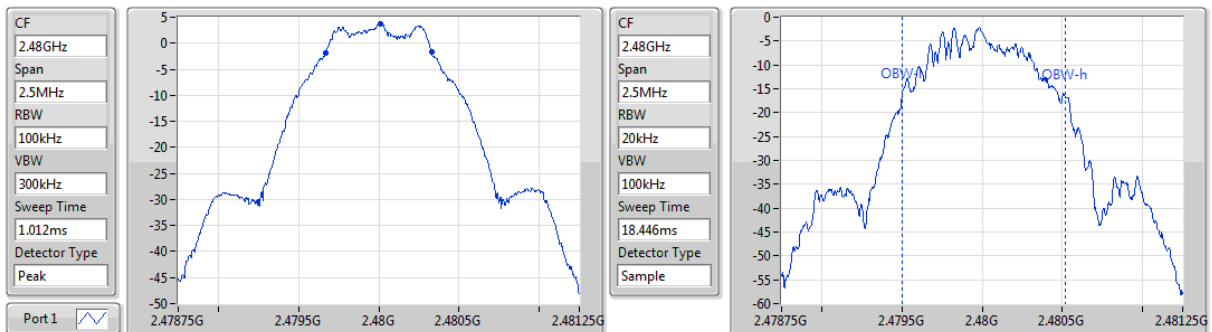
#### 2440MHz

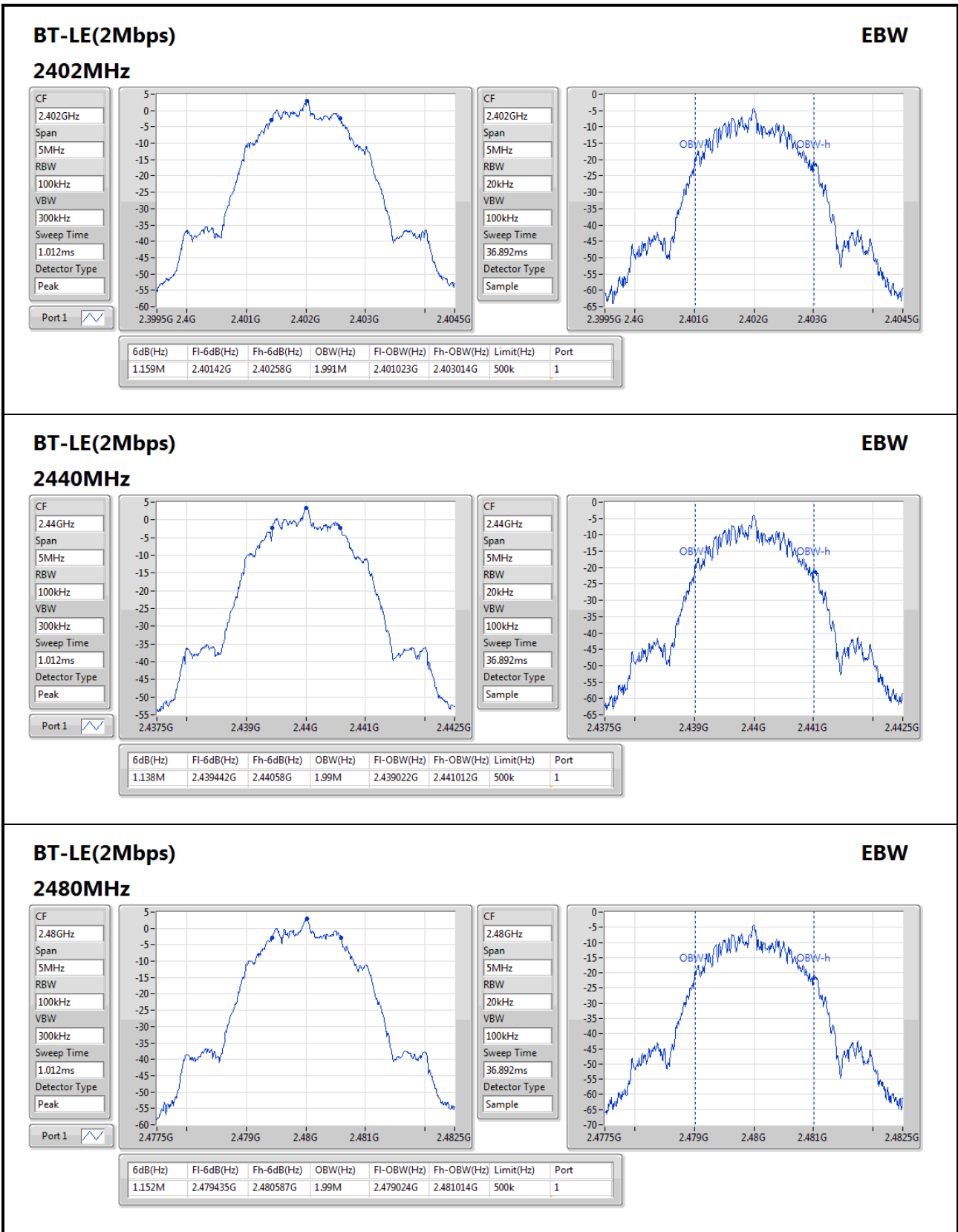


### BT-LE(1Mbps)

EBW

#### 2480MHz




**BT-LE(2Mbps)**
**EBW**

### 2480MHz

CF: 2.48GHz  
Span: 5MHz  
RBW: 100kHz  
VBW: 300kHz  
Sweep Time: 1.012ms  
Detector Type: Peak



CF: 2.48GHz  
Span: 5MHz  
RBW: 20kHz  
VBW: 100kHz  
Sweep Time: 36.892ms  
Detector Type: Sample



### 3.3 RF Output Power

#### 3.3.1 Limit of RF Output Power

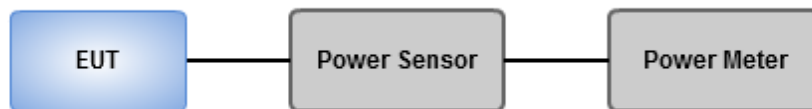
Conducted power shall not exceed 1Watt.

Antenna gain  $\leq 6\text{dBi}$ , no any corresponding reduction is in output power limit.

#### 3.3.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

#### 3.3.3 Test Setup



### 3.3.4 Test Result of Maximum Output Power

#### Summary of Peak Conducted Output Power

| Mode                | Power (dBm) | Power (W) |
|---------------------|-------------|-----------|
| 2.4-2.4835GHz       | -           | -         |
| BT-LE0.125_Nss1_1TX | 3.34        | 0.00216   |
| BT-LE0.5_Nss1_1TX   | 3.35        | 0.00216   |
| BT-LE(1Mbps)        | 3.36        | 0.00217   |
| BT-LE(2Mbps)        | 3.34        | 0.00216   |

#### Result

| Mode                | Result | Gain (dBi) | Power (dBm) | Power Limit (dBm) |
|---------------------|--------|------------|-------------|-------------------|
| BT-LE0.125_Nss1_1TX | -      | -          | -           | -                 |
| 2402MHz             | Pass   | -6.00      | 3.34        | 30.00             |
| 2440MHz             | Pass   | -6.00      | 3.08        | 30.00             |
| 2480MHz             | Pass   | -6.00      | 3.09        | 30.00             |
| BT-LE0.5_Nss1_1TX   | -      | -          | -           | -                 |
| 2402MHz             | Pass   | -6.00      | 3.35        | 30.00             |
| 2440MHz             | Pass   | -6.00      | 3.08        | 30.00             |
| 2480MHz             | Pass   | -6.00      | 3.09        | 30.00             |
| BT-LE(1Mbps)        | -      | -          | -           | -                 |
| 2402MHz             | Pass   | -6.00      | 3.36        | 30.00             |
| 2440MHz             | Pass   | -6.00      | 3.09        | 30.00             |
| 2480MHz             | Pass   | -6.00      | 3.11        | 30.00             |
| BT-LE(2Mbps)        | -      | -          | -           | -                 |
| 2402MHz             | Pass   | -6.00      | 3.34        | 30.00             |
| 2440MHz             | Pass   | -6.00      | 3.07        | 30.00             |
| 2480MHz             | Pass   | -6.00      | 3.10        | 30.00             |

### Summary of Conducted (Average) Output Power

| Mode                | Power<br>(dBm) | Power<br>(W) |
|---------------------|----------------|--------------|
| 2.4-2.4835GHz       | -              | -            |
| BT-LE0.125_Nss1_1TX | 3.08           | 0.00203      |
| BT-LE0.5_Nss1_1TX   | 3.10           | 0.00204      |
| BT-LE(1Mbps)        | 3.12           | 0.00205      |
| BT-LE(2Mbps)        | 3.11           | 0.00205      |

### Result

| Mode                | Result | Gain<br>(dBi) | Power<br>(dBm) | Power Limit<br>(dBm) |
|---------------------|--------|---------------|----------------|----------------------|
| BT-LE0.125_Nss1_1TX | -      | -             | -              | -                    |
| 2402MHz             | Pass   | -6.00         | 3.08           | -                    |
| 2440MHz             | Pass   | -6.00         | 2.81           | -                    |
| 2480MHz             | Pass   | -6.00         | 2.85           | -                    |
| BT-LE0.5_Nss1_1TX   | -      | -             | -              | -                    |
| 2402MHz             | Pass   | -6.00         | 3.10           | -                    |
| 2440MHz             | Pass   | -6.00         | 2.82           | -                    |
| 2480MHz             | Pass   | -6.00         | 2.86           | -                    |
| BT-LE(1Mbps)        | -      | -             | -              | -                    |
| 2402MHz             | Pass   | -6.00         | 3.12           | -                    |
| 2440MHz             | Pass   | -6.00         | 2.85           | -                    |
| 2480MHz             | Pass   | -6.00         | 2.87           | -                    |
| BT-LE(2Mbps)        | -      | -             | -              | -                    |
| 2402MHz             | Pass   | -6.00         | 3.11           | -                    |
| 2440MHz             | Pass   | -6.00         | 2.84           | -                    |
| 2480MHz             | Pass   | -6.00         | 2.86           | -                    |

Note: Average power is for reference only.

## 3.4 Power Spectral Density

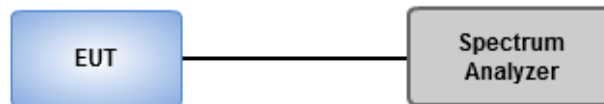
### 3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

### 3.4.2 Test Procedures

1. Set the RBW = 3 kHz, VBW = 10 kHz.
2. Detector = Peak, Sweep time = auto couple.
3. Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

### 3.4.3 Test Setup



### 3.4.4 Test Result of Power Spectral Density

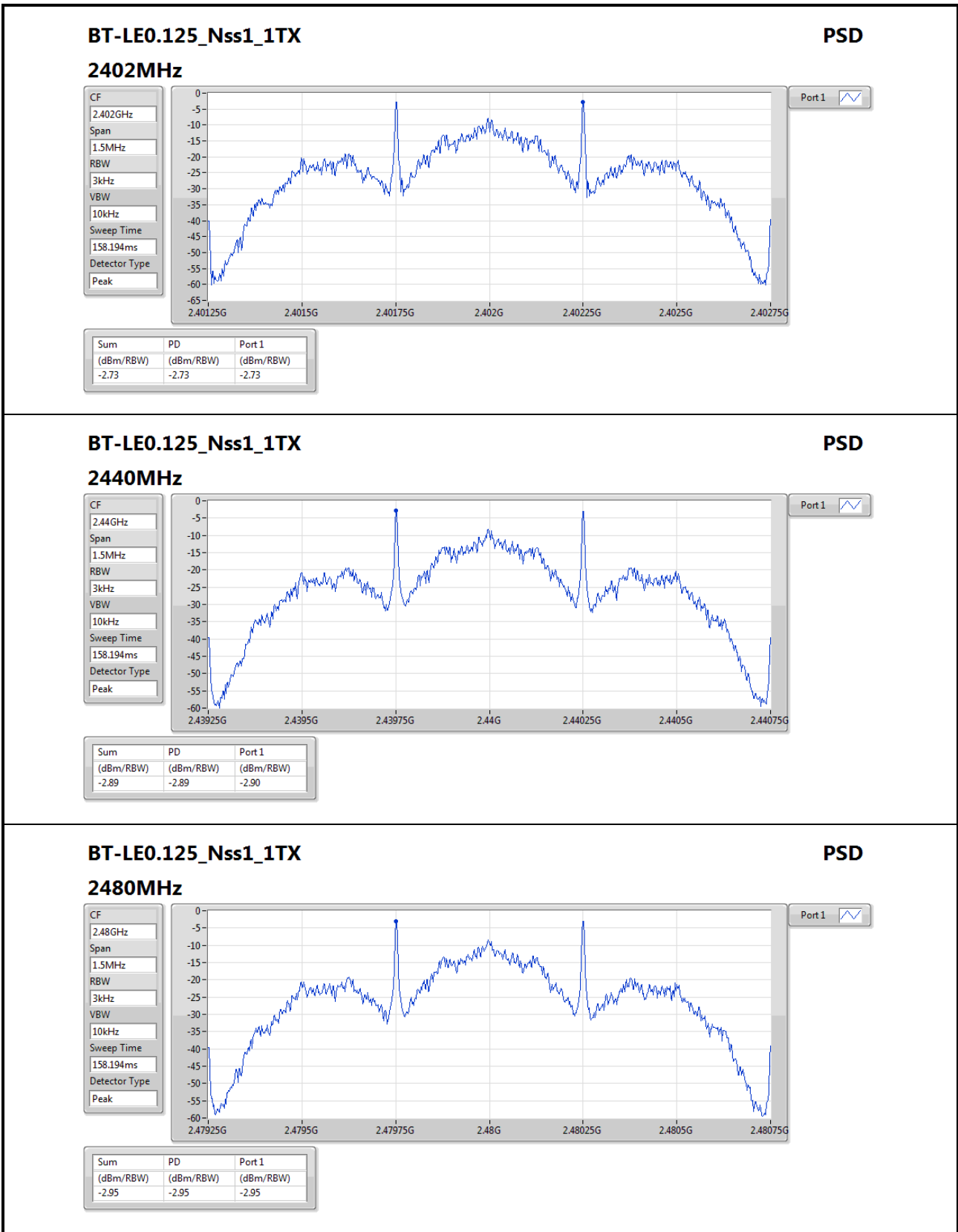
#### Summary

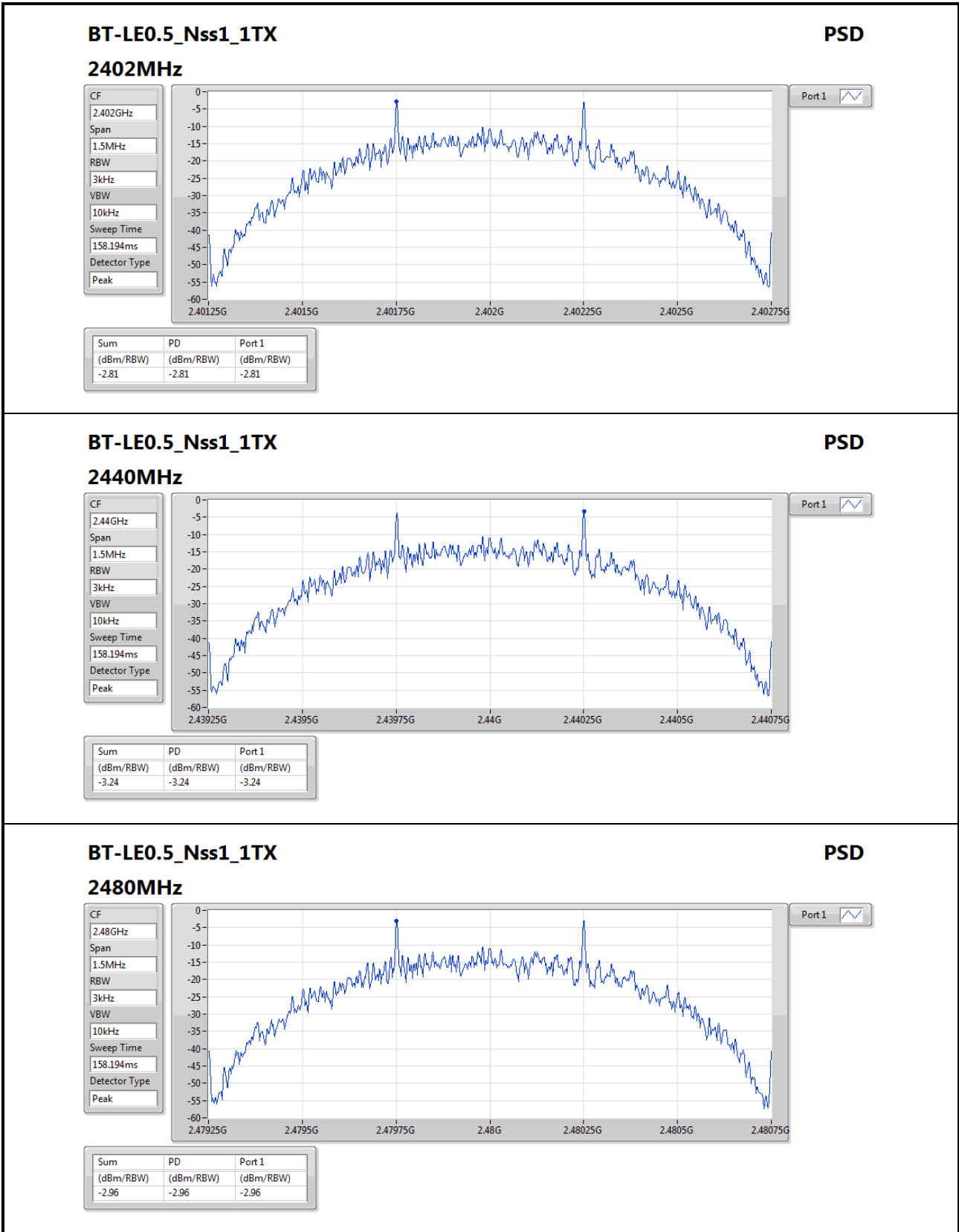
| Mode                | PD<br>(dBm/RBW) |
|---------------------|-----------------|
| 2.4-2.4835GHz       | -               |
| BT-LE0.125_Nss1_1TX | -2.73           |
| BT-LE0.5_Nss1_1TX   | -2.81           |
| BT-LE(1Mbps)        | -10.63          |
| BT-LE(2Mbps)        | -13.90          |

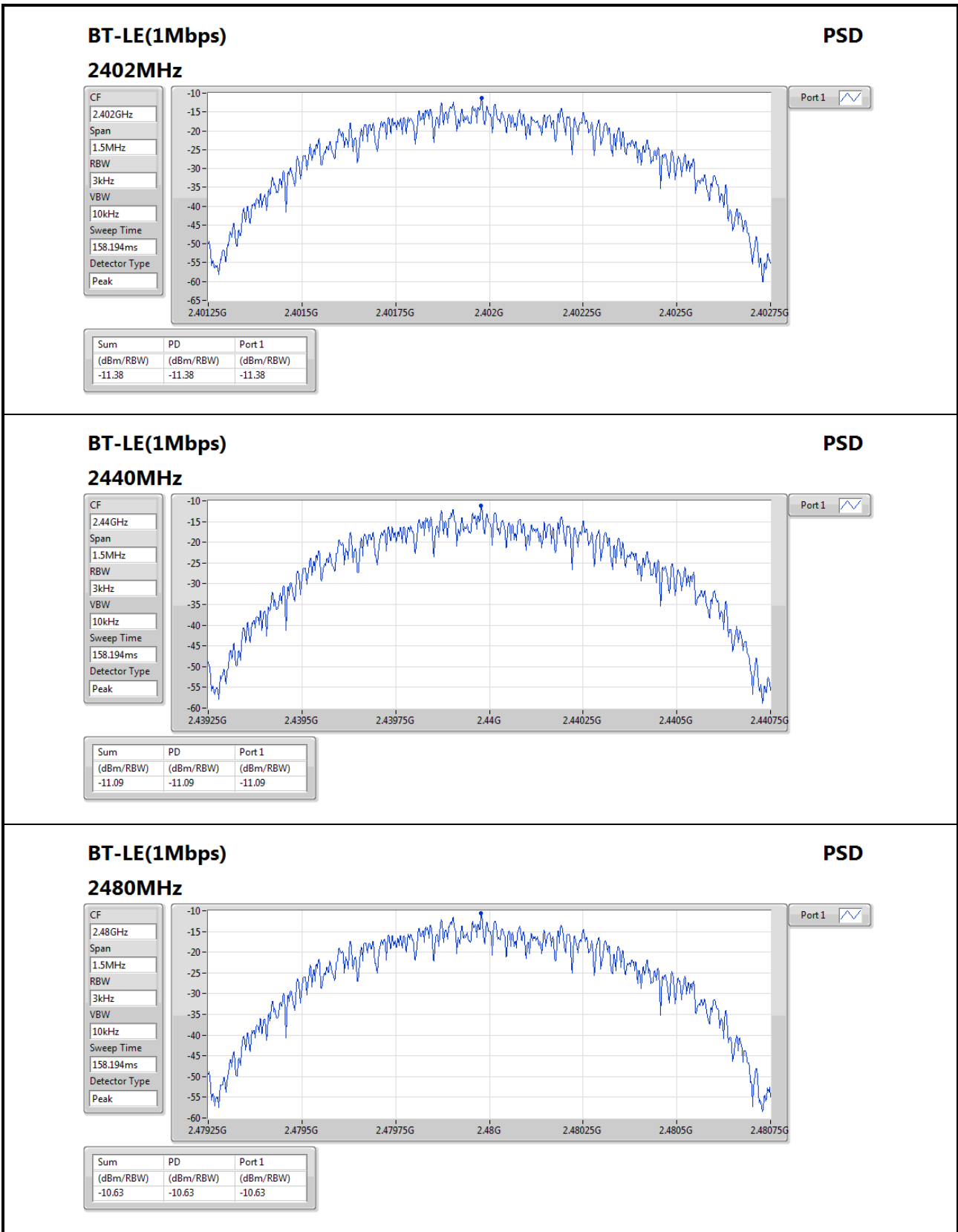
#### Result

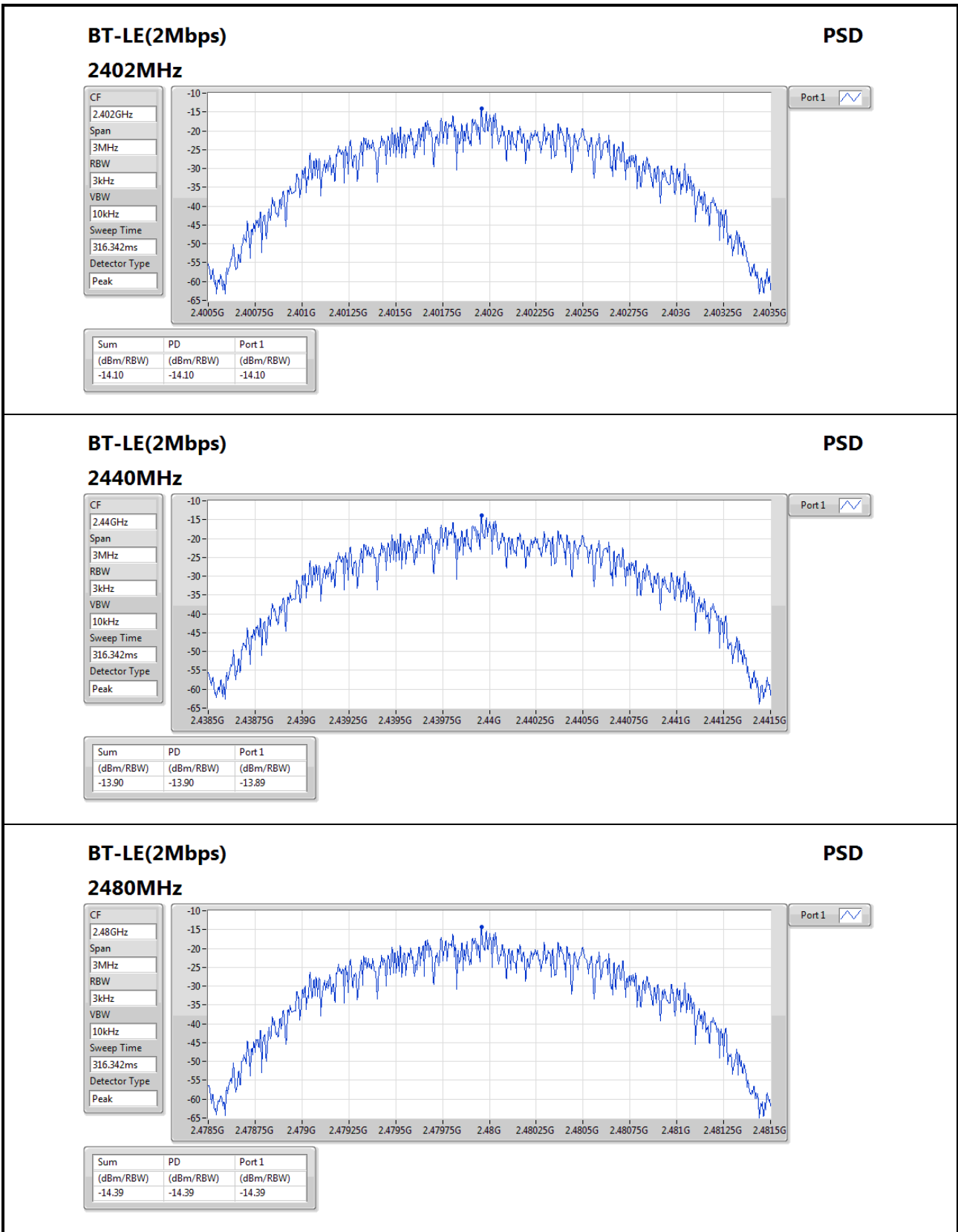
| Mode                | Result | Gain<br>(dBi) | PD<br>(dBm/RBW) | PD Limit<br>(dBm/RBW) |
|---------------------|--------|---------------|-----------------|-----------------------|
| BT-LE0.125_Nss1_1TX | -      | -             | -               | -                     |
| 2402MHz             | Pass   | -6.00         | -2.73           | 8.00                  |
| 2440MHz             | Pass   | -6.00         | -2.89           | 8.00                  |
| 2480MHz             | Pass   | -6.00         | -2.95           | 8.00                  |
| BT-LE0.5_Nss1_1TX   | -      | -             | -               | -                     |
| 2402MHz             | Pass   | -6.00         | -2.81           | 8.00                  |
| 2440MHz             | Pass   | -6.00         | -3.24           | 8.00                  |
| 2480MHz             | Pass   | -6.00         | -2.96           | 8.00                  |
| BT-LE(1Mbps)        | -      | -             | -               | -                     |
| 2402MHz             | Pass   | -6.00         | -11.38          | 8.00                  |
| 2440MHz             | Pass   | -6.00         | -11.09          | 8.00                  |
| 2480MHz             | Pass   | -6.00         | -10.63          | 8.00                  |
| BT-LE(2Mbps)        | -      | -             | -               | -                     |
| 2402MHz             | Pass   | -6.00         | -14.10          | 8.00                  |
| 2440MHz             | Pass   | -6.00         | -13.90          | 8.00                  |
| 2480MHz             | Pass   | -6.00         | -14.39          | 8.00                  |











## 3.5 Emissions in Restricted Frequency Bands

### 3.5.1 Limit of Emissions in Restricted Frequency Bands

| Restricted Band Emissions Limit |                       |                         |                      |
|---------------------------------|-----------------------|-------------------------|----------------------|
| Frequency Range (MHz)           | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |
| 0.009~0.490                     | 2400/F(kHz)           | 48.5 - 13.8             | 300                  |
| 0.490~1.705                     | 24000/F(kHz)          | 33.8 - 23               | 30                   |
| 1.705~30.0                      | 30                    | 29                      | 30                   |
| 30~88                           | 100                   | 40                      | 3                    |
| 88~216                          | 150                   | 43.5                    | 3                    |
| 216~960                         | 200                   | 46                      | 3                    |
| Above 960                       | 500                   | 54                      | 3                    |

**Note 1:**  
Quasi-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

**Note 2:**  
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

### 3.5.2 Test Procedures

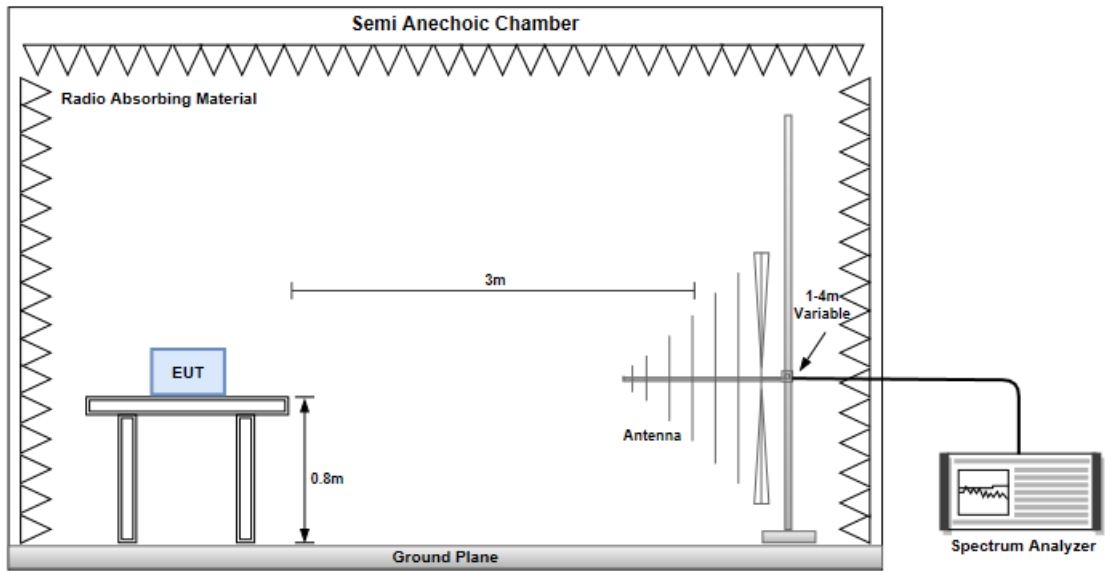
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

**Note:**

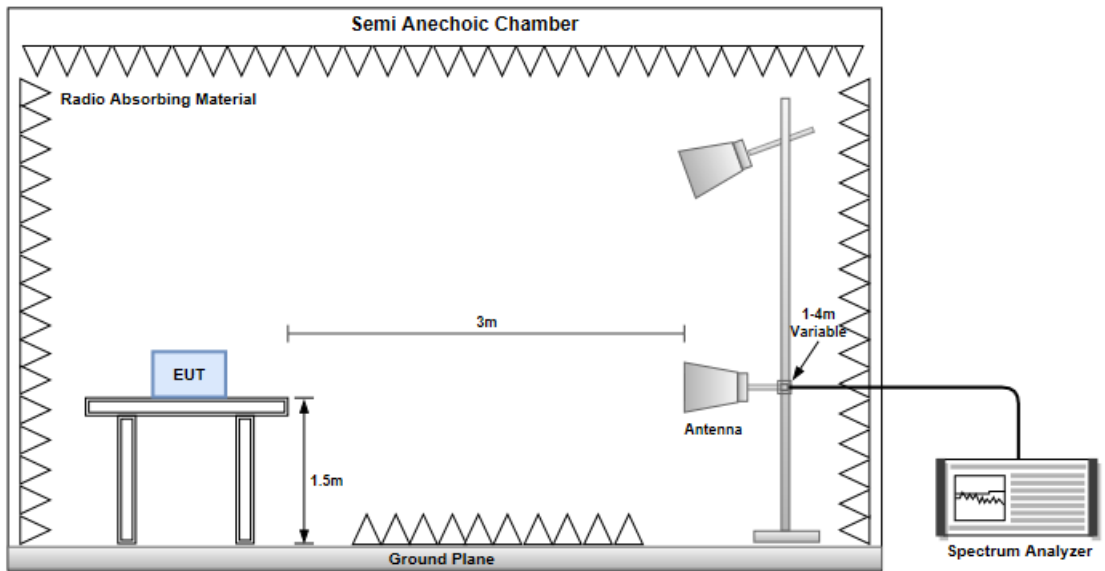
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

### 3.5.3 Test Setup

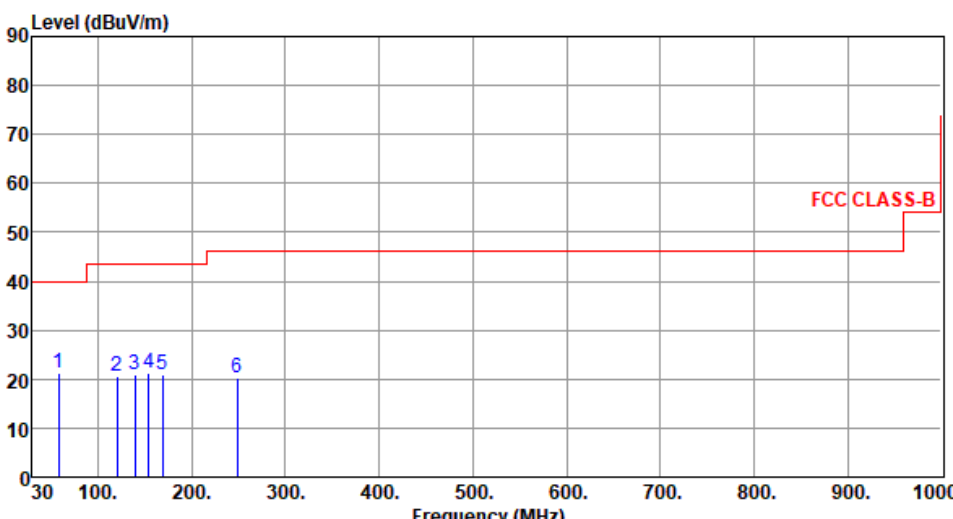
#### Radiated Emissions below 1 GHz



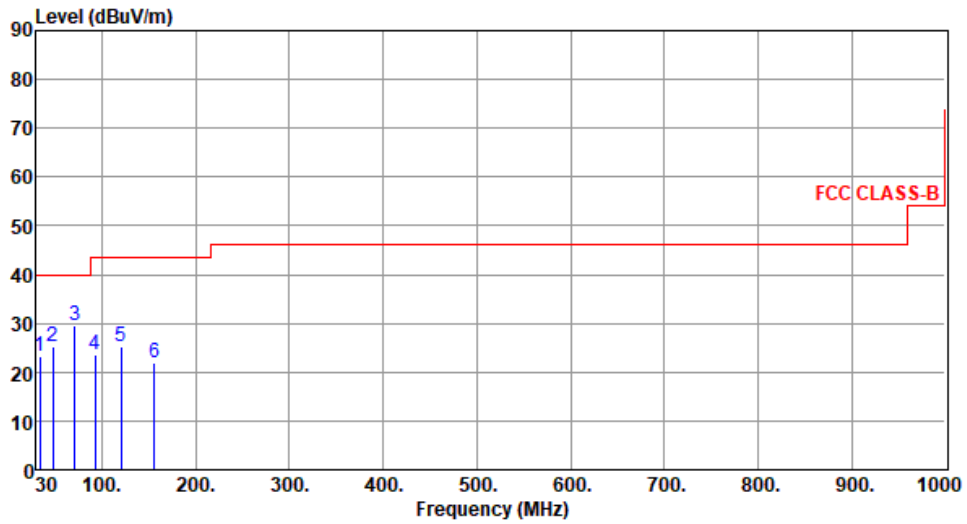
#### Radiated Emissions above 1 GHz



### 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

| Modulation   | BT LE-1Mbps | Test Freq. (MHz) | 2402   |        |            |        |        |          |            |
|--|-------------|------------------|--------|--------|------------|--------|--------|----------|------------|
| Polarization   | Horizontal  |                  |        |        |            |        |        |          |            |
|   |             |                  |        |        |            |        |        |          |            |
|  | Freq.       | Emission level   | Limit  | Margin | SA reading | Factor | Remark | ANT High | Turn Table |
|  | MHz         | dBuV/m           | dBuV/m | dB     | dBuV       | dB     |        | cm       | deg        |
| 1  | 58.13       | 21.33            | 40.00  | -18.67 | 30.24      | -8.91  | Peak   | ---      | ---        |
| 2  | 120.21      | 20.57            | 43.50  | -22.93 | 31.16      | -10.59 | Peak   | ---      | ---        |
| 3  | 139.61      | 20.86            | 43.50  | -22.64 | 29.76      | -8.90  | Peak   | ---      | ---        |
| 4  | 154.16      | 21.36            | 43.50  | -22.14 | 29.70      | -8.34  | Peak   | ---      | ---        |
| 5  | 168.71      | 21.00            | 43.50  | -22.50 | 29.78      | -8.78  | Peak   | ---      | ---        |
| 6  | 248.25      | 20.22            | 46.00  | -25.78 | 30.18      | -9.96  | Peak   | ---      | ---        |
| <p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)<br/>           *Factor includes antenna factor , cable loss and amplifier gain<br/>           Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).<br/>           Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.</p> |             |                  |        |        |            |        |        |          |            |

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2402 |
| <b>Polarization</b> | Vertical    |                         |      |



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|--------|-------------------|----------------------|
| 1 | 33.88        | 23.21                       | 40.00           | -16.79       | 32.76                 | -9.55        | Peak   | ---               | ---                  |
| 2 | 47.52        | 25.32                       | 40.00           | -14.68       | 33.72                 | -8.40        | Peak   | ---               | ---                  |
| 3 | 70.85        | 29.64                       | 40.00           | -10.36       | 40.38                 | -10.74       | Peak   | ---               | ---                  |
| 4 | 92.58        | 23.54                       | 43.50           | -19.96       | 37.56                 | -14.02       | Peak   | ---               | ---                  |
| 5 | 120.85       | 25.11                       | 43.50           | -18.39       | 35.70                 | -10.59       | Peak   | ---               | ---                  |
| 6 | 155.69       | 21.87                       | 43.50           | -21.63       | 30.20                 | -8.33        | Peak   | ---               | ---                  |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

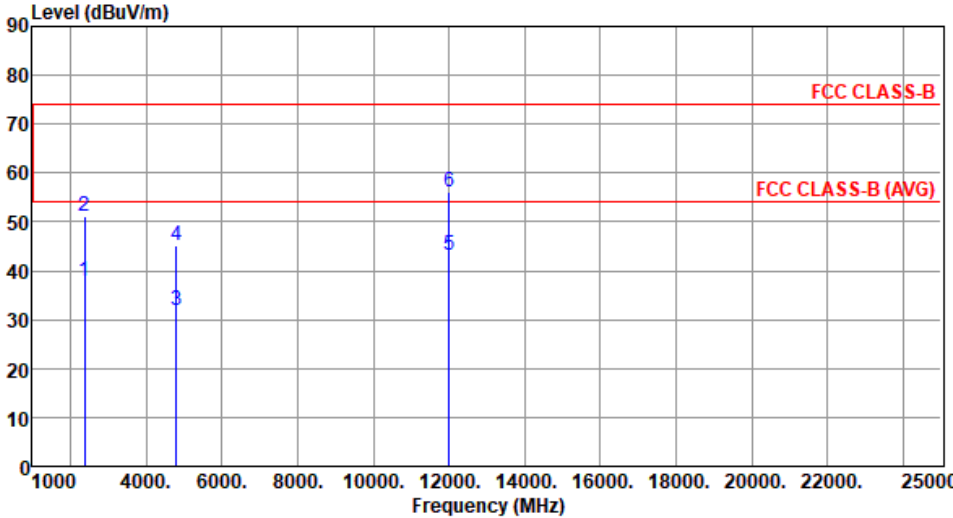
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



### 3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2402 |
| <b>Polarization</b> | Horizontal  |                         |      |

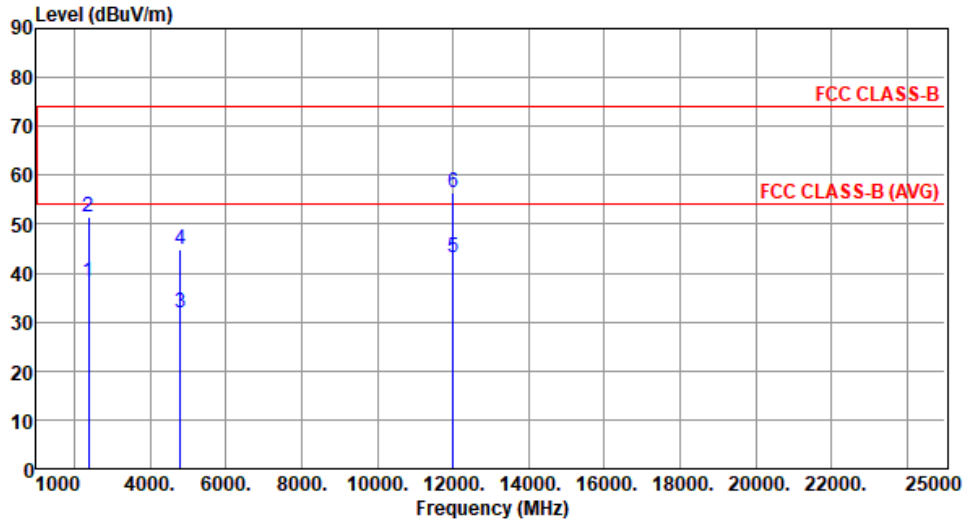
  



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 37.88                       | 54.00           | -16.12       | 40.68                 | -2.80        | Average | 100               | 141                  |
| 2 | 2390.00      | 51.26                       | 74.00           | -22.74       | 54.06                 | -2.80        | Peak    | 100               | 141                  |
| 3 | 4804.00      | 31.88                       | 54.00           | -22.12       | 28.35                 | 3.53         | Average | 100               | 20                   |
| 4 | 4804.00      | 45.00                       | 74.00           | -29.00       | 41.47                 | 3.53         | Peak    | 100               | 20                   |
| 5 | 12010.00     | 43.31                       | 54.00           | -10.69       | 29.59                 | 13.72        | Average | 100               | 60                   |
| 6 | 12010.00     | 56.19                       | 74.00           | -17.81       | 42.47                 | 13.72        | Peak    | 100               | 60                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)  
\*Factor includes antenna factor , cable loss and amplifier gain  
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2402 |
| <b>Polarization</b> | Vertical    |                         |      |



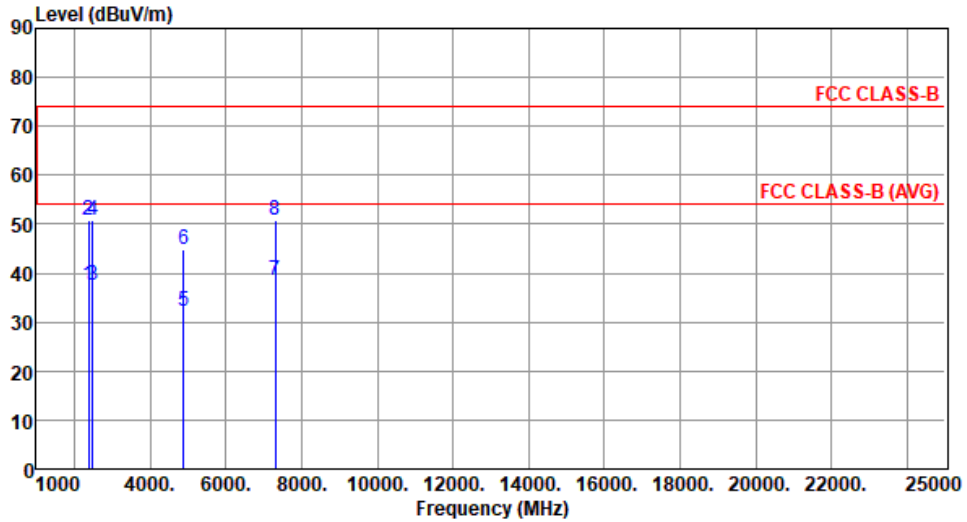
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 38.22                       | 54.00           | -15.78       | 41.02                 | -2.80        | Average | 161               | 101                  |
| 2 | 2390.00      | 51.46                       | 74.00           | -22.54       | 54.26                 | -2.80        | Peak    | 161               | 101                  |
| 3 | 4804.00      | 31.99                       | 54.00           | -22.01       | 28.46                 | 3.53         | Average | 100               | 80                   |
| 4 | 4804.00      | 44.79                       | 74.00           | -29.21       | 41.26                 | 3.53         | Peak    | 100               | 80                   |
| 5 | 12010.00     | 43.09                       | 54.00           | -10.91       | 29.37                 | 13.72        | Average | 100               | 20                   |
| 6 | 12010.00     | 56.30                       | 74.00           | -17.70       | 42.58                 | 13.72        | Peak    | 100               | 20                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2440 |
| <b>Polarization</b> | Horizontal  |                         |      |



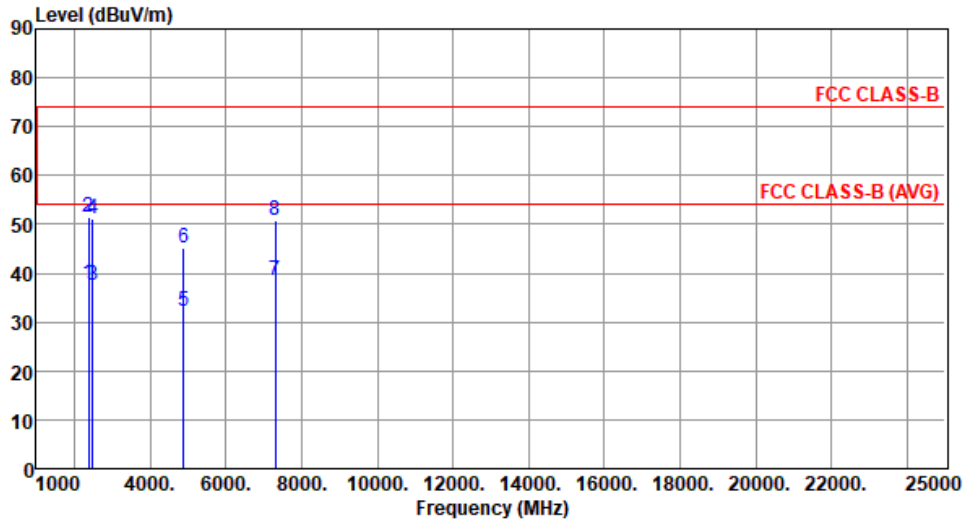
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 37.65                       | 54.00           | -16.35       | 40.45                 | -2.80        | Average | 100               | 142                  |
| 2 | 2390.00      | 50.89                       | 74.00           | -23.11       | 53.69                 | -2.80        | Peak    | 100               | 142                  |
| 3 | 2483.50      | 37.45                       | 54.00           | -16.55       | 40.48                 | -3.03        | Average | 100               | 142                  |
| 4 | 2483.50      | 50.84                       | 74.00           | -23.16       | 53.87                 | -3.03        | Peak    | 100               | 142                  |
| 5 | 4880.00      | 32.18                       | 54.00           | -21.82       | 28.55                 | 3.63         | Average | 100               | 40                   |
| 6 | 4880.00      | 44.85                       | 74.00           | -29.15       | 41.22                 | 3.63         | Peak    | 100               | 40                   |
| 7 | 7320.00      | 38.48                       | 54.00           | -15.52       | 29.26                 | 9.22         | Average | 100               | 55                   |
| 8 | 7320.00      | 50.89                       | 74.00           | -23.11       | 41.67                 | 9.22         | Peak    | 100               | 55                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2440 |
| <b>Polarization</b> | Vertical    |                         |      |



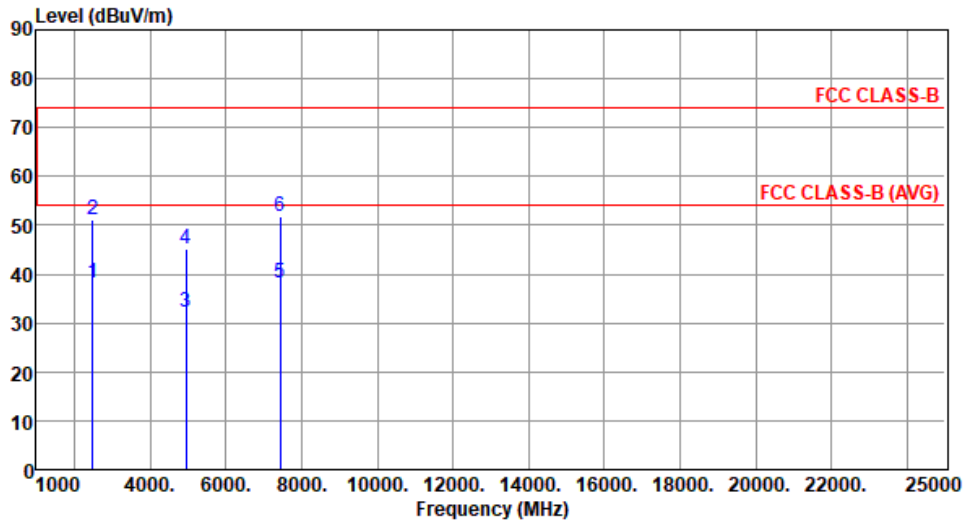
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2390.00      | 37.88                       | 54.00           | -16.12       | 40.68                 | -2.80        | Average | 202               | 103                  |
| 2 | 2390.00      | 51.32                       | 74.00           | -22.68       | 54.12                 | -2.80        | Peak    | 202               | 103                  |
| 3 | 2483.50      | 37.55                       | 54.00           | -16.45       | 40.58                 | -3.03        | Average | 202               | 103                  |
| 4 | 2483.50      | 51.23                       | 74.00           | -22.77       | 54.26                 | -3.03        | Peak    | 202               | 103                  |
| 5 | 4880.00      | 32.23                       | 54.00           | -21.77       | 28.60                 | 3.63         | Average | 100               | 20                   |
| 6 | 4880.00      | 45.20                       | 74.00           | -28.80       | 41.57                 | 3.63         | Peak    | 100               | 20                   |
| 7 | 7320.00      | 38.37                       | 54.00           | -15.63       | 29.15                 | 9.22         | Average | 100               | 60                   |
| 8 | 7320.00      | 50.91                       | 74.00           | -23.09       | 41.69                 | 9.22         | Peak    | 100               | 60                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Horizontal  |                         |      |



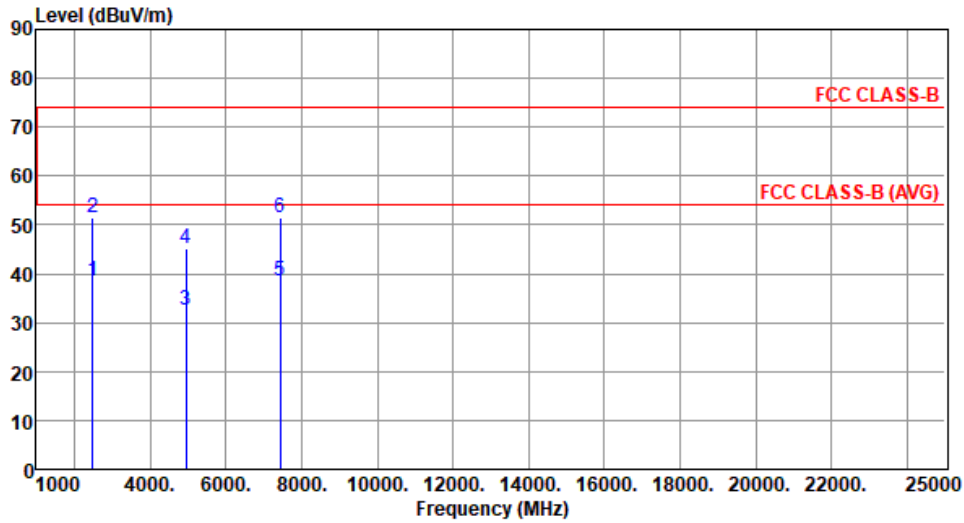
|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2483.50      | 38.09                       | 54.00           | -15.91       | 41.12                 | -3.03        | Average | 100               | 146                  |
| 2 | 2483.50      | 51.09                       | 74.00           | -22.91       | 54.12                 | -3.03        | Peak    | 100               | 146                  |
| 3 | 4960.00      | 32.30                       | 54.00           | -21.70       | 28.47                 | 3.83         | Average | 100               | 30                   |
| 4 | 4960.00      | 45.15                       | 74.00           | -28.85       | 41.32                 | 3.83         | Peak    | 100               | 30                   |
| 5 | 7440.00      | 38.35                       | 54.00           | -15.65       | 29.14                 | 9.21         | Average | 100               | 50                   |
| 6 | 7440.00      | 51.68                       | 74.00           | -22.32       | 42.47                 | 9.21         | Peak    | 100               | 50                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

|                     |             |                         |      |
|---------------------|-------------|-------------------------|------|
| <b>Modulation</b>   | BT LE-1Mbps | <b>Test Freq. (MHz)</b> | 2480 |
| <b>Polarization</b> | Vertical    |                         |      |



|   | Freq.<br>MHz | Emission<br>level<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | SA<br>reading<br>dBuV | Factor<br>dB | Remark  | ANT<br>High<br>cm | Turn<br>Table<br>deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 2483.50      | 38.62                       | 54.00           | -15.38       | 41.65                 | -3.03        | Average | 200               | 99                   |
| 2 | 2483.50      | 51.56                       | 74.00           | -22.44       | 54.59                 | -3.03        | Peak    | 200               | 99                   |
| 3 | 4960.00      | 32.39                       | 54.00           | -21.61       | 28.56                 | 3.83         | Average | 100               | 40                   |
| 4 | 4960.00      | 45.08                       | 74.00           | -28.92       | 41.25                 | 3.83         | Peak    | 100               | 40                   |
| 5 | 7440.00      | 38.47                       | 54.00           | -15.53       | 29.26                 | 9.21         | Average | 100               | 60                   |
| 6 | 7440.00      | 51.46                       | 74.00           | -22.54       | 42.25                 | 9.21         | Peak    | 100               | 60                   |

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

## 3.6 Emissions in non-restricted Frequency Bands

### 3.6.1 Emissions in non-restricted frequency bands limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

### 3.6.2 Test Procedures

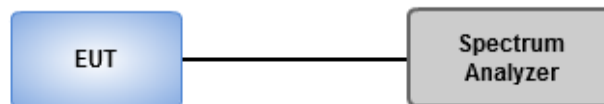
#### Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

#### Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

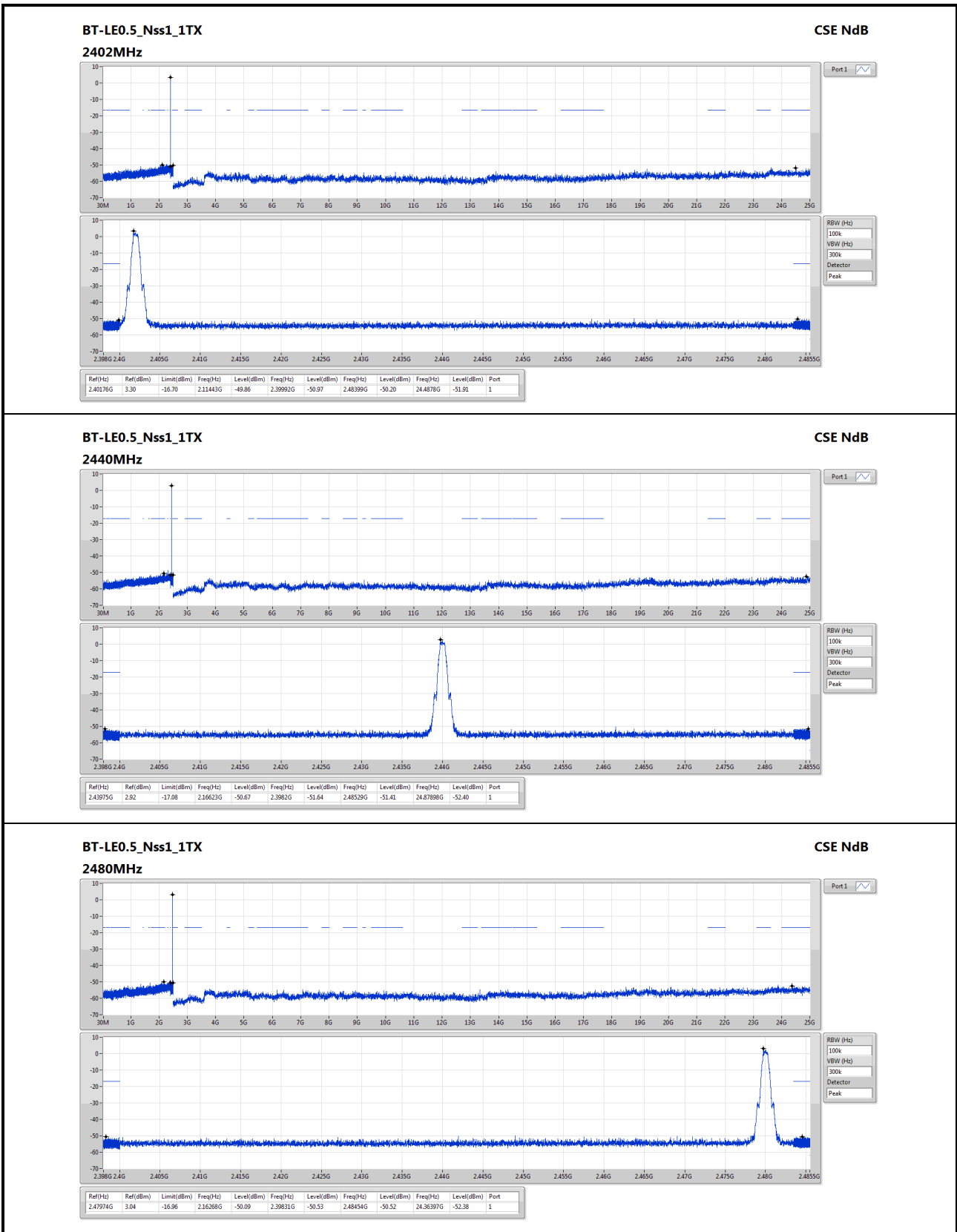
### 3.6.3 Test Setup

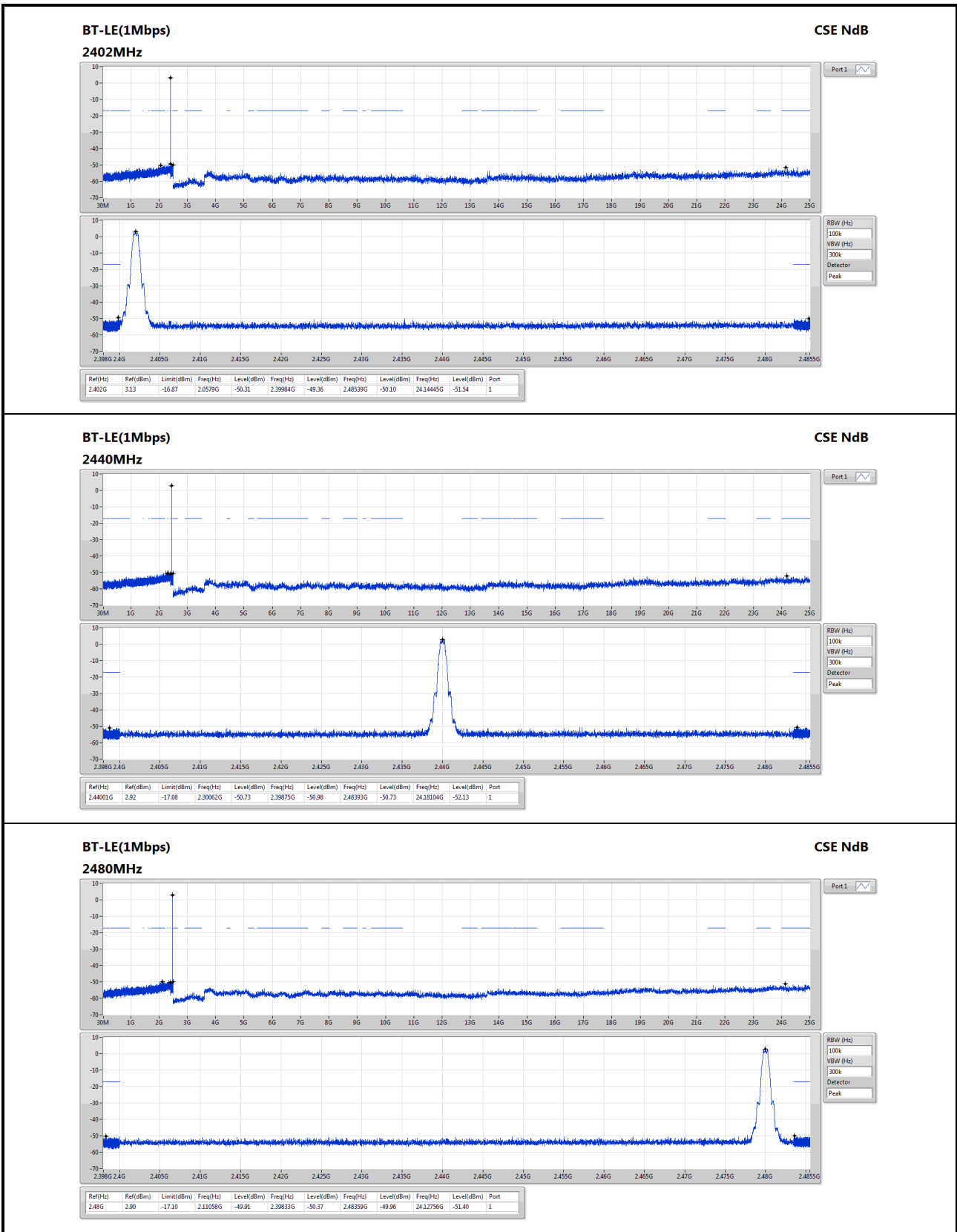


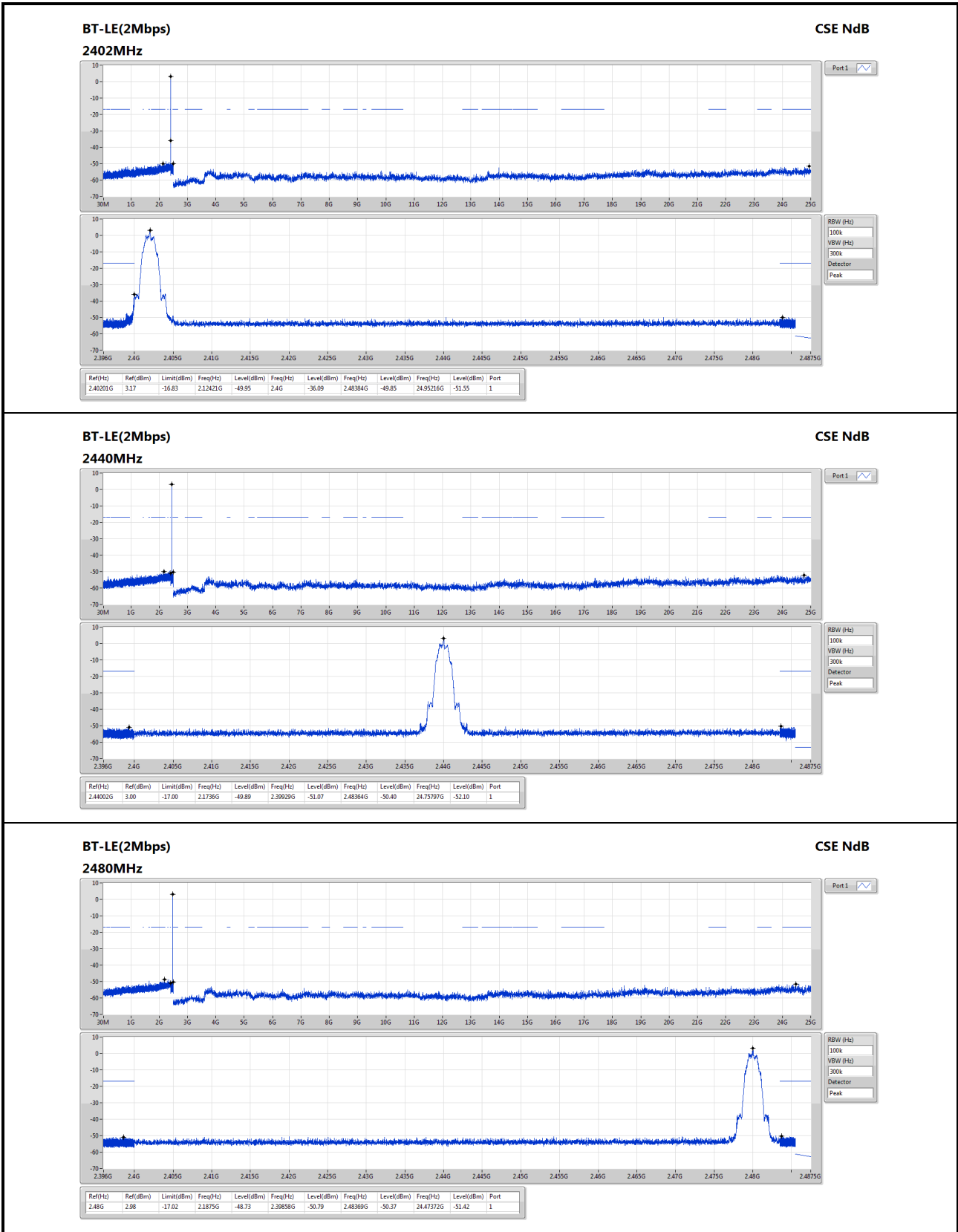
### 3.6.4 Test Result of Emissions in non-restricted Frequency Bands











## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

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Taiwan, R.O.C.

### **Kwei Shan**

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Kwei Shan District, Tao Yuan City  
333, Taiwan, R.O.C.

### **Kwei Shan Site II**

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St., Kwei Shan District, Tao Yuan  
City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

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