

# TEST REPORT

For

**Watch**

**Model Number: OPWE242**

**FCC ID: 2ABZ2-OPWE242**

**IC: 12739A-OPWE242**

**Report Number : WT248002355**

Test Laboratory : Shenzhen Academy of Metrology and Quality Inspection

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The "important statement" on the back of report's homepage is an element of the report, and any copy that does not contain the "important statement" is incomplete.

## Revision History

| No   | Date       | Remark        |
|------|------------|---------------|
| V1.0 | 2025.01.16 | Initial issue |

## TEST REPORT DECLARATION

Applicant : OnePlus Technology (Shenzhen) Co., Ltd.  
Address : 18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building,  
Binhe Avenue North, Futian District, Shenzhen, Guangdong,  
518100, P.R. China  
Manufacturer : OnePlus Technology (Shenzhen) Co., Ltd.  
Address : 18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building,  
Binhe Avenue North, Futian District, Shenzhen, Guangdong,  
518100, P.R. China  
EUT Description : Watch  
Model No. : OPWE242  
Trade mark : ONEPLUS  
HVIN : OPWE242  
FCC ID : 2ABZ2-OPWE242  
IC : 12739A-OPWE242

Test Standards:

**FCC Part 15 Subpart C**  
**RSS-247 Issue 3 (2023-08)**  
**RSS-GEN Issue 5 (2021-02)**

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results, unless they depend on the manufacturer information.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

|                   |   |       |                      |
|-------------------|---|-------|----------------------|
| Project Engineer: | <br>(Chen Silin 陈司林)   | Date: | <u>Jan. 16, 2025</u> |
| Checked by:       | <br>(Wan Xiaojing 万晓婧) | Date: | <u>Jan. 16, 2025</u> |
| Approved by:      | <br>(Lin Bin 林斌)       | Date: | <u>Jan. 16, 2025</u> |

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## 1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

| Test Items                                | FCC Rules                      | ISED Rules                                       | Test Results |
|---|--------------------------------|--|--------------|
| 6dB DTS Bandwidth                         | 15.247 (a) (2)                 | RSS-247<br>Clause 5.2(a)                         | Pass         |
| Maximum Peak Conducted Power              | 15.247 (b) (3)                 | RSS-247<br>Clause 5.4(d)                         | Pass         |
| Maximum Power Spectral Density Level      | 15.247 (e)                     | RSS-247<br>Clause 5.2(b)                         | Pass         |
| Conducted Bandedge and Spurious           | 15.247 (d)                     | RSS-247<br>Clause 5.5                            | Pass         |
| Radiated Bandedge and Spurious            | 15.247 (d)<br>15.209<br>15.205 | RSS-Gen<br>Clause 8.9<br>& RSS-247<br>Clause 5.5 | Pass         |
| Conducted Emission Test for AC Power Port | 15.207                         | RSS-Gen<br>Clause 8.8                            | Pass         |
| 99% Bandwidth                             | N/A                            | RSS-Gen<br>Clause 6.7                            | Pass         |
| Antenna Requirements                      | 15.203                         | RSS-GEN<br>Clause 6.8                            | Pass         |

Remark: "N/A" means "Not applicable."

## **2. GENERAL INFORMATION**

### **2.1. Report Information**

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

The lab will not be liable for any loss or damage resulting for false, inaccurate, inappropriate or incomplete product information provided by the applicant/manufacturere.

### **2.2. Laboratory Accreditation and Relationship to Customer**

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

The Laboratory is registered to perform emission tests with VCCI, and the registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

### **2.3.Measurement Uncertainty**

Conducted Emission

9 kHz~150 kHz  $U=3.7$  dB  $k=2$

150 kHz~30MHz  $U=3.3$  dB  $k=2$

Radiated Emission

30MHz~1000MHz  $U=4.3$  dB  $k=2$

1GHz~6GHz  $U=4.6$  dB  $k=2$

6GHz~40GHz  $U=5.1$  dB  $k=2$



### 3. PRODUCT DESCRIPTION

NOTE: The extreme test conditions for temperature and antenna gain were declared by the manufacturer.

#### 3.1. EUT Description

Description : Watch  
Manufacturer : OnePlus Technology (Shenzhen) Co., Ltd.  
Model Number : OPWE242  
Operate Frequency : 2.402 GHz~2.480 GHz  
Antenna Designation : Monopole Antenna  
Antenna Gain: -3.5 dBi  
Operating Voltage : DC 3.92 V  
Software Version : OPWE242\_11\_A.02  
Hardware Version : XK935  
Remark: /

Bluetooth Low Energy:

Table 2 Working Frequency List

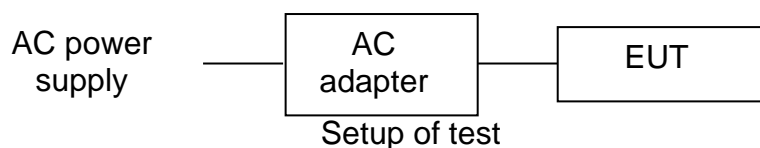
| Regulatory Range | RF Channels                        |
|------------------|------------------------------------|
| 2.400-2.4835 GHz | $f=2402+k*2$ MHz, $k=0, \dots, 39$ |

#### 3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2ABZ2-OPWE242** filing to comply with Section 15.207, 15.209, 15.247 of the FCC Part 15 Subpart C Rules.

This submittal(s) (test report) is intended for **IC: 12739A-OPWE242** filing to comply with RSS-247 and RSS-GEN.

#### 3.3. Block Diagram of EUT Configuration



#### 3.4. Operating Condition of EUT

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power.

Worst-case data rates as provided by the client were:

Bluetooth low energy

Test mode is configured to be with duty cycle >98%

**3.5. Directional Antenna Gain**

Directional gain need NOT to be considered.

**3.6. Support Equipment List**

Table 3 Support Equipment List

| Name    | Model No | S/N | Manufacturer                             |
|---------|----------|-----|--|
| Adapter | VCB3HDUH | --- | Huizhou Golden Lake Industrial Co., Ltd. |

**3.7. Test Conditions**

Date of test: Dec.24, 2024- Jan.02, 2025  
Date of EUT Receive: Dec.10, 2024  
Temperature: 20 °C-25 °C  
Relative Humidity: 25%-52%

**3.8. Special Accessories**

Not available for this EUT intended for grant.

**3.9. Equipment Modifications**

Not available for this EUT intended for grant.

#### 4. TEST EQUIPMENT USED

Table 4 Test Equipment

| No.       | Equipment              | Manufacturer | Model No.       | Last Cal.    | Cal. Interval |
|-----------|------------------------|--------------|-----------------|--------------|---------------|
| SB9054/05 | Test Receiver          | R&S          | ESCI            | Jun.17, 2024 | 1 Year        |
| SB8501/06 | AMN                    | R&S          | ESH-Z5          | Jan.16, 2024 | 1 Year        |
| SB9549    | Shielded Room          | Albatross    | SR              | Aug.28, 2024 | 1 Year        |
| SB17366   | Test Receiver          | R&S          | ESR26           | Apr.30, 2024 | 1 Year        |
| SB3345    | Loop Antenna           | Schwarzbeck  | FMZB1516        | Jan.12, 2024 | 1 Year        |
| SB3955    | Broadband Antenna      | SCHWARZBECK  | VULB9163        | Apr.30, 2024 | 1 Year        |
| SB9555/01 | Semi Anechoic Chamber  | Albatross    | 9×6×6(m)        | Aug.12, 2024 | 1 Year        |
| SB8501/09 | Test Receiver          | R&S          | ESU40           | Jan.17, 2024 | 1 Year        |
| SB3435    | Horn Antenna           | R&S          | HF906           | Nov.19, 2024 | 1 Year        |
| SB9058/03 | Pre-Amplifier          | R&S          | SCU 18          | Jan.16, 2024 | 1 Year        |
| SB8501/11 | Antenna                | R&S          | 3160-09         | Feb.22, 2023 | 3 Years       |
| SB8501/16 | Pre-Amplifier          | R&S          | SCU-26          | Jan.16, 2024 | 1 Year        |
| SB9555/02 | Fully Anechoic Chamber | Albatross    | 10.0×5.2×5.4(m) | Aug.08, 2024 | 1 Year        |
| SB9060    | Signal Analyzer        | R&S          | FSQ40           | Apr.22, 2024 | 1 Year        |

Table 5 Test software

| Name                           | Manufacturer                 | Version |
|--------------------------------|------------------------------|---------|
| Bluetooth and WiFi Test System | Shenzhen JS tonscond co.,ltd | 3.3.10  |

## 5. 6DB BANDWIDTH MEASUREMENT

### 5.1.Limits of 6dB Bandwidth Measurement

CFR 47 (FCC) part 15.247 (a) (2), 558074 D01 DTS Meas Guidance v05r02  
RSS-247 Clause 5.2(a) the minimum 6 dB bandwidth shall be 500 kHz

### 5.2.Test Procedure

The transmitter output was connected to the spectrum analyzer.

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW)  $\geq 3 \times$  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.

### 5.3.Test Setup

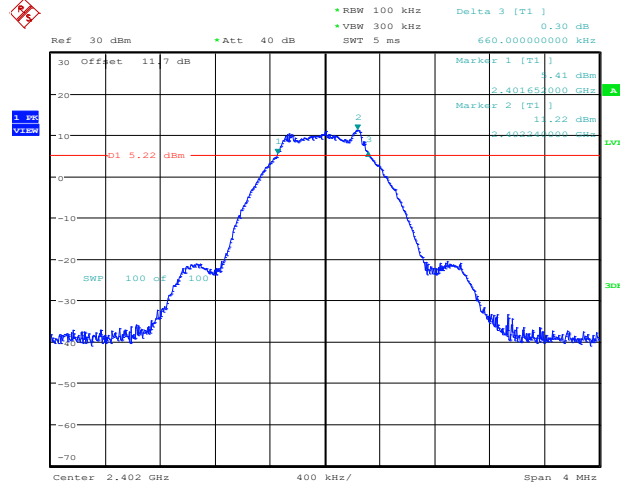


### 5.4.Test Data

Table 6 6dB Bandwidth Test Data

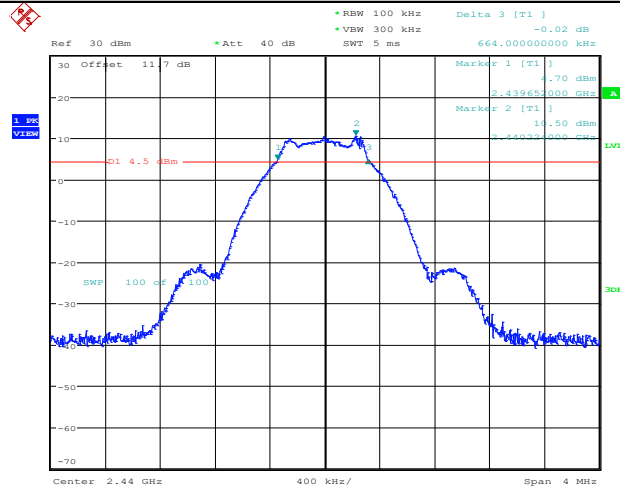
| TestMode | Antenna | Frequency [MHz] | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|----------|---------|-----------------|--------------|---------|---------|------------|---------|
| BLE_1M   | Ant1    | 2402            | 0.66         | 2401.65 | 2402.31 | 0.5        | PASS    |
|          |         | 2440            | 0.66         | 2439.65 | 2440.32 | 0.5        | PASS    |
|          |         | 2480            | 0.70         | 2479.64 | 2480.33 | 0.5        | PASS    |
| BLE_2M   | Ant1    | 2402            | 1.14         | 2401.43 | 2402.57 | 0.5        | PASS    |
|          |         | 2440            | 1.15         | 2439.42 | 2440.57 | 0.5        | PASS    |
|          |         | 2480            | 1.13         | 2479.42 | 2480.55 | 0.5        | PASS    |

### BLE\_1M\_Ant1\_2402



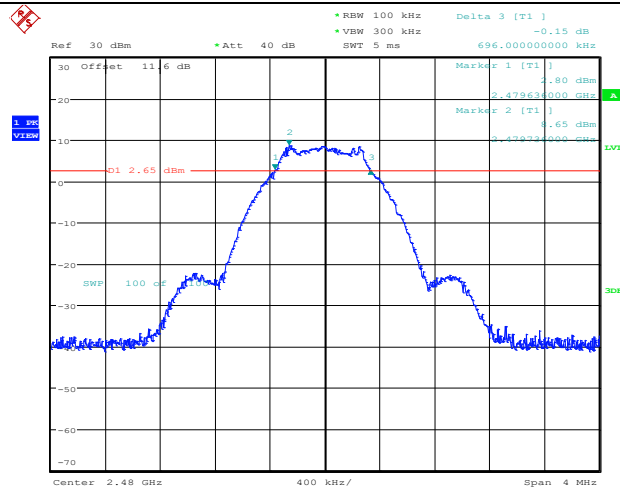
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### BLE\_1M\_Ant1\_2440



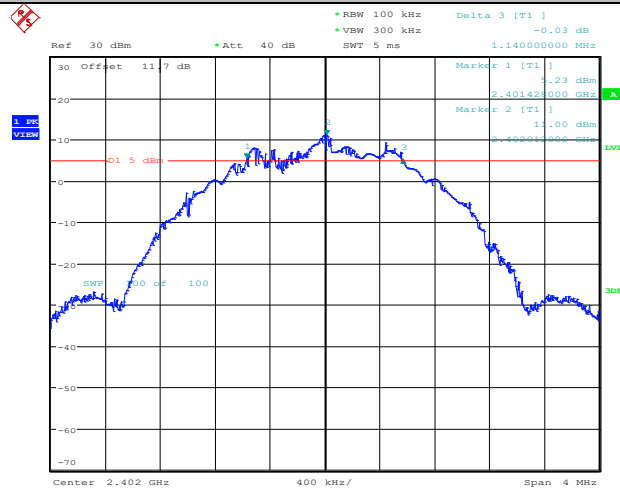
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### BLE\_1M\_Ant1\_2480



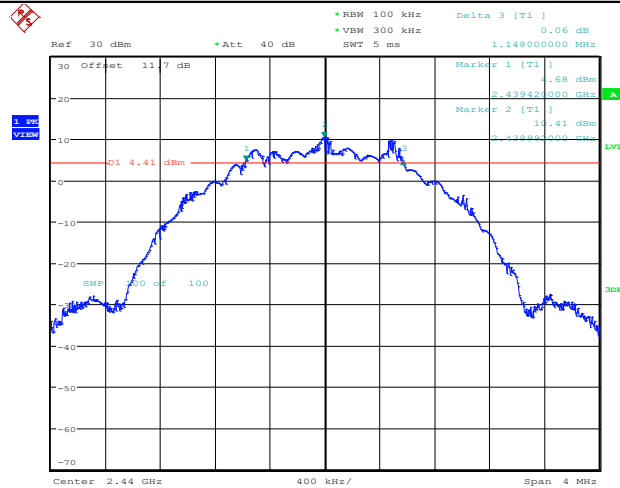
Date: 24.DEC.2024 09:42:04

### BLE\_2M\_Ant1\_2402



Date: 24.DEC.2024 09:47:14

### BLE\_2M\_Ant1\_2440



Date: 24.DEC.2024 09:51:14

### BLE\_2M\_Ant1\_2480



## 6. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### 6.1.Limits of Maximum Conducted Output Power Measurement

CFR 47 (FCC) part 15.247 (b) (3), 558074 D01 DTS Meas Guidance v05r02  
RSS-247 Clause 5.4(d), For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W.

### 6.2. Test Procedure

The transmitter output was connected to the spectrum analyzer.

- Set the RBW  $\geq$  DTS bandwidth.
- Set VBW  $\geq 3 \times$  RBW.
- Set span  $\geq 3 \times$  RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

### 6.3. Test Setup



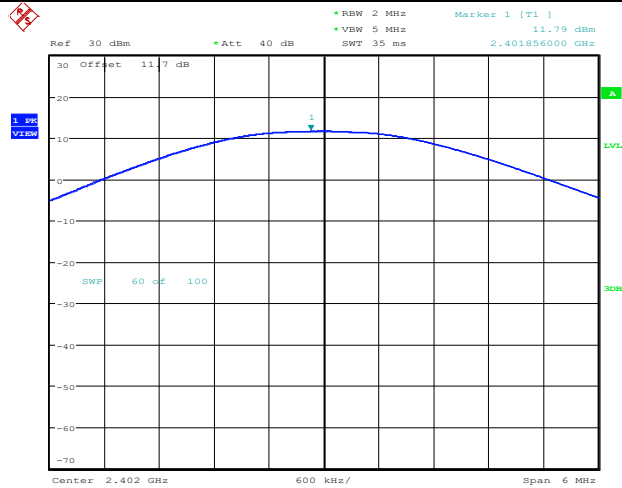
### 6.4. Test Data

Table 7 Maximum Conducted Output Power Test Data

| TestMode | Antenna | Frequency [MHz] | Conducted Peak Power [dBm] | Conducted Power Limit[dBm] | Antenna Gain[dBi] | EIRP [dBm] | EIRP Limit[dBm] | Verdict |
|----------|---------|-----------------|----------------------------|----------------------------|-------------------|------------|-----------------|---------|
| BLE_1M   | Ant1    | 2402            | 11.79                      | $\leq 30$                  | -3.5              | 8.29       | $\leq 36$       | PASS    |
|          |         | 2440            | 11.28                      | $\leq 30$                  | -3.5              | 7.78       | $\leq 36$       | PASS    |
|          |         | 2480            | 10.01                      | $\leq 30$                  | -3.5              | 6.51       | $\leq 36$       | PASS    |
| BLE_2M   | Ant1    | 2402            | 11.89                      | $\leq 30$                  | -3.5              | 8.39       | $\leq 36$       | PASS    |
|          |         | 2440            | 11.42                      | $\leq 30$                  | -3.5              | 7.92       | $\leq 36$       | PASS    |
|          |         | 2480            | 10.13                      | $\leq 30$                  | -3.5              | 6.63       | $\leq 36$       | PASS    |

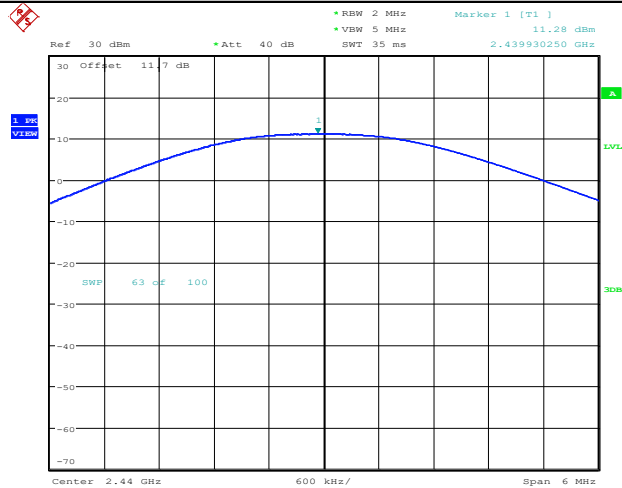


BLE\_1M\_Ant1\_2402



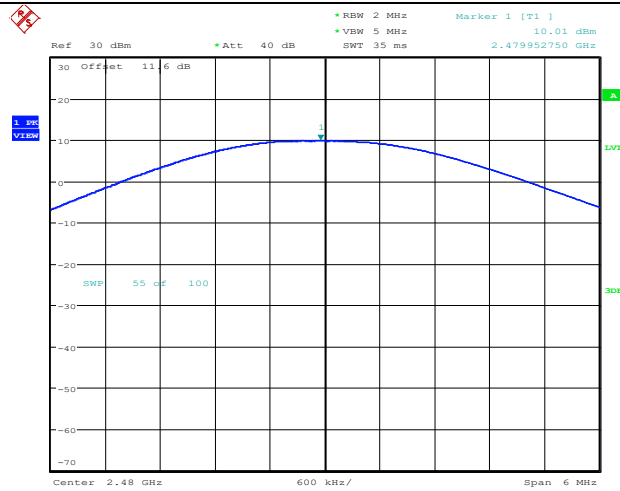
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BLE\_1M\_Ant1\_2440



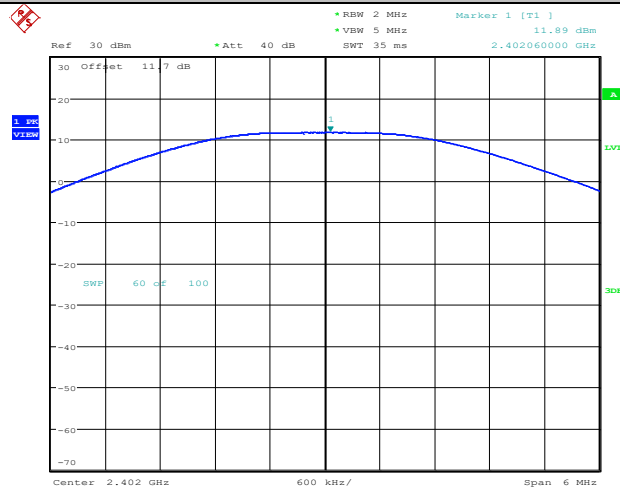
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BLE\_1M\_Ant1\_2480



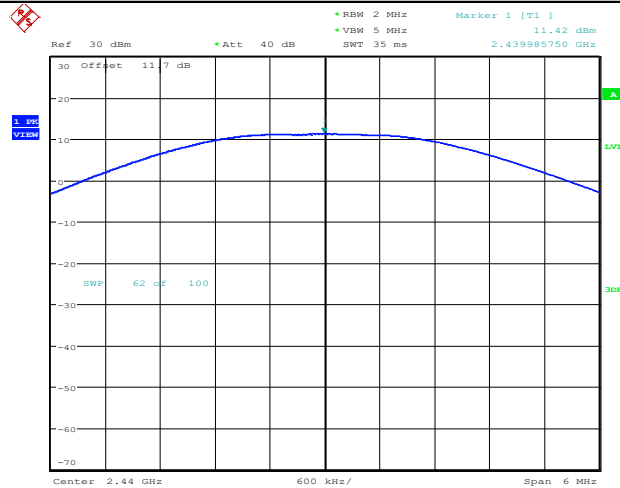
Date: 24.DEC.2024 09:42:21

### BLE\_2M\_Ant1\_2402



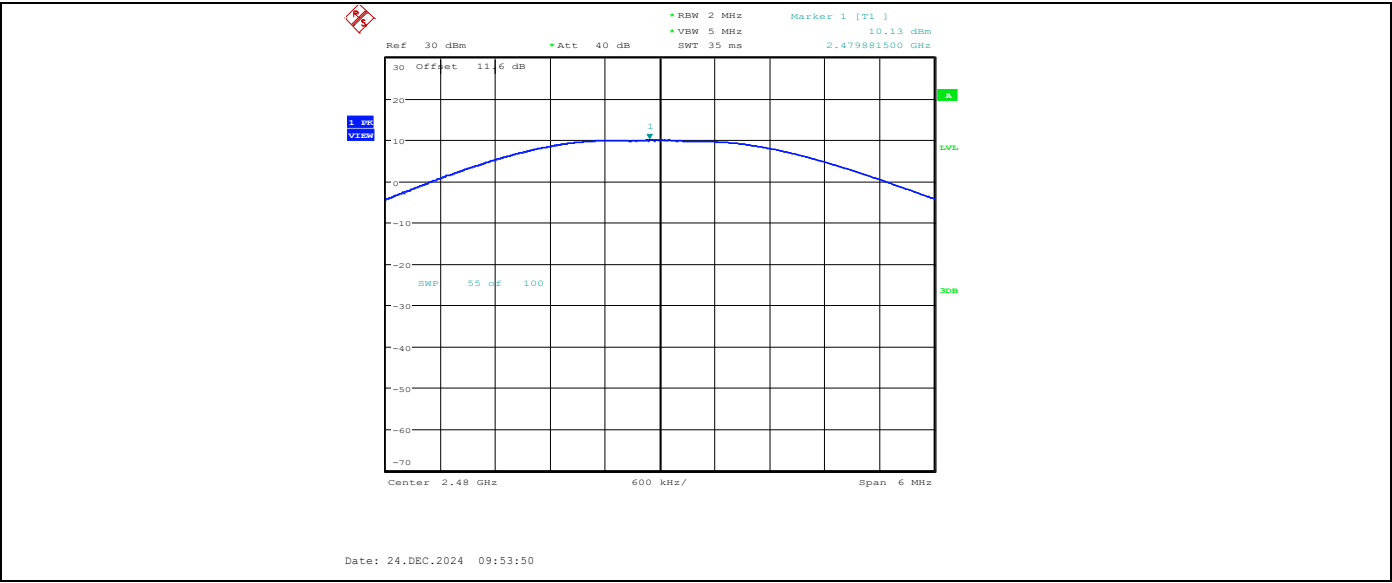
Date: 24.DEC.2024 09:47:30

### BLE\_2M\_Ant1\_2440



Date: 24.DEC.2024 09:51:31

### BLE\_2M\_Ant1\_2480



## 7. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT

### 7.1.Limits of Maximum Power Spectral Density Level Measurement

CFR 47 (FCC) part 15.247 (e) , 558074 D01 DTS Meas Guidance v05r02, RSS-247 Clause 5.2(b), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 7.2.Test Procedure

The transmitter output was connected to the spectrum analyzer.

a)Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set RBW to:  $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .

d) Set VBW  $\geq 3 \times \text{RBW}$ .

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h)Allow trace to fully stabilize.

i)Use the peak marker function to determine the maximum amplitude level within the RBW.

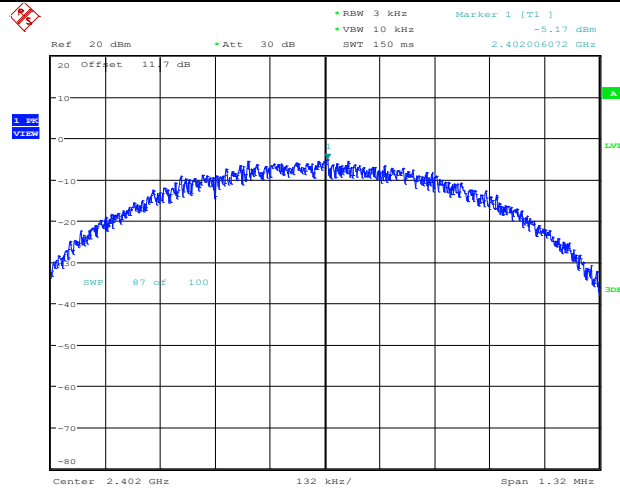
j)If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 7.3.Test Data

Table 8 Maximum Power Spectral Density Level Test Data

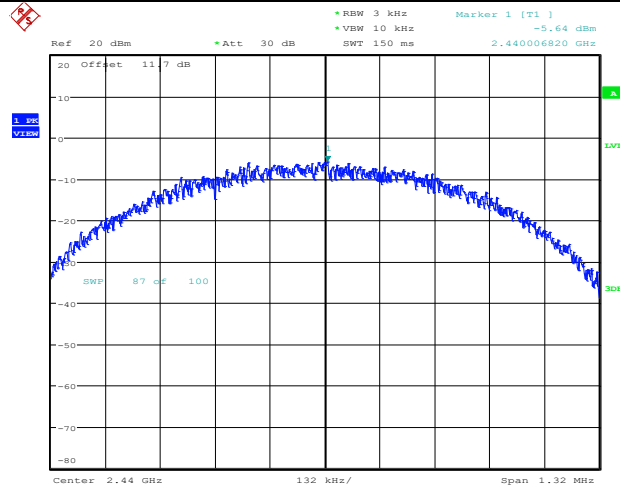
| TestMode | Antenna | Frequency [MHz] | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|----------|---------|-----------------|------------------|-----------------|---------|
| BLE_1M   | Ant1    | 2402            | -5.17            | $\leq 8.00$     | PASS    |
|          |         | 2440            | -5.64            | $\leq 8.00$     | PASS    |
|          |         | 2480            | -6.87            | $\leq 8.00$     | PASS    |
| BLE_2M   | Ant1    | 2402            | -7.16            | $\leq 8.00$     | PASS    |
|          |         | 2440            | -7.64            | $\leq 8.00$     | PASS    |
|          |         | 2480            | -8.93            | $\leq 8.00$     | PASS    |

### BLE\_1M\_Ant1\_2402



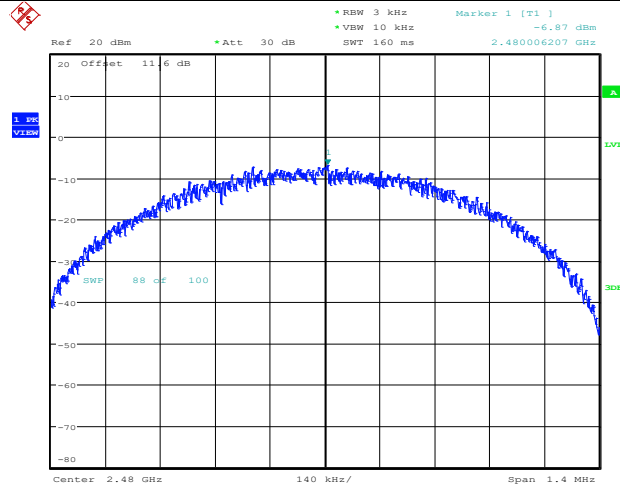
Date: 24.DEC.2024 09:33:44

### BLE\_1M\_Ant1\_2440



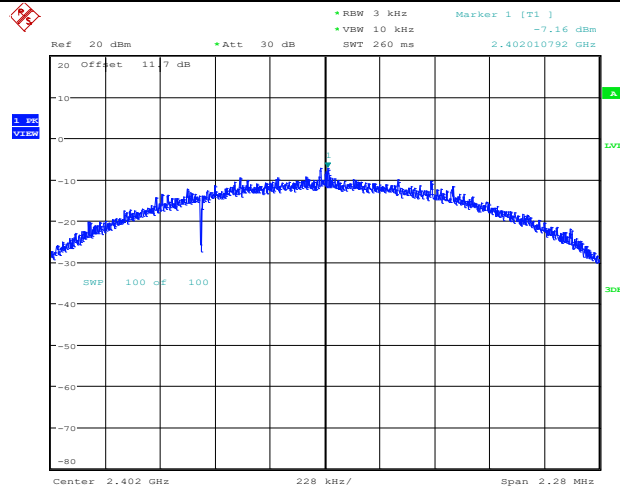
Date: 24.DEC.2024 09:37:23

### BLE\_1M\_Ant1\_2480



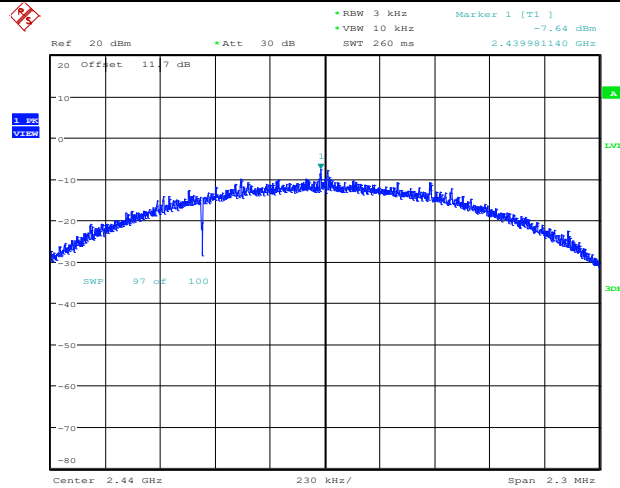
Date: 24.DEC.2024 09:42:46

### BLE\_2M\_Ant1\_2402



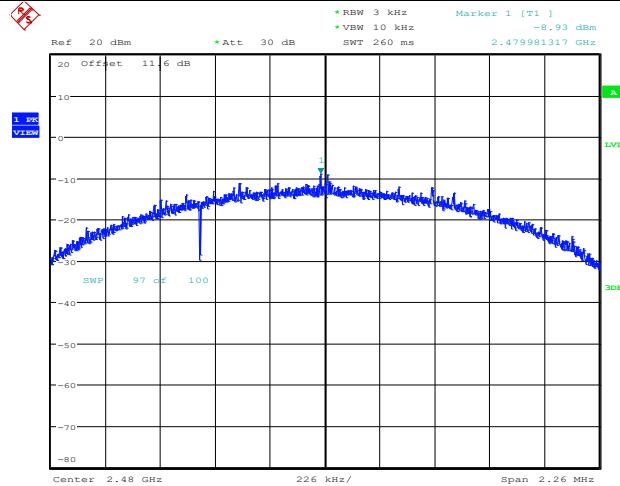
Date: 24.DEC.2024 09:48:35

### BLE\_2M\_Ant1\_2440



Date: 24.DEC.2024 09:52:09

### BLE\_2M\_Ant1\_2480



Date: 24.DEC.2024 09:54:28

## **8. CONDUCTED BANDEDGE AND SPURIOUS MEASUREMENT**

### **8.1.Limits of Conducted Bandedge and Spurious Measurement**

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v05r02, RSS-247 Clause 5.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits.

### **8.2. Test Procedure**

The transmitter output was connected to the spectrum analyzer.

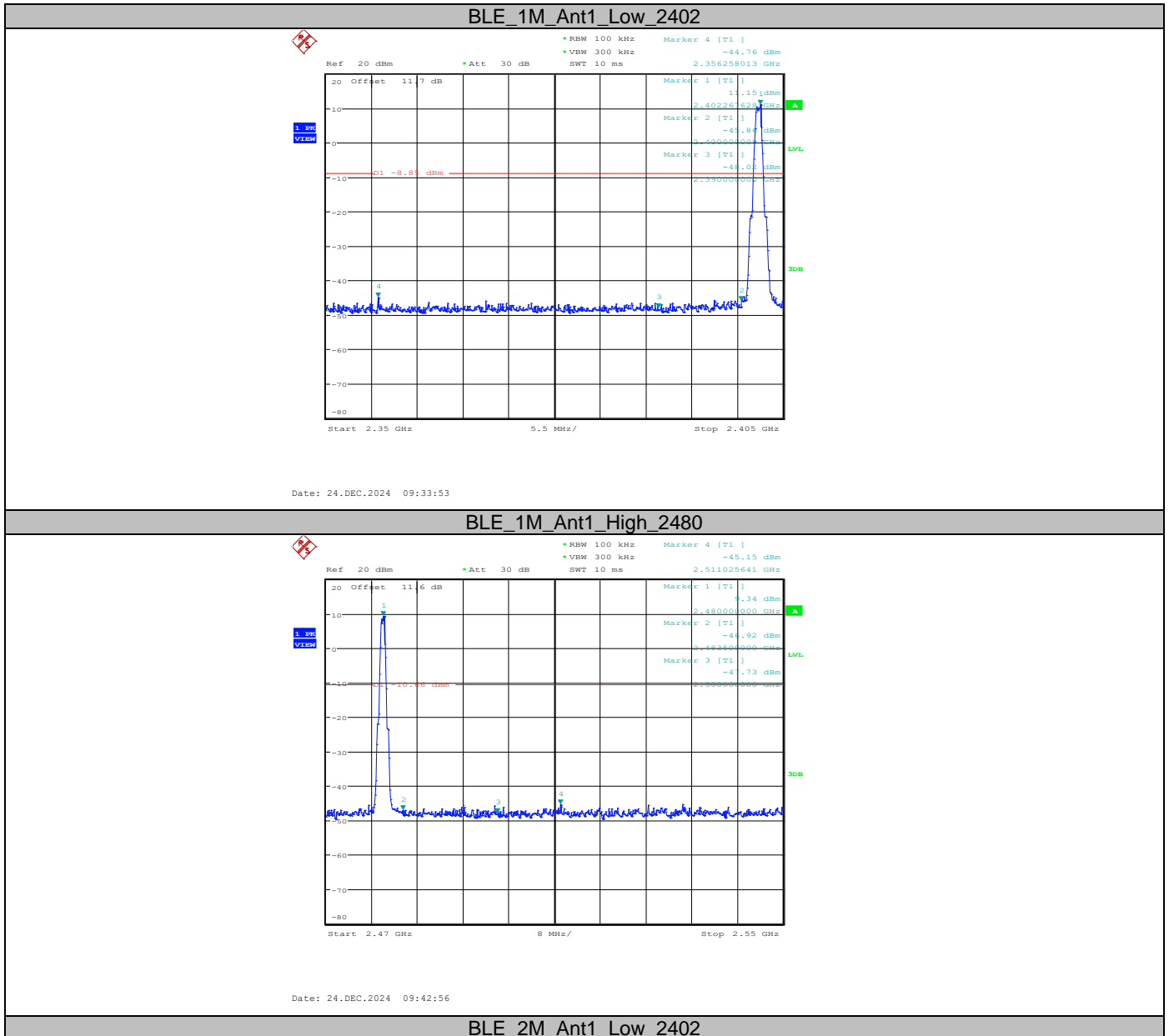
Establish a reference level by using the following procedure:

- a)Set instrument center frequency to DTS channel center frequency.
  - b)Set the span to  $\geq 1.5$  times the DTS bandwidth.
  - c)Set the RBW = 100 kHz.
  - d)Set the VBW  $\geq 3 \times$  RBW.
  - e)Detector = peak.
  - f)Sweep time = auto couple.
  - g)Trace mode = max hold.
  - h)Allow trace to fully stabilize.
  - i)Use the peak marker function to determine the maximum PSD level.
- Emission level measurement
- a)Set the center frequency and span to encompass frequency range to be measured.
  - b)Set the RBW = 100 kHz.
  - c)Set the VBW  $\geq 3 \times$  RBW.
  - d)Detector = peak.
  - e)Ensure that the number of measurement points  $\geq$  span/RBW
  - f)Sweep time = auto couple.
  - g)Trace mode = max hold.
  - h)Allow trace to fully stabilize.
  - i)Use the peak marker function to determine the maximum amplitude level.

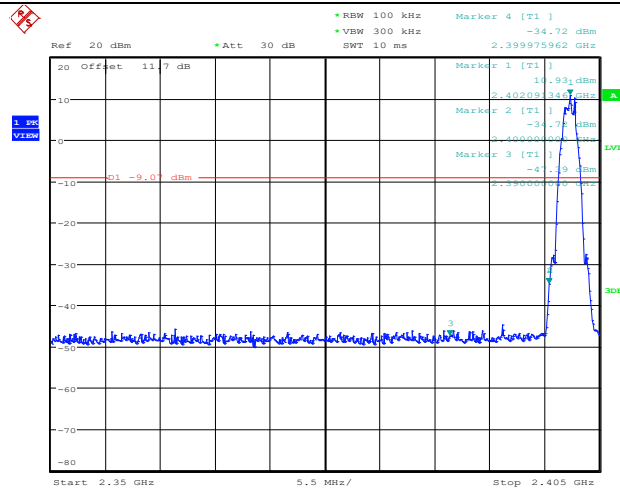
### **8.3. Test Data**

Table 9 Band edge Test Data

| TestMode | Antenna | ChName | Frequency[MHz] | RefLevel | Result | Limit   | Verdict |
|----------|---------|--------|----------------|----------|--------|---------|---------|
| BLE_1M   | Ant1    | Low    | 2402           | 11.15    | -44.76 | ≤-8.85  | PASS    |
|          |         | High   | 2480           | 9.34     | -45.15 | ≤-10.66 | PASS    |
| BLE_2M   | Ant1    | Low    | 2402           | 10.93    | -34.72 | ≤-9.07  | PASS    |
|          |         | High   | 2480           | 9.25     | -45.51 | ≤-10.75 | PASS    |

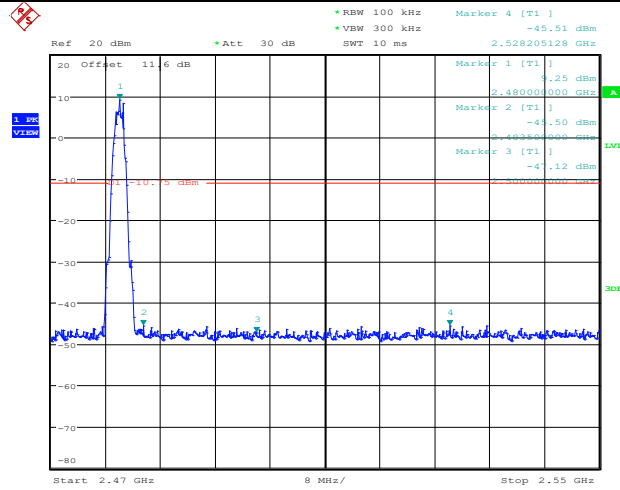






Date: 24.DEC.2024 09:48:45

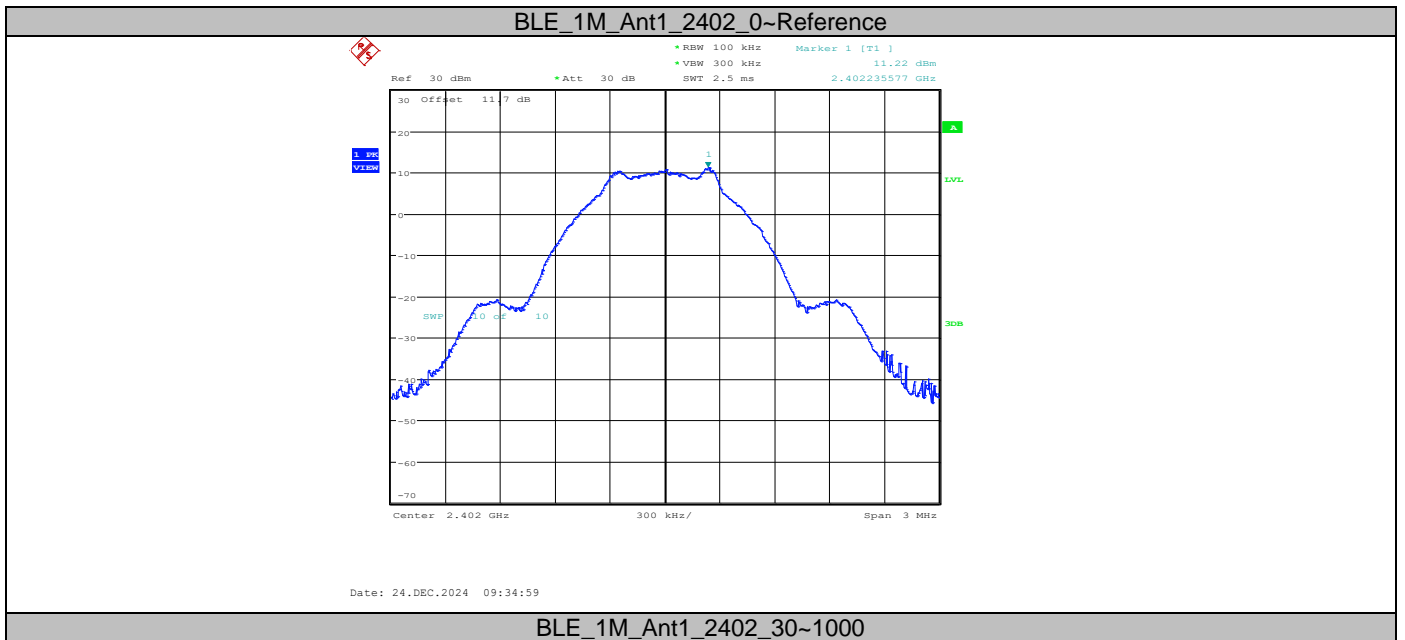
### BLE\_2M\_Ant1\_High\_2480

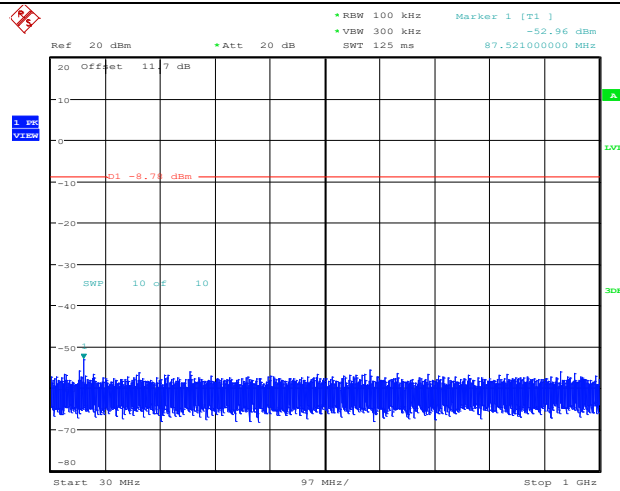


Date: 24.DEC.2024 09:54:38

Table 10 Conducted Spurious Emission Test Data

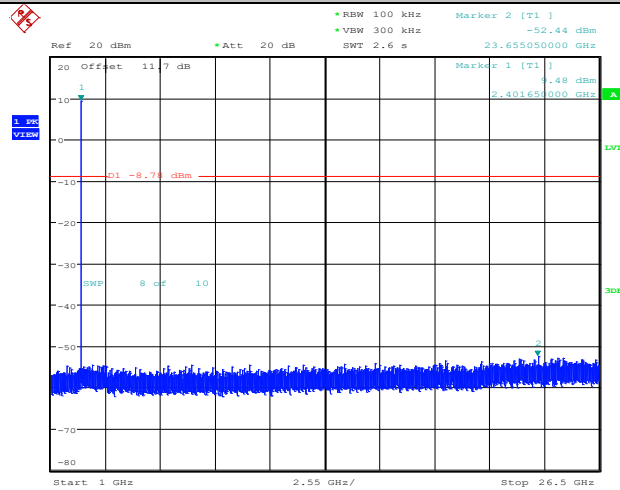
| TestMode | Antenna | Frequency[MHz] | FreqRange [MHz] | RefLevel | Result | Limit         | Verdict |
|----------|---------|----------------|-----------------|----------|--------|---------------|---------|
| BLE_1M   | Ant1    | 2402           | Reference       | 11.22    | 11.22  | ---           | PASS    |
|          |         |                | 30~1000         | 11.22    | -52.96 | $\leq -8.78$  | PASS    |
|          |         |                | 1000~26500      | 11.22    | -52.44 | $\leq -8.78$  | PASS    |
|          |         | 2440           | Reference       | 10.67    | 10.67  | ---           | PASS    |
|          |         |                | 30~1000         | 10.67    | -54.46 | $\leq -9.33$  | PASS    |
|          |         |                | 1000~26500      | 10.67    | -50.91 | $\leq -9.33$  | PASS    |
|          |         | 2480           | Reference       | 9.33     | 9.33   | ---           | PASS    |
|          |         |                | 30~1000         | 9.33     | -55.44 | $\leq -10.67$ | PASS    |
|          |         |                | 1000~26500      | 9.33     | -52.31 | $\leq -10.67$ | PASS    |
| BLE_2M   | Ant1    | 2402           | Reference       | 10.77    | 10.77  | ---           | PASS    |
|          |         |                | 30~1000         | 10.77    | -53.42 | $\leq -9.23$  | PASS    |
|          |         |                | 1000~26500      | 10.77    | -52.85 | $\leq -9.23$  | PASS    |
|          |         | 2440           | Reference       | 10.48    | 10.48  | ---           | PASS    |
|          |         |                | 30~1000         | 10.48    | -54.25 | $\leq -9.52$  | PASS    |
|          |         |                | 1000~26500      | 10.48    | -52.33 | $\leq -9.52$  | PASS    |
|          |         | 2480           | Reference       | 9.15     | 9.15   | ---           | PASS    |
|          |         |                | 30~1000         | 9.15     | -55.77 | $\leq -10.85$ | PASS    |
|          |         |                | 1000~26500      | 9.15     | -52.73 | $\leq -10.85$ | PASS    |





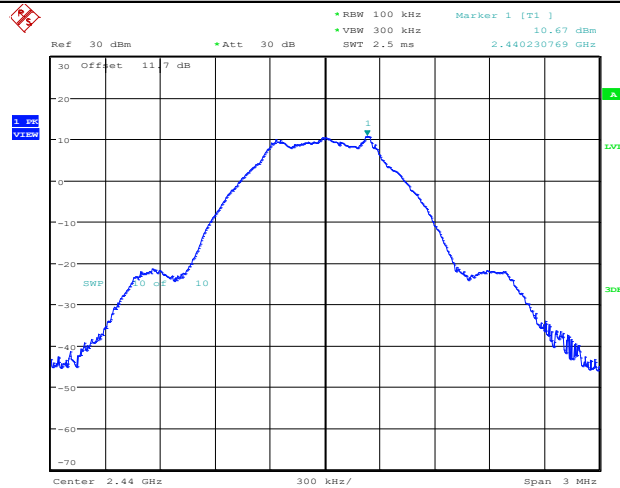
Date: 24.DEC.2024 09:35:08

#### BLE\_1M\_Ant1\_2402\_1000~26500



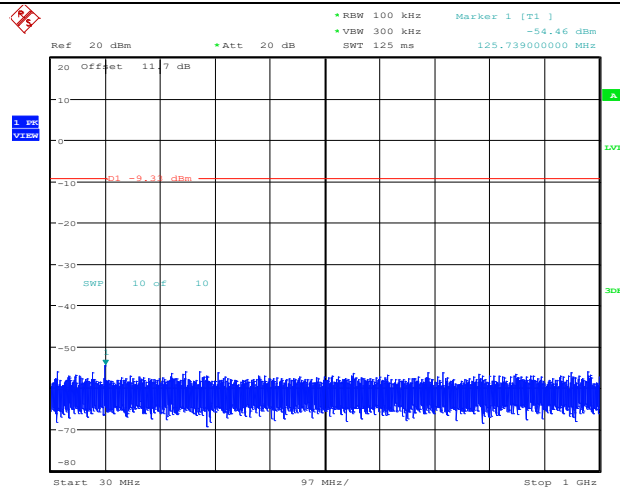
Date: 24.DEC.2024 09:35:31

#### BLE\_1M\_Ant1\_2440\_0~Reference



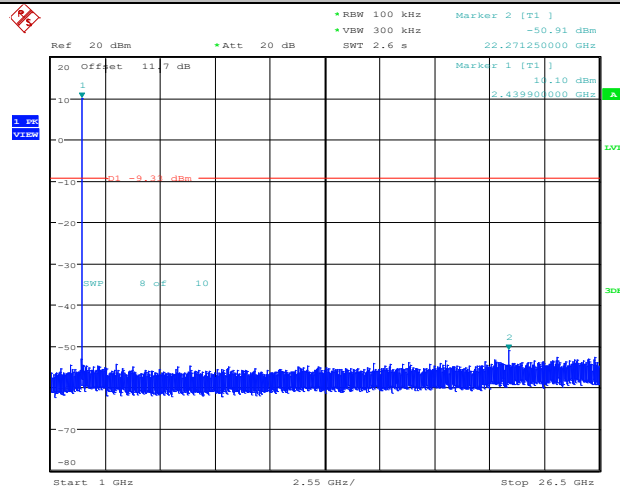
Date: 24.DEC.2024 09:37:31

#### BLE\_1M\_Ant1\_2440\_30~1000



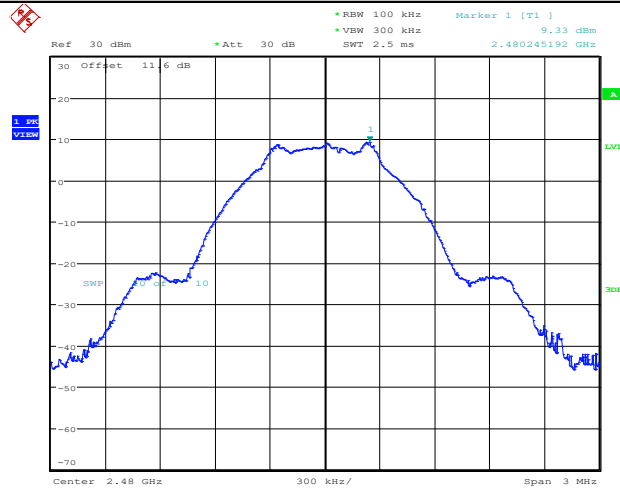
Date: 24.DEC.2024 09:37:40

#### BLE\_1M\_Ant1\_2440\_1000~26500



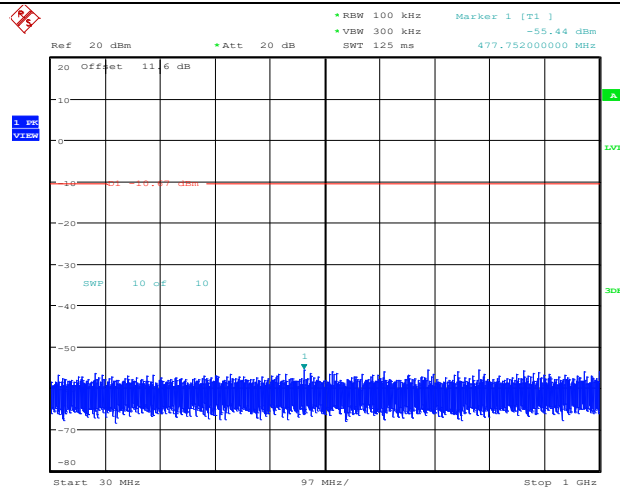
Date: 24.DEC.2024 09:38:03

#### BLE\_1M\_Ant1\_2480\_0~Reference



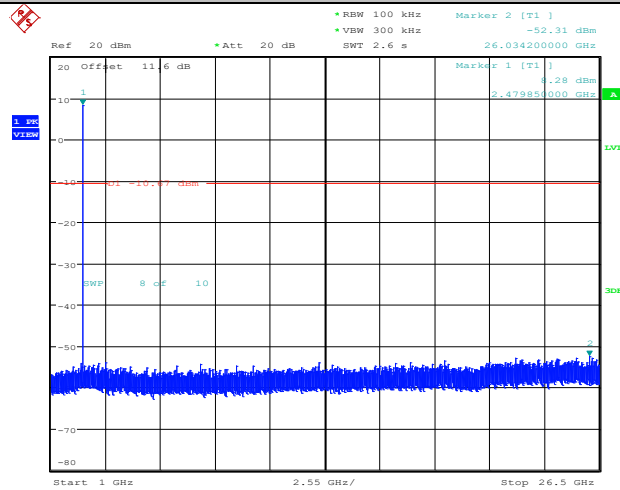
Date: 24.DEC.2024 09:44:01

#### BLE\_1M\_Ant1\_2480\_30~1000



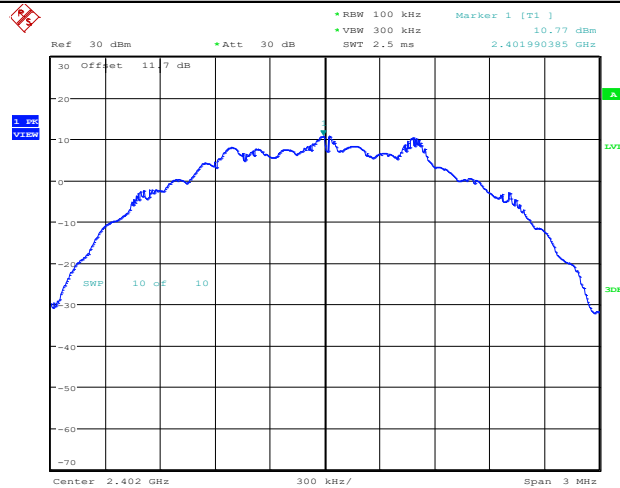
Date: 24.DEC.2024 09:44:10

#### BLE\_1M\_Ant1\_2480\_1000~26500



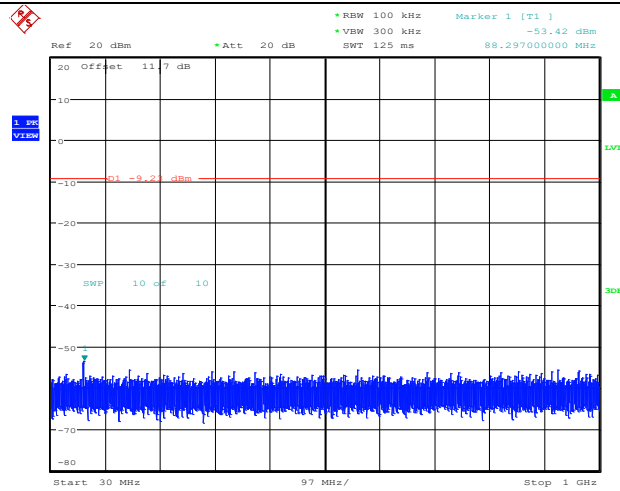
Date: 24.DEC.2024 09:44:33

#### BLE\_2M\_Ant1\_2402\_0~Reference



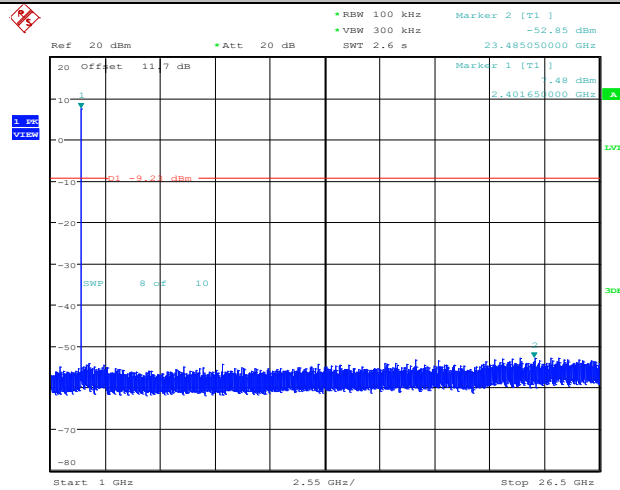
Date: 24.DEC.2024 09:49:50

#### BLE\_2M\_Ant1\_2402\_30~1000



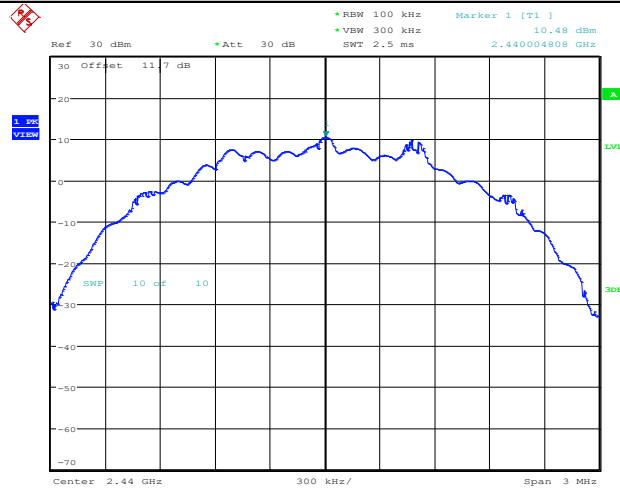
Date: 24.DEC.2024 09:49:59

#### BLE\_2M\_Ant1\_2402\_1000~26500



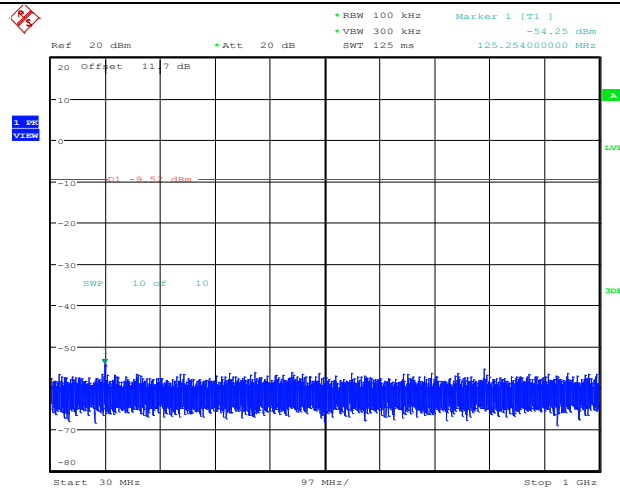
Date: 24.DEC.2024 09:50:22

#### BLE\_2M\_Ant1\_2440\_0~Reference



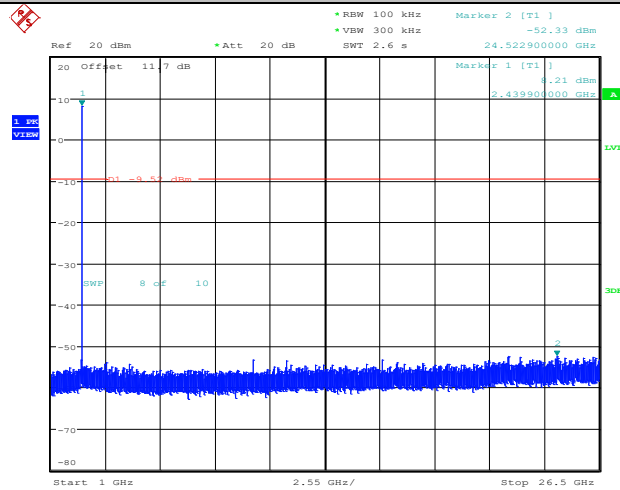
Date: 24.DEC.2024 09:52:17

#### BLE\_2M\_Ant1\_2440\_30~1000



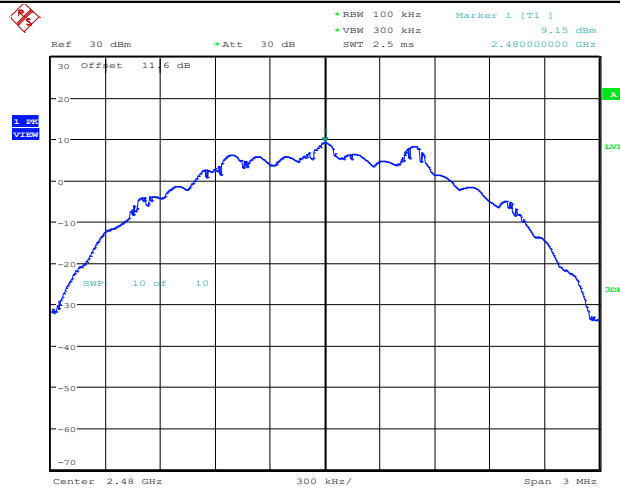
Date: 24.DEC.2024 09:52:26

#### BLE\_2M\_Ant1\_2440\_1000~26500



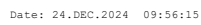
Date: 24.DEC.2024 09:52:49

#### BLE\_2M\_Ant1\_2480\_0~Reference



Date: 24.DEC.2024 09:55:43

#### BLE\_2M\_Ant1\_2480\_30~1000





## 9. RADIATED BANDEDGE AND SPURIOUS MEASUREMENT

### 9.1.Limits of Radiated Bandedge and Spurious Measurement

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v05r02  
RSS-247 Clause 5.5 and RSS GEN Clause 8.9

Table 11 Radiation Emission Test Limit (9KHz-1GHz)

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 0.009~0.490        | 2400/F(KHz)                          | 300                              |
| 0.490~1.705        | 24000/F(KHz)                         | 30                               |
| 1.705~30.0         | 30                                   | 30                               |
| 30~88              | 100                                  | 3                                |
| 88~216             | 150                                  | 3                                |
| 216~960            | 200                                  | 3                                |
| 960~1000           | 500                                  | 3                                |

Table 12 Radiation Emission Test Limit (Above 1G)

| Frequency (MHz) | (dBuV/m) (at 3 meters) |         |
|-----------------|------------------------|---------|
|                 | PEAK                   | AVERAGE |
| Above 1000      | 74                     | 54      |

Table 13 Restricted Band Radiated Emission Data

| 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           | 2483.5 - 2500   | 17.7-21.4        |
| 8.37625 - 8.38675          | 156.52525           | 2655 - 2900     | 22.01-23.12      |
| 8.41425 - 8.41475          | 156.7 - 156.9       | 3260 - 3267     | 23.6-24.0        |
| 12.29 - 12.293             | 162.0125 - 167.17   | 3332 - 3339     | 31.2-31.8        |
| 12.51975 -                 | 167.72 - 173.2      | 3345.8 - 3358   | 36.43-36.5       |
| 12.52025                   | 240 - 285           | 3600 - 4400     | ( <sup>2</sup> ) |
| 12.57675 -                 | 322 - 335.4         |                 |                  |
| 12.57725                   |                     |                 |                  |

|               |  |  |  |
|---------------|--|--|--|
| 13.36 - 13.41 |  |  |  |
|---------------|--|--|--|

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

## 9.2. Test Procedure

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. For measurement below 1GHz, the EUT was placed on a turntable with 0.8meter, above ground. For measurement above 1 GHz, test at FAR, the EUT is placed on a non-conductive table, which is 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f > 1$  GHz for peak measurement. Set RBW = 1 MHz, and 1/T (on time) for average measurement.

## 9.3. Test Data

9 kHz-30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Table 14 Radiated Emission Test Data 9k Hz-30MHz

| Frequency (MHz) | Cable Loss +preamp (dB) | Antenna Factor (dB) | Reading (dB $\mu$ V/m) | Level (dB $\mu$ V/m) | Polarity (H/V) | Limit (dB $\mu$ V/m) | Margin (dB) | Note |
|-----------------|-------------------------|---------------------|------------------------|----------------------|----------------|----------------------|-------------|------|
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |
| --              | --                      | --                  | --                     | --                   | --             | --                   | --          | --   |

### 30 MHz-1 GHz

Worst case is shown below for 30MHz-1GHz only.

The emissions don't show in following result tables are more than 20dB below the limits.

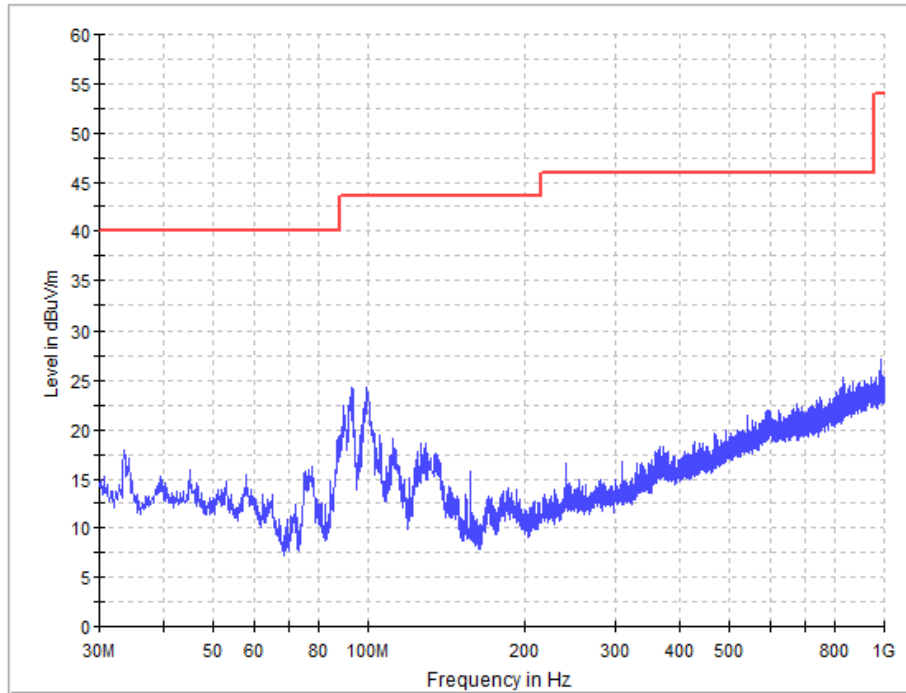
Table 15 Radiated Emission Test Data 30MHz-1GHz

| Frequency (MHz) | Cable Loss +preamp (dB) | Antenna Factor (dB) | Reading (dBμV/m) | Level (dBμV/m) | Polarity (Horizontal/ Vertical) | Limit (dBμV/m) | Margin (dB) | Note |
|-----------------|-------------------------|---------------------|------------------|----------------|---------------------------------|----------------|-------------|------|
| 33.449          | 0.7                     | 12.3                | 14.7             | 27.7           | Vertical                        | 40.0           | 12.3        | QP   |
| 57.806          | 0.8                     | 13.0                | 13.7             | 27.5           | Vertical                        | 40.0           | 12.5        | QP   |
| 78.284          | 1.1                     | 7.8                 | 16.2             | 25.1           | Vertical                        | 40.0           | 14.9        | QP   |
| 92.511          | 1.1                     | 11.9                | 17.2             | 30.2           | Vertical                        | 43.5           | 13.3        | QP   |
| 99.517          | 1.1                     | 12.8                | 10.4             | 24.3           | Vertical                        | 43.5           | 19.2        | QP   |
| 180.566         | 1.6                     | 9.7                 | 8.4              | 19.7           | Vertical                        | 43.5           | 23.8        | QP   |
| 33.448          | 0.7                     | 12.3                | 2.3              | 15.3           | Horizontal                      | 40             | 24.7        | QP   |
| 44.873          | 0.7                     | 13.6                | 1.5              | 15.8           | Horizontal                      | 40             | 24.2        | QP   |
| 77.745          | 1.0                     | 7.8                 | 3.5              | 12.3           | Horizontal                      | 40             | 27.7        | QP   |
| 93.050          | 1.1                     | 11.9                | 6.5              | 19.5           | Horizontal                      | 43.5           | 24.0        | QP   |
| 99.516          | 1.1                     | 12.8                | 9.0              | 22.9           | Horizontal                      | 43.5           | 20.6        | QP   |
| 129.587         | 1.3                     | 10.5                | 2.5              | 14.3           | Horizontal                      | 43.5           | 29.2        | QP   |

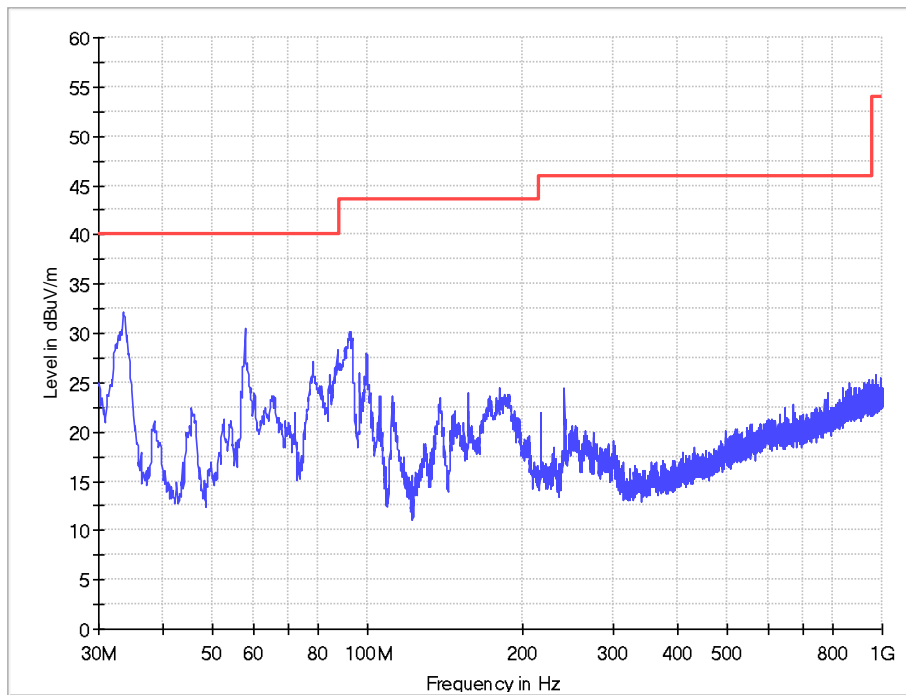
Remark: Emission level (dBμV) =Read Value(dBμV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

30MHz-1GHz

Horizontal

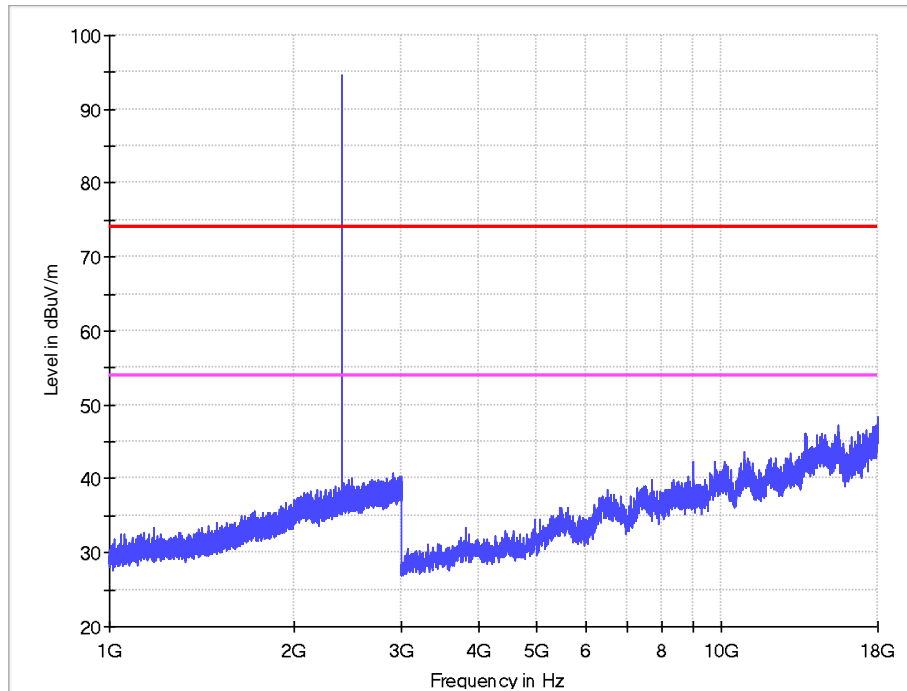


Vertical

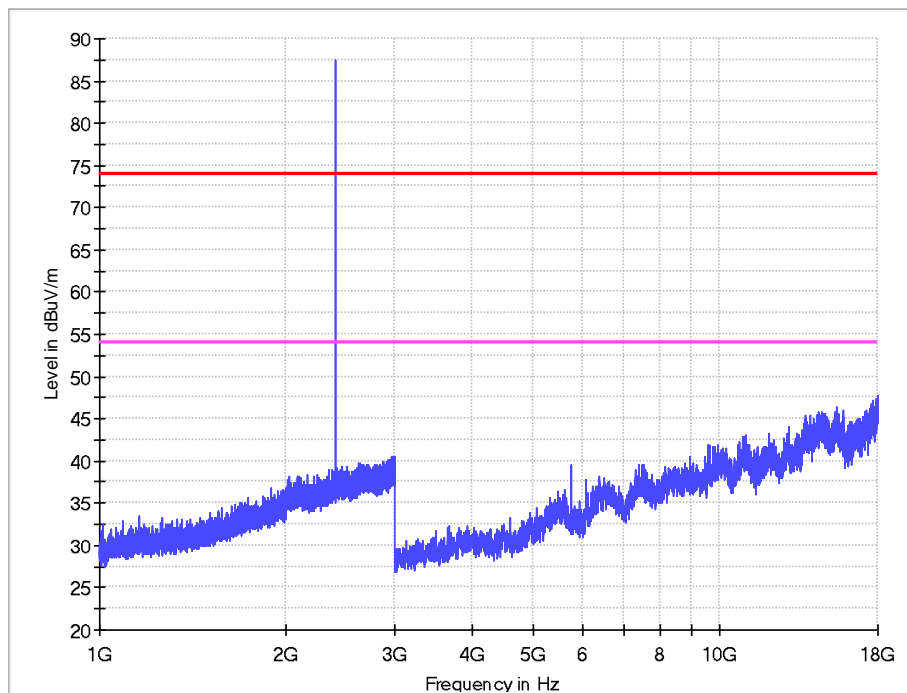


1-18 GHz

BLE\_1Mbps CH0  
Horizontal



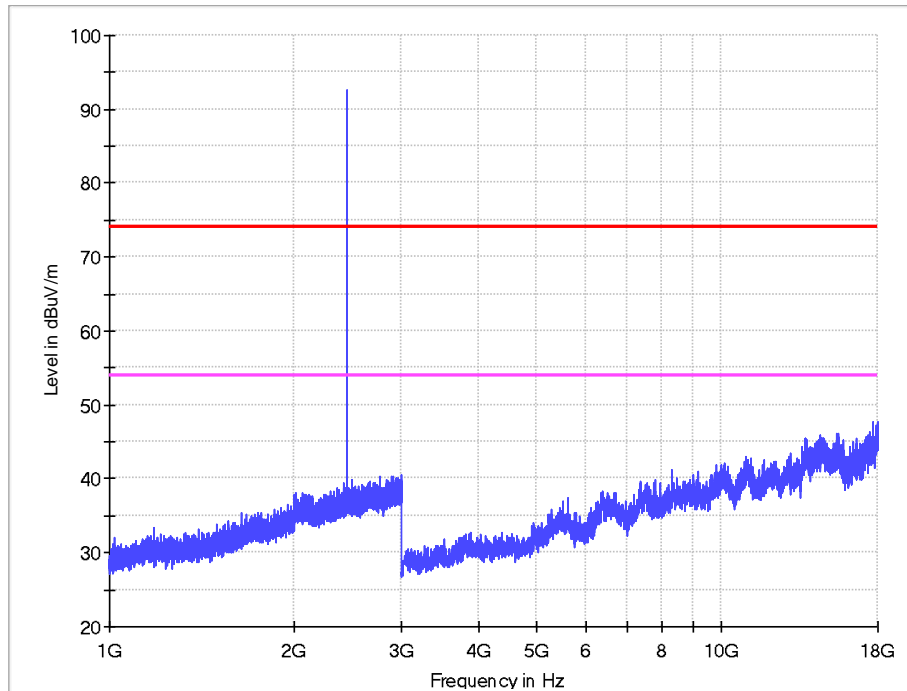
Vertical



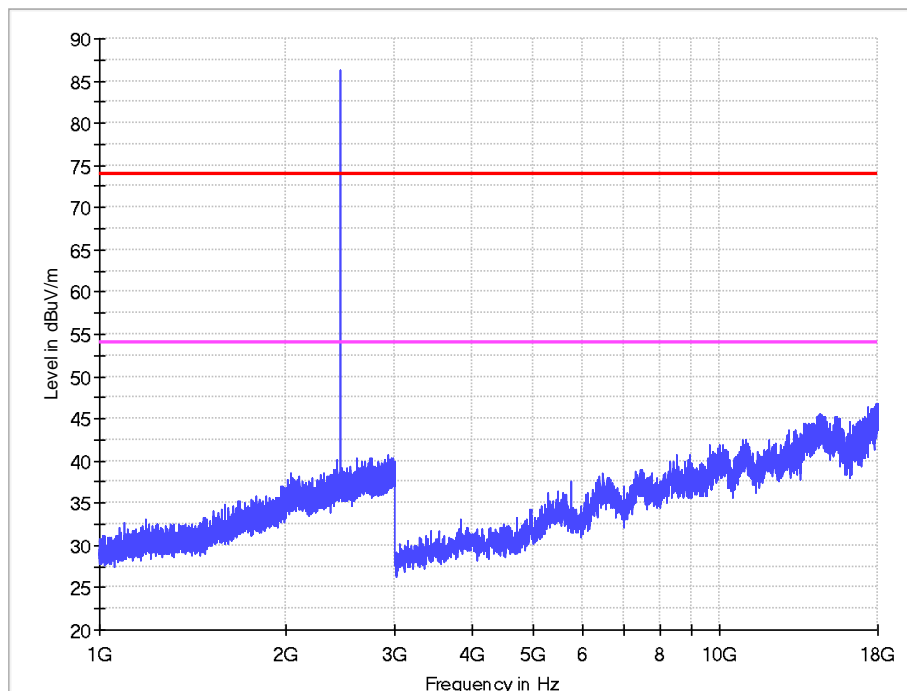
1-18 GHz

BLE\_1Mbps BLE CH19

Horizontal

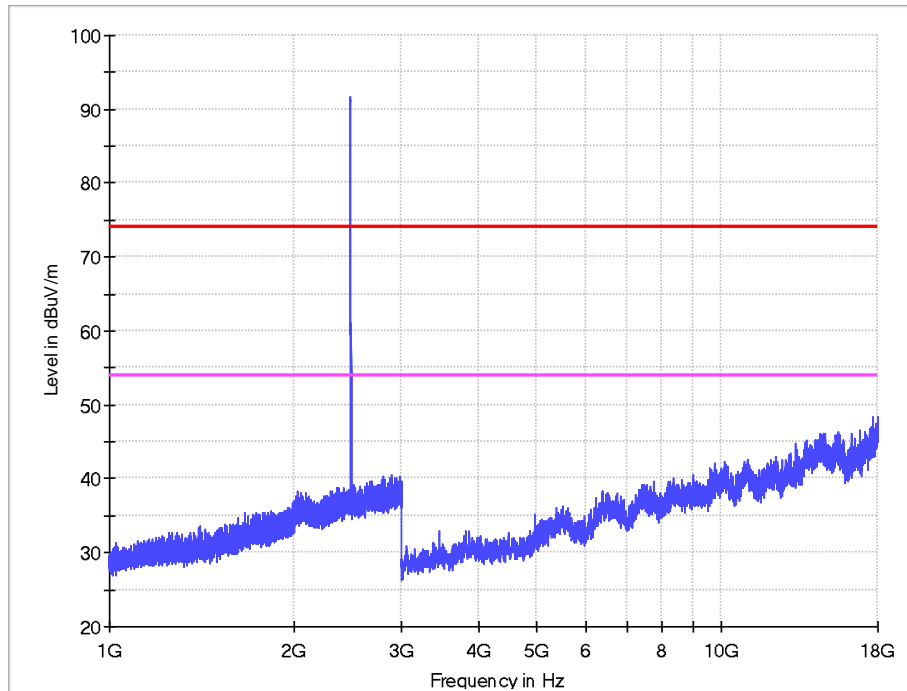


Vertical

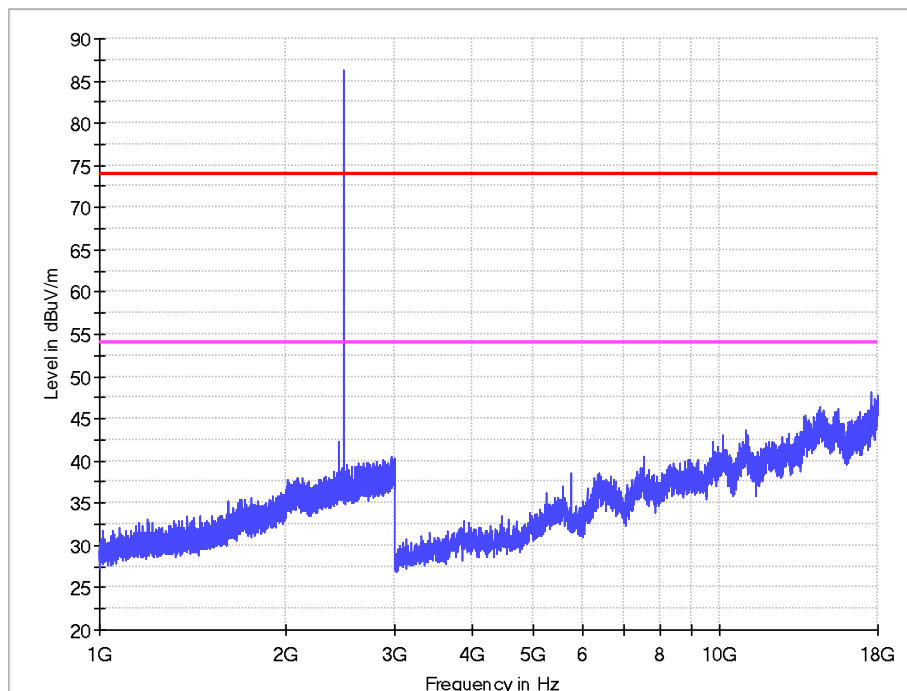


1-18 GHz

BLE\_1Mbps BLE CH39  
Horizontal



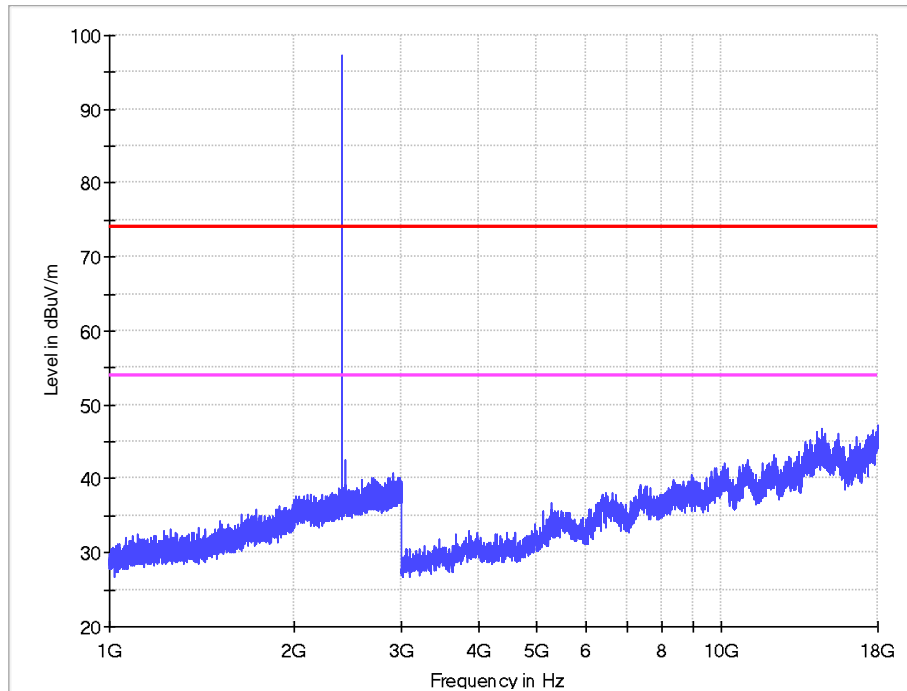
Vertical



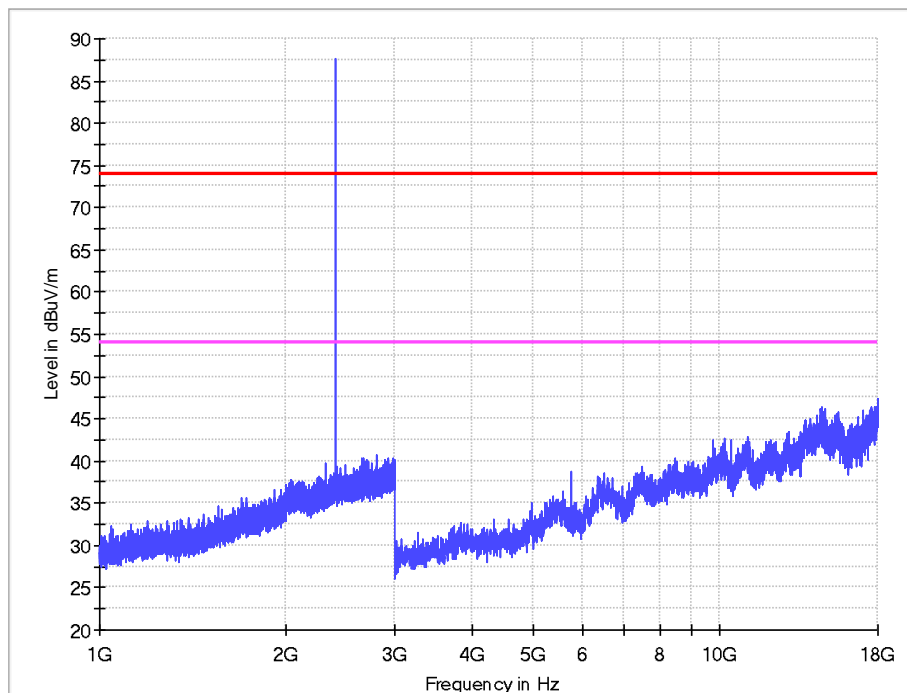
1-18 GHz

BLE\_2Mbps CH0

Horizontal



Vertical

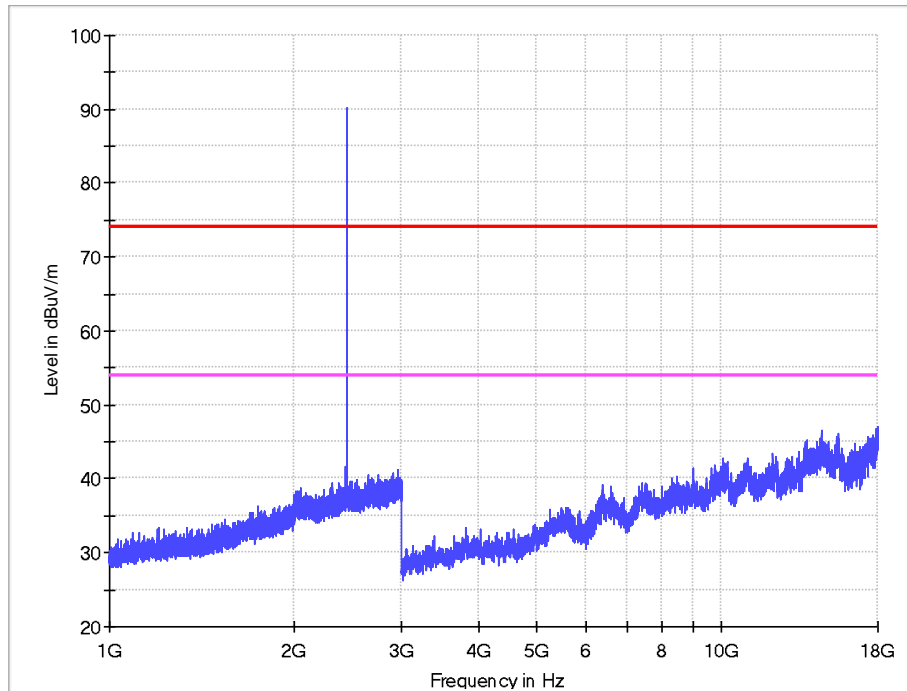




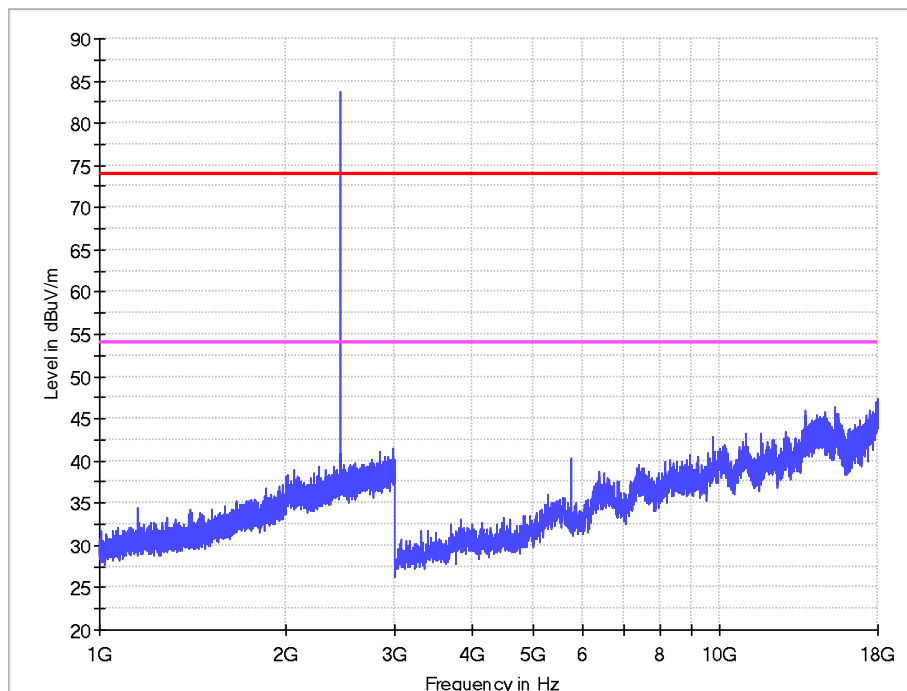
1-18 GHz

BLE\_2Mbps BLE CH19

Horizontal

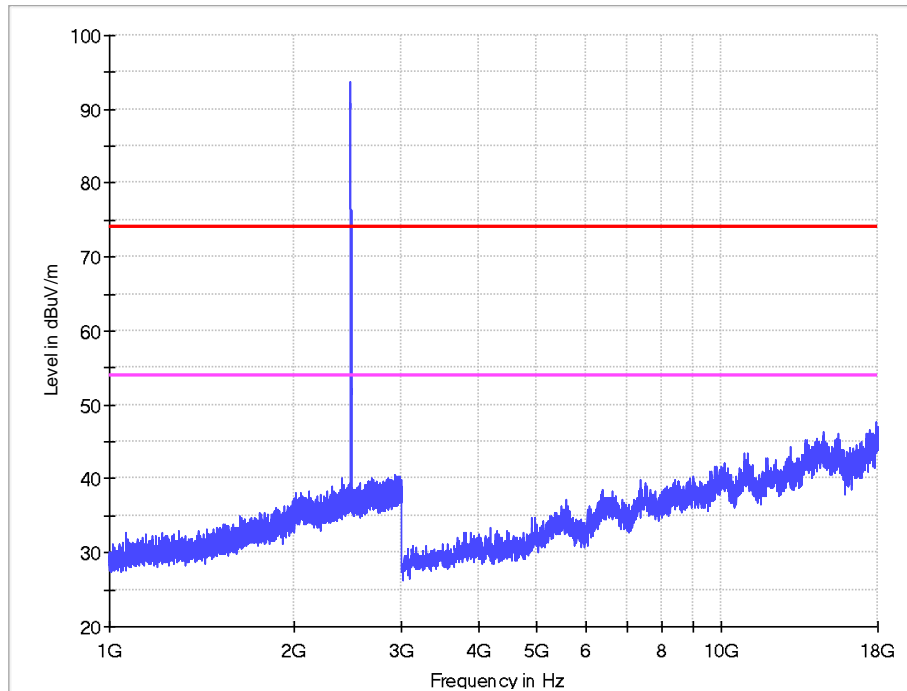


Vertical

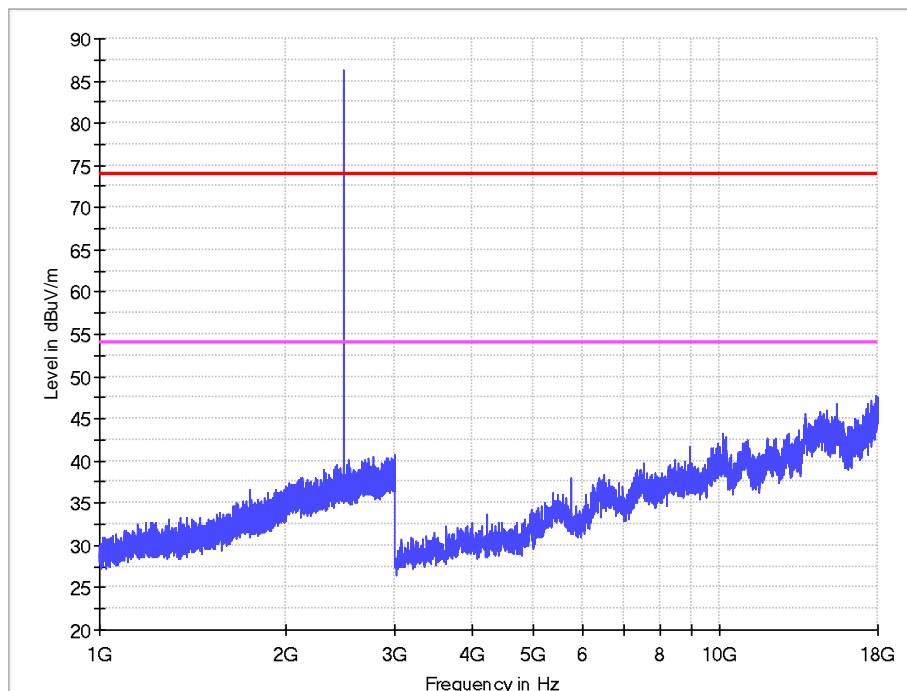


1-18 GHz

BLE\_2Mbps BLE CH39  
Horizontal

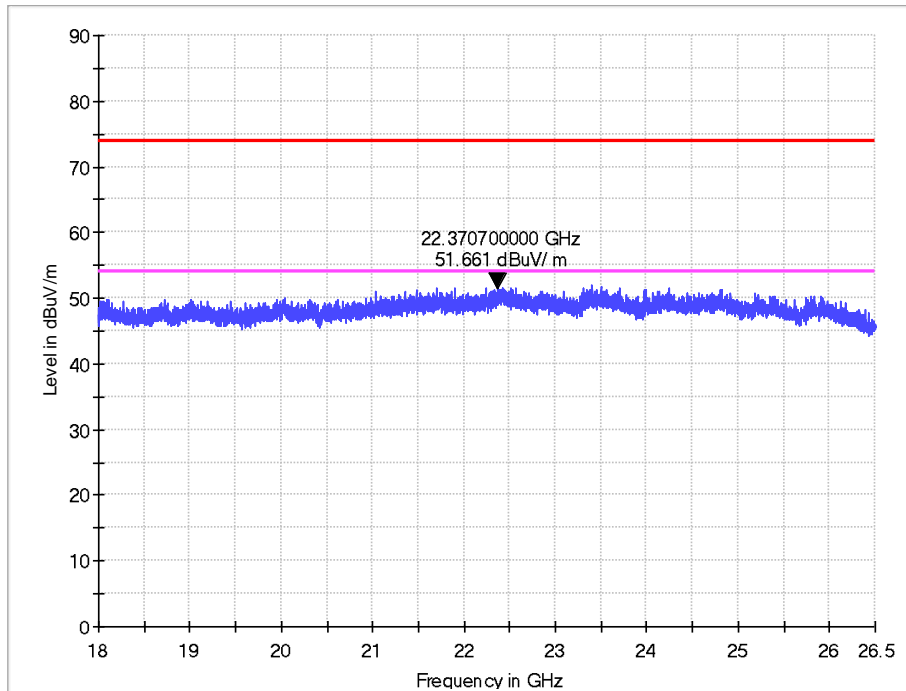


Vertical

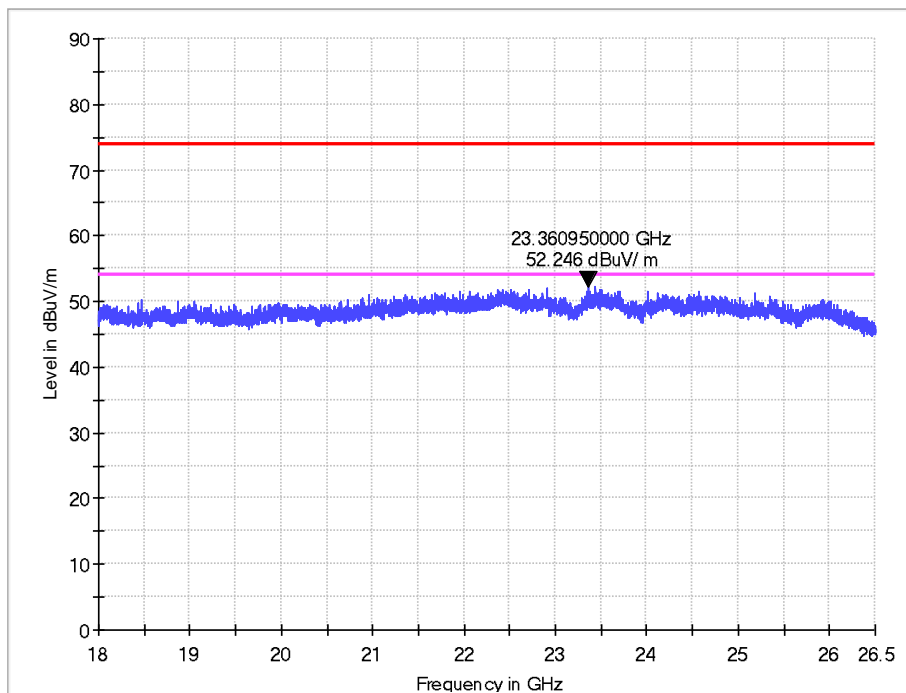


18-26.5 GHz

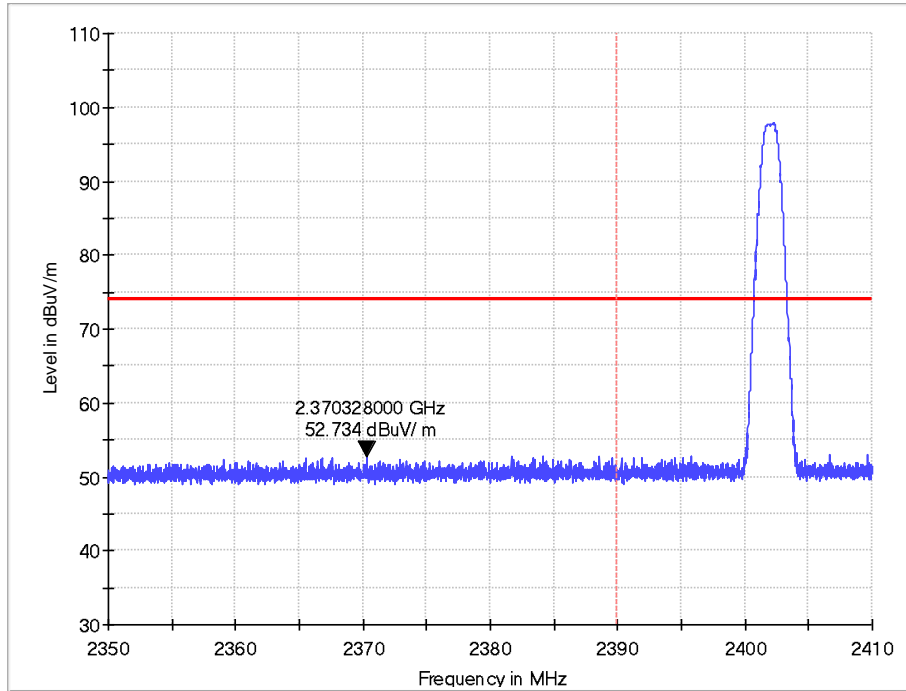
No Peak found in pre-scan, only worst case result is listed in this report.  
Horizontal



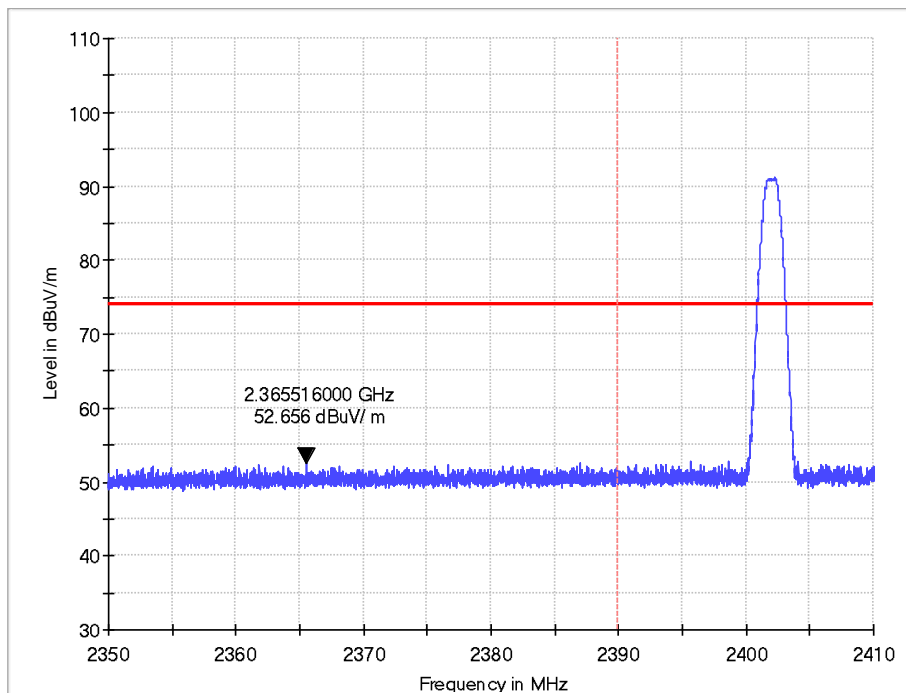
Vertical



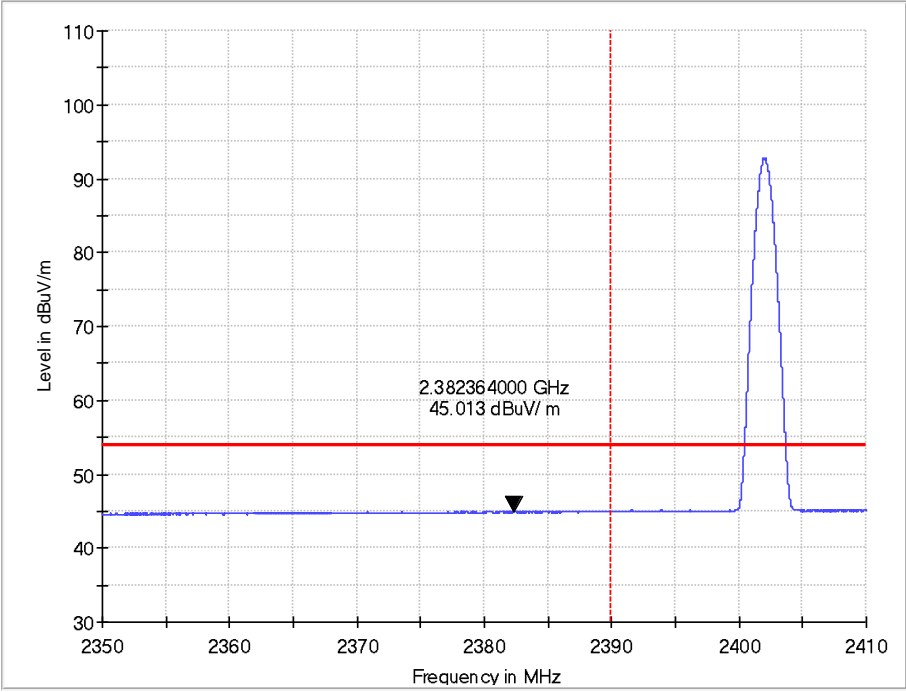
Band Edge  
BLE\_1Mbps BLE CH0  
PK  
Horizontal



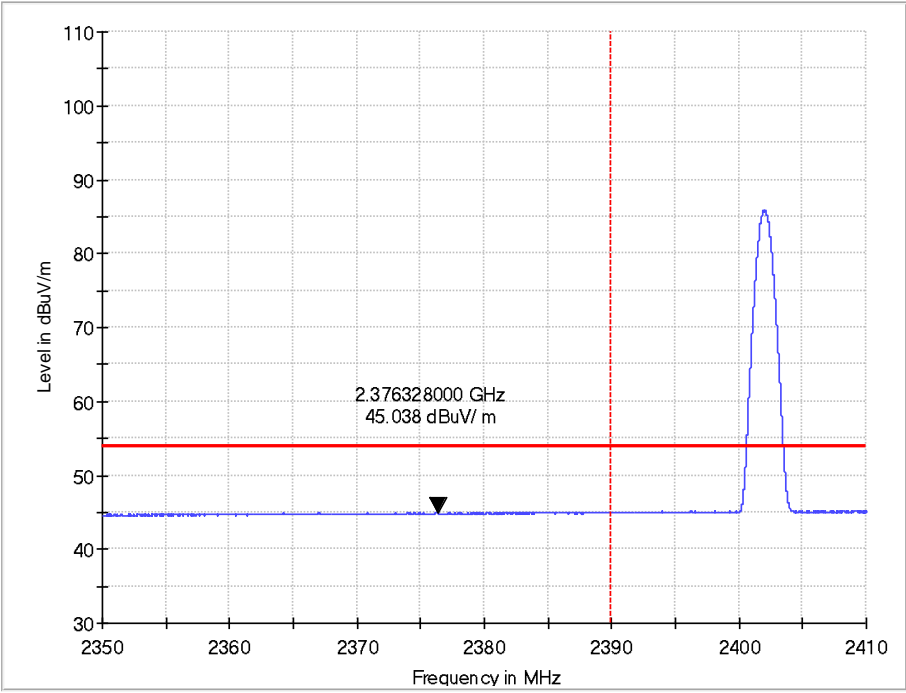
Vertical



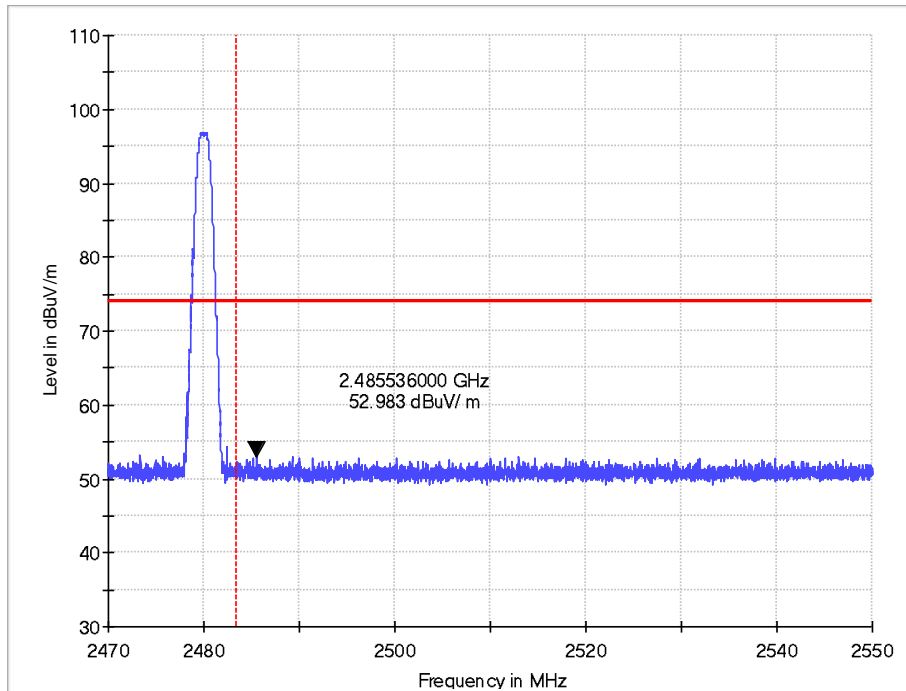
AV  
Horizontal



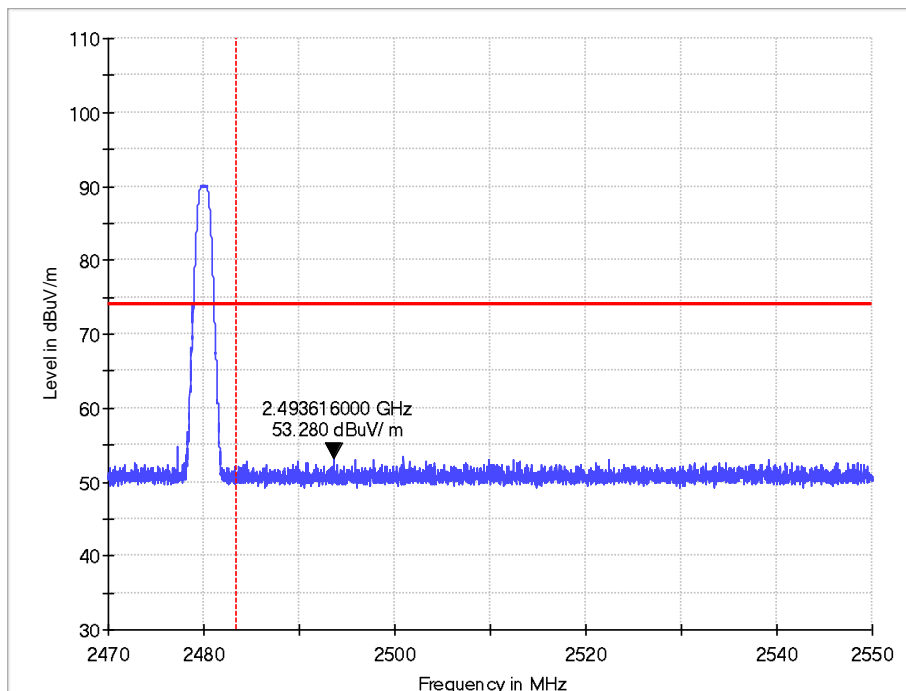
Vertical



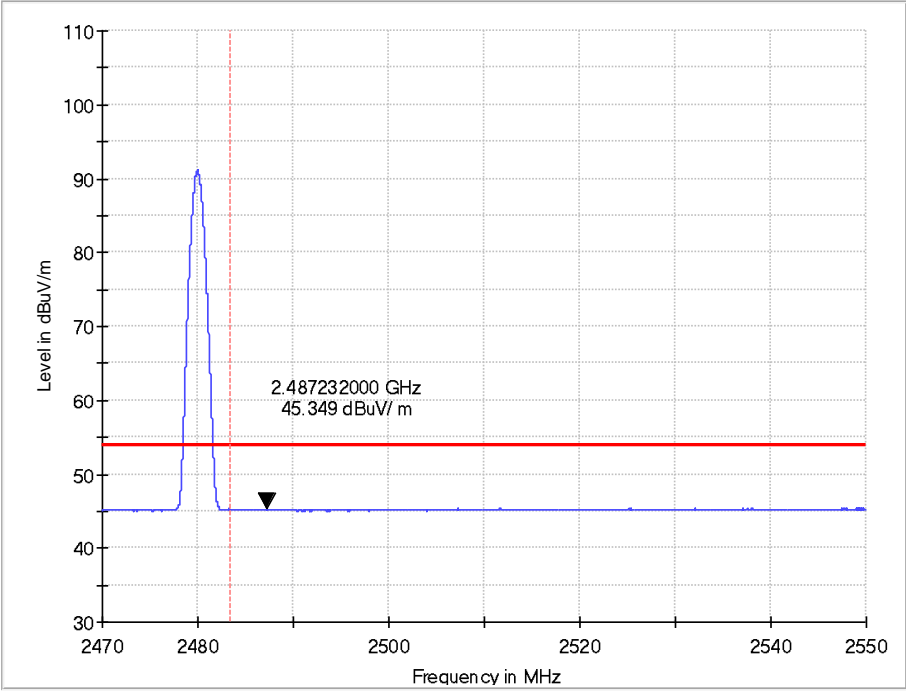
Band Edge  
BLE\_1Mbps BLE CH39  
PK  
Horizontal



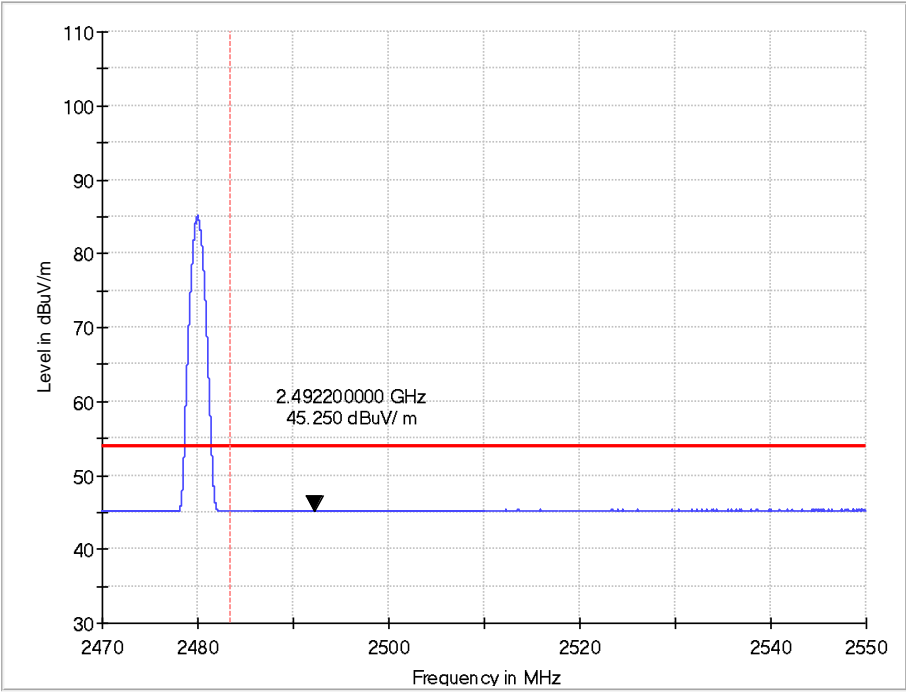
Vertical



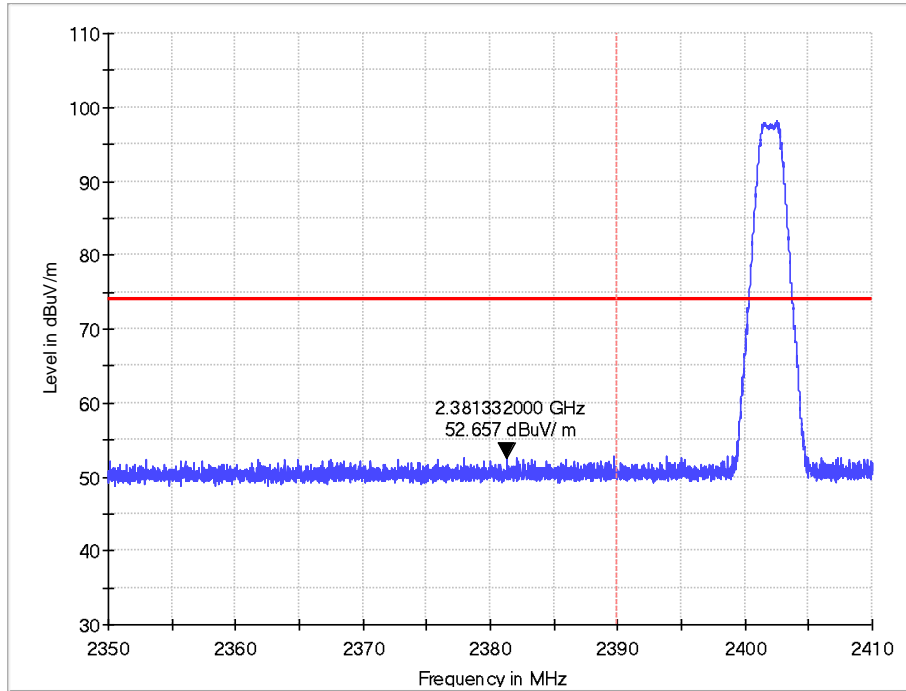
AV  
Horizontal



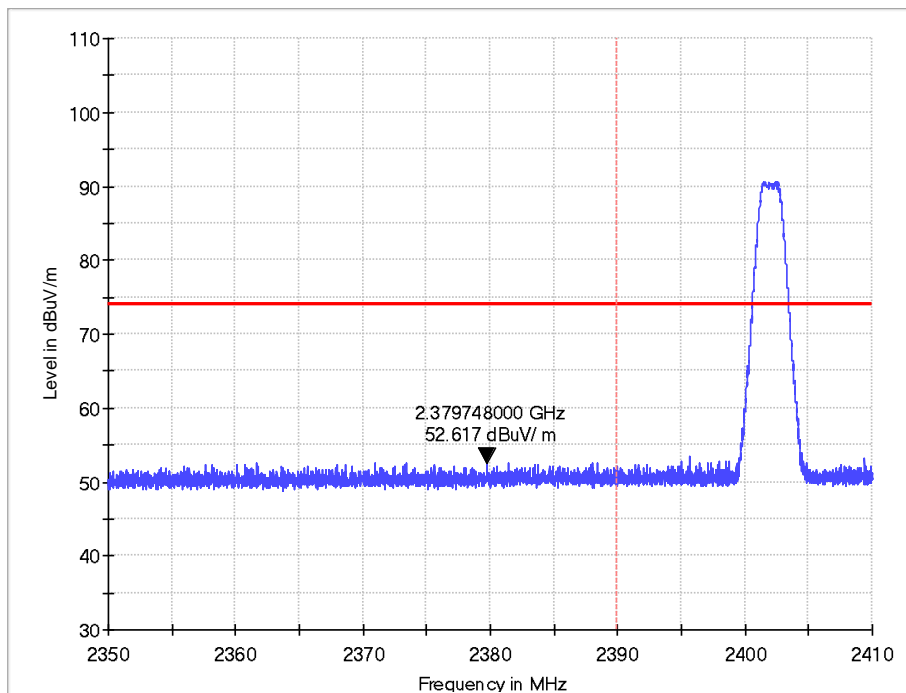
Vertical



Band Edge  
BLE\_2Mbps BLE CH0  
PK  
Horizontal

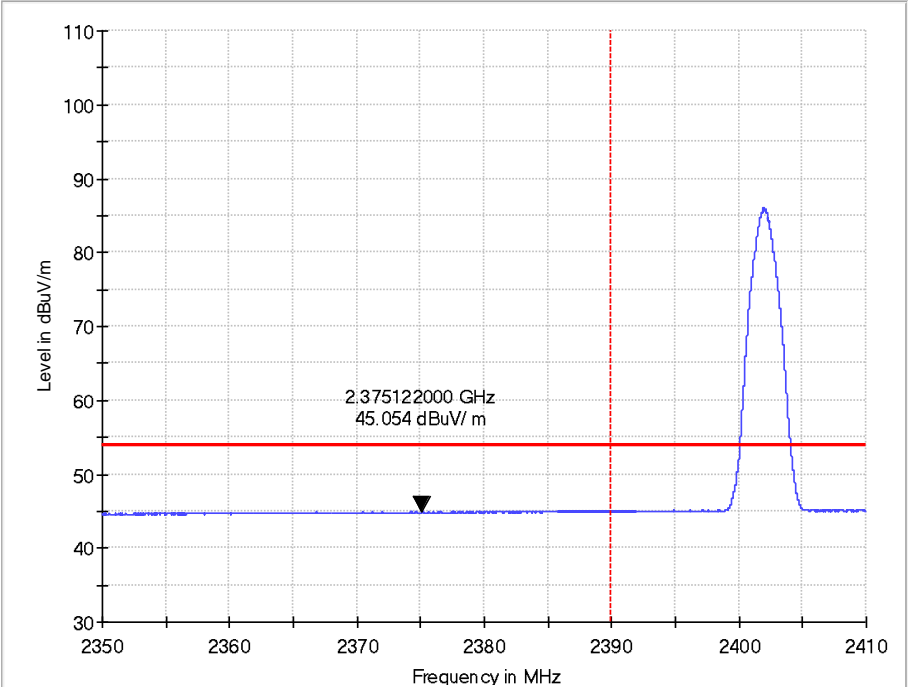


Vertical

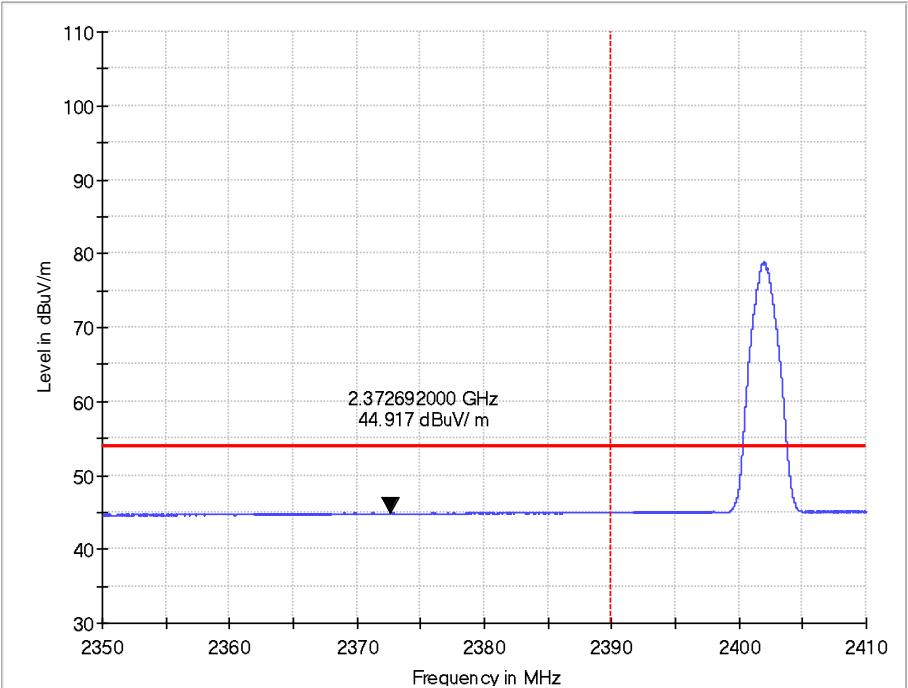




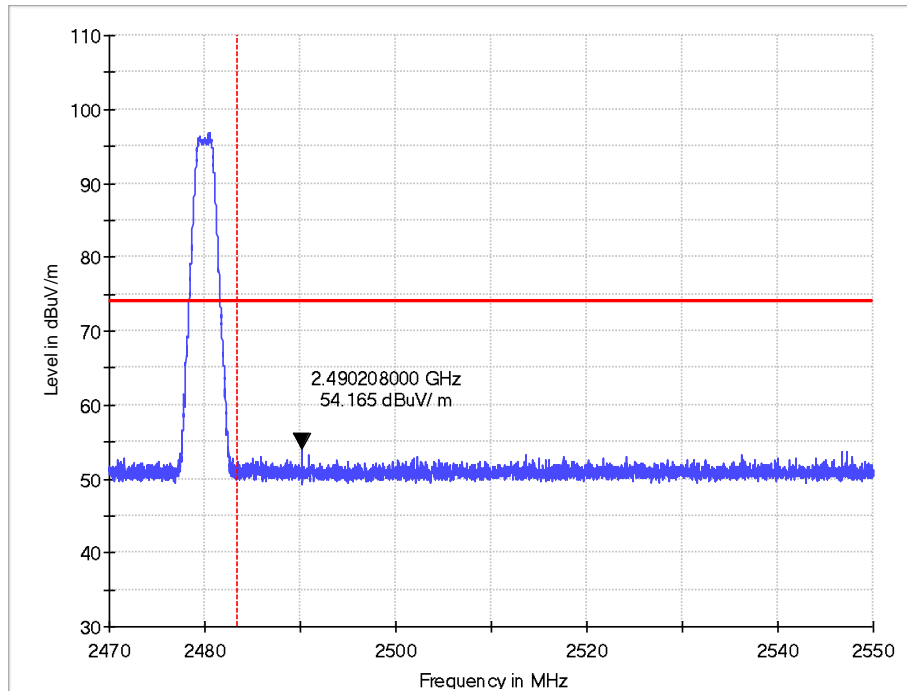
AV  
Horizontal



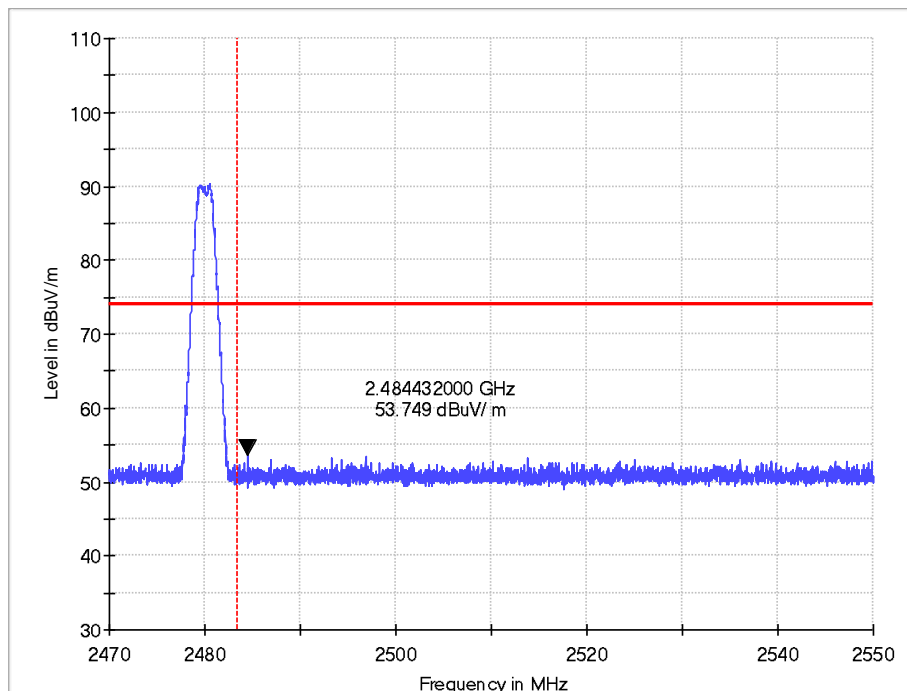
Vertical



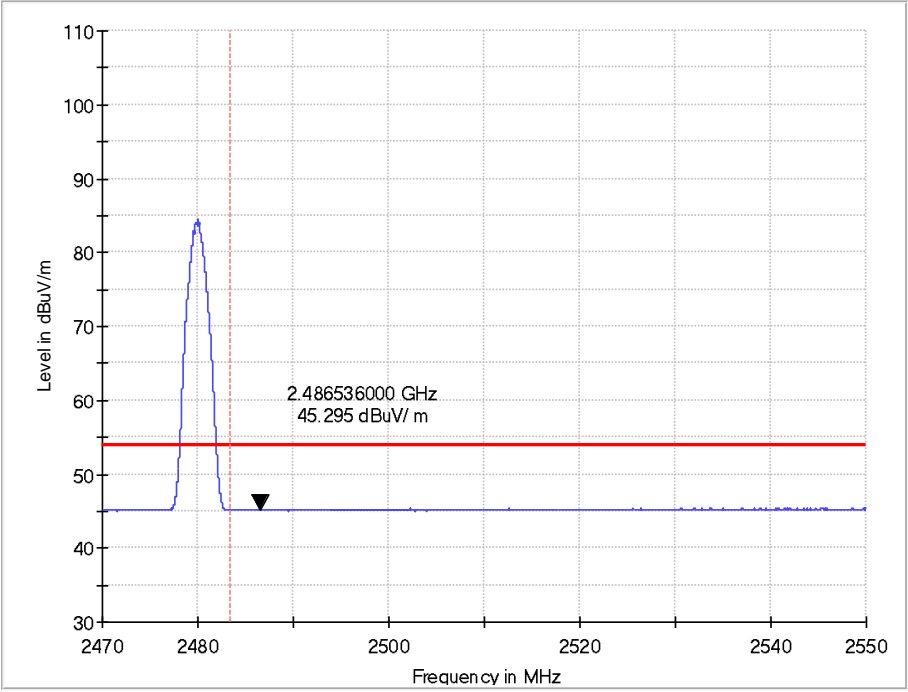
Band Edge  
BLE\_1Mbps BLE CH39  
PK  
Horizontal



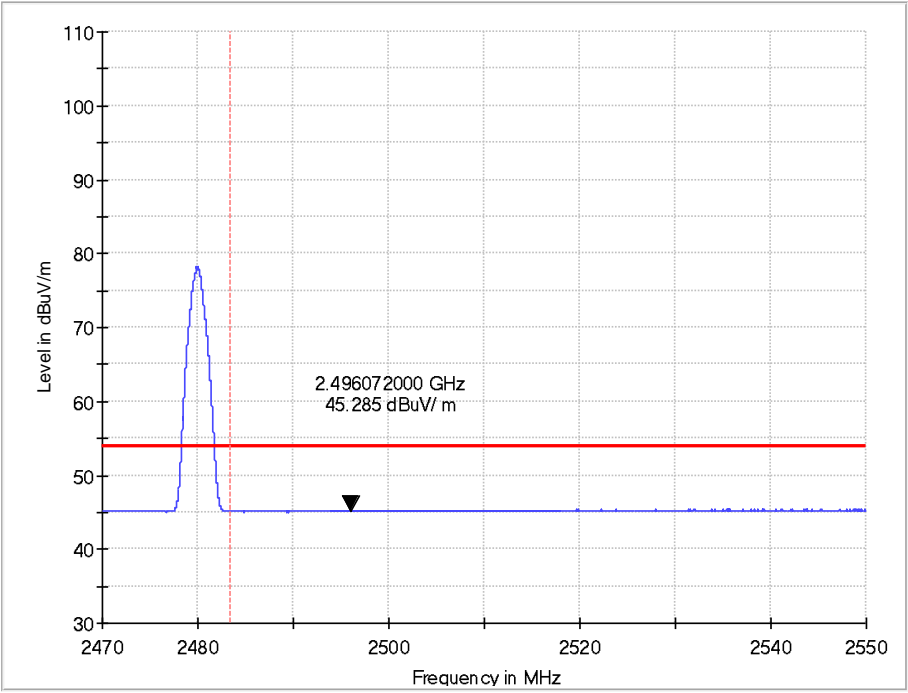
Vertical



AV  
Horizontal



Vertical



## 10. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

### 10.1. Test Standard and Limit

#### 10.1.1. Test Standard

FCC Part 15.207  
RSS-Gen Clause 8.8

#### 10.1.2. Test Limit

Table 16 Conducted Emission Test Limit

| Frequency     | Maximum RF Line Voltage (dB $\mu$ V) |               |
|---------------|--------------------------------------|---------------|
|               | Quasi-peak Level                     | Average Level |
| 150kHz~500kHz | 66 ~ 56 *                            | 56 ~ 46 *     |
| 500kHz~5MHz   | 56                                   | 46            |
| 5MHz~30MHz    | 60                                   | 50            |

\* Decreasing linearly with logarithm of the frequency

\* The lower limit shall apply at the transition frequency.

### 10.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver is used to test the emissions from both sides of AC line. According to the requirements of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

The bandwidth of EMI test receiver is set at 9 kHz.

### 10.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

### 10.4. Test Data

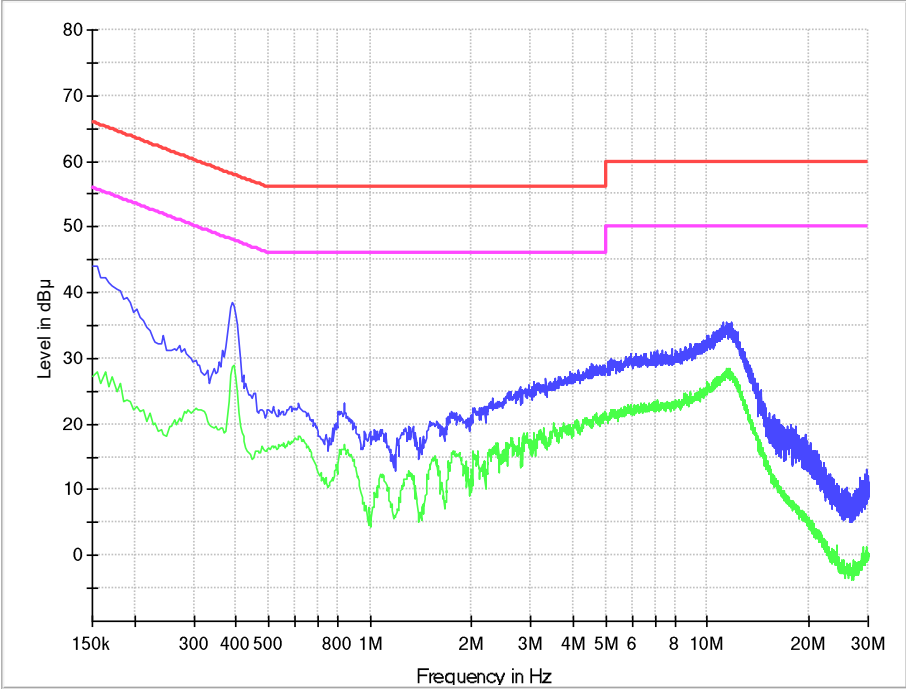
The emissions don't show in below are too low against the limits. Refer to the test curves.

**Table 17 Conducted Emission Test Data**

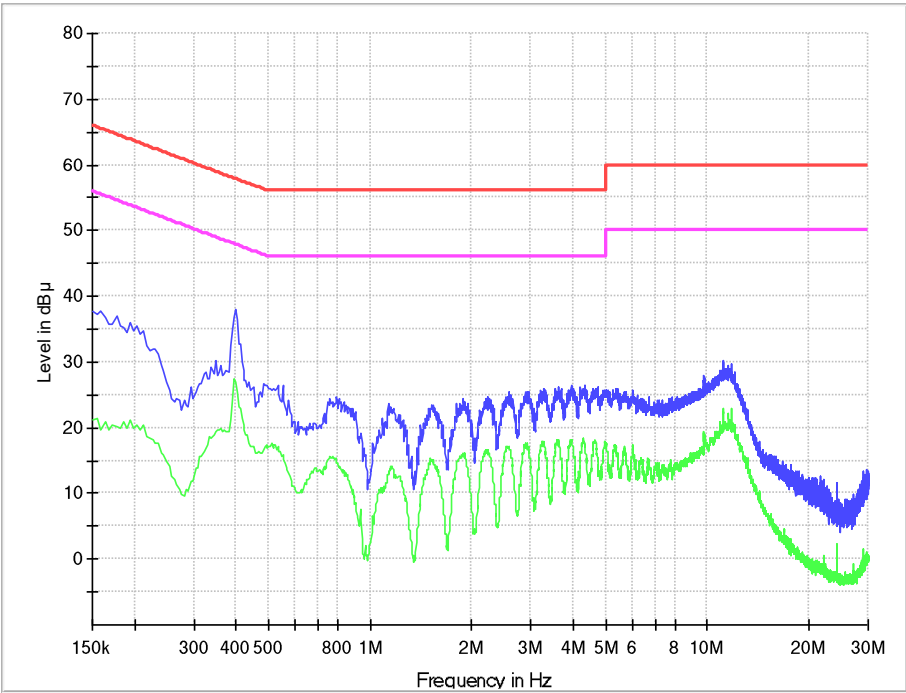
| Test mode: Charging and Transmitting |                    |                              |                         |                                   |                       |                         |                                   |                       |
|--------------------------------------|--------------------|------------------------------|-------------------------|-----------------------------------|-----------------------|-------------------------|-----------------------------------|-----------------------|
|                                      | Frequency<br>(MHz) | Correction<br>Factor<br>(dB) | Quasi-Peak              |                                   |                       | Average                 |                                   |                       |
|                                      |                    |                              | Reading<br>(dB $\mu$ V) | Emission<br>Level<br>(dB $\mu$ V) | Limit<br>(dB $\mu$ V) | Reading<br>(dB $\mu$ V) | Emission<br>Level<br>(dB $\mu$ V) | Limit<br>(dB $\mu$ V) |
| Line                                 | 0.15               | 9.7                          | 32.0                    | 41.7                              | 66                    | 19.0                    | 28.7                              | 56                    |
|                                      | 0.204              | 9.7                          | 24.7                    | 34.4                              | 63.4                  | 12.4                    | 22.1                              | 53.4                  |
|                                      | 0.388              | 9.7                          | 26.5                    | 36.2                              | 58.1                  | 19.2                    | 28.9                              | 48.1                  |
|                                      | 0.838              | 9.8                          | 12.0                    | 21.8                              | 56                    | 7.0                     | 16.8                              | 46                    |
|                                      | 3.795              | 9.9                          | 15.3                    | 25.2                              | 56                    | 10.3                    | 20.2                              | 46                    |
|                                      | 11.838             | 9.9                          | 21.7                    | 31.6                              | 60                    | 18.8                    | 28.7                              | 50                    |
| Neutral                              | 0.150              | 9.7                          | 25.2                    | 34.9                              | 66                    | 10.5                    | 20.2                              | 56                    |
|                                      | 0.195              | 9.7                          | 23.1                    | 32.8                              | 63.8                  | 11.4                    | 21.1                              | 53.8                  |
|                                      | 0.397              | 9.7                          | 25.7                    | 35.4                              | 57.9                  | 17.3                    | 27.0                              | 47.9                  |
|                                      | 0.793              | 9.8                          | 11.0                    | 20.8                              | 56                    | 4.8                     | 14.6                              | 46                    |
|                                      | 1.172              | 9.8                          | 10.3                    | 20.1                              | 56                    | 4.4                     | 14.2                              | 46                    |
|                                      | 4.200              | 9.9                          | 14.3                    | 24.2                              | 56                    | 7.9                     | 17.8                              | 46                    |

REMARKS: 1. Emission level (dB $\mu$ V) = Read Value (dB $\mu$ V) + Correction Factor (dB)  
2. Correction Factor (dB) = LISN Factor (dB) + Cable Factor (dB) + Limiter Factor (dB)  
3. The other emission levels were very low against the limit.

Line



Neutral



## 11.99% BANDWIDTH

### 11.1.LIMITS OF 99% Bandwidth

RSS-GEN Clause 6.7, for reporting purposes only

### 11.2.TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer.

The transmitter output is connected to a spectrum analyzer.

The RBW is set to  $\geq 1\%$  to 5% of the actual occupied.

The VBW is set to  $\geq 3\text{RBW}$ . The sweep time is coupled

### 11.3.TEST SETUP

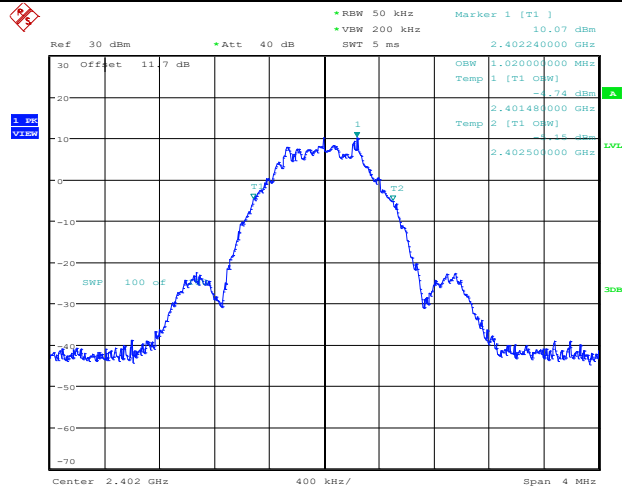


### 11.4.TEST DATA

Table 18 99%Occupied Bandwidth Test Data

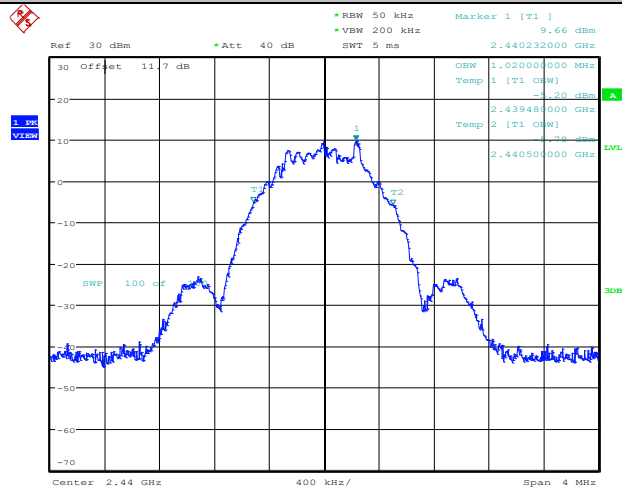
| TestMode | Antenna | Frequency [MHz] | OCB [MHz] | FL[MHz]   | FH[MHz]   | Limit[MHz] | Verdict |
|----------|---------|-----------------|-----------|-----------|-----------|------------|---------|
| BLE_1M   | Ant1    | 2402            | 1.02      | 2401.4800 | 2402.5000 | ---        | ---     |
|          |         | 2440            | 1.02      | 2439.4800 | 2440.5000 | ---        | ---     |
|          |         | 2480            | 1.024     | 2479.4760 | 2480.5000 | ---        | ---     |
| BLE_2M   | Ant1    | 2402            | 2.024     | 2400.9920 | 2403.0160 | ---        | ---     |
|          |         | 2440            | 2.024     | 2438.9920 | 2441.0160 | ---        | ---     |
|          |         | 2480            | 2.024     | 2478.9840 | 2481.0080 | ---        | ---     |

### BLE\_1M\_Ant1\_2402



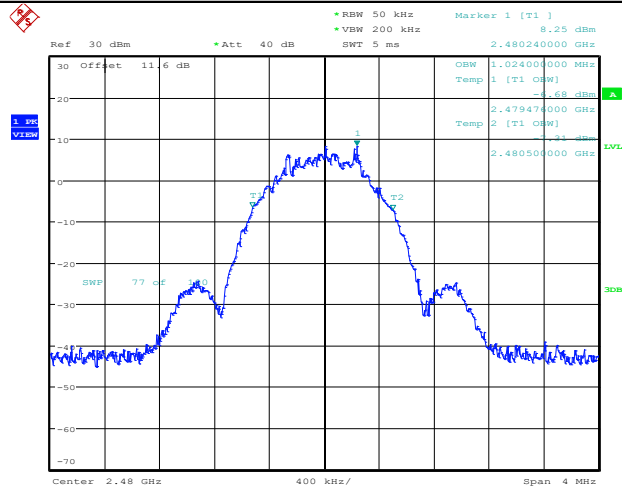
Date: 24.DEC.2024 09:33:09

### BLE\_1M\_Ant1\_2440



Date: 24.DEC.2024 09:36:49

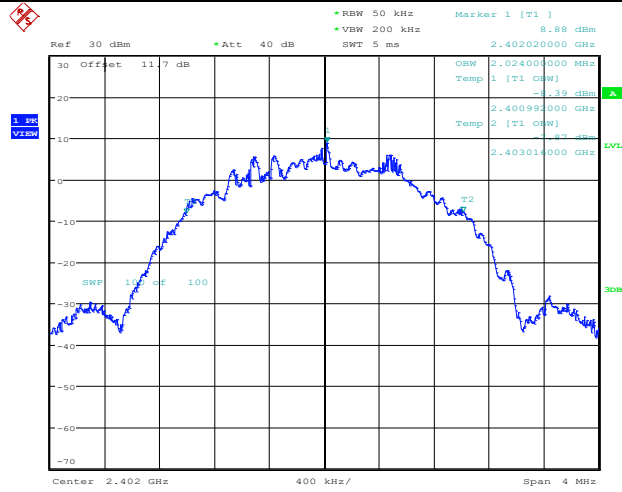
### BLE\_1M\_Ant1\_2480



Date: 24.DEC.2024 09:42:11

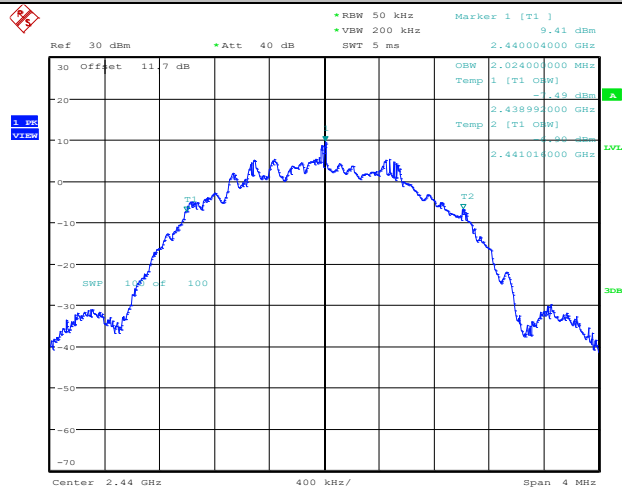


### BLE\_2M\_Ant1\_2402



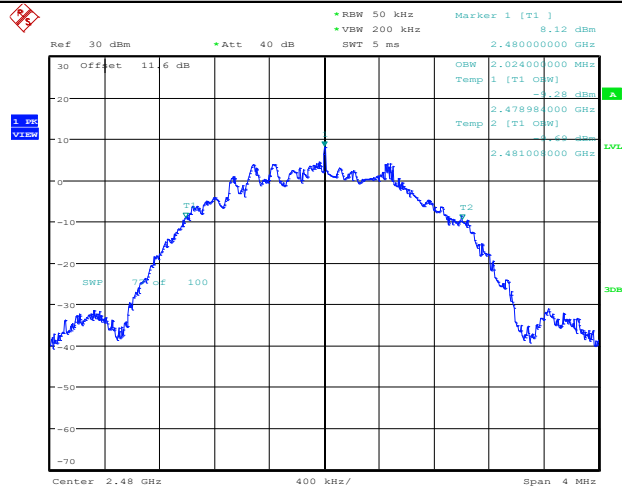
Date: 24.DEC.2024 09:47:20

### BLE\_2M\_Ant1\_2440



Date: 24.DEC.2024 09:51:21

### BLE\_2M\_Ant1\_2480



Date: 24.DEC.2024 09:53:40

## **12. ANTENNA REQUIREMENTS**

15.203 requirements:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The 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(b) (4) requirements:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-GEN Section 6.8:

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.

### **12.1. Antenna Connector**

Antenna Connector is on the PCB within enclosure and not accessible to user.

### **12.2. Antenna Gain**

The antenna gain of EUT is less than 6 dBi.

**END OF REPORT**