



# RF Test Report

## For

**Applicant Name:** Shenzhen Fusion Aurora Technology Co., Ltd  
**Address:** L25, 4th Floor, Lianhui Building, Longhua Street, Longhua District, Shenzhen  
**EUT Name:** Android Box  
**Brand Name:** N/A  
**Model Number:** R801, R802, R803, R805, R806, R811, R812, R813, R815, R816  
**Series Model Number:** Refer to section 2

## Issued By

**Company Name:** BTF Testing Lab (Shenzhen) Co., Ltd.  
**Address:** F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

**Report Number:** BTF230612R00301  
**Test Standards:** 47 CFR Part 15.247

**Test Conclusion:** Pass  
**FCC ID:** 2BAF2-R801  
**Test Date:** 2023-05-20 to 2023-05-30  
**Date of Issue:** 2023-06-12

**Prepared By:**

*Elma. Yang*

**Date:**

elma.yang / Project Engineer  
2023-06-12

**Approved By:**

*Ryan.CJ*

**Date:**

Ryan.CJ / EMC Manager  
2023-06-12

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| Revision History                                                                          |            |                   |
|-------------------------------------------------------------------------------------------|------------|-------------------|
| Version                                                                                   | Issue Date | Revisions Content |
| R_V0                                                                                      | 2023-06-12 | Original          |
|                                                                                           |            |                   |
| <i>Note: Once the revision has been made, then previous versions reports are invalid.</i> |            |                   |

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## 1. SUMMARY OF STANDARDS AND RESULTS

### 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

| Test Item                               | Test Requirement | Standards Paragraph | Result |
|-----------------------------------------|------------------|---------------------|--------|
| Conducted Emission                      | FCC PART 15      | 15.207              | P      |
| 6dB Bandwidth                           | FCC PART 15      | 15.247 (a)(2)       | P      |
| Output Power                            | FCC PART 15      | 15.247 (b)(3)       | P      |
| Radiated Spurious Emission              | FCC PART 15      | 15.247 (c)          | P      |
| Conducted Spurious & Band Edge Emission | FCC PART 15      | 15.247 (d)          | P      |
| Power Spectral Density                  | FCC PART 15      | 15.247 (e)          | P      |
| Radiated Band Edge Emission             | FCC PART 15      | 15.205              | P      |
| Antenna Requirement                     | FCC PART 15      | 15.203              | P      |

Note: 1. P is an abbreviation for Pass.

2. F is an abbreviation for Fail.

3. N/A is an abbreviation for Not Applicable.

4. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

EUT Name : Android Box  
Model No. : R801, R802, R803, R805, R806, R811, R812, R813, R815, R816  
DIFF. : There is no difference except the name of the model. All tests are made with the R801 model.  
Power supply : DC 5V from adapter

Radio Technology : Bluetooth V5.0 BLE

Operation frequency : 2402-2480MHz

Channel No. : 40 Channels

Channel spacing : 2MHz

Rate : 1Mbps

Modulation type : GFSK

Antenna Type : Internal antenna, Maximum Gain is 1.51dBi.  
Antenna information is provided by applicant.

Software version : V1.0

Hardware version : V1.0

Connector cable loss : N/A

Intend use : Residential, commercial and light industrial environment  
environment

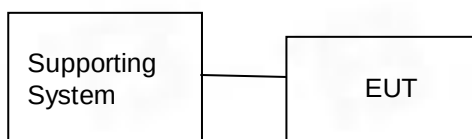
## 2.2. Accessories of Device (EUT)

Accessories : /  
Manufacturer : /  
Model : /  
Ratings : /

## 2.3. Tested Supporting System Details

| No. | Description | Manufacturer | Model | Serial Number | Certification or SDoC |
|-----|-------------|--------------|-------|---------------|-----------------------|
| 1   | --          | --           | --    | --            | --                    |

## 2.4. Block Diagram of connection between EUT and simulators



## 2.5. Test Mode Description

| Tested mode, channel, and data rate information |              |                 |
|-------------------------------------------------|--------------|-----------------|
| Mode                                            | Channel      | Frequency (MHz) |
| GFSK (1M)                                       | Low :CH1     | 2402            |
|                                                 | Middle: CH20 | 2440            |
|                                                 | High: CH40   | 2480            |

## 2.6. Test Conditions

| Items              | Required  | Actual |
|--------------------|-----------|--------|
| Temperature range: | 15-35℃    | 24℃    |
| Humidity range:    | 25-75%    | 56%    |
| Pressure range:    | 86-106kPa | 980kPa |

## 2.7. Test Facility

|                          |                                                                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Company Name:            | BTF Testing Lab (Shenzhen) Co., Ltd.                                                                                                |
| Address:                 | F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China |
| Phone Number:            | +86-0755-23146130                                                                                                                   |
| Fax Number:              | +86-0755-23146130                                                                                                                   |
| FCC Registration Number: | 518915                                                                                                                              |
| Designation Number:      | CN1330                                                                                                                              |

## 2.8. Measurement Uncertainty

| Measurement                       | Value   |
|-----------------------------------|---------|
| Occupied Channel Bandwidth        | 69 KHz  |
| RF output power, conducted        | 0.87 dB |
| Power Spectral Density, conducted | 0.69 dB |
| Unwanted Emissions, conducted     | 0.94 dB |
| All emissions, radiated(<1GHz)    | 4.12 dB |
| All emissions, radiated(>1GHz)    | 4.16 dB |
| Temperature                       | 0.82 °C |
| Humidity                          | 4.1 %   |



## 2.9. Test Equipment List

| Conducted Emission at AC power line |               |             |              |            |              |
|-------------------------------------|---------------|-------------|--------------|------------|--------------|
| Equipment                           | Manufacturer  | Model No    | Inventory No | Cal Date   | Cal Due Date |
| Pulse Limiter                       | SCHWARZBECK   | VTSD 9561-F | 00953        | 2022-11-24 | 2023-11-23   |
| Coaxial Switcher                    | SCHWARZBECK   | CX210       | CX210        | 2022-11-24 | 2023-11-23   |
| V-LISN                              | SCHWARZBECK   | NSLK 8127   | 01073        | 2022-11-24 | 2023-11-23   |
| LISN                                | AFJ           | LS16/110VAC | 16010020076  | 2023-02-23 | 2024-02-22   |
| EMI Receiver                        | ROHDE&SCHWARZ | ESCI3       | 101422       | 2022-11-24 | 2023-11-23   |

| Occupied Bandwidth                                 |                                                 |           |              |            |              |
|----------------------------------------------------|-------------------------------------------------|-----------|--------------|------------|--------------|
| Equipment                                          | Manufacturer                                    | Model No  | Inventory No | Cal Date   | Cal Due Date |
| RFTest software                                    | /                                               | V1.00     | /            | /          | /            |
| RF Control Unit                                    | Techy                                           | TR1029-1  | /            | 2022-11-24 | 2023-11-23   |
| RF Sensor Unit                                     | Techy                                           | TR1029-2  | /            | 2022-11-24 | 2023-11-23   |
| Programmable constant temperature and humidity box | ZZCKONG                                         | ZZ-K02A   | 20210928007  | 2022-11-24 | 2023-11-23   |
| Adjustable Direct Current Regulated Power Supply   | Dongguan Tongmen Electronic Technology Co., LTD | etm-6050c | 20211026123  | 2022-11-24 | 2023-11-23   |
| WIDEBAND RADIO COMMUNICATION TESTER                | Rohde & Schwarz                                 | CMW500    | 161997       | 2022-11-24 | 2023-11-23   |
| MXA Signal Analyzer                                | KEYSIGHT                                        | N9020A    | MY50410020   | 2022-11-24 | 2023-11-23   |

| Maximum Conducted Output Power                     |                                                 |           |              |            |              |
|----------------------------------------------------|-------------------------------------------------|-----------|--------------|------------|--------------|
| Equipment                                          | Manufacturer                                    | Model No  | Inventory No | Cal Date   | Cal Due Date |
| RFTest software                                    | /                                               | V1.00     | /            | /          | /            |
| RF Control Unit                                    | Techy                                           | TR1029-1  | /            | 2022-11-24 | 2023-11-23   |
| RF Sensor Unit                                     | Techy                                           | TR1029-2  | /            | 2022-11-24 | 2023-11-23   |
| Programmable constant temperature and humidity box | ZZCKONG                                         | ZZ-K02A   | 20210928007  | 2022-11-24 | 2023-11-23   |
| Adjustable Direct Current Regulated Power Supply   | Dongguan Tongmen Electronic Technology Co., LTD | etm-6050c | 20211026123  | 2022-11-24 | 2023-11-23   |
| WIDEBAND RADIO COMMUNICATION TESTER                | Rohde & Schwarz                                 | CMW500    | 161997       | 2022-11-24 | 2023-11-23   |

|                     |          |        |            |            |            |
|---------------------|----------|--------|------------|------------|------------|
| MXA Signal Analyzer | KEYSIGHT | N9020A | MY50410020 | 2022-11-24 | 2023-11-23 |
|---------------------|----------|--------|------------|------------|------------|

| Power Spectral Density                             |                                                 |           |              |            |              |
|----------------------------------------------------|-------------------------------------------------|-----------|--------------|------------|--------------|
| Equipment                                          | Manufacturer                                    | Model No  | Inventory No | Cal Date   | Cal Due Date |
| RFTest software                                    | /                                               | V1.00     | /            | /          | /            |
| RF Control Unit                                    | Techy                                           | TR1029-1  | /            | 2022-11-24 | 2023-11-23   |
| RF Sensor Unit                                     | Techy                                           | TR1029-2  | /            | 2022-11-24 | 2023-11-23   |
| Programmable constant temperature and humidity box | ZZCKONG                                         | ZZ-K02A   | 20210928007  | 2022-11-24 | 2023-11-23   |
| Adjustable Direct Current Regulated Power Supply   | Dongguan Tongmen Electronic Technology Co., LTD | etm-6050c | 20211026123  | 2022-11-24 | 2023-11-23   |
| WIDEBAND RADIO COMMUNICATION TESTER                | Rohde & Schwarz                                 | CMW500    | 161997       | 2022-11-24 | 2023-11-23   |
| MXA Signal Analyzer                                | KEYSIGHT                                        | N9020A    | MY50410020   | 2022-11-24 | 2023-11-23   |

| Emissions in non-restricted frequency bands        |                                                 |           |              |            |              |
|----------------------------------------------------|-------------------------------------------------|-----------|--------------|------------|--------------|
| Equipment                                          | Manufacturer                                    | Model No  | Inventory No | Cal Date   | Cal Due Date |
| RFTest software                                    | /                                               | V1.00     | /            | /          | /            |
| RF Control Unit                                    | Techy                                           | TR1029-1  | /            | 2022-11-24 | 2023-11-23   |
| RF Sensor Unit                                     | Techy                                           | TR1029-2  | /            | 2022-11-24 | 2023-11-23   |
| Programmable constant temperature and humidity box | ZZCKONG                                         | ZZ-K02A   | 20210928007  | 2022-11-24 | 2023-11-23   |
| Adjustable Direct Current Regulated Power Supply   | Dongguan Tongmen Electronic Technology Co., LTD | etm-6050c | 20211026123  | 2022-11-24 | 2023-11-23   |
| WIDEBAND RADIO COMMUNICATION TESTER                | Rohde & Schwarz                                 | CMW500    | 161997       | 2022-11-24 | 2023-11-23   |
| MXA Signal Analyzer                                | KEYSIGHT                                        | N9020A    | MY50410020   | 2022-11-24 | 2023-11-23   |

| Band edge emissions (Radiated) |              |                 |              |            |              |
|--------------------------------|--------------|-----------------|--------------|------------|--------------|
| Equipment                      | Manufacturer | Model No        | Inventory No | Cal Date   | Cal Due Date |
| Coaxial cable Multiflex 141    | Schwarzbeck  | N/SMA 0.5m      | 517386       | 2023-03-24 | 2024-03-23   |
| Preamplifier                   | SCHWARZBECK  | BBV9744         | 00246        | 2022-11-24 | 2023-11-23   |
| RE Cable                       | REBES Talent | UF1-SMASMAM-10m | 21101566     | 2022-11-24 | 2023-11-23   |
| RE Cable                       | REBES Talent | UF2-NMNM-10m    | 21101570     | 2022-11-24 | 2023-11-23   |

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|                        |               |                |          |            |            |
|------------------------|---------------|----------------|----------|------------|------------|
| RE Cable               | REBES Talent  | UF1-SMASMAM-1m | 21101568 | 2022-11-24 | 2023-11-23 |
| RE Cable               | REBES Talent  | UF2-NMNM-1m    | 21101576 | 2022-11-24 | 2023-11-23 |
| RE Cable               | REBES Talent  | UF2-NMNM-2.5m  | 21101573 | 2022-11-24 | 2023-11-23 |
| POSITIONAL CONTROLLER  | SKET          | PCI-GPIB       | /        | /          | /          |
| Horn Antenna           | SCHWARZBECK   | BBHA9170       | 01157    | 2021-11-28 | 2023-11-27 |
| EMI TEST RECEIVER      | ROHDE&SCHWARZ | ESCI7          | 101032   | 2022-11-24 | 2023-11-23 |
| SIGNAL ANALYZER        | ROHDE&SCHWARZ | FSQ40          | 100010   | 2022-11-24 | 2023-11-23 |
| POSITIONAL CONTROLLER  | SKET          | PCI-GPIB       | /        | /          | /          |
| Broadband Preamplifier | SCHWARZBECK   | BBV9718D       | 00008    | 2023-03-24 | 2024-03-23 |
| Horn Antenna           | SCHWARZBECK   | BBHA9120D      | 2597     | 2022-05-22 | 2024-05-21 |
| EZ EMC                 | Frad          | FA-03A2 RE+    | /        | /          | /          |
| POSITIONAL CONTROLLER  | SKET          | PCI-GPIB       | /        | /          | /          |
| Log periodic antenna   | SCHWARZBECK   | VULB 9168      | 01328    | 2021-11-28 | 2023-11-27 |

#### Emissions in restricted frequency bands (below 1GHz)

| Equipment                   | Manufacturer  | Model No        | Inventory No | Cal Date   | Cal Due Date |
|-----------------------------|---------------|-----------------|--------------|------------|--------------|
| Coaxial cable Multiflex 141 | Schwarzbeck   | N/SMA 0.5m      | 517386       | 2023-03-24 | 2024-03-23   |
| Preamplifier                | SCHWARZBECK   | BBV9744         | 00246        | 2022-11-24 | 2023-11-23   |
| RE Cable                    | REBES Talent  | UF1-SMASMAM-10m | 21101566     | 2022-11-24 | 2023-11-23   |
| RE Cable                    | REBES Talent  | UF2-NMNM-10m    | 21101570     | 2022-11-24 | 2023-11-23   |
| RE Cable                    | REBES Talent  | UF1-SMASMAM-1m  | 21101568     | 2022-11-24 | 2023-11-23   |
| RE Cable                    | REBES Talent  | UF2-NMNM-1m     | 21101576     | 2022-11-24 | 2023-11-23   |
| RE Cable                    | REBES Talent  | UF2-NMNM-2.5m   | 21101573     | 2022-11-24 | 2023-11-23   |
| POSITIONAL CONTROLLER       | SKET          | PCI-GPIB        | /            | /          | /            |
| Horn Antenna                | SCHWARZBECK   | BBHA9170        | 01157        | 2021-11-28 | 2023-11-27   |
| EMI TEST RECEIVER           | ROHDE&SCHWARZ | ESCI7           | 101032       | 2022-11-24 | 2023-11-23   |
| SIGNAL ANALYZER             | ROHDE&SCHWARZ | FSQ40           | 100010       | 2022-11-24 | 2023-11-23   |
| POSITIONAL CONTROLLER       | SKET          | PCI-GPIB        | /            | /          | /            |
| Broadband Preamplifier      | SCHWARZBECK   | BBV9718D        | 00008        | 2023-03-24 | 2024-03-23   |
| Horn Antenna                | SCHWARZBECK   | BBHA9120D       | 2597         | 2022-05-22 | 2024-05-21   |
| EZ EMC                      | Frad          | FA-03A2 RE+     | /            | /          | /            |

|                       |             |           |       |            |            |
|-----------------------|-------------|-----------|-------|------------|------------|
| POSITIONAL CONTROLLER | SKET        | PCI-GPIB  | /     | /          | /          |
| Log periodic antenna  | SCHWARZBECK | VULB 9168 | 01328 | 2021-11-28 | 2023-11-27 |

| Emissions in restricted frequency bands (above 1GHz) |               |                 |              |            |              |
|------------------------------------------------------|---------------|-----------------|--------------|------------|--------------|
| Equipment                                            | Manufacturer  | Model No        | Inventory No | Cal Date   | Cal Due Date |
| Coaxial cable Multiflex 141                          | Schwarzbeck   | N/SMA 0.5m      | 517386       | 2023-03-24 | 2024-03-23   |
| Preamplifier                                         | SCHWARZBECK   | BBV9744         | 00246        | 2022-11-24 | 2023-11-23   |
| RE Cable                                             | REBES Talent  | UF1-SMASMAM-10m | 21101566     | 2022-11-24 | 2023-11-23   |
| RE Cable                                             | REBES Talent  | UF2-NMNM-10m    | 21101570     | 2022-11-24 | 2023-11-23   |
| RE Cable                                             | REBES Talent  | UF1-SMASMAM-1m  | 21101568     | 2022-11-24 | 2023-11-23   |
| RE Cable                                             | REBES Talent  | UF2-NMNM-1m     | 21101576     | 2022-11-24 | 2023-11-23   |
| RE Cable                                             | REBES Talent  | UF2-NMNM-2.5m   | 21101573     | 2022-11-24 | 2023-11-23   |
| POSITIONAL CONTROLLER                                | SKET          | PCI-GPIB        | /            | /          | /            |
| Horn Antenna                                         | SCHWARZBECK   | BBHA9170        | 01157        | 2021-11-28 | 2023-11-27   |
| EMI TEST RECEIVER                                    | ROHDE&SCHWARZ | ESC17           | 101032       | 2022-11-24 | 2023-11-23   |
| SIGNAL ANALYZER                                      | ROHDE&SCHWARZ | FSQ40           | 100010       | 2022-11-24 | 2023-11-23   |
| POSITIONAL CONTROLLER                                | SKET          | PCI-GPIB        | /            | /          | /            |
| Broadband Preamplifier                               | SCHWARZBECK   | BBV9718D        | 00008        | 2023-03-24 | 2024-03-23   |
| Horn Antenna                                         | SCHWARZBECK   | BBHA9120D       | 2597         | 2022-05-22 | 2024-05-21   |
| EZ EMC                                               | Frad          | FA-03A2 RE+     | /            | /          | /            |
| POSITIONAL CONTROLLER                                | SKET          | PCI-GPIB        | /            | /          | /            |
| Log periodic antenna                                 | SCHWARZBECK   | VULB 9168       | 01328        | 2021-11-28 | 2023-11-27   |

### 3. SPURIOUS EMISSION

#### 3.1. Test Limits

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/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                                |
| Above 960            | 500                                  | 3                                |

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

**NOTE:**

- a) The tighter limit applies at the band edges.
- b) Emission Level(dB uV/m)=20log Emission Level(uv/m)

#### 3.2. Test Procedure

The measuring distance of 3m shall be used for measurements at frequency up to 1GH and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, The table was rotated 360 degrees to determine the position of the highest radiation

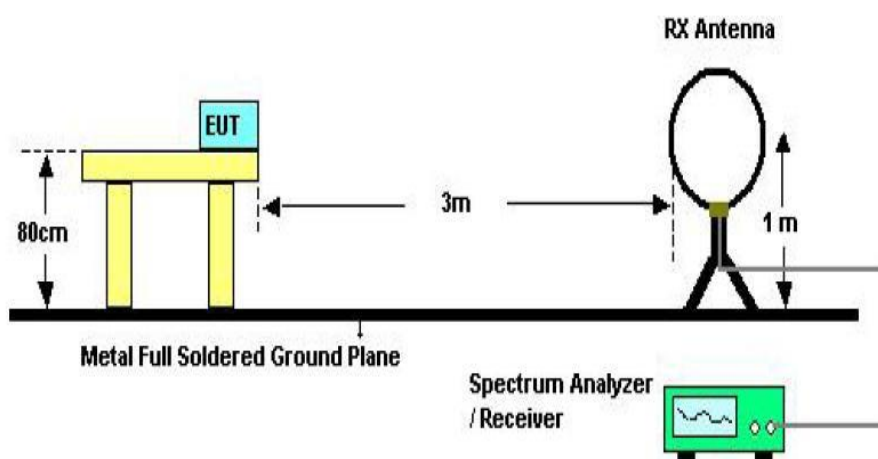
The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.

The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Qusia Peak Detector mode premeasured

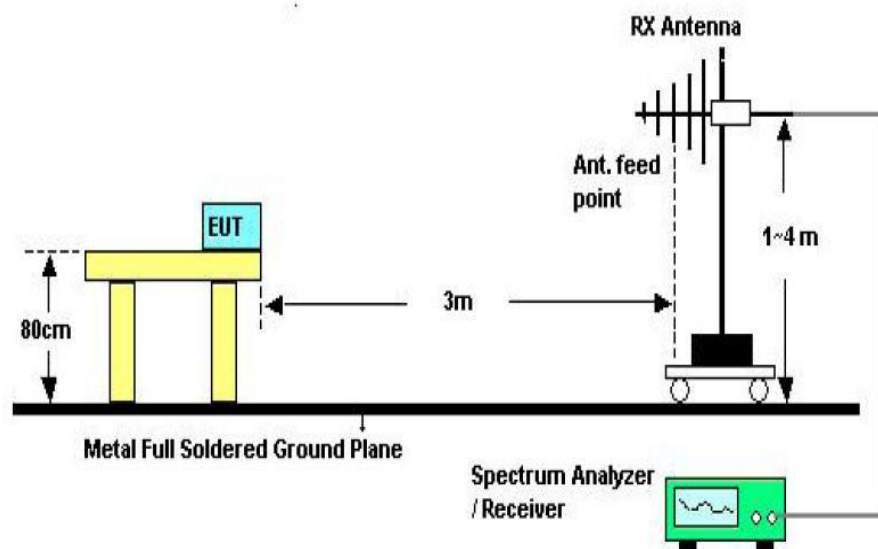
If Peak value comply with QP limit Below 1GHz. The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

For the actual test configuration, please see the test setup photo.

### 3.3. Test Setup

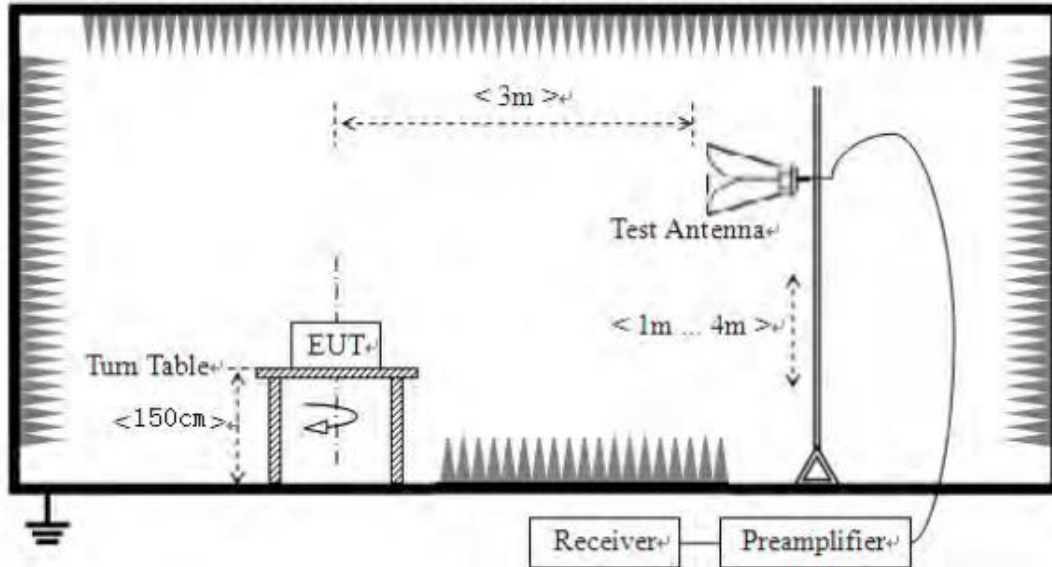


Below 30MHz Test Setup





Above 30MHz Test Setup



Above 1GHz Test Setup

### 3.4. Test Results

#### Test Condition

Continual Transmitting in maximum power.

|              |           |            |
|--------------|-----------|------------|
| 9KHz~150KHz  | RBW200Hz  | VBW1KHz    |
| 150KHz~30MHz | RBW9KHz   | VBW 30KHz  |
| 30MHz~1GHz   | RBW120KHz | VBW 300KHz |
| Above1GHz    | RBW1MHz   | VBW 3MHz   |

We have scanned the 10th harmonic from 9 kHz to the EUT.

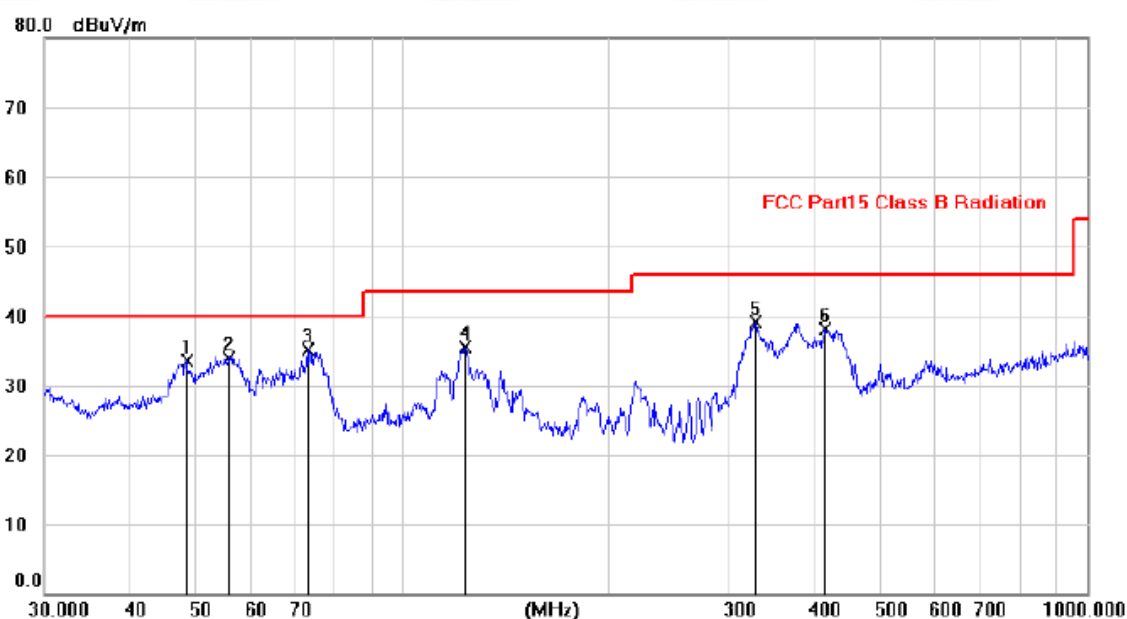
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: 1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2. Only show the test data of the worst Channel in this report.

Antenna polarity: Horizontal



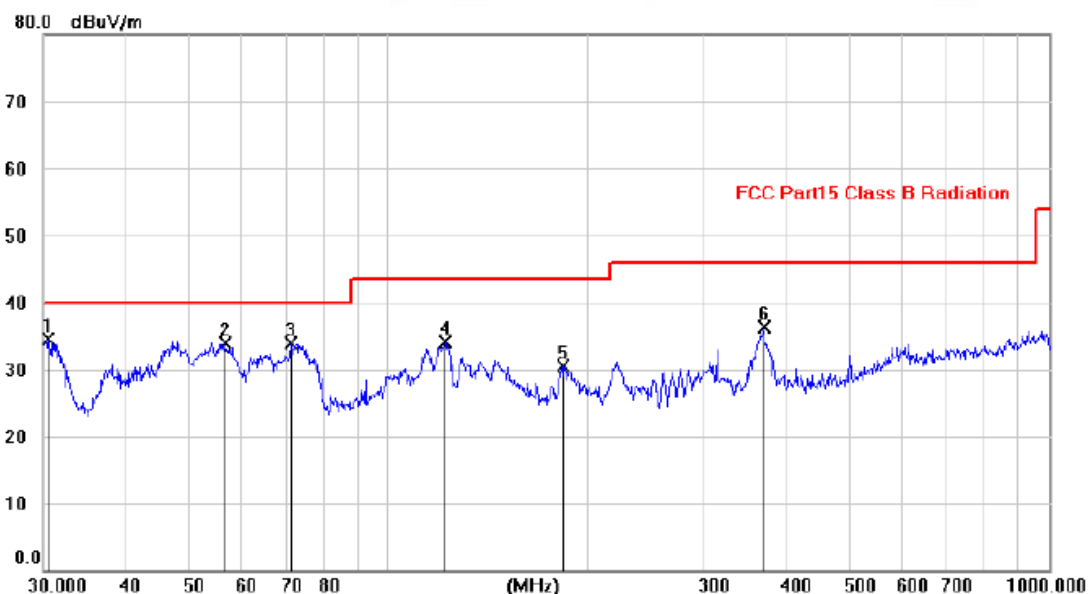
| No. | Mk. | Freq.    | Reading | Correct | Measure- | Limit  | Margin | Antenna  | Table  |        |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|--------|--------|
|     |     | MHz      | Level   | Factor  | ment     |        |        | Height   | Degree |        |
|     |     |          | dBuV    | dB      | dBuV/m   | dBuV/m | dB     | Detector | cm     | degree |
| 1   |     | 48.3373  | 19.45   | 14.06   | 33.51    | 40.00  | -6.49  | peak     |        |        |
| 2   |     | 55.6613  | 20.38   | 13.57   | 33.95    | 40.00  | -6.05  | peak     |        |        |
| 3   | *   | 72.8210  | 24.21   | 10.86   | 35.07    | 40.00  | -4.93  | peak     |        |        |
| 4   |     | 123.5972 | 22.25   | 13.24   | 35.49    | 43.50  | -8.01  | peak     |        |        |
| 5   |     | 328.9236 | 24.22   | 14.80   | 39.02    | 46.00  | -6.98  | peak     |        |        |
| 6   |     | 415.3528 | 21.42   | 16.62   | 38.04    | 46.00  | -7.96  | peak     |        |        |

Note:1. \*:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.



## Antenna polarity: Vertical



| No. | Mk. | Freq.    | Reading | Correct | Measure- | Limit  | Margin | Antenna | Table  |         |
|-----|-----|----------|---------|---------|----------|--------|--------|---------|--------|---------|
|     |     | MHz      | Level   | Factor  | ment     |        |        | Height  | Degree | Comment |
|     |     |          | dBuV    | dB      | dBuV/m   | dBuV/m | dB     | cm      | degree |         |
| 1   | *   | 30.6271  | 20.86   | 13.57   | 34.43    | 40.00  | -5.57  | peak    |        |         |
| 2   |     | 56.6392  | 20.49   | 13.47   | 33.96    | 40.00  | -6.04  | peak    |        |         |
| 3   |     | 71.1134  | 22.72   | 11.11   | 33.83    | 40.00  | -6.17  | peak    |        |         |
| 4   |     | 121.8188 | 20.98   | 13.14   | 34.12    | 43.50  | -9.38  | peak    |        |         |
| 5   |     | 184.4036 | 18.29   | 12.15   | 30.44    | 43.50  | -13.06 | peak    |        |         |
| 6   |     | 369.4478 | 20.65   | 15.63   | 36.28    | 46.00  | -9.72  | peak    |        |         |

Note: 1. \*: Maximum data; x: Over limit; !: over margin.

2. Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

**Notes:** Above is below 1GHz test data. This report only shall the worst case mode for TX 2402MHz(1Mbps).

From 1G-25GHz

| Test Mode: TX Low  |                     |             |                       |                |                 |                 |                |             |        |
|--------------------|---------------------|-------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------|--------|
| Freq (MHz)         | Read Level (dBuV/m) | Polar (H/V) | Antenna Factor (dB/m) | Cable loss(dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
| 4804               | 48.06               | V           | 33.93                 | 10.18          | 34.26           | 57.91           | 74             | -16.09      | PK     |
| 4804               | 36.66               | V           | 33.93                 | 10.18          | 34.26           | 46.51           | 54             | -7.49       | AV     |
| 7206               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 9608               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 4804               | 47.94               | H           | 33.93                 | 10.18          | 34.26           | 57.79           | 74             | -16.21      | PK     |
| 4804               | 35.86               | H           | 33.93                 | 10.18          | 34.26           | 45.71           | 54             | -8.29       | AV     |
| 7206               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 9608               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| Test Mode: TX Mid  |                     |             |                       |                |                 |                 |                |             |        |
| 4880               | 49.87               | V           | 33.95                 | 10.20          | 34.26           | 59.76           | 74             | -14.24      | PK     |
| 4880               | 35.48               | V           | 33.95                 | 10.20          | 34.26           | 45.37           | 54             | -8.63       | AV     |
| 7320               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 9760               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 4880               | 48.32               | H           | 33.95                 | 10.20          | 34.26           | 58.21           | 74             | -15.79      | PK     |
| 4880               | 34.06               | H           | 33.95                 | 10.20          | 34.26           | 43.95           | 54             | -10.05      | AV     |
| 7320               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 9760               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| Test Mode: TX High |                     |             |                       |                |                 |                 |                |             |        |
| 4960               | 47.35               | V           | 33.98                 | 10.22          | 34.25           | 57.30           | 74             | -16.70      | PK     |
| 4960               | 33.33               | V           | 33.98                 | 10.22          | 34.25           | 43.28           | 54             | -10.72      | AV     |
| 7440               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 9920               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 4960               | 46.97               | H           | 33.98                 | 10.22          | 34.25           | 56.92           | 74             | -17.08      | PK     |
| 4960               | 32.34               | H           | 33.98                 | 10.22          | 34.25           | 42.29           | 54             | -11.71      | AV     |
| 7440               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |
| 9920               | /                   | /           | /                     | /              | /               | /               | /              | /           | /      |

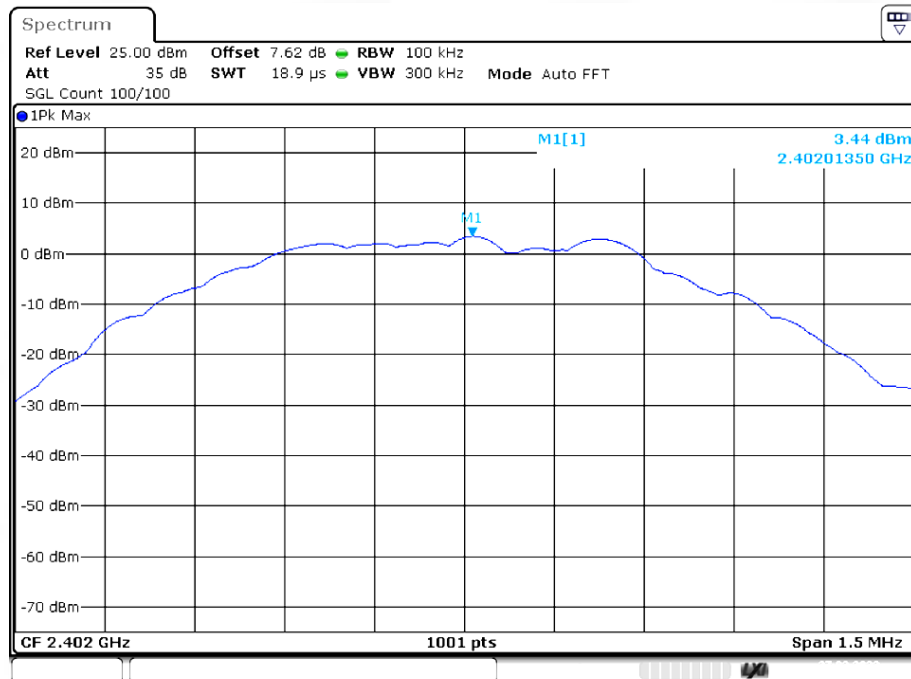
Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

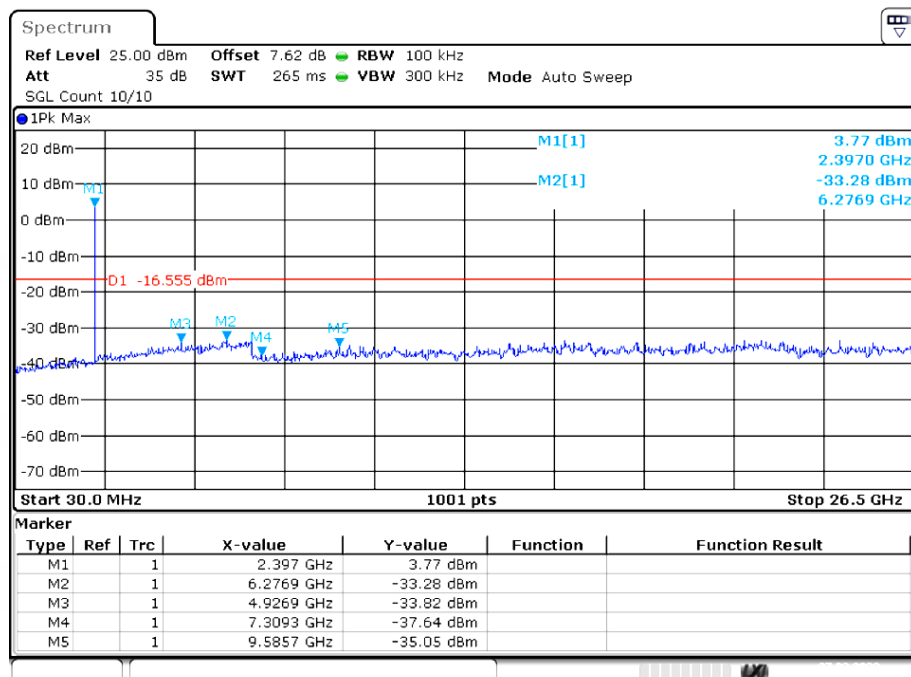
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

## Conducted RF Spurious Emission

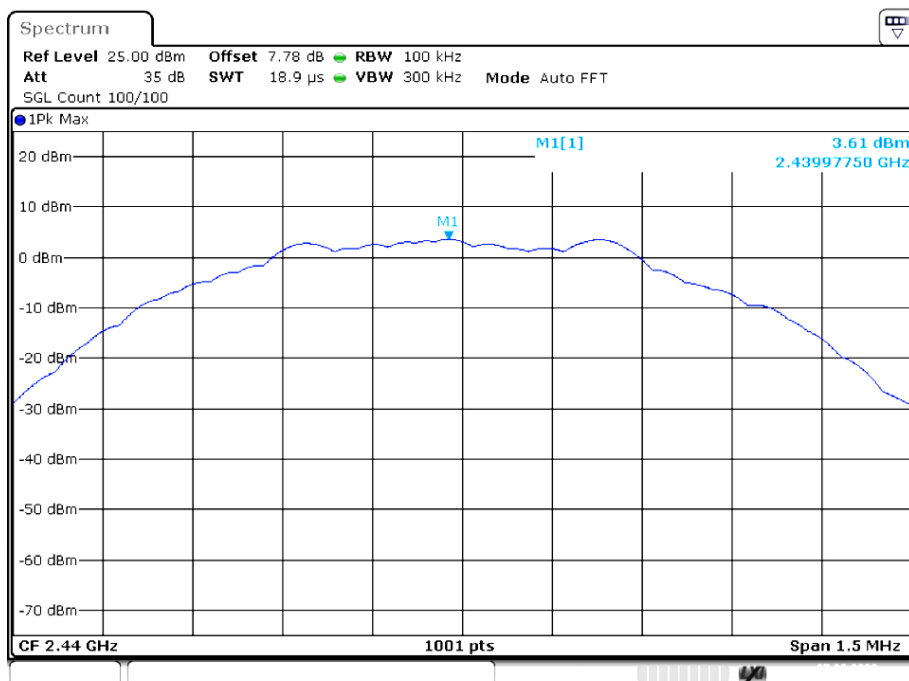
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



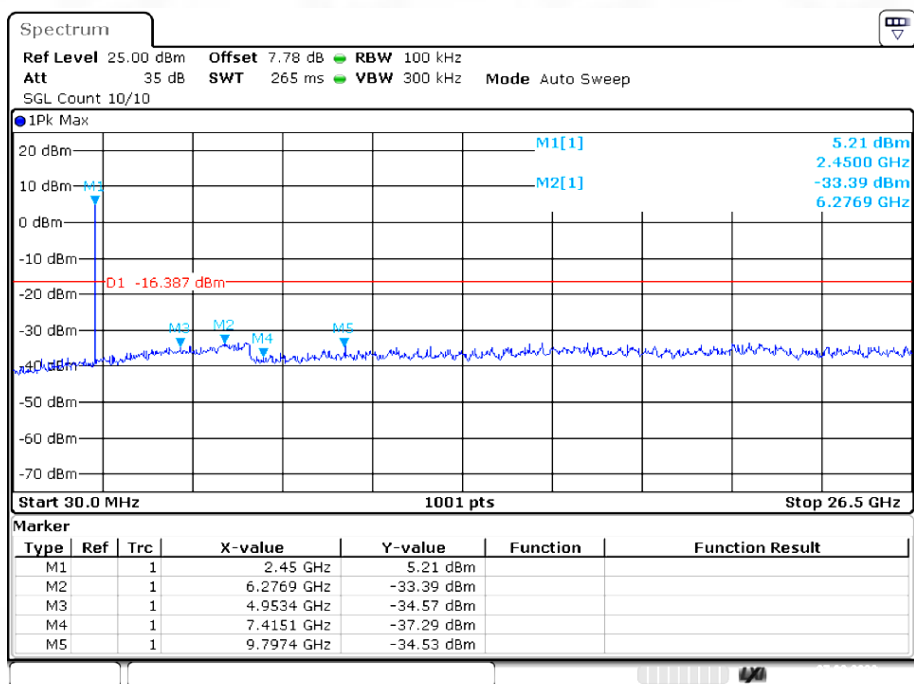
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



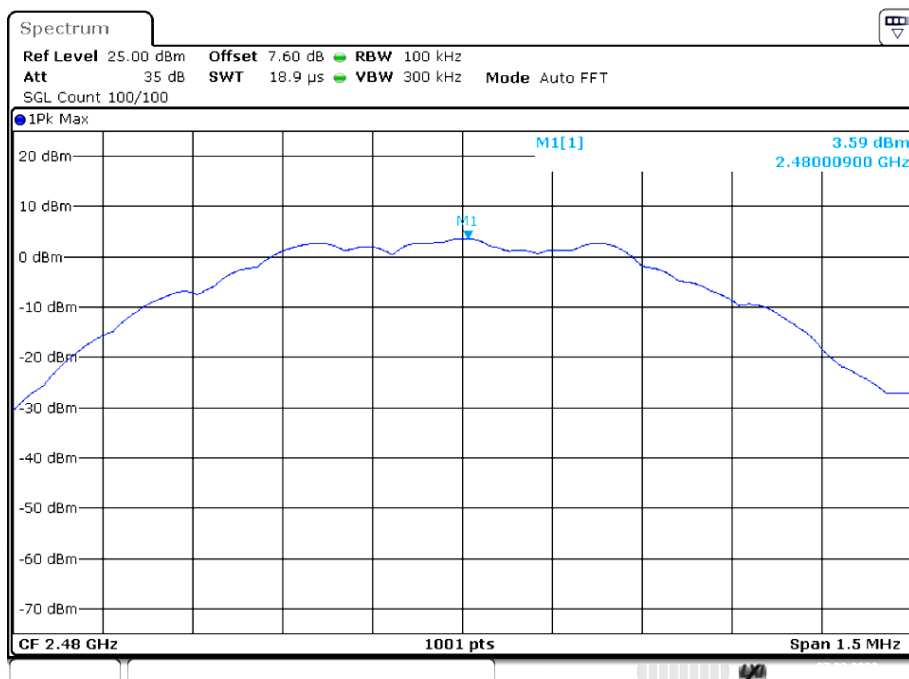
## Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



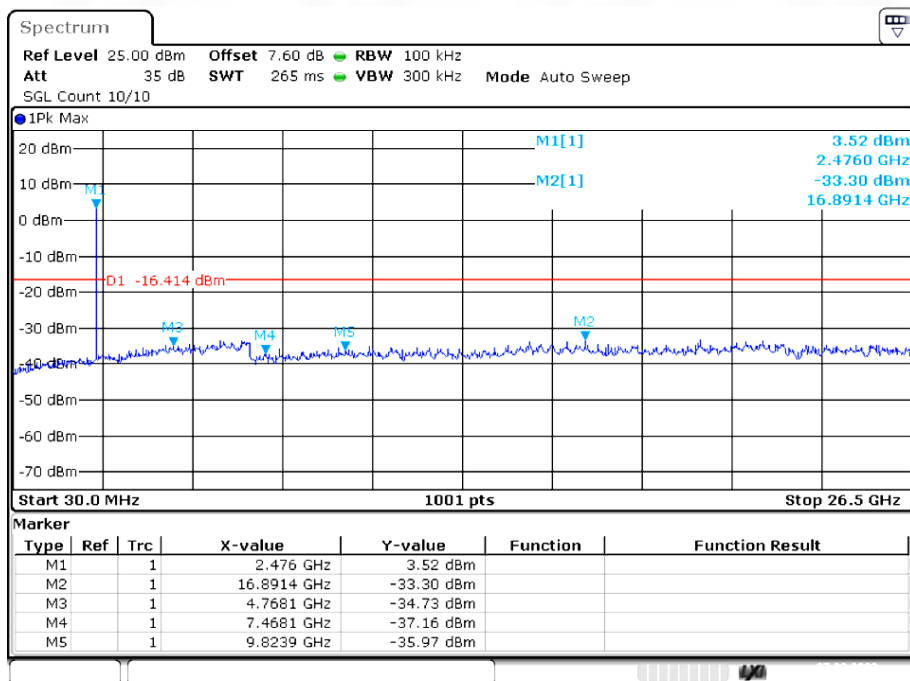
## Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



## Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



## Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



## POWER LINE CONDUCTED EMISSION

### 3.5. Test Limits

| Frequency<br>MHz | Limits dB(μV)    |               |
|------------------|------------------|---------------|
|                  | Quasi-peak Level | Average Level |
| 0.15 -0.50       | 66 -56*          | 56 - 46*      |
| 0.50 -5.00       | 56               | 46            |
| 5.00 -30.00      | 60               | 50            |

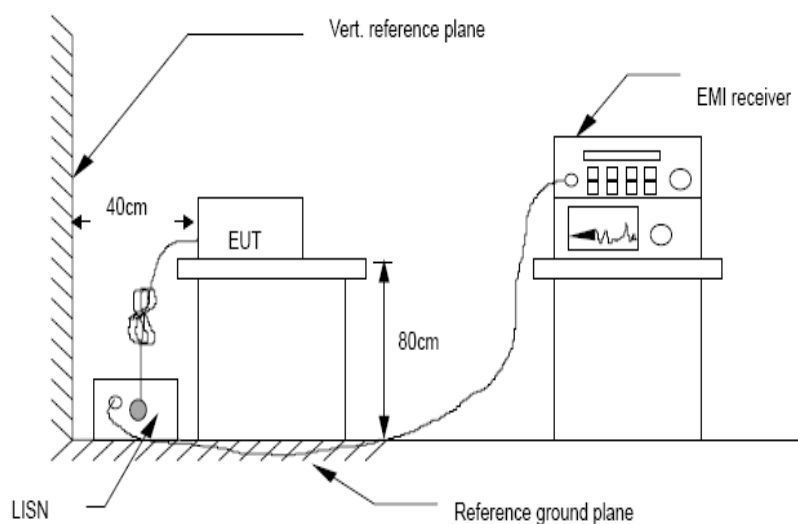
- Notes: 1. \*Decreasing linearly with logarithm of frequency.  
2. The lower limit shall apply at the transition frequencies.  
3. The limit decreases in line with the logarithm of the frequency in rang of 0.15 to 0.50 MHz.

### 3.6. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9 kHz.

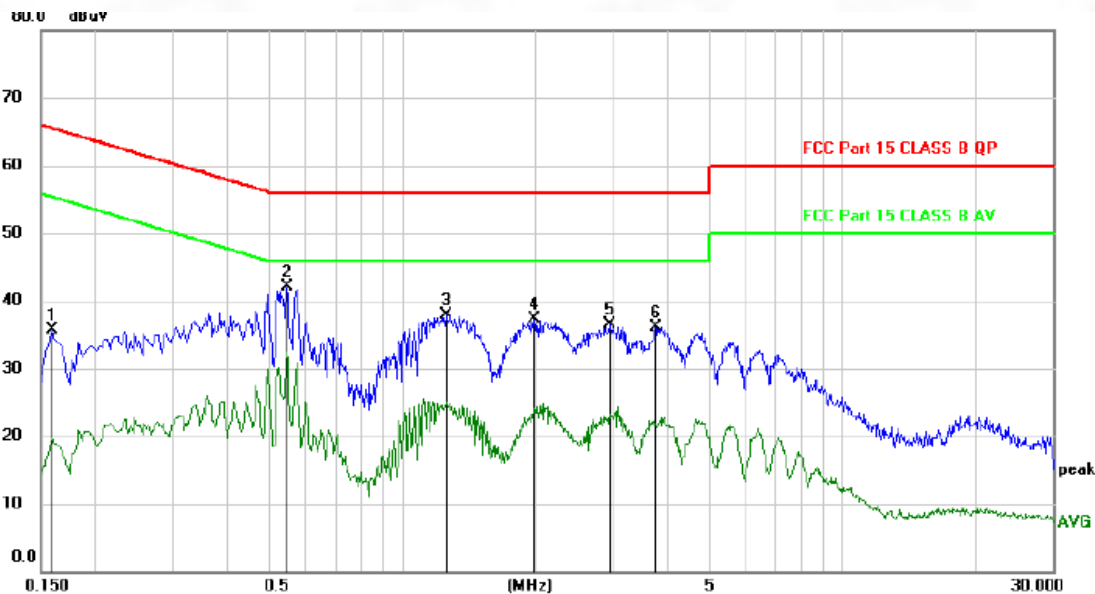
## 3.7. Test Setup





### 3.8. Test Results

Polarity: L



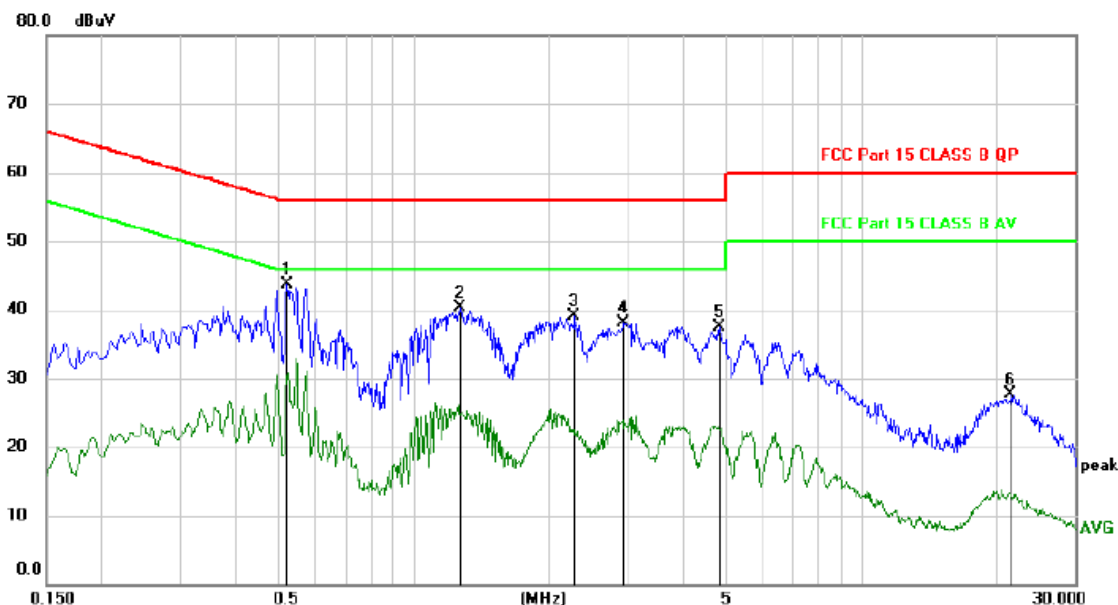
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1   |     | 0.1590       | 25.56                    | 10.06                   | 35.62                    | 65.52         | -29.90       | peak     |         |
| 2   | *   | 0.5460       | 31.85                    | 10.27                   | 42.12                    | 56.00         | -13.88       | peak     |         |
| 3   |     | 1.2540       | 27.42                    | 10.42                   | 37.84                    | 56.00         | -18.16       | peak     |         |
| 4   |     | 1.9860       | 26.85                    | 10.41                   | 37.26                    | 56.00         | -18.74       | peak     |         |
| 5   |     | 2.9520       | 26.02                    | 10.49                   | 36.51                    | 56.00         | -19.49       | peak     |         |
| 6   |     | 3.7560       | 25.61                    | 10.56                   | 36.17                    | 56.00         | -19.83       | peak     |         |

\*:Maximum data    x:Over limit    !:over margin

(Reference Only)

Note: Measurement=Reading Level+Correc Factor.    Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Polarity: N



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1   | *   | 0.5190       | 33.51                    | 10.27                   | 43.78                    | 56.00         | -12.22       | peak     |         |
| 2   |     | 1.2660       | 29.87                    | 10.42                   | 40.29                    | 56.00         | -15.71       | peak     |         |
| 3   |     | 2.2740       | 28.58                    | 10.44                   | 39.02                    | 56.00         | -16.98       | peak     |         |
| 4   |     | 2.9460       | 27.55                    | 10.49                   | 38.04                    | 56.00         | -17.96       | peak     |         |
| 5   |     | 4.7970       | 26.89                    | 10.62                   | 37.51                    | 56.00         | -18.49       | peak     |         |
| 6   |     | 21.5280      | 16.59                    | 11.04                   | 27.63                    | 60.00         | -32.37       | peak     |         |

\*:Maximum data x:Over limit !:over margin

(Reference Only)

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

## 4. CONDUCTED MAXIMUM OUTPUT POWER

### 4.1. Test limits

Please refer section RSS-247 & 15.247.

### 4.2. Test Procedure

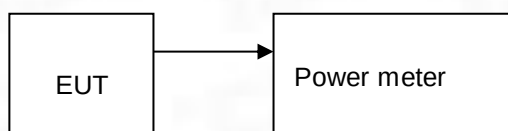
Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

### 4.3. Test Setup



### 4.4. Test Results

| Test Mode | Antenna | Freq(MHz) | Conducted Peak Power[dBm] | Conducted Limit[dBm] | Verdict |
|-----------|---------|-----------|---------------------------|----------------------|---------|
| BLE_1M    | Ant1    | 2402      | <b>3.50</b>               | ≤30                  | PASS    |
|           |         | 2440      | 3.21                      | ≤30                  | PASS    |
|           |         | 2480      | 3.08                      | ≤30                  | PASS    |

## 5. PEAK POWER SPECTRAL DENSITY

### 5.1. Test limits

6.1.1 Please refer section RSS-247 & 15.247.

6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 5.2. Test Procedure

Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

6.2.1 Place the EUT on the table and set it in transmitting mode.

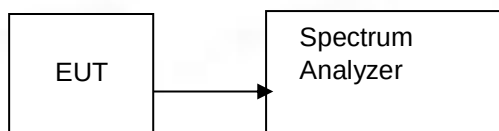
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 3kHz(Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .), VBW = 10kHz(Set the  $\text{VBW} \geq 3 \times \text{RBW}$ ), span= $1.5 \times \text{DTS bandwidth}$ ., detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

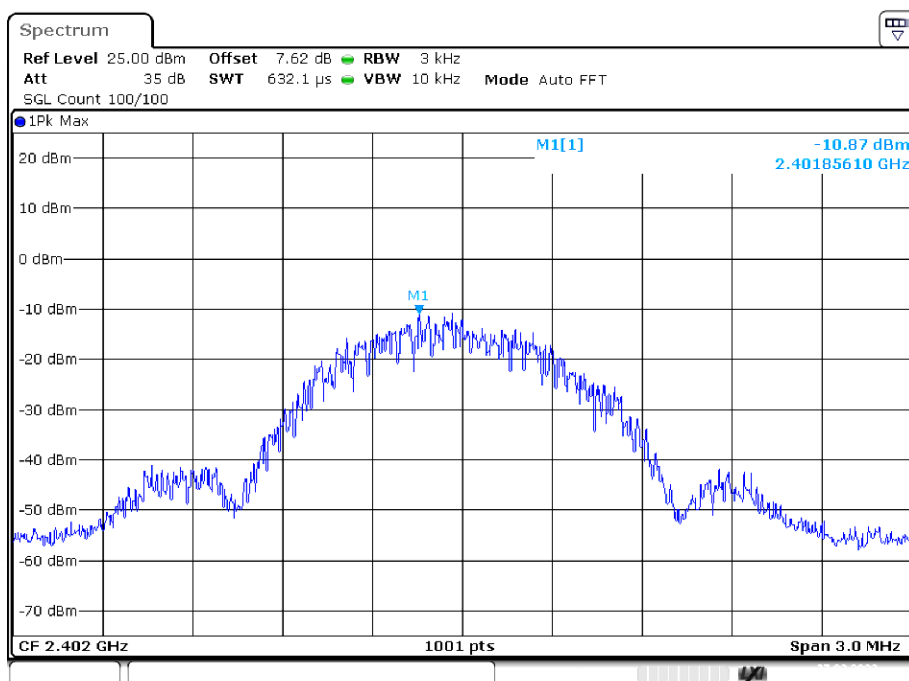
### 5.3. Test Setup



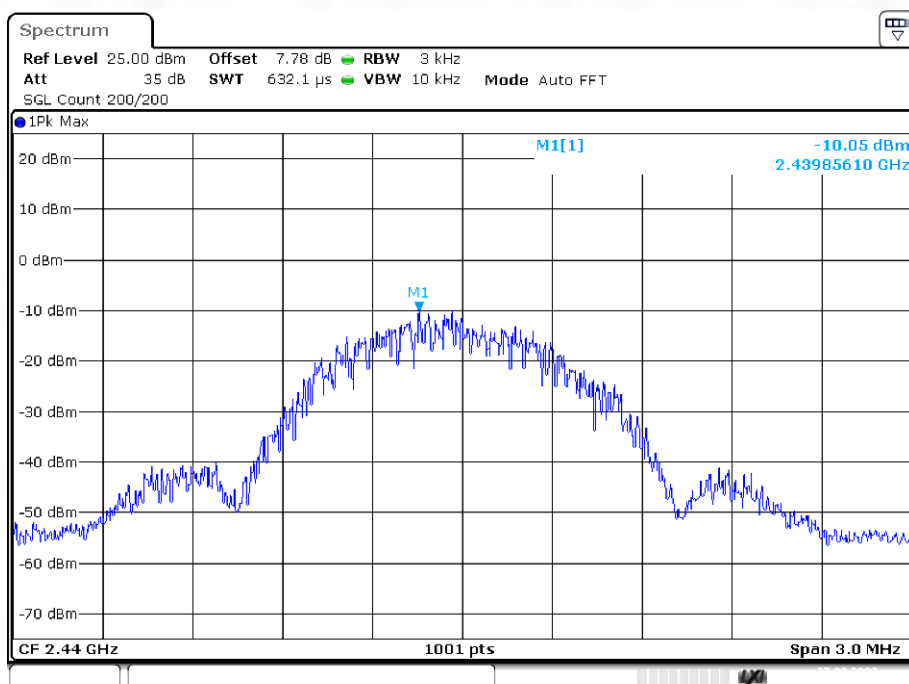
## 5.4. Test Results

| Condition | Mode | Frequency (MHz) | Antenna | Max PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict |
|-----------|------|-----------------|---------|--------------------|------------------|---------|
| NVNT      | BLE  | 2402            | Ant 1   | -10.868            | 8                | Pass    |
| NVNT      | BLE  | 2440            | Ant 1   | -10.045            | 8                | Pass    |
| NVNT      | BLE  | 2480            | Ant 1   | -10.339            | 8                | Pass    |

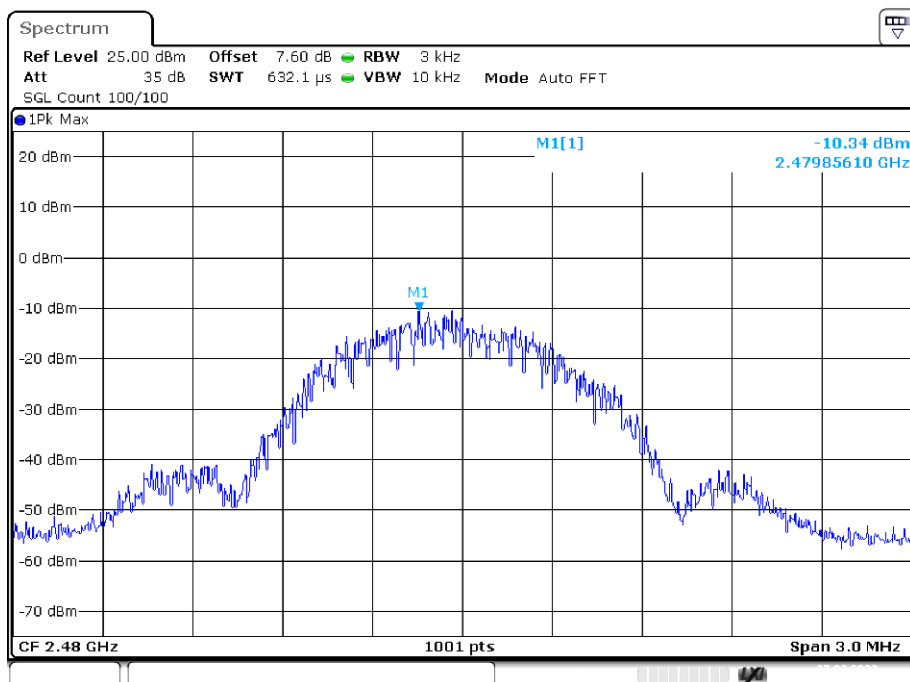
## PSD NVNT BLE 1M 2402MHz Ant1



## PSD NVNT BLE 1M 2440MHz Ant1



## PSD NVNT BLE 1M 2480MHz Ant1



## 6. BANDWIDTH

### 6.1. Test limits

Please refer section RSS-247 & 15.247

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

### 6.2. Test Procedure

Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

a) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

b) The test receiver set RBW = 100kHz, VBW $\geq$ 3\*RBW =300kHz, sweep time set auto, detail see the test plot.

### 6.3. Test Setup



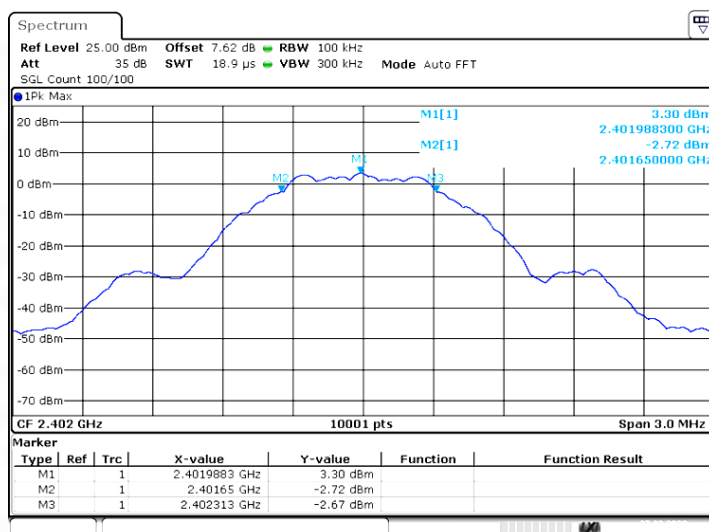
### 6.4. Test Results

#### -6dB Bandwidth

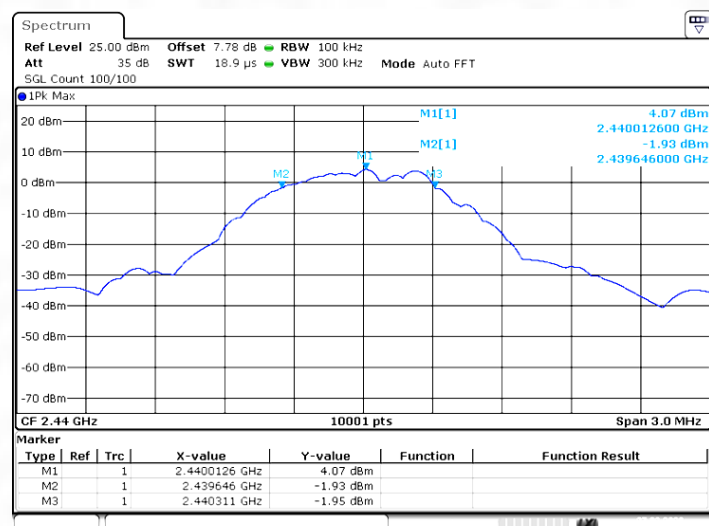
| Mode   | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|--------|-----------------|---------|-----------------------|-----------------------------|---------|
| BLE 1M | 2402            | Ant1    | 0.663                 | 0.5                         | Pass    |
| BLE 1M | 2440            | Ant1    | 0.665                 | 0.5                         | Pass    |
| BLE 1M | 2480            | Ant1    | 0.671                 | 0.5                         | Pass    |



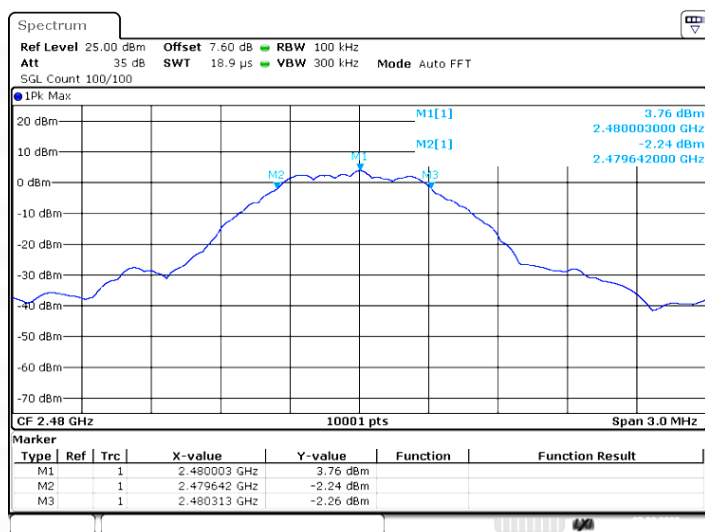
### -6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



### -6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



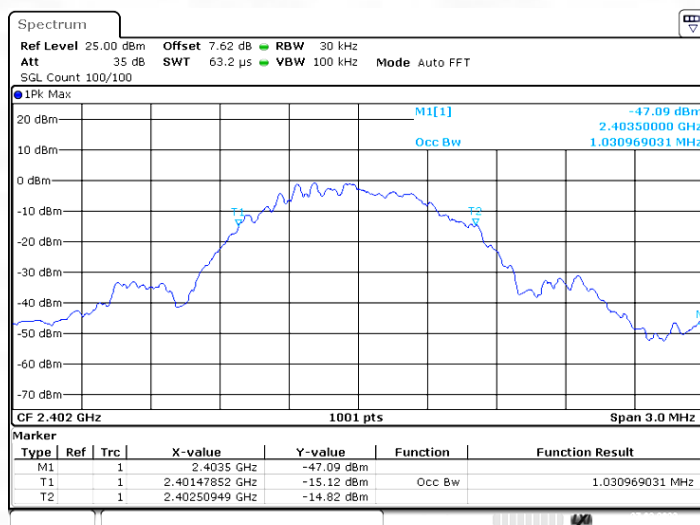
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



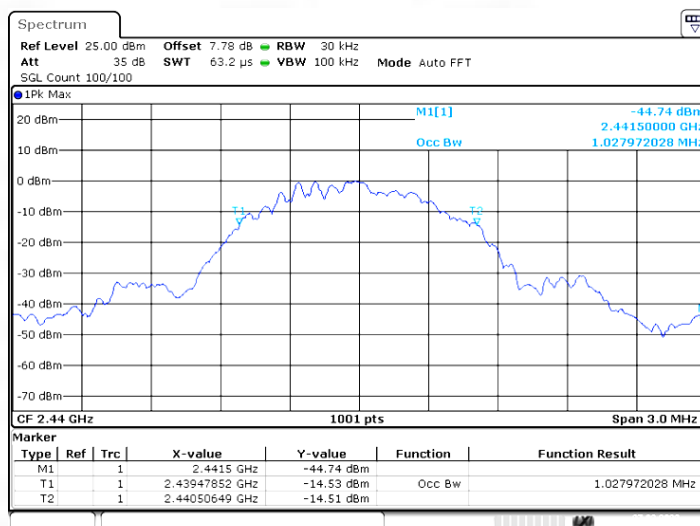
### Occupied Channel Bandwidth

| Condition | Mode   | Frequency (MHz) | Antenna | 99% OBW (MHz) |
|-----------|--------|-----------------|---------|---------------|
| NVNT      | BLE 1M | 2402            | Ant1    | 1.031         |
| NVNT      | BLE 1M | 2440            | Ant1    | 1.028         |
| NVNT      | BLE 1M | 2480            | Ant1    | 1.025         |

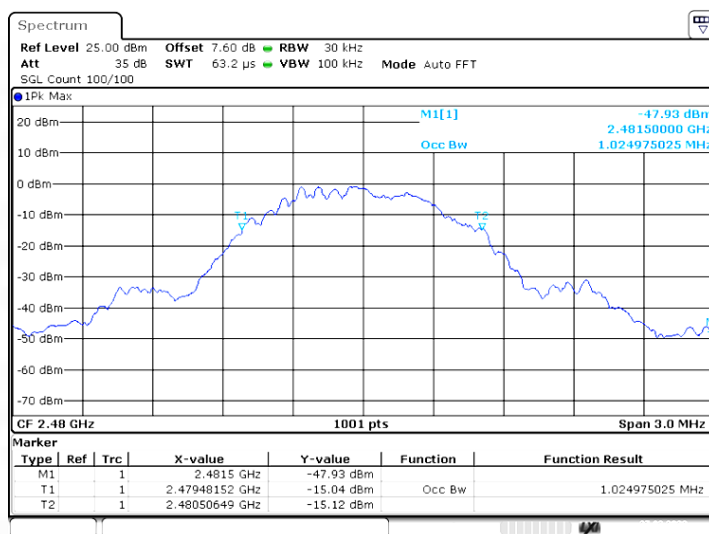
### OBW NVNT BLE 1M 2402MHz Ant1



### OBW NVNT BLE 1M 2440MHz Ant1



## OBW NVNT BLE 1M 2480MHz Ant1



## 7. BAND EDGE CHECK

### 7.1. Test limits

Please refer section RSS-GEN&15.247.

### 7.2. Test Procedure

Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

8.2.1 Put the EUT on a 0.8m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

8.2.2 Check the spurious emissions out of band.

8.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value, RBW 1MHz, VBW 3MHz, RMS detector for AV value.

### 7.3. Test Setup

Same as 5.2.2.

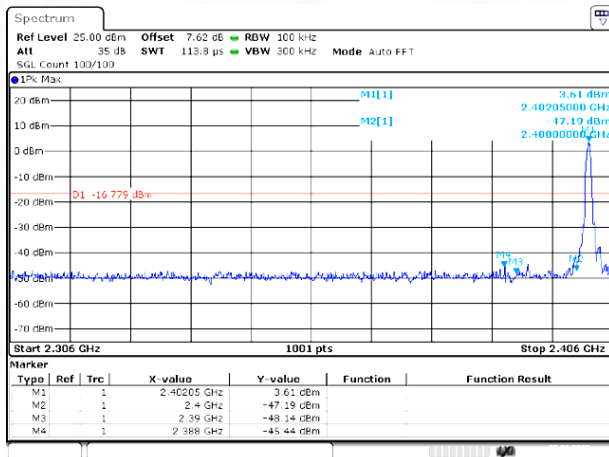
### 7.4. Test Results

Pass

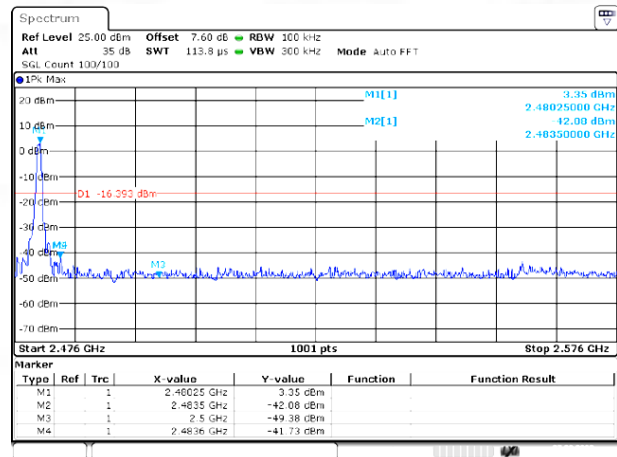
The test results are listed in next pages.

Conduct Method: GFSK(1M)

Test Mode: CH-L

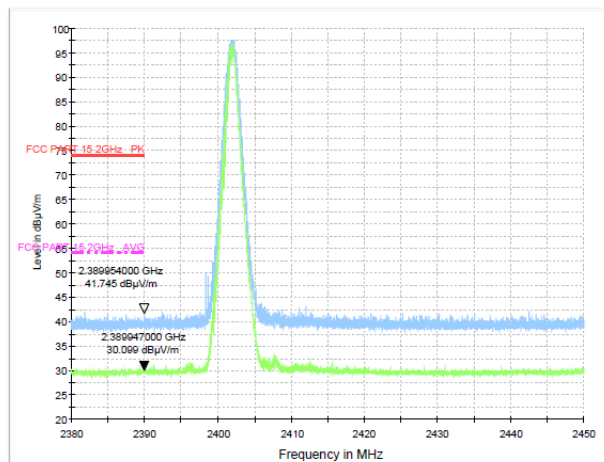


Test Mode: CH-H

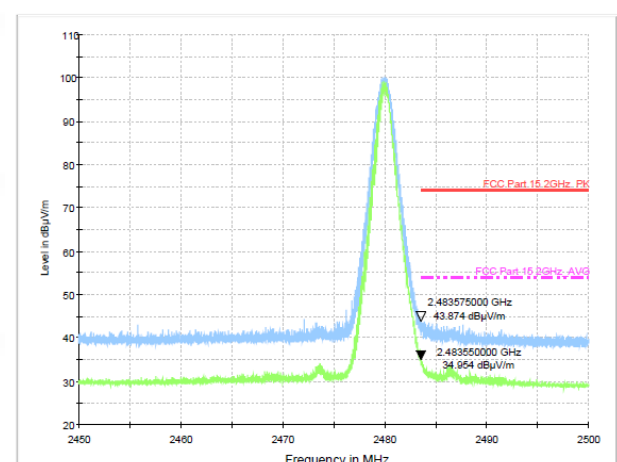


Radiated Method: GFSK(1M)

Test Mode: CH-L



Test Mode: CH-H



## 8. ANTENNA REQUIREMENT

### 8.1. Standard Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator 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.

### 8.2. Antenna Connected Construction

The antenna is internal antenna and no consideration of replacement. Please see EUT photo for details.

### 8.3. Results

The use of an antenna that is uniquely coupled to the intended radiator shall be considered sufficient to comply with the provisions of this section.

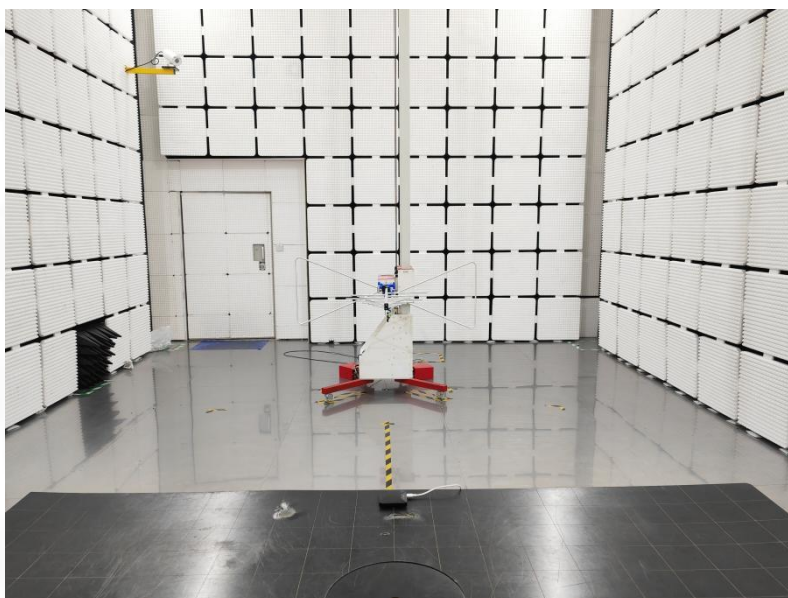
## 9. TEST SETUP PHOTO

### 9.1. Photo of Radiated Emission test

**Band edge emissions (Radiated)**  
**Emissions in restricted frequency bands (above 1GHz)**



**Emissions in restricted frequency bands (below 1GHz)**





## 9.2. Photo of Conducted Emission test

### Conducted Emission at AC power line





Test Report Number: BTF230612R00301



BTF Testing Lab (Shenzhen) Co., Ltd.

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**-- END OF REPORT --**

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**EMC Test Report**