# FCC RF Test Report

| | | |
|---|---|---|
| APPLICANT | : | vivo Mobile Communication Co., Ltd. |
| EQUIPMENT | : | Mobile Phone |
| BRAND NAME | : | vivo |
| MODEL NAME | : | V2349 |
| FCC ID | : | 2AUCY-V2349 |
| STANDARD | : | FCC Part 15 Subpart C §15.247 |
| CLASSIFICATION | : | (DTS) Digital Transmission System |
| TEST DATE(S) | : | Jan. 13, 2024 ~ Jan. 24, 2024 |

**We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.**

Jason Jia

**Approved by: Jason Jia**

ACCREDITED
Cert #5145.01

***Sporton International Inc. (ShenZhen)***
***1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055***
***People's Republic of China***

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR3D0709B | Rev. 01 | Initial issue of report | Feb. 05, 2024 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|
| 3.1 | 15.247(a)(2) | 6dB Bandwidth | ≥ 0.5MHz | Pass | - |
| 3.1 | - | 99% Bandwidth | - | Report only | - |
| 3.2 | 15.247(b)(3) | Peak Output Power | ≤ 30dBm | Pass | - |
| 3.3 | 15.247(e) | Power Spectral Density | ≤ 8dBm/3kHz | Pass | - |
| 3.4 | 15.247(d) | Conducted Band Edges and Spurious Emission | ≤ 20dBc | Pass | - |
| 3.5 | 15.247(d) | Radiated Band Edges and Spurious Emission | 15.209(a) & 15.247(d) | Pass | Under limit 10.39 dB at 2491.44 MHz |
| 3.6 | 15.207 | AC Conducted Emission | 15.207(a) | Pass | Under limit 14.52 dB at 0.16 MHz |
| 3.7 | 15.203 & 15.247(b) | Antenna Requirement | 15.203 & 15.247(b) | Pass | - |

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

# 1 General Description

## 1.1 Applicant

**vivo Mobile Communication Co., Ltd.**
No.1, vivo Road, Chang'an, Dongguan, Guangdong, China

## 1.2 Manufacturer

**vivo Mobile Communication Co., Ltd.**
No.1, vivo Road, Chang'an, Dongguan, Guangdong, China

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Mobile Phone |
| **Brand Name** | vivo |
| **Model Name** | V2349 |
| **FCC ID** | 2AUCY-V2349 |
| **IMEI Code** | Conducted: 865264079977969/865264079977977<br>Conduction: 866829079997933/866829079997925<br>Radiation: 865264079978645/865264079978652 |
| **HW Version** | MP_0.1 |
| **SW Version** | PD2341EF_EX_A_14.0.6.16.W30 |
| **EUT Stage** | Identical Prototype |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx/Rx Frequency Range** | 2402 MHz ~ 2480 MHz |
| **Number of Channels** | 40 |
| **Carrier Frequency of Each Channel** | 40 Channel (37 hopping + 3 advertising channel) |
| **Maximum Output Power to Antenna** | 5.81 dBm (0.0038 W) |
| **99% Occupied Bandwidth** | 1.043 MHz |
| **Antenna Type / Gain** | IFA Antenna Type with gain 1.01 dBi |
| **Type of Modulation** | Bluetooth LE : GFSK |

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

| | | | |
|---|---|---|---|
| **Test Firm** | Sporton International Inc. (ShenZhen) | | |
| **Test Site Location** | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China<br>TEL: +86-755-86379589<br>FAX: +86-755-86379595 | | |
| **Test Site No.** | **Sporton Site No.** | **FCC Designation No.** | **FCC Test Firm Registration No.** |
| | CO01-SZ<br>TH01-SZ | CN1256 | 421272 |

| | | | |
|---|---|---|---|
| **Test Firm** | Sporton International Inc. (ShenZhen) | | |
| **Test Site Location** | 101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China<br>TEL: +86-755-86066985 | | |
| **Test Site No.** | **Sporton Site No.** | **FCC Designation No.** | **FCC Test Firm Registration No.** |
| | 03CH03-SZ | CN1256 | 421272 |

## 1.7 Test Software

| Item | Site | Manufacturer | Name | Version |
|---|---|---|---|---|
| 1. | 03CH03-SZ | AUDIX | E3 | 6.2009-8-24 |
| 2. | CO01-SZ | AUDIX | E3 | 6.120613b |

## 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

## 2.1 Carrier Frequency Channel

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

## 2.2 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

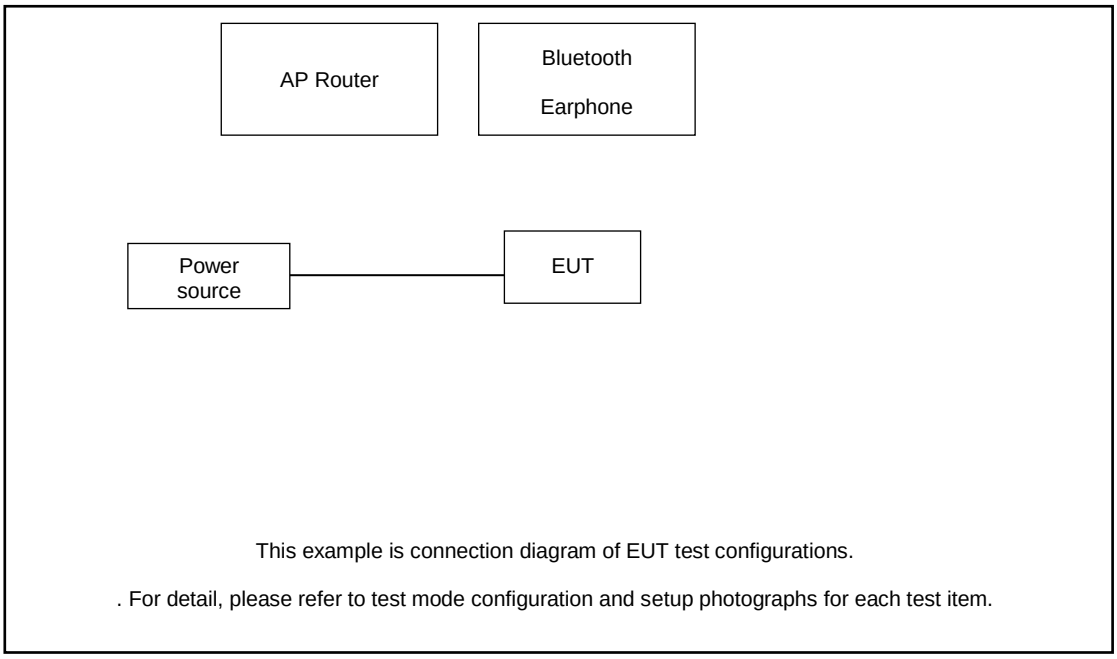
The following summary table is showing all test modes to demonstrate in compliance with the standard.

| Summary table of Test Cases | |
|---|---|
| **Test Item** | **Data Rate / Modulation** |
| | **Bluetooth – LE / GFSK** |
| **Conducted TCs** | Mode 1: Bluetooth Tx CH00_2402 MHz<br>Mode 2: Bluetooth Tx CH19_2440 MHz<br>Mode 3: Bluetooth Tx CH39_2480 MHz |
| **Radiated TCs** | Mode 1: Bluetooth Tx CH00_2402 MHz<br>Mode 2: Bluetooth Tx CH19_2440 MHz<br>Mode 3: Bluetooth Tx CH39_2480 MHz |
| **AC Conducted Emission** | Mode 1: GSM 850 Idle + Bluetooth Link + Adapter 1 + USB Cable + Battery 1 |
| **Remark:** For Radiated Test Cases, The tests were performance with Adapter 1 ,and USB Cable1 . | |

| RSE Co-location |
|---|
| Bluetooth LE CH39_TX + LTE Band 13 link |

## 2.3 Connection Diagram of Test System

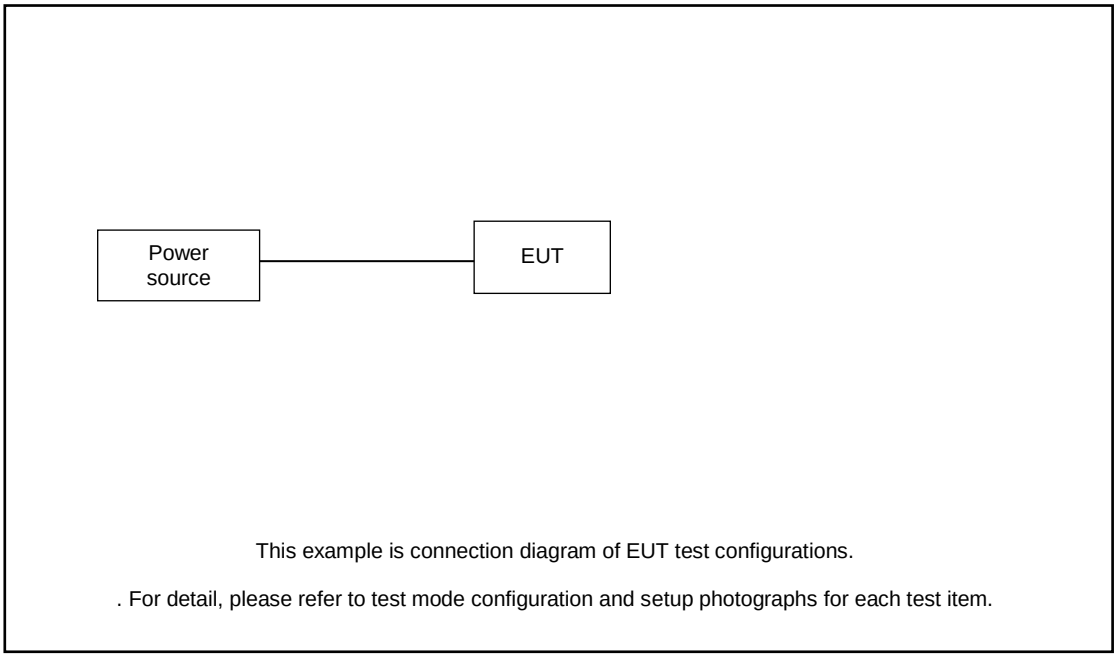
AC Conducted Emission:




This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

Radiated Emission:




This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

## 2.4 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | Base Station(LTE) | Anritsu | MT8820C | N/A | N/A | Unshielded,1.8m |
| 2. | Bluetooth Earphone | Samsung | EO-MG900 | PYAHS-107W | N/A | N/A |
| 3. | WLAN AP | Dlink | DIR-820L | KA2IR820LA1 | N/A | Unshielded,1.8m |

## 2.5 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

## 2.6 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 2.20 dB and 10dB attenuator.

*Offset(dB) = RF cable loss(dB) + attenuator factor(dB).*

= 2.20 + 10 = 12.20 (dB)

# 3 Test Result

## 3.1 6dB and 99% Bandwidth Measurement

### 3.1.1 Limit of 6dB and 99% Bandwidth

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

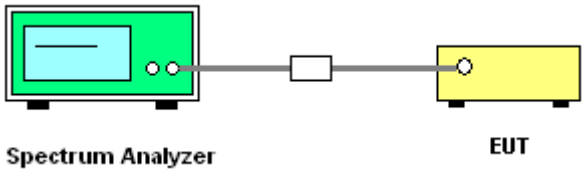
### 3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1% to 5% of the 99% OBW and the VBW is set to 3 times of the RBW.
6. Measure and record the results in the test report.

### 3.1.4 Test Setup




### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

### 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

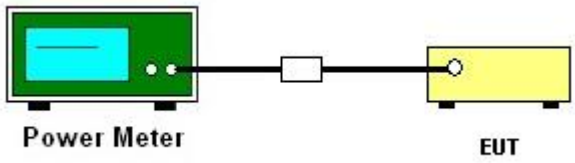
### 3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Peak Output Power

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Peak Conducted Power (dBm) | Conducted Power Limit (dBm) | DG (dBi) | EIRP Power (dBm) | EIRP Power Limit (dBm) | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| BLE | 1Mbps | 1 | 0 | 2402 | 4.75 | 30.00 | 1.01 | 5.76 | 36.00 | Pass |
| BLE | 1Mbps | 1 | 19 | 2440 | 5.77 | 30.00 | 1.01 | 6.78 | 36.00 | Pass |
| BLE | 1Mbps | 1 | 39 | 2480 | 5.81 | 30.00 | 1.01 | 6.82 | 36.00 | Pass |

### 3.2.6 Test Result of Average Output Power (Reporting Only)

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) | Conducted Power Limit (dBm) | DG (dBi) | EIRP Power (dBm) | EIRP Power Limit (dBm) | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BLE | 1Mbps | 1 | 0 | 2402 | 1.97 | 4.44 | 30.00 | 1.01 | 5.45 | 36.00 | Pass |
| BLE | 1Mbps | 1 | 19 | 2440 | 1.97 | 5.42 | 30.00 | 1.01 | 6.43 | 36.00 | Pass |
| BLE | 1Mbps | 1 | 39 | 2480 | 1.97 | 5.48 | 30.00 | 1.01 | 6.49 | 36.00 | Pass |

## 3.3 Power Spectral Density Measurement

### 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

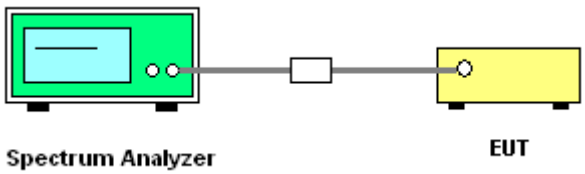
### 3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

### 3.3.4 Test Setup




### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

# 3.4 Conducted Band Edges and Spurious Emission Measurement

## 3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

## 3.4.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

## 3.4.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 11.13
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

## 3.4.4 Test Setup


## 3.4.5 Test Result of Conducted Band Edges Plots

Please refer to Appendix A.

## 3.4.6 Test Result of Conducted Spurious Emission Plots

Please refer to Appendix A.

# 3.5 Radiated Band Edges and Spurious Emission Measurement

## 3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (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 |

## 3.5.2 Measuring Instruments

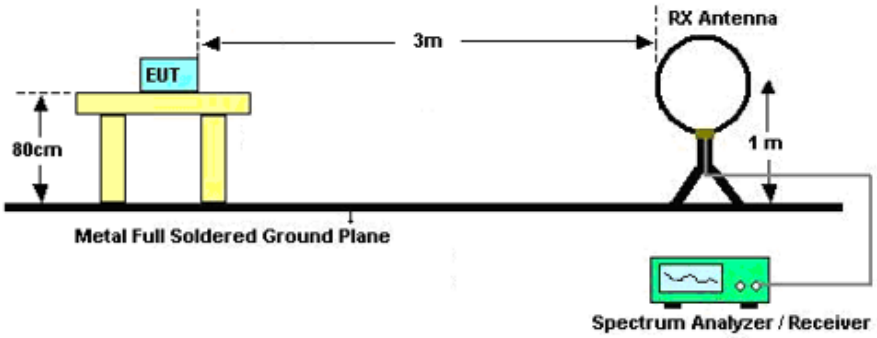
The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.5.3 Test Procedures

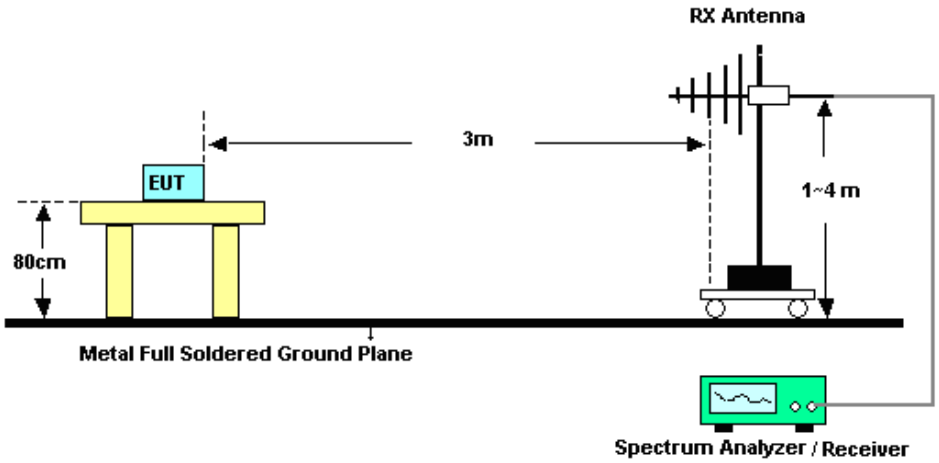
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively 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 testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

## 3.5.4 Test Setup

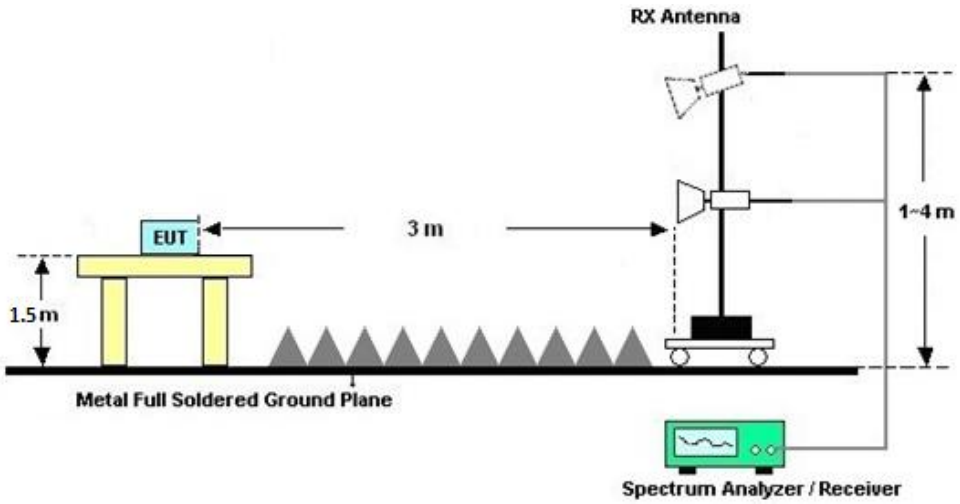
**For radiated emissions below 30MHz**




**For radiated emissions from 30MHz to 1GHz**




**For radiated emissions above 1GHz**



### 3.5.5 Test Results of Radiated Spurious Emissions (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 was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

### 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

### 3.5.7 Duty Cycle

Please refer to Appendix D.

### 3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.

# 3.6 AC Conducted Emission Measurement

## 3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

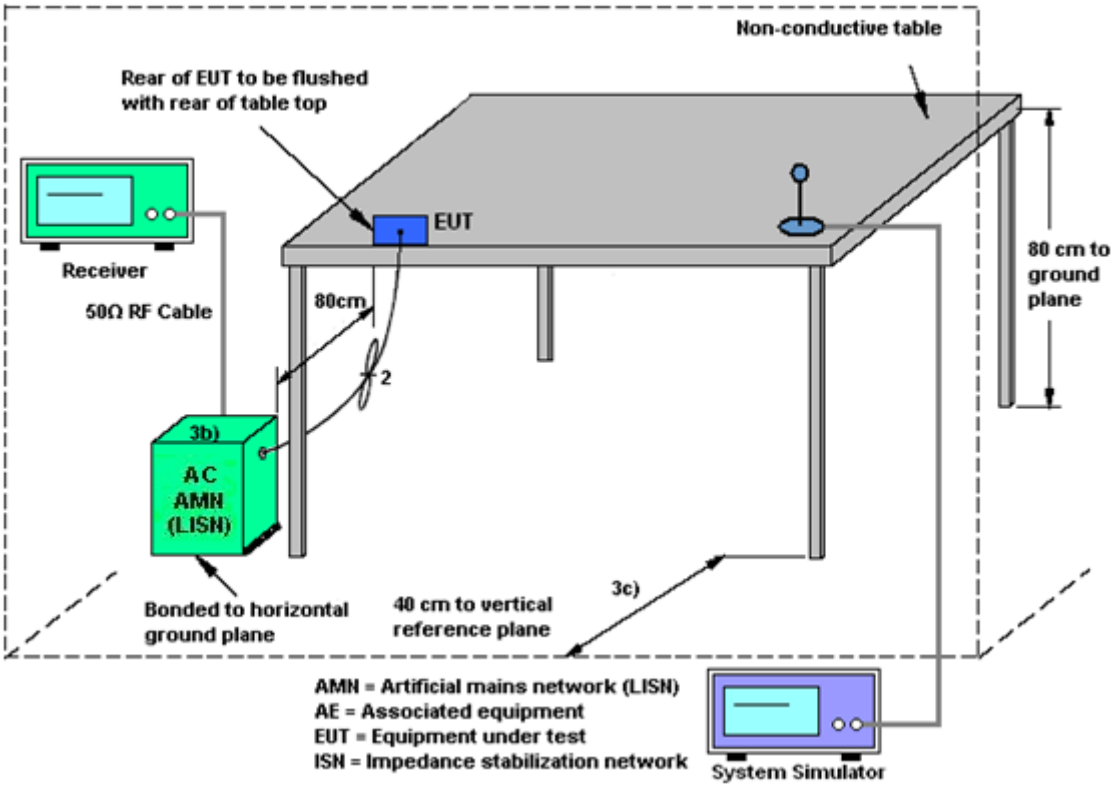
## 3.6.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

## 3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.6.4 Test Setup




### 3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

# 3.7 Antenna Requirements

## 3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

## 3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

## 3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

# 4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| EMI Test Receiver&SA | KEYSIGHT | N9038A | MY54450083 | 20Hz~8.4GHz | Apr. 04, 2023 | Jan. 13, 2024 | Apr. 03, 2024 | Radiation (03CH03-SZ) |
| EXA Spectrum Anaiyzer | KEYSIGHT | N9010A | MY55150246 | 10Hz~44GHz; | Apr. 04, 2023 | Jan. 13, 2024 | Apr. 03, 2024 | Radiation (03CH03-SZ) |
| Loop Antenna | R&S | HFH2-Z2 | 100354 | 9kHz~30MHz | Jul. 28, 2022 | Jan. 13, 2024 | Jul. 27, 2024 | Radiation (03CH03-SZ) |
| Bilog Antenna | TeseQ | CBL6112D | 35408 | 30MHz-2GHz | Aug. 20, 2023 | Jan. 13, 2024 | Aug. 19, 2025 | Radiation (03CH03-SZ) |
| Double Ridge Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-1355 | 1GHz~18GHz | Apr. 08, 2023 | Jan. 13, 2024 | Apr. 07, 2024 | Radiation (03CH03-SZ) |
| HF Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz | Jul. 07, 2023 | Jan. 13, 2024 | Jul.06, 2024 | Radiation (03CH03-SZ) |
| SHF-EHF Horn | com-power | AH-840 | 101071 | 18Ghz-40GHz | Apr. 08, 2023 | Jan. 13, 2024 | Apr. 07, 2024 | Radiation (03CH03-SZ) |
| Amplifier | Burgeon | BPA-530 | 102211 | 0.01Hz ~3000MHz | Oct. 18, 2023 | Jan. 13, 2024 | Oct. 17, 2024 | Radiation (03CH03-SZ) |
| HF Amplifier | MITEQ | AMF-7D-00101800-30-10P-R | 1943528 | 1GHz~18GHz | Oct. 18, 2023 | Jan. 13, 2024 | Oct. 17, 2024 | Radiation (03CH03-SZ) |
| Amplifier | Agilent Technologies | 83017A | MY39501302 | 500MHz~26.5GHz | Dec. 27, 2023 | Jan. 13, 2024 | Dec. 26, 2024 | Radiation (03CH03-SZ) |
| AC Power Source | Chroma | 61601 | 616010002729 | N/A | Oct. 18, 2023 | Jan. 13, 2024 | Oct. 17, 2024 | Radiation (03CH03-SZ) |
| Turn Table | EM | EM1000 | N/A | 0~360 degree | NCR | Jan. 13, 2024 | NCR | Radiation (03CH03-SZ) |
| Antenna Mast | EM | EM1000 | N/A | 1 m~4 m | NCR | Jan. 13, 2024 | NCR | Radiation (03CH03-SZ) |
| Thermo meter | Anymetre | JR593 | #11 | - 10℃ ~ 50℃ 10%RH~99%RH | Oct. 19, 2023 | Jan. 13, 2024 | Oct. 18, 2024 | Radiation (03CH03-SZ) |
| EMI Receiver | R&S | ESR7 | 101630 | 9kHz~7GHz; | Jul. 06, 2023 | Jan. 24, 2024 | Jul. 05, 2024 | Conduction (CO01-SZ) |
| AC LISN | R&S | ENV216 | 100063 | 9kHz~30MHz | Aug. 21, 2023 | Jan. 24, 2024 | Aug. 20, 2024 | Conduction (CO01-SZ) |
| AC LISN (for auxiliary equipment) | EMCO | 3816/2SH | 00103892 | 9kHz~30MHz | Oct. 16, 2023 | Jan. 24, 2024 | Oct. 15, 2024 | Conduction (CO01-SZ) |
| AC Power Source | Chroma | 61602 | 616020000891 | 100Vac~250Vac | Jul. 07, 2023 | Jan. 24, 2024 | Jul. 06, 2024 | Conduction (CO01-SZ) |
| Thermo meter | Anymetre | JR593 | #5 | - 10℃ ~ 50℃ 10%RH~99%RH | Apr. 08, 2023 | Jan. 24, 2024 | Apr. 07, 2024 | Conduction (CO01-SZ) |
| Spectrum Analyzer | R&S | FSV40 | 101078 | 10Hz~40GHz | Apr. 06, 2023 | Jan. 18, 2024 | Apr. 05, 2024 | Conducted (TH01-SZ) |
| Pulse Power Senor | Anritsu | MA2411B | 1339473 | 30MHz~40GHz | Dec. 29, 2023 | Jan. 18, 2024 | Dec. 28, 2024 | Conducted (TH01-SZ) |
| Thermo meter | Anymetre | JR593 | #7 | - 10℃ ~ 50℃ 10%RH~99%RH | Apr. 08, 2023 | Jan. 18, 2024 | Apr. 07, 2024 | Conducted (TH01-SZ) |

NCR: No Calibration Required

# 5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

**Uncertainty of Conducted Measurement**

| Test Item | Uncertainty |
|---|---|
| Conducted Spurious Emission & Bandedge | ±1.34 dB |
| Occupied Channel Bandwidth | ±0.1 MHz |
| Conducted Power | ±1.34 dB |
| Conducted Power Spectral Density | ±1.32 dB |
| Frequency | ±1.3 Hz |

**Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 2.7 dB |

**Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0 dB |

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0 dB |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 4.9 dB |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0 dB |

**---------- THE END ----------**

# Appendix A. Conducted Test Results

| | |
|---|---|
| **Ambient Condition**: 24~26 ℃, 45~55 %RH | |
| **Test Date:** 2024/01/18 | **Test Engineer:** Zhang Xue Yi |

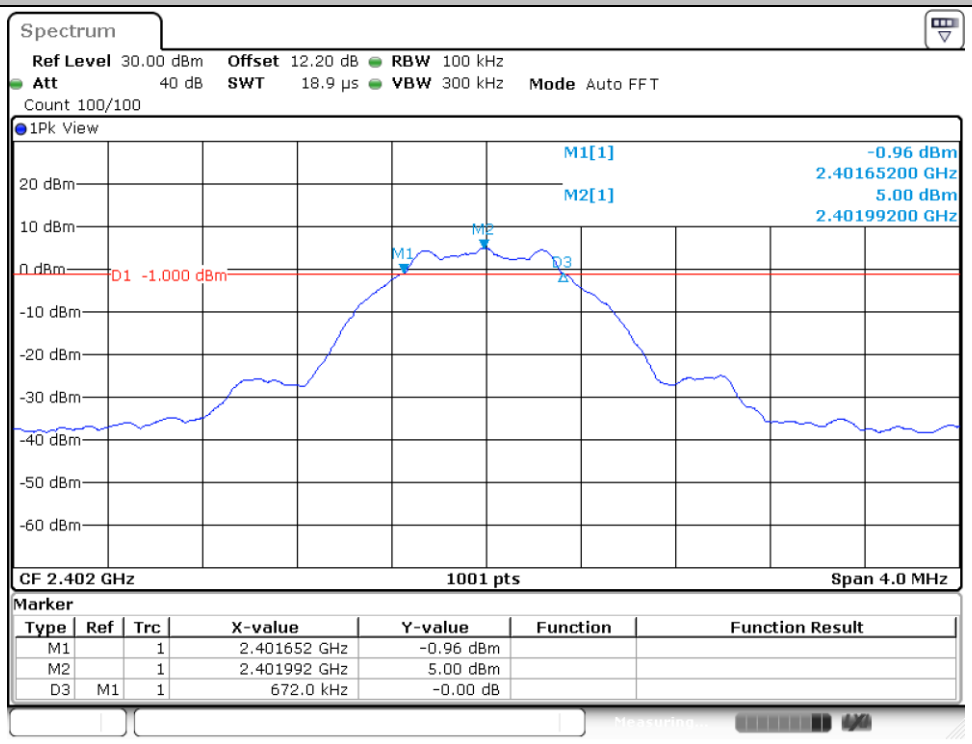
# DTS Bandwidth

## Test Result

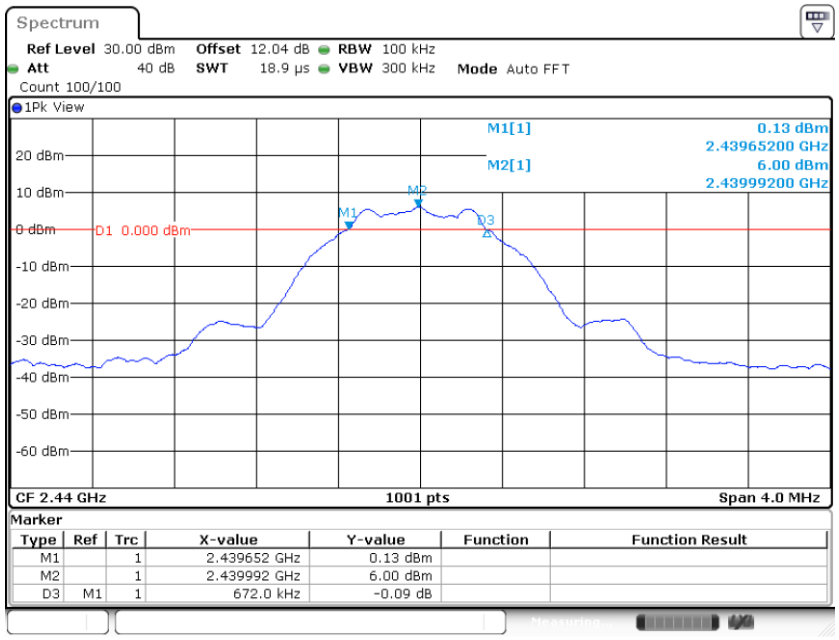
| TestMode | Antenna | Freq(MHz) | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant22 | 2402 | 0.67 | 2401.65 | 2402.32 | 0.5 | PASS |
| | | 2440 | 0.67 | 2439.65 | 2440.32 | 0.5 | PASS |
| | | 2480 | 0.67 | 2479.65 | 2480.32 | 0.5 | PASS |

## Test Graphs

BLE_1M_2402

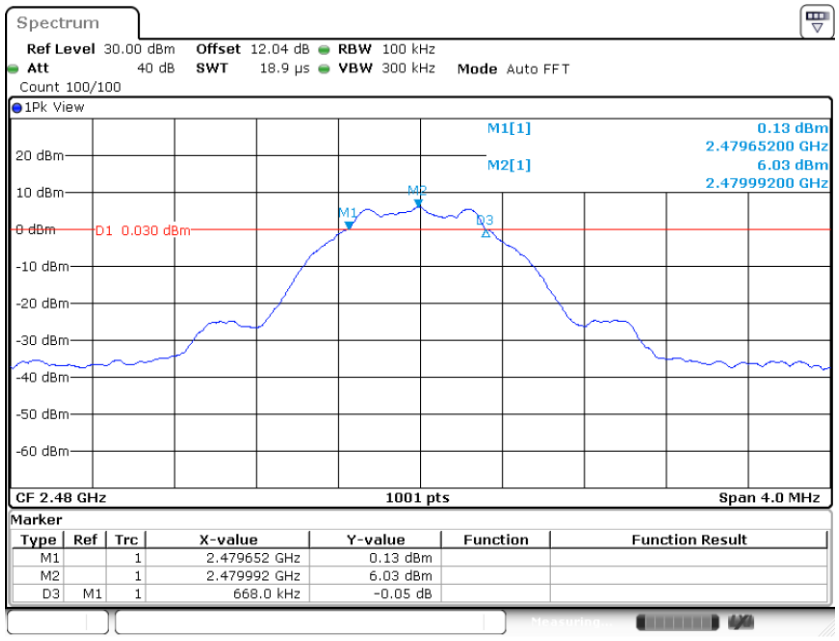


BLE_1M_2440




Date: 18.JAN.2024 15:32:16

BLE_1M_2480




Date: 18.JAN.2024 15:33:33

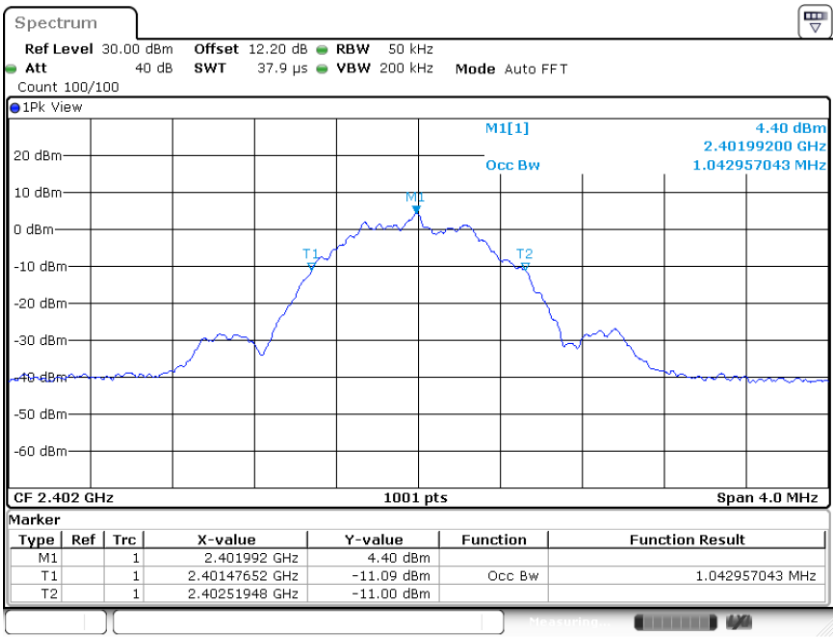
# Occupied Channel Bandwidth

## Test Result

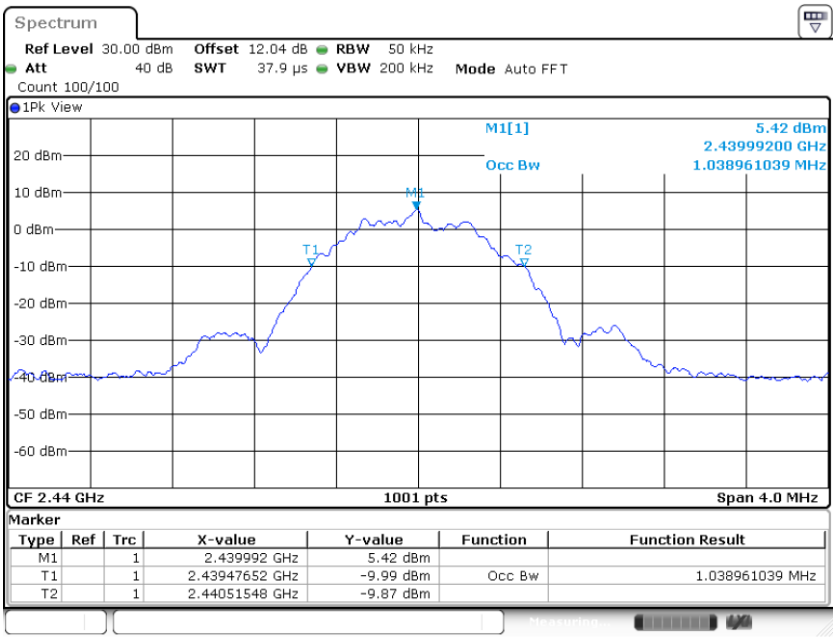
| TestMode | Antenna | Freq(MHz) | OCB [MHz] | FL[MHz] | FH[MHz] |
|---|---|---|---|---|---|
| BLE_1M | Ant22 | 2402 | 1.043 | 2401.4765 | 2402.5195 |
| | | 2440 | 1.039 | 2439.4765 | 2440.5155 |
| | | 2480 | 1.043 | 2479.4725 | 2480.5155 |

## Test Graphs

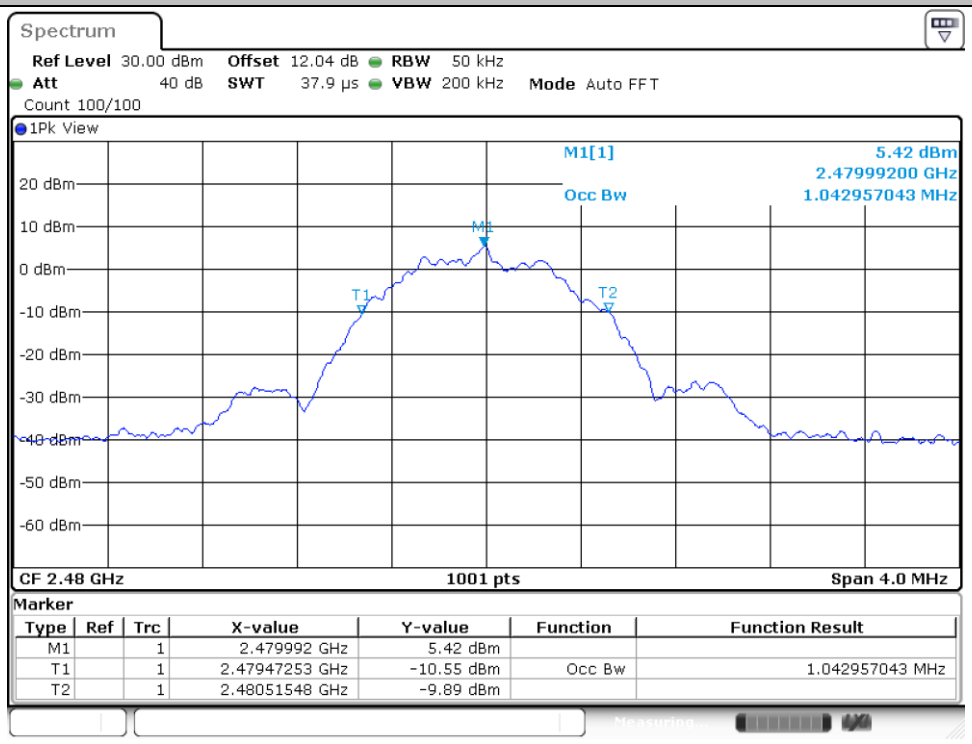
BLE_1M_2402




BLE_1M_2440



BLE_1M_2480


Spectrum
Ref Level 30.00 dBm Offset 12.04 dB RBW 50 kHz
Att 40 dB SWT 37.9 µs VBW 200 kHz Mode Auto FFT
Count 100/100
1Pk View
M1[1] 5.42 dBm
2.47999200 GHz
Occ Bw 1.042957043 MHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
M1
T1
T2
CF 2.48 GHz
1001 pts
Span 4.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.479992 GHz 5.42 dBm
T1 1 2.47947253 GHz -10.55 dBm Occ Bw 1.042957043 MHz
T2 1 2.48051548 GHz -9.89 dBm
Measuring...
Date: 18.JAN.2024 15:33:42

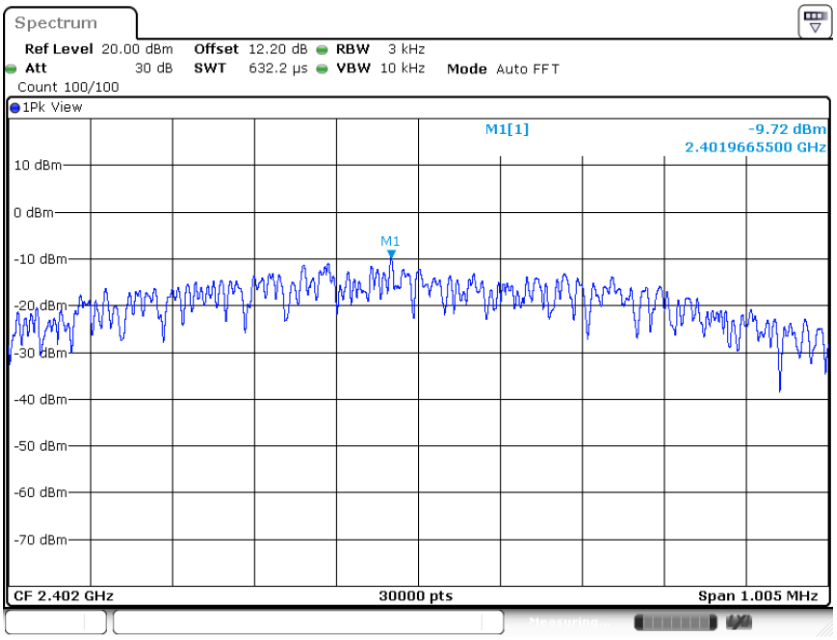
# Maximum power spectral density

## Test Result

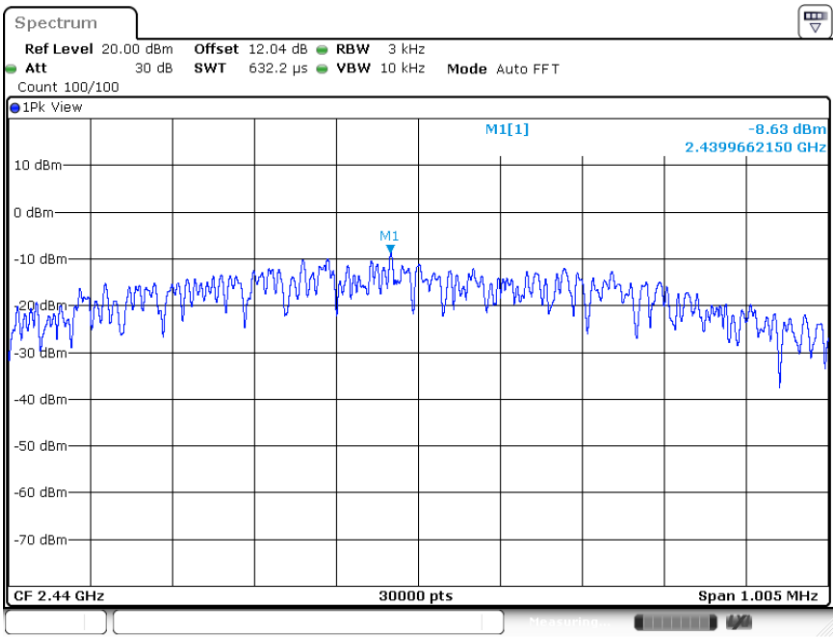
| TestMode | Antenna | Freq(MHz) | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| BLE_1M | Ant22 | 2402 | -9.72 | ≤8.00 | PASS |
| | | 2440 | -8.63 | ≤8.00 | PASS |
| | | 2480 | -8.64 | ≤8.00 | PASS |

## Test Graphs

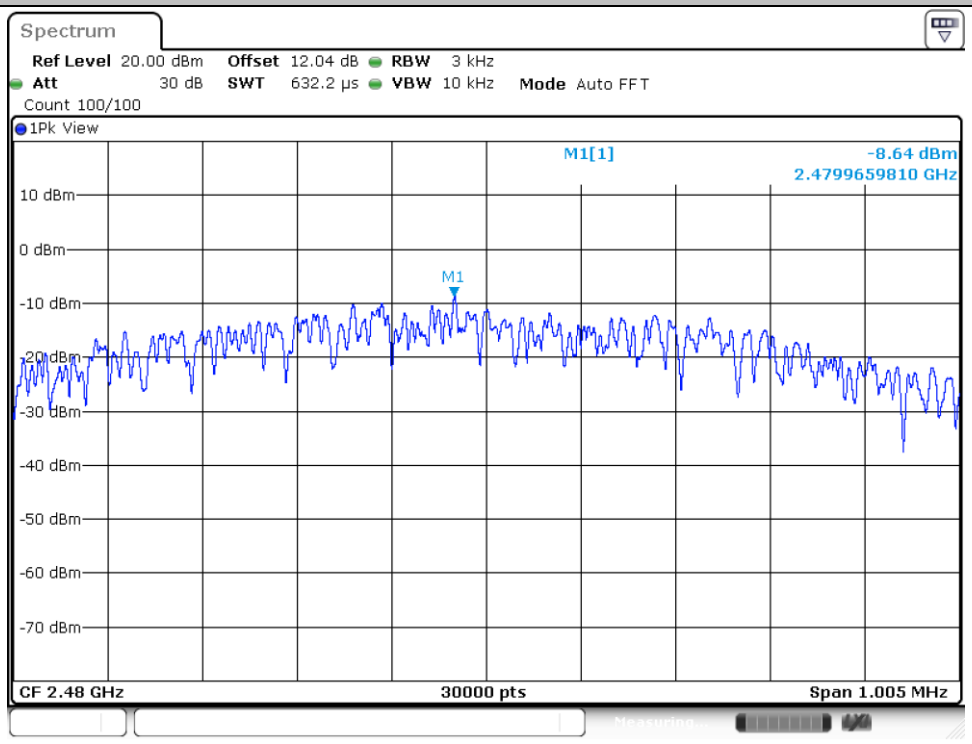
BLE_1M_Ant22_2402




BLE_1M_Ant22_2440



BLE_1M_Ant22_2480



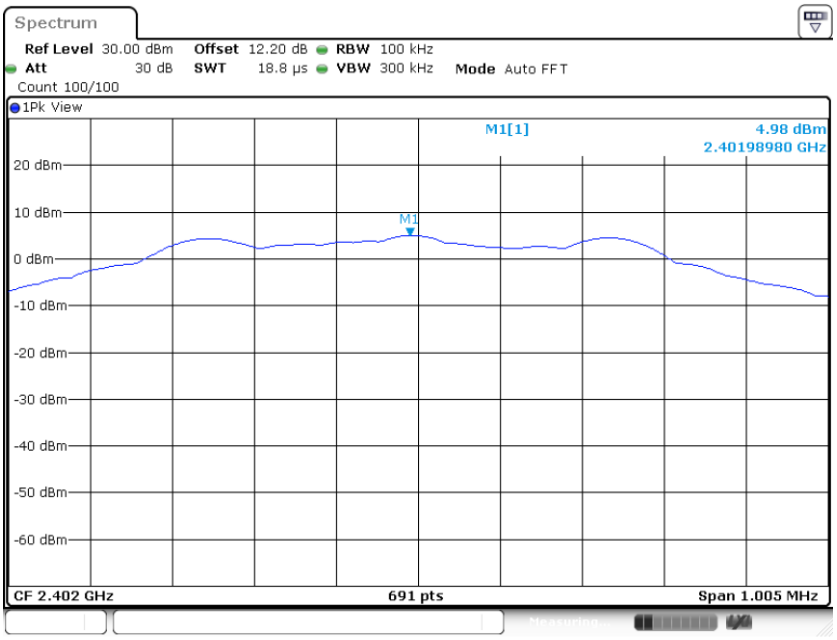
# Reference level measurement

## Test Result

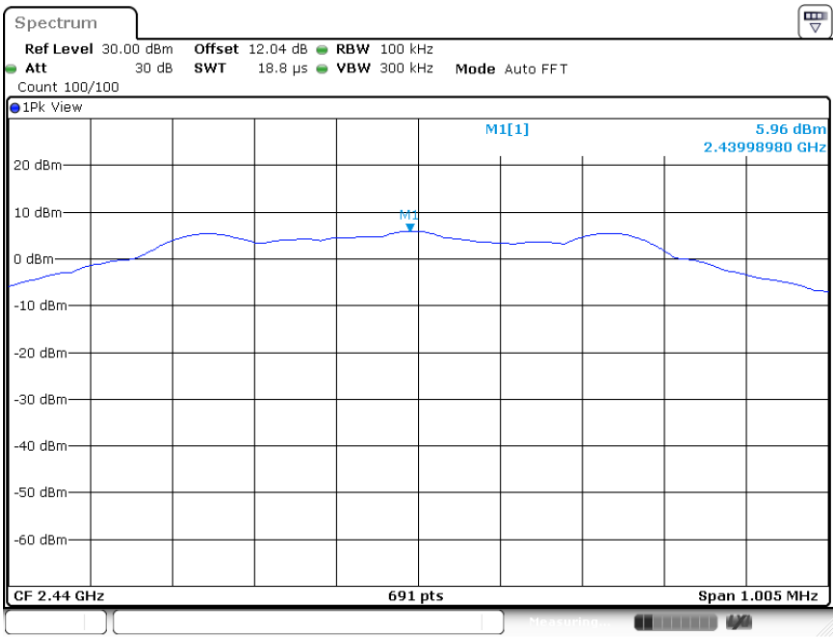
| TestMode | Antenna | Freq(MHz) | Max.Point[MHz] | Result[dBm/100KHz] |
|---|---|---|---|---|
| BLE_1M | Ant22 | 2402 | 2401.99 | 4.98 |
| | | 2440 | 2439.99 | 5.96 |
| | | 2480 | 2479.99 | 6.04 |

## Test Graphs

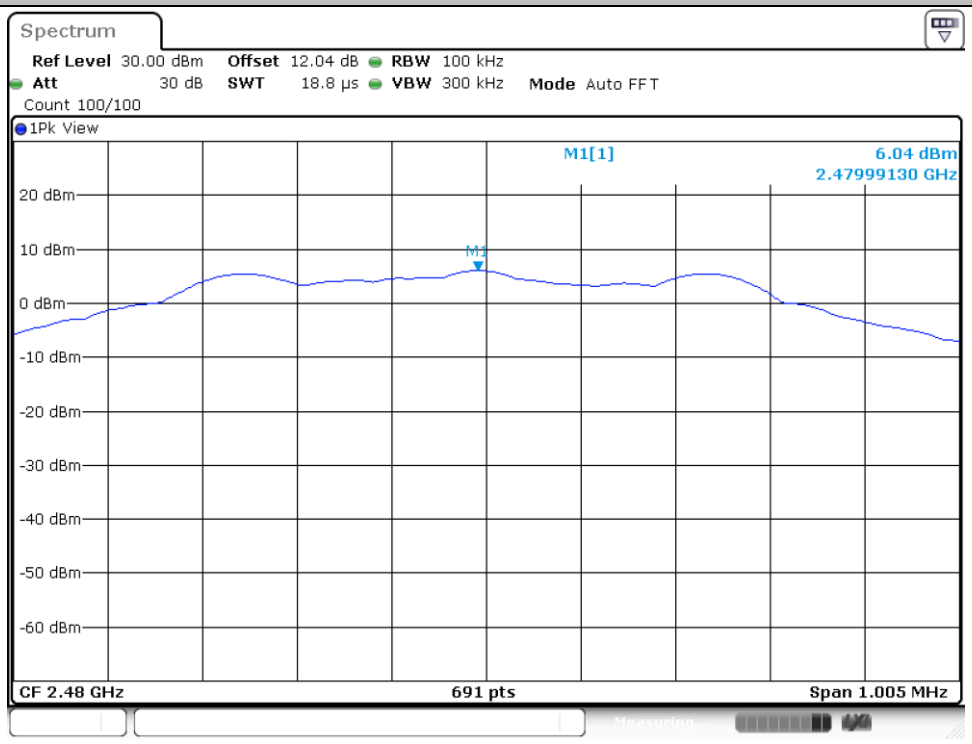
BLE_1M_Ant22_2402




BLE_1M_Ant22_2440



BLE_1M_Ant22_2480



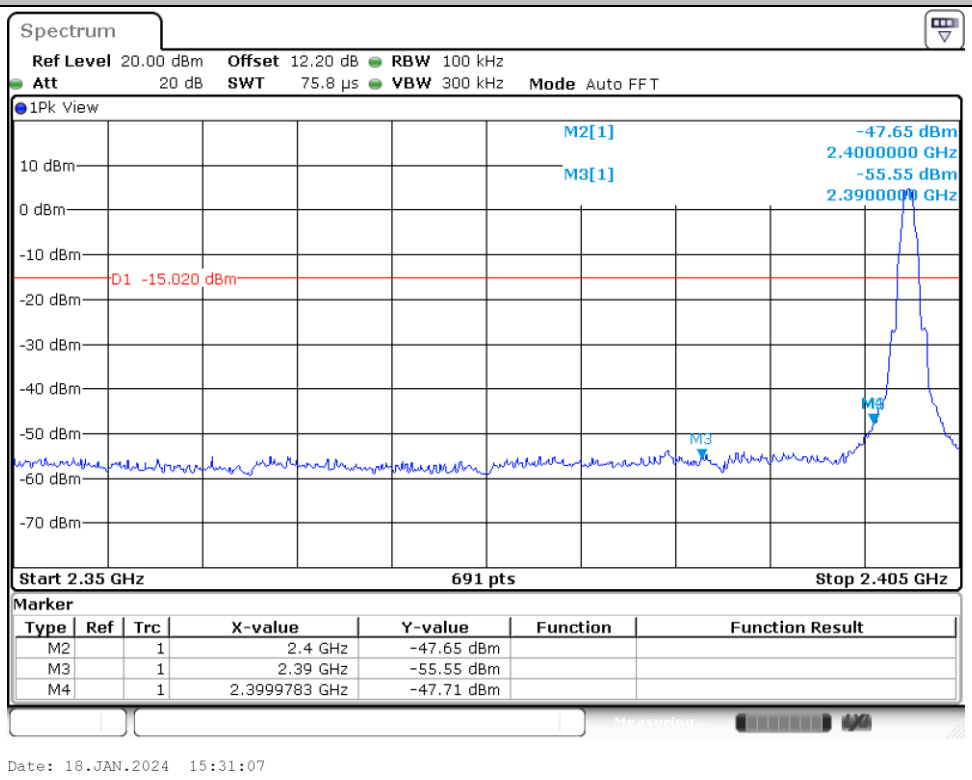
# Band edge measurements

## Test Result

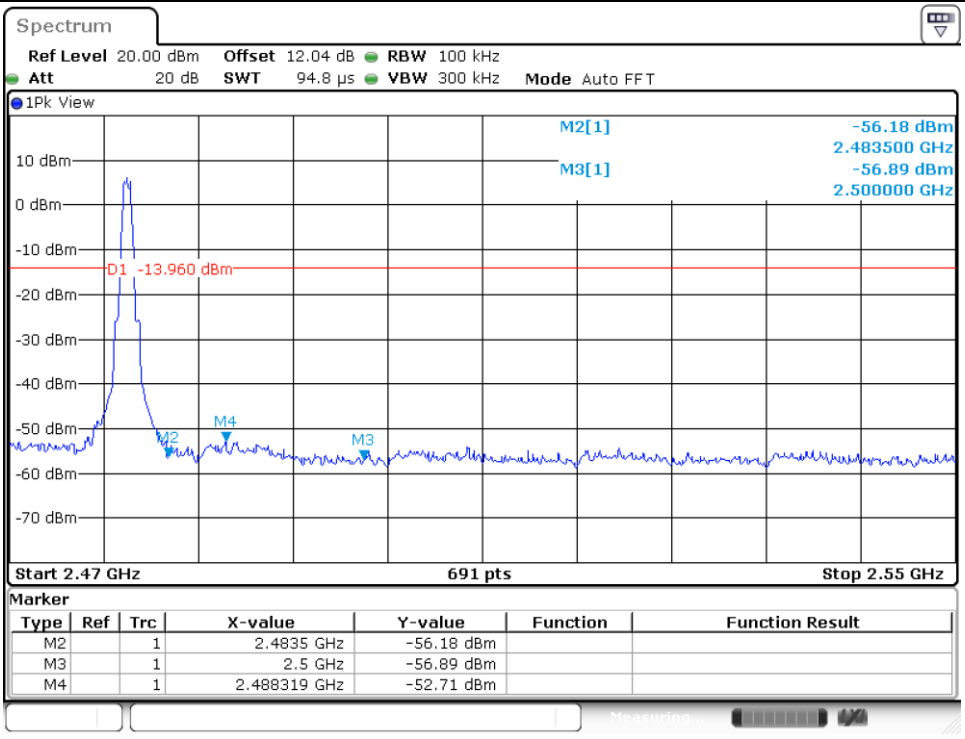
| TestMode | Antenna | ChName | Freq(MHz) | RefLevel [dBm/100KHz] | Result [dBm/100KHz] | Limit [dBm/100KHz] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant22 | Low | 2402 | 4.98 | -47.71 | ≤-15.02 | PASS |
| | | High | 2480 | 6.04 | -52.71 | ≤-13.96 | PASS |

## Test Graphs

BLE_1M_Ant22_Low_2402



BLE_1M_Ant22_High_2480



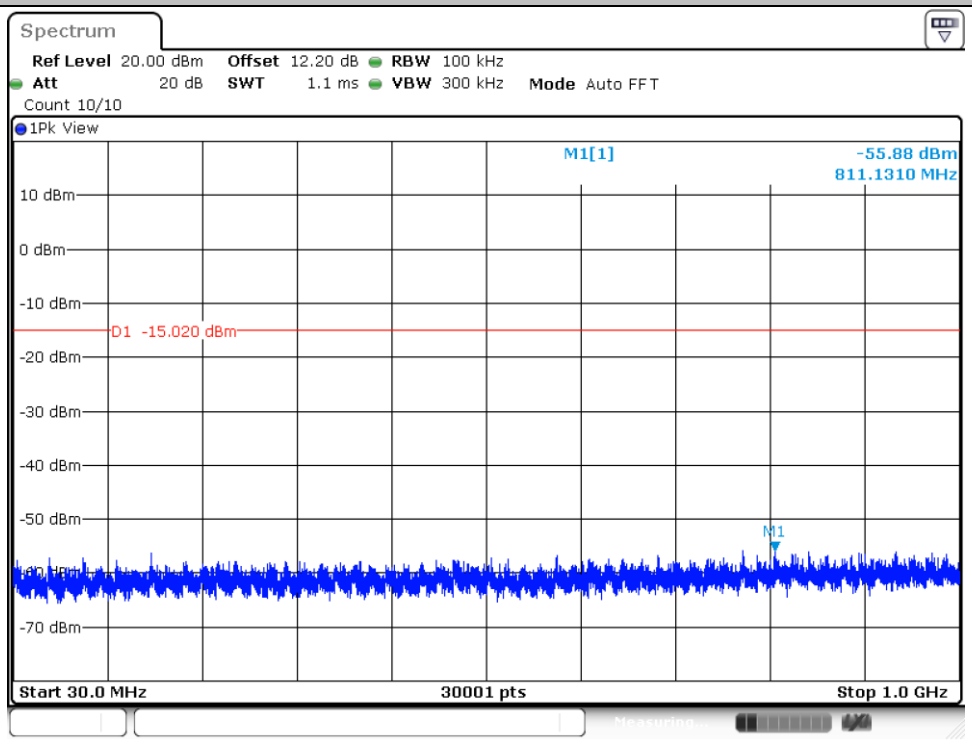
# Conducted Spurious Emission

## Test Result

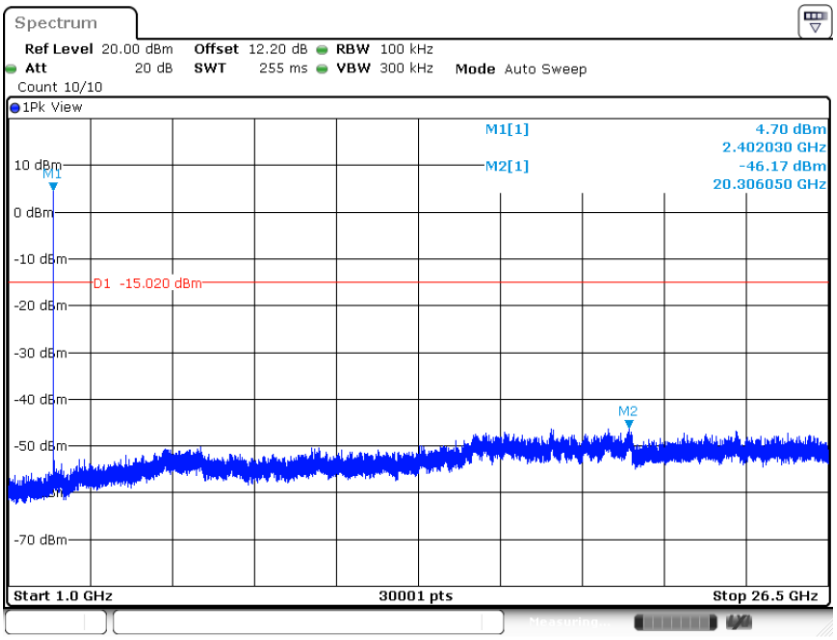
| TestMode | Antenna | Freq(MHz) | FreqRange [MHz] | RefLevel [dBm/100KHz] | Result [dBm/100KHz] | Limit [dBm/100KHz] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_1M | Ant22 | 2402 | 30~1000 | 4.98 | -55.88 | ≤-15.02 | PASS |
| | | | 1000~26500 | 4.98 | -46.17 | ≤-15.02 | PASS |
| | | 2440 | 30~1000 | 5.96 | -55.43 | ≤-14.04 | PASS |
| | | | 1000~26500 | 5.96 | -45.75 | ≤-14.04 | PASS |
| | | 2480 | 30~1000 | 6.04 | -55.5 | ≤-13.96 | PASS |
| | | | 1000~26500 | 6.04 | -45.4 | ≤-13.96 | PASS |

## Test Graphs

BLE_1M_Ant22_2402_30~1000

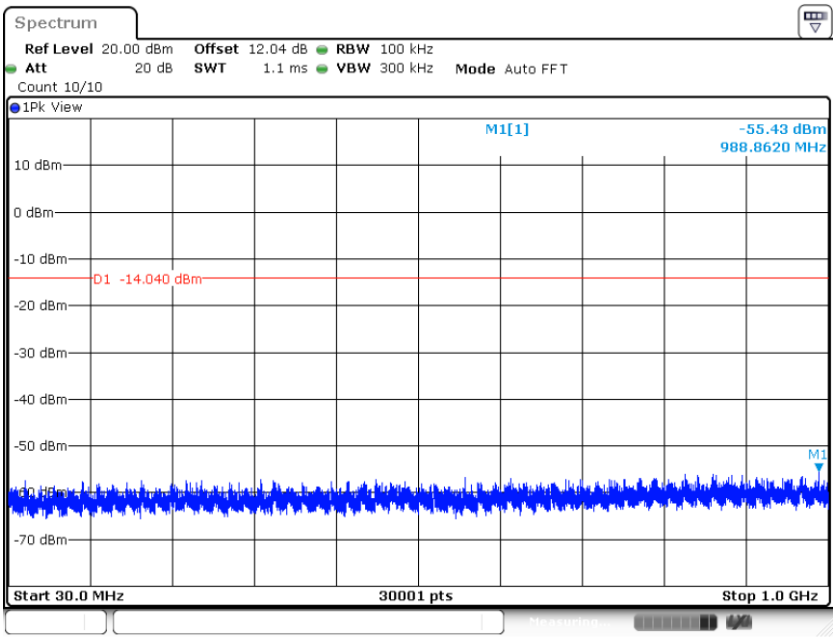


BLE_1M_Ant22_2402_1000~26500



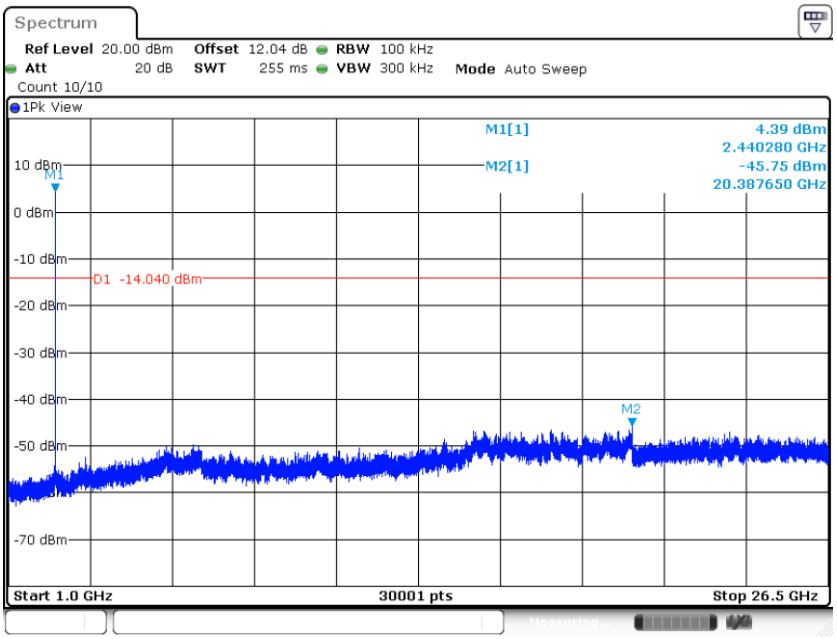

Date: 18.JAN.2024 15:31:40

BLE_1M_Ant22_2440_30~1000



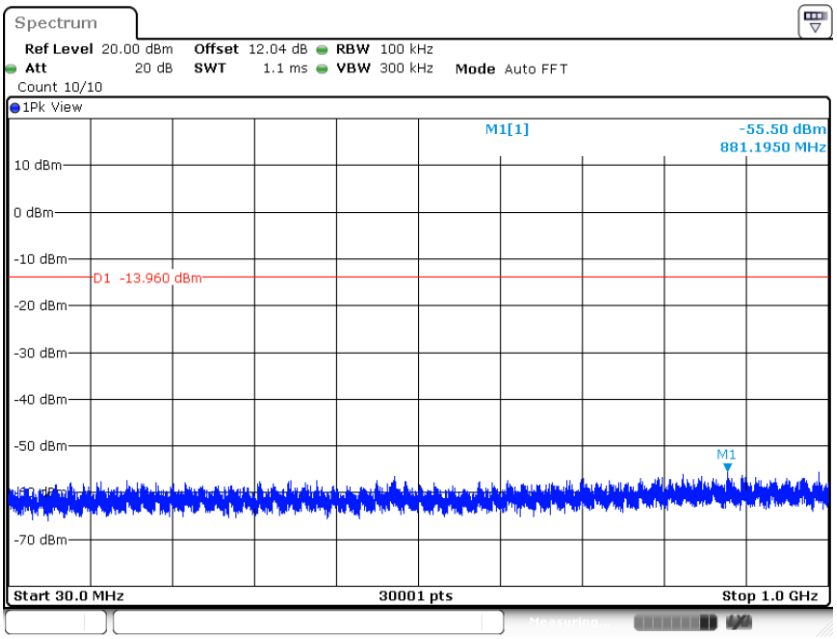

Date: 18.JAN.2024 15:32:55

BLE_1M_Ant22_2440_1000~26500



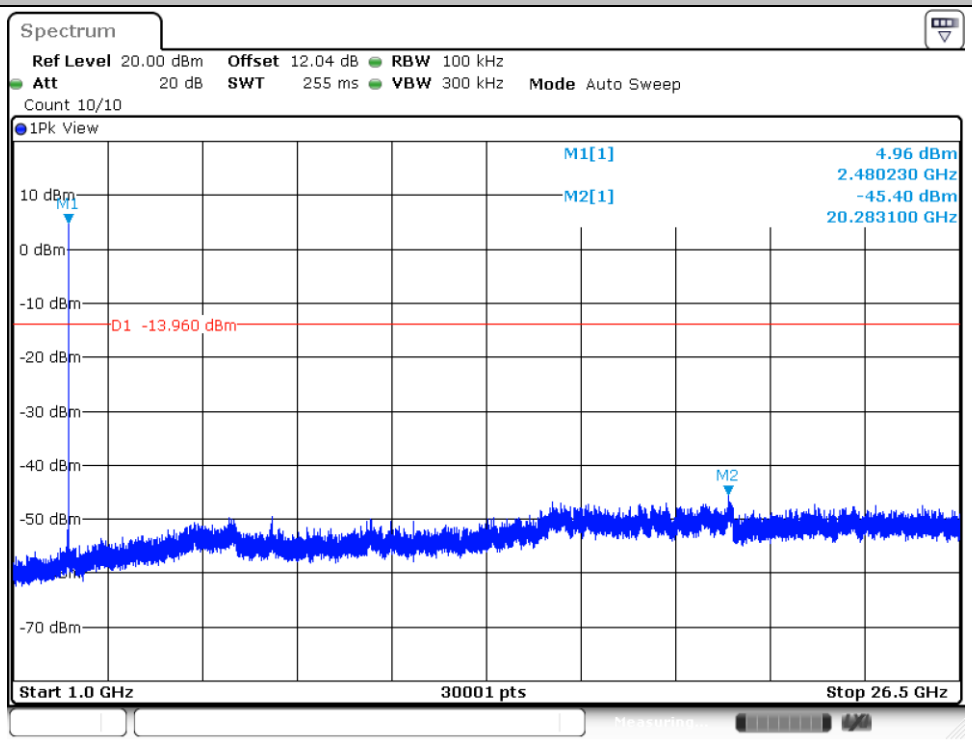

Date: 18.JAN.2024 15:33:17

BLE_1M_Ant22_2480_30~1000



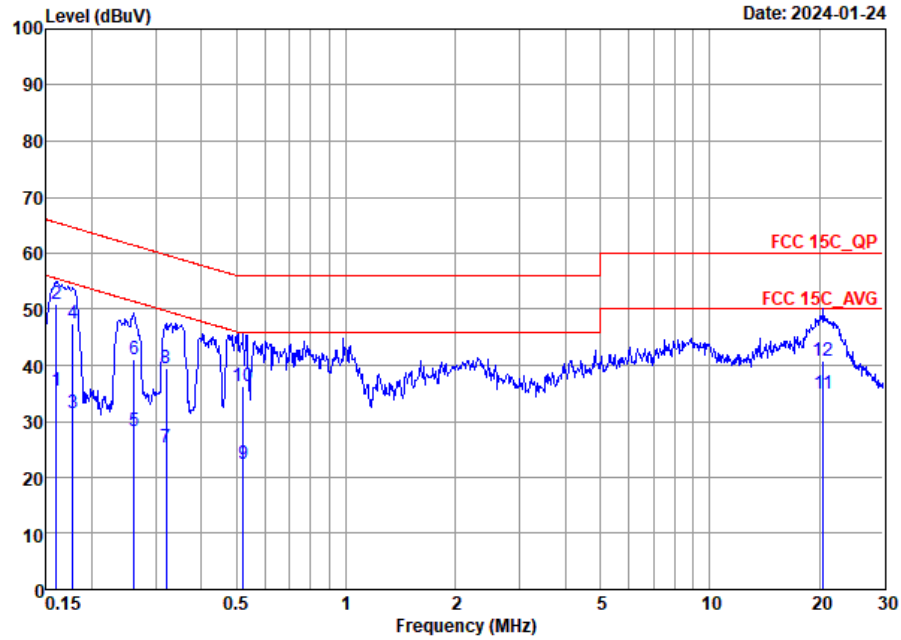

Date: 18.JAN.2024 15:34:26

BLE_1M_Ant22_2480_1000~26500



# Appendix B. AC Conducted Emission Test Results

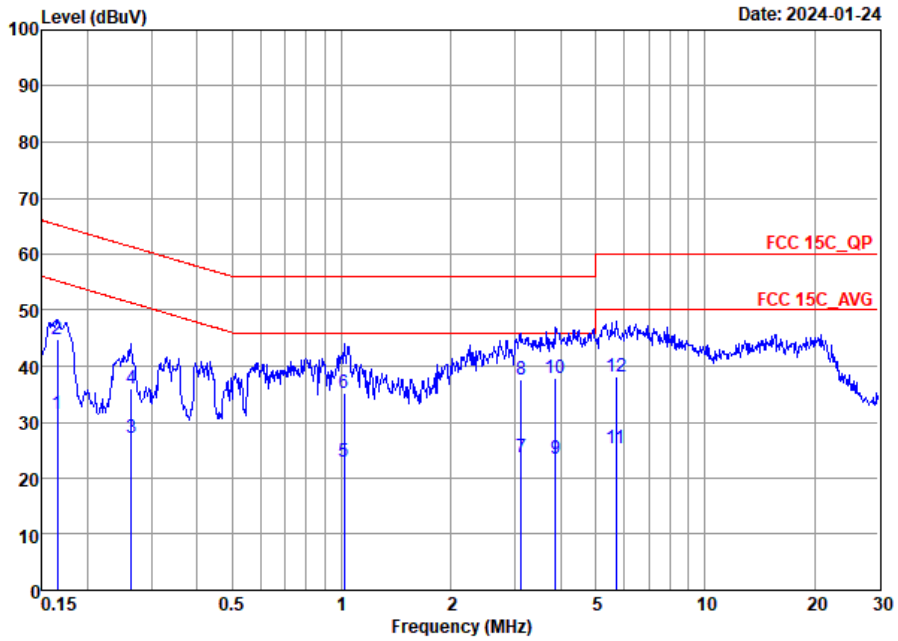
| | | | |
|---|---|---|---|
| **Test Engineer :** | FangMing Liang | **Temperature :** | 22~24℃ |
| | | **Relative Humidity :** | 44~50% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Remark :** | All emissions not reported here are more than 10 dB below the prescribed limit. | | |




Site : CO01-SZ
Condition: FCC 15C_QP AC LISN 100063_L LINE

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.16 | 35.55 | -19.92 | 55.47 | 15.10 | 10.31 | 10.14 | Average |
| 2 | * | 0.16 | 50.95 | -14.52 | 65.47 | 30.50 | 10.31 | 10.14 | QP |
| 3 | | 0.18 | 31.44 | -23.15 | 54.59 | 11.00 | 10.30 | 10.14 | Average |
| 4 | | 0.18 | 47.44 | -17.15 | 64.59 | 27.00 | 10.30 | 10.14 | QP |
| 5 | | 0.26 | 28.36 | -23.02 | 51.38 | 8.10 | 10.11 | 10.15 | Average |
| 6 | | 0.26 | 41.16 | -20.22 | 61.38 | 20.90 | 10.11 | 10.15 | QP |
| 7 | | 0.32 | 25.37 | -24.34 | 49.71 | 5.09 | 10.12 | 10.16 | Average |
| 8 | | 0.32 | 39.57 | -20.14 | 59.71 | 19.29 | 10.12 | 10.16 | QP |
| 9 | | 0.52 | 22.40 | -23.60 | 46.00 | 2.00 | 10.24 | 10.16 | Average |
| 10 | | 0.52 | 36.30 | -19.70 | 56.00 | 15.90 | 10.24 | 10.16 | QP |
| 11 | | 20.49 | 34.90 | -15.10 | 50.00 | 14.20 | 10.12 | 10.58 | Average |
| 12 | | 20.49 | 40.90 | -19.10 | 60.00 | 20.20 | 10.12 | 10.58 | QP |

| | | | |
|---|---|---|---|
| **Test Engineer :** | FangMing Liang | **Temperature :** | 22~24℃ |
| | | **Relative Humidity :** | 44~50% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Neutral |
| **Remark :** | All emissions not reported here are more than 10 dB below the prescribed limit. | | |




Site : CO01-SZ
Condition: FCC 15C_QP AC LISN 100063_N NEUTRAL

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.17 | 31.55 | -23.66 | 55.21 | 11.00 | 10.41 | 10.14 | Average |
| 2 | | 0.17 | 44.75 | -20.46 | 65.21 | 24.20 | 10.41 | 10.14 | QP |
| 3 | | 0.26 | 27.11 | -24.18 | 51.29 | 6.71 | 10.25 | 10.15 | Average |
| 4 | | 0.26 | 36.01 | -25.28 | 61.29 | 15.61 | 10.25 | 10.15 | QP |
| 5 | | 1.02 | 22.88 | -23.12 | 46.00 | 2.50 | 10.22 | 10.16 | Average |
| 6 | | 1.02 | 35.08 | -20.92 | 56.00 | 14.70 | 10.22 | 10.16 | QP |
| 7 | | 3.12 | 23.77 | -22.23 | 46.00 | 3.00 | 10.48 | 10.29 | Average |
| 8 | | 3.12 | 37.47 | -18.53 | 56.00 | 16.70 | 10.48 | 10.29 | QP |
| 9 | | 3.88 | 23.50 | -22.50 | 46.00 | 2.70 | 10.48 | 10.32 | Average |
| 10 | * | 3.88 | 37.80 | -18.20 | 56.00 | 17.00 | 10.48 | 10.32 | QP |
| 11 | | 5.68 | 25.43 | -24.57 | 50.00 | 4.80 | 10.27 | 10.36 | Average |
| 12 | | 5.68 | 38.23 | -21.77 | 60.00 | 17.60 | 10.27 | 10.36 | QP |

Note:

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

# Appendix C. Radiated Spurious Emission Test Data

| Test Engineer : | Shunping You | Relative Humidity : | 48~49% |
|---|---|---|---|
| | | Temperature : | 24-25℃ |

## Radiated Spurious Emission Test Modes

| Mode | Band (MHz) | Antenna | Modulation | Channel | Frequency | Data Rate | RU | Remark |
|---|---|---|---|---|---|---|---|---|
| Mode 1 | 2400-2483.5 | 22 | Bluetooth-LE_GSFK | 00 | 2402 | 1Mbps | - | - |
| Mode 2 | 2400-2483.5 | 22 | Bluetooth-LE_GSFK | 19 | 2440 | 1Mbps | - | - |
| Mode 3 | 2400-2483.5 | 22 | Bluetooth-LE_GSFK | 39 | 2480 | 1Mbps | - | - |
| Mode 4 | 2400-2483.5 | 22 | Bluetooth-LE_GSFK | 39 | 2480 | 1Mbps | - | LF |

## Summary of each worse mode

| Mode | Modulation | Ch. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol. | Peak Avg. | Result | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bluetooth-LE_GSFK | 00 | 2388.20 | 41.82 | 54.00 | -12.18 | V | AVERAGE | Pass | Band Edge |
| 1 | Bluetooth-LE_GSFK | 00 | 4804.00 | 41.28 | 74.00 | -32.72 | H | Peak | Pass | Harmonic |
| 2 | Bluetooth-LE_GSFK | 19 | - | - | - | - | - | - | - | Band Edge |
| 2 | Bluetooth-LE_GSFK | 19 | 7320.00 | 44.57 | 74.00 | -29.43 | H | Peak | Pass | Harmonic |
| 3 | Bluetooth-LE_GSFK | 39 | 2491.44 | 43.61 | 54.00 | -10.39 | V | AVERAGE | Pass | Band Edge |
| 3 | Bluetooth-LE_GSFK | 39 | 7440.00 | 43.90 | 74.00 | -30.10 | V | Peak | Pass | Harmonic |
| 4 | Bluetooth-LE_GSFK | 39 | 948.59 | 32.05 | 46 | -13.95 | V | Peak | Pass | LF |

# <Co-location>

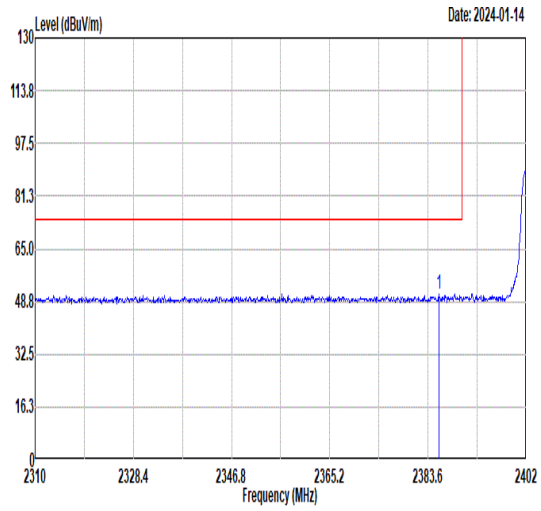
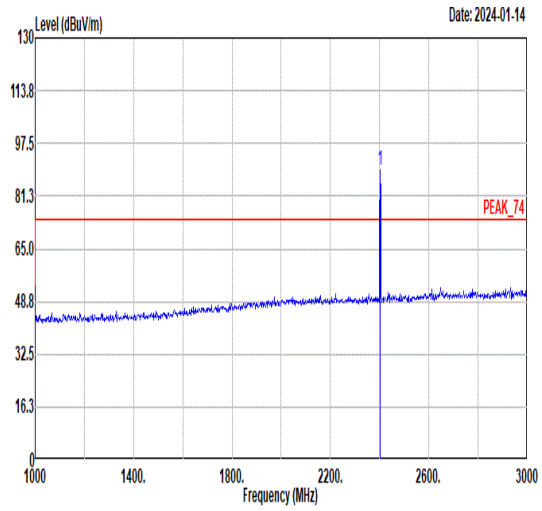
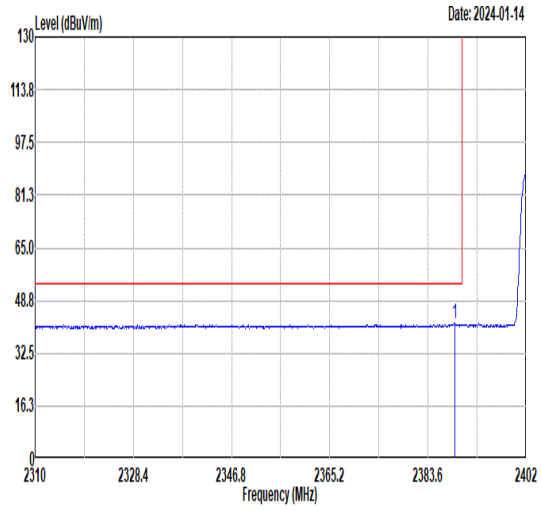
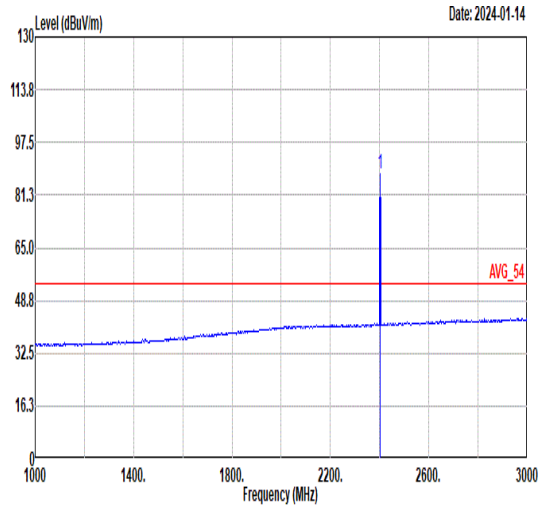
## BLE_Ch39 + LTE_Band 13

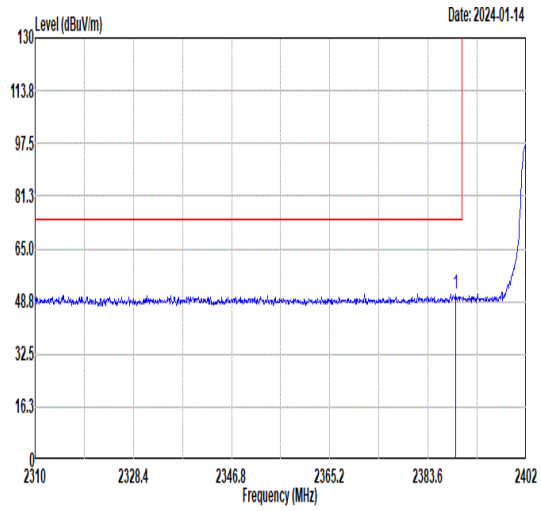
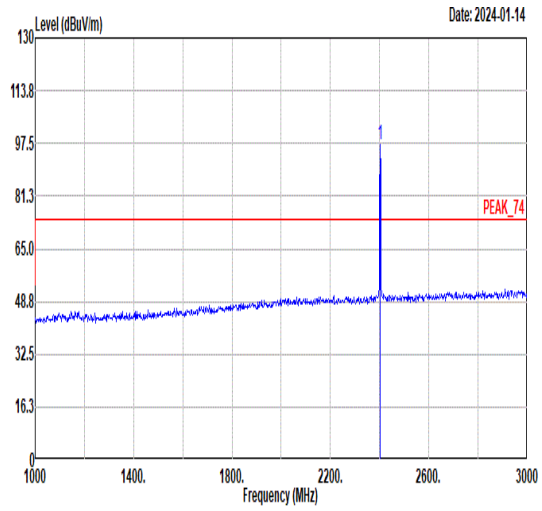
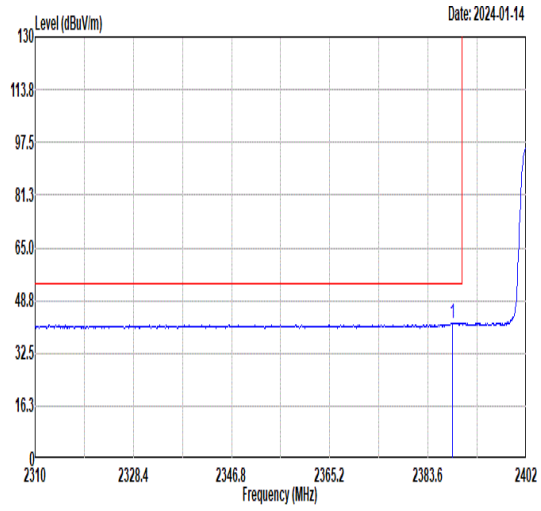
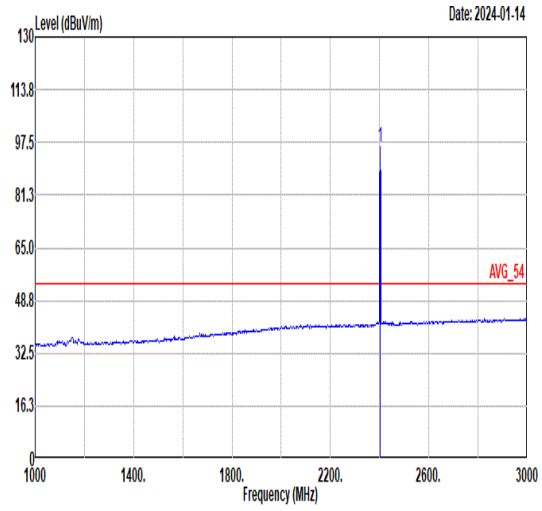
### BLE _Ch39 (Band Edge @ 3m)

| | Note | Frequency | Level | Margin | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | ( dBµV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BLE_Ch39+ LTE_B13 Co-location | * | 2480 | 97.24 | - | - | 96.3 | 30.83 | 4.92 | 34.81 | 387 | 315 | P | H |
| | * | 2480 | 96.46 | - | - | 95.52 | 30.83 | 4.92 | 34.81 | 387 | 315 | A | H |
| | | 2483.52 | 51.66 | -22.34 | 74 | 50.72 | 30.83 | 4.92 | 34.81 | 387 | 315 | P | H |
| | | 2488.44 | 40.2 | -13.8 | 54 | 39.19 | 30.9 | 4.92 | 34.81 | 387 | 315 | A | H |
| | * | 2480 | 99.24 | - | - | 98.3 | 30.83 | 4.92 | 34.81 | 137 | 319 | P | V |
| | * | 2480 | 98.46 | - | - | 97.52 | 30.83 | 4.92 | 34.81 | 137 | 319 | A | V |
| | | 2483.52 | 51.12 | -22.88 | 74 | 50.18 | 30.83 | 4.92 | 34.81 | 137 | 319 | P | V |
| | | 2483.72 | 40.48 | -13.52 | 54 | 39.54 | 30.83 | 4.92 | 34.81 | 137 | 319 | A | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

### Harmonic (Harmonic @ 3m)

| | Note | Frequency | Level | Margin | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | ( dBµV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BLE_Ch39 +LTE_B13 Co-location | | 4960 | 41.37 | -32.63 | 74 | 56.69 | 34.45 | 7.81 | 57.58 | - | - | P | H |
| | | 7440 | 43.64 | -30.36 | 74 | 58.02 | 35.41 | 9.19 | 58.98 | - | - | P | H |
| | | 4960 | 41.13 | -32.87 | 74 | 56.45 | 34.45 | 7.81 | 57.58 | - | - | P | V |
| | | 7440 | 43.88 | -30.12 | 74 | 58.26 | 35.41 | 9.19 | 58.98 | - | - | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

| Mode | 1 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH00_2402MHz | |
| ANT | 22 | |
| Pol. | Horizontal | Fundamental |
| Peak |  |  |
| Avg |  |  |

| Mode | 1 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH00_2402MHz | |
| ANT | 22 | |
| Pol. | Vertical | Fundamental |
| Peak |  |  |
| Avg |  |  |



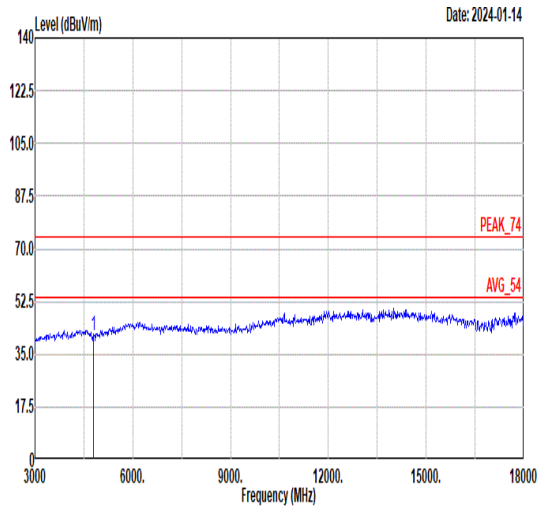
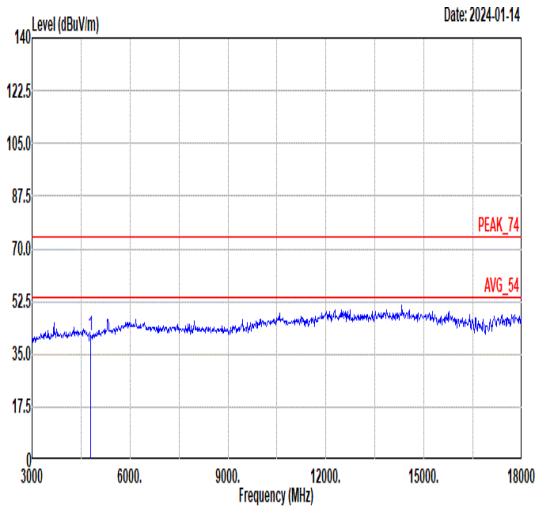
| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2388.75 | 50.99 | 74.00 | -23.01 | 47.51 | 32.36 | 4.79 | 33.67 | 100 | 300 | PEAK |

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2402.00 | 97.05 | ------ | ------ | 93.54 | 32.36 | 4.81 | 33.66 | 100 | 300 | PEAK |



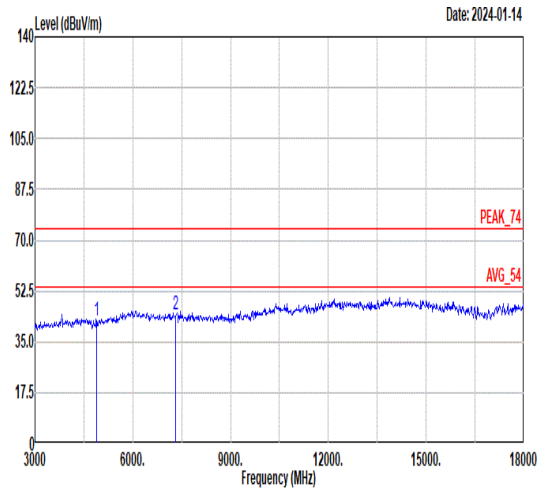
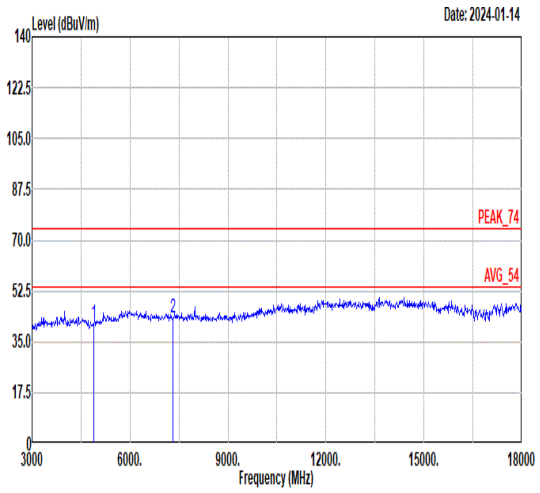
| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2388.20 | 41.82 | 54.00 | -12.18 | 38.34 | 32.36 | 4.79 | 33.67 | 100 | 300 | AVERAGE |

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2402.00 | 95.99 | ------ | ------ | 92.48 | 32.36 | 4.81 | 33.66 | 100 | 300 | AVERAGE |

| Mode | 1 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH00_2402MHz | |
| ANT | 22 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  |  |

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 4804.00 | 41.28 | 74.00 | -32.72 | 56.59 | 34.42 | 7.74 | 57.47 | -- | -- | Peak |

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 4804.00 | 41.07 | 74.00 | -32.93 | 56.38 | 34.42 | 7.74 | 57.47 | -- | -- | Peak |

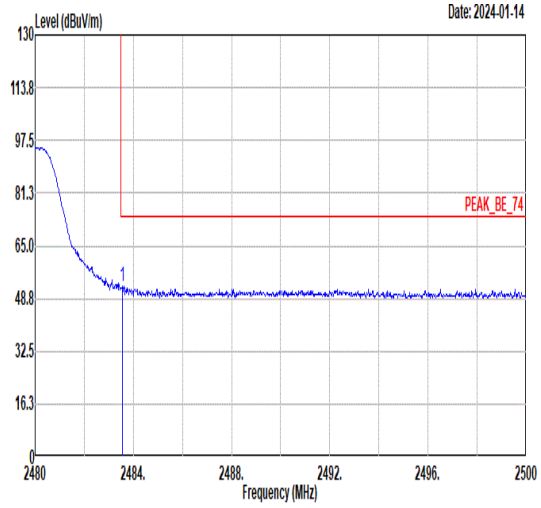
| Mode | 2 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH19_2440MHz | |
| ANT | 22 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  |  |

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 4880.00 | 42.18 | 74.00 | -31.82 | 57.56 | 34.37 | 7.77 | 57.52 | -- | -- | Peak |
| 2 | 7320.00 | 44.57 | 74.00 | -29.43 | 58.50 | 36.04 | 8.96 | 58.93 | -- | -- | Peak |

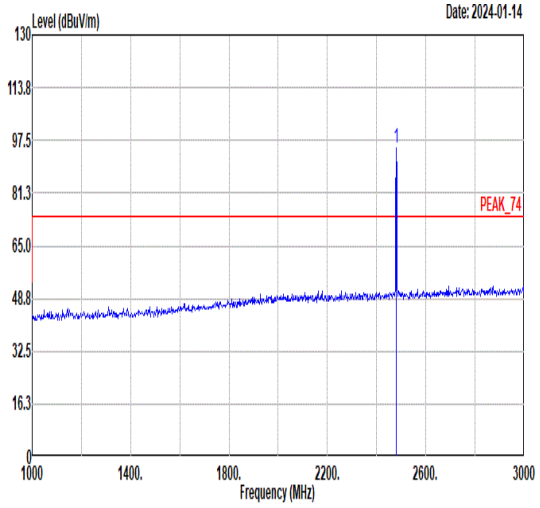
| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 4880.00 | 41.43 | 74.00 | -32.57 | 56.81 | 34.37 | 7.77 | 57.52 | -- | -- | Peak |
| 2 | 7320.00 | 43.38 | 74.00 | -30.62 | 57.31 | 36.04 | 8.96 | 58.93 | -- | -- | Peak |

| Mode | 3 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH39_2480MHz | |
| ANT | 22 | |
| Pol. | Horizontal | Fundamental |

**Peak**

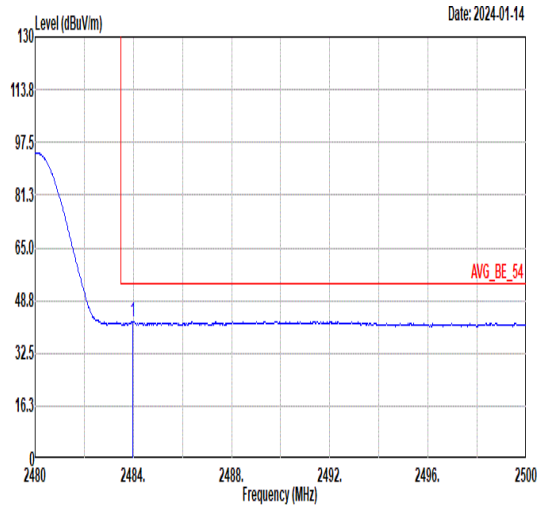



| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2483.56 | 52.69 | 74.00 | -21.31 | 48.99 | 32.39 | 4.92 | 33.61 | 400 | 311 | PEAK |

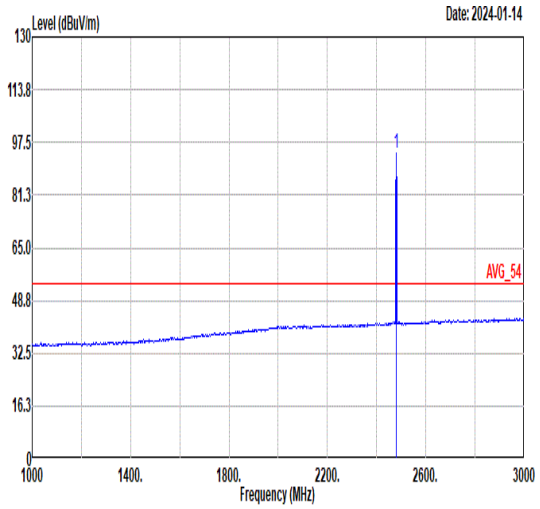



| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2480.00 | 95.35 | ------ | ------ | 91.65 | 32.39 | 4.92 | 33.61 | 400 | 311 | PEAK |

**Avg**



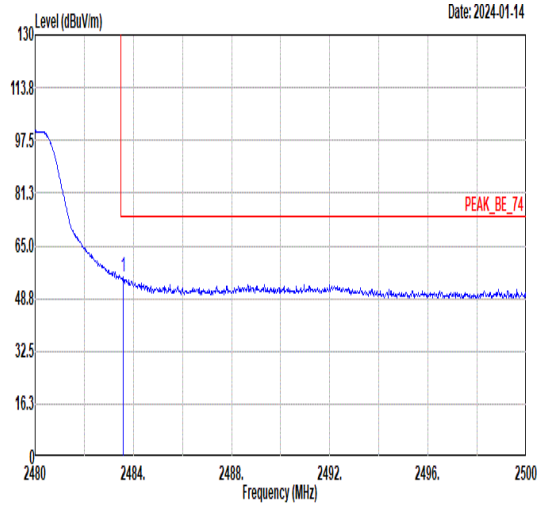

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2483.96 | 42.37 | 54.00 | -11.63 | 38.66 | 32.40 | 4.92 | 33.61 | 400 | 311 | AVERAGE |



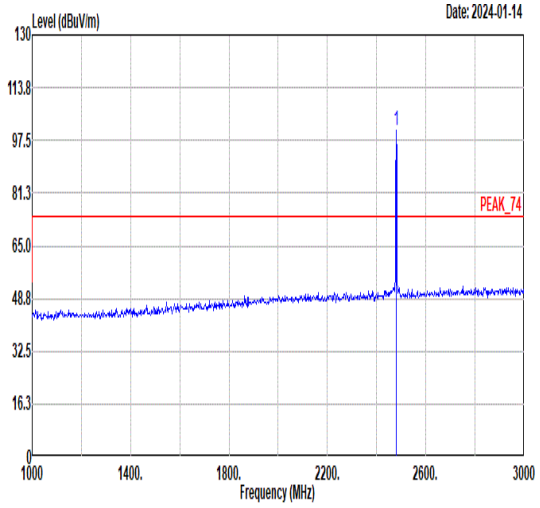

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2480.00 | 94.19 | ------ | ------ | 90.49 | 32.39 | 4.92 | 33.61 | 400 | 311 | AVERAGE |

| Mode | 3 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH39_2480MHz | |
| ANT | 22 | |
| Pol. | Vertical | Fundamental |

**Peak**

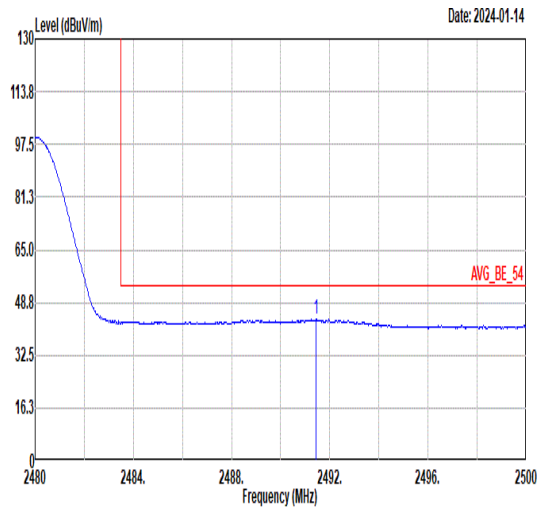



| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2483.58 | 55.63 | 74.00 | -18.37 | 51.93 | 32.39 | 4.92 | 33.61 | 100 | 227 | PEAK |

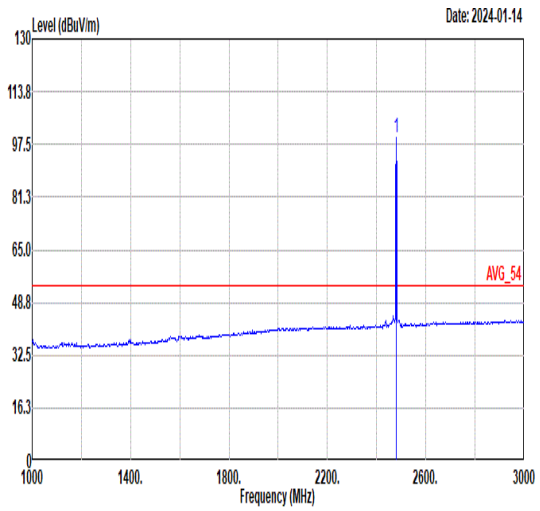



| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2480.00 | 100.57 | ------ | ------ | 96.87 | 32.39 | 4.92 | 33.61 | 100 | 227 | PEAK |

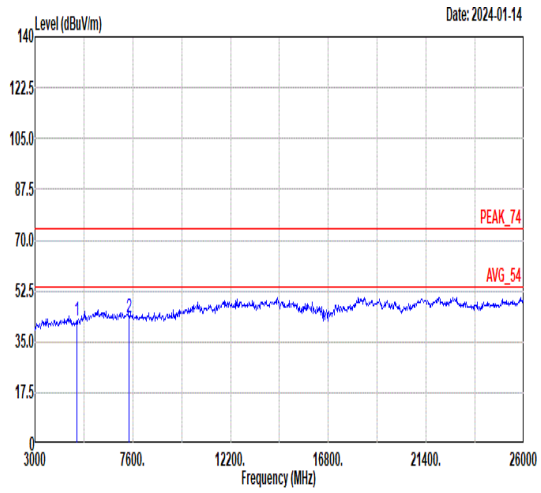
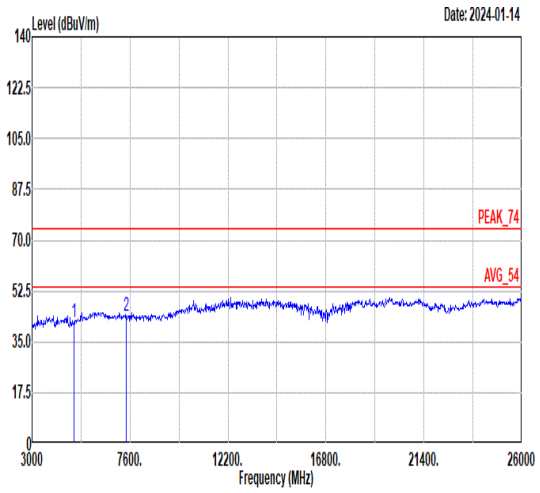
**Avg**




| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2491.44 | 43.61 | 54.00 | -10.39 | 39.89 | 32.40 | 4.93 | 33.61 | 100 | 227 | AVERAGE |




| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 2480.00 | 99.43 | ------ | ------ | 95.73 | 32.39 | 4.92 | 33.61 | 100 | 227 | AVERAGE |

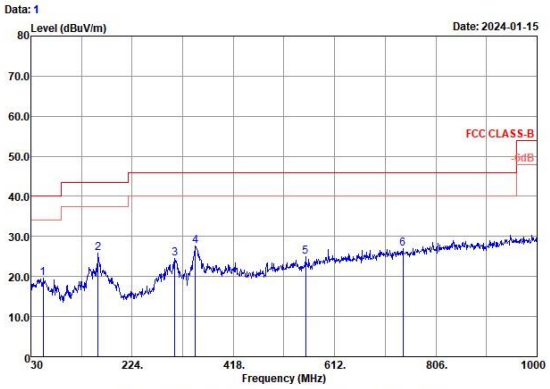
| Mode | 3 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH39_2480MHz | |
| ANT | 22 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  |  |

| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 4960.00 | 42.49 | 74.00 | -31.51 | 57.94 | 34.32 | 7.81 | 57.58 | -- | -- | Peak |
| 2 | 7440.00 | 43.47 | 74.00 | -30.53 | 57.32 | 35.94 | 9.19 | 58.98 | -- | -- | Peak |

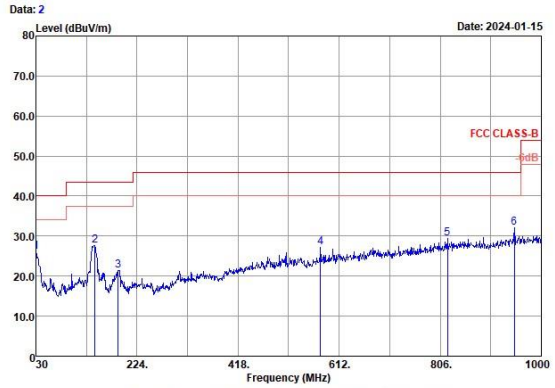
| | Freq | Level | Limit Line | Margin | Read Level | Ant Factor | Cable Loss | Preamp Factor | APos | TPos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 4960.00 | 41.63 | 74.00 | -32.37 | 57.08 | 34.32 | 7.81 | 57.58 | -- | -- | Peak |
| 2 | 7440.00 | 43.90 | 74.00 | -30.10 | 57.75 | 35.94 | 9.19 | 58.98 | -- | -- | Peak |

| Mode | 4 | |
|---|---|---|
| | LF | |
| | 2400-2483.5_Bluetooth-LE_GSFK _CH39_2480MHz | |
| ANT | 22 | |
| Pol. | Horizontal | Vertical |

**QP/Peak**




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 53.28 | 19.52 | -20.48 | 40.00 | 34.26 | 19.47 | 0.74 | 34.95 | --- | --- | Peak |
| 2 | 159.01 | 25.93 | -17.57 | 43.50 | 40.86 | 18.45 | 1.32 | 34.70 | --- | --- | Peak |
| 3 | 305.48 | 24.43 | -21.57 | 46.00 | 37.96 | 19.25 | 1.82 | 34.60 | --- | --- | Peak |
| 4 | 345.25 | 27.70 | -18.30 | 46.00 | 40.26 | 20.11 | 1.93 | 34.60 | --- | --- | Peak |
| 5 | 556.71 | 25.02 | -20.98 | 46.00 | 32.57 | 24.45 | 2.51 | 34.51 | --- | --- | Peak |
| 6 | 742.95 | 26.86 | -19.14 | 46.00 | 30.81 | 27.52 | 2.93 | 34.40 | --- | --- | Peak |

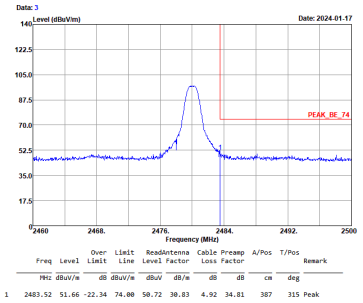
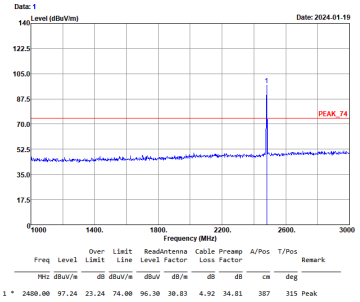
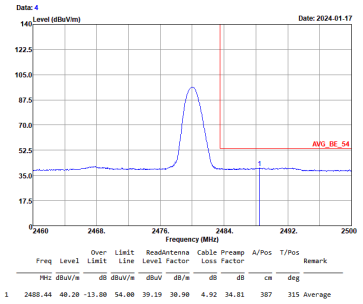
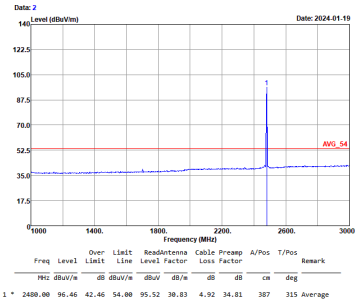


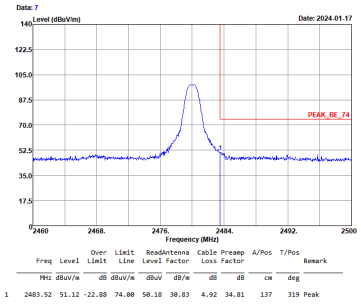
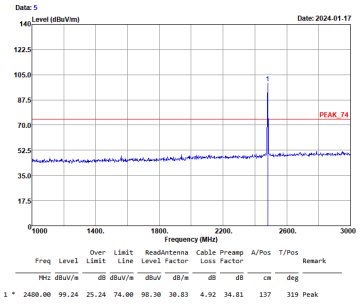
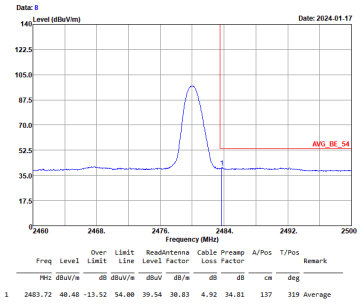
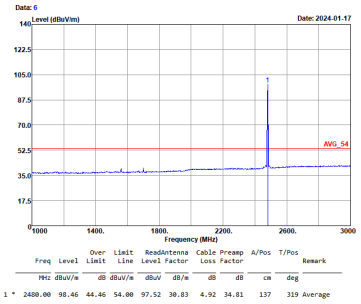

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | |
| 1 | 30.00 | 25.98 | -14.02 | 40.00 | 42.58 | 17.56 | 0.54 | 34.70 | --- | --- | Peak |
| 2 | 143.49 | 27.74 | -15.76 | 43.50 | 42.77 | 18.43 | 1.26 | 34.72 | --- | --- | Peak |
| 3 | 188.11 | 21.47 | -22.03 | 43.50 | 38.04 | 16.69 | 1.44 | 34.70 | --- | --- | Peak |
| 4 | 576.11 | 27.20 | -18.80 | 46.00 | 34.02 | 25.18 | 2.55 | 34.55 | --- | --- | Peak |
| 5 | 819.58 | 29.38 | -16.62 | 46.00 | 32.40 | 28.22 | 3.06 | 34.30 | --- | --- | Peak |
| 6 | 948.59 | 32.05 | -13.95 | 46.00 | 33.35 | 29.74 | 3.26 | 34.30 | --- | --- | Peak |

## Co-location

### BLE_Ch39 +LTE_B13

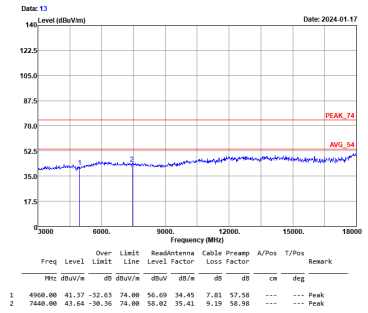
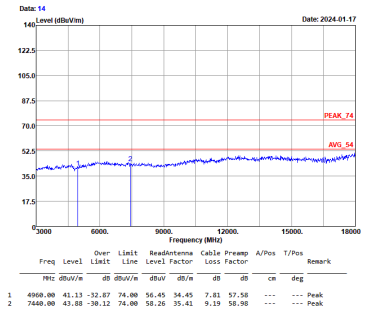
### BLE_Ch39 (Band Edge @ 3m)

| | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | |
|---|---|---|
| | BLE_Ch39 +LTE_B13Co-location | |
| | Horizontal | Fundamental |
| Peak |  |  |
| Avg. |  |  |

| | 2.4GHz 2400~2483.5MHz Band Edge @ 3m | |
|---|---|---|
| | BLE_Ch39 +LTE_B13Co-location | |
| | Vertical | Fundamental |
| Peak |  |  |
| Avg. |  |  |

# Harmonic (Harmonic @ 3m)

## BLE_Ch39 +LTE_B13

| | 2.4GHz 2400~2483.5MHz Harmonic @ 3m | |
|---|---|---|
| | BLE_Ch39 +LTE_B13Co-location | |
| | Horizontal | Vertical |
| Peak<br>Avg. |  |  |

# Appendix D. Duty Cycle Plots

| Band | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|---|---|---|---|---|
| Bluetooth LE 1Mbps | 62.5 | 0.39 | 2.56 | 3KHz |

**Bluetooth LE 1Mbps**