# TEST REPORT

| | |
|---|---|
| **Applicant:** | Hit Technologies Inc. |
| **Address of Applicant:** | 2050 Scotia St, Vancouver, BC V5T 4T1 |
| **Manufacturer/Factory:** | Wonders Technology Co., Ltd. |
| **Address of Manufacturer/Factory:** | 4F Block A Bldg 3 Phase I Tian' an Yungu Bantian Street Shenzhen, 518110 China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| **Product Name:** | Outdoor Bluetooth Speaker |
| **Model No.:** | smpl. audio1 |
| **Trade Mark:** | smpl. |
| **FCC ID:** | 2AX23SMPLSP1 |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.249 |
| **Date of sample receipt:** | December 14, 2020 |
| **Date of Test:** | December 15- December 22, 2020 |
| **Date of report issued:** | December 25, 2020 |
| **Test Result :** | PASS * |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Robinson Luo**
**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

# 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *December 25, 2020* | *Original* |
| | | |
| | | |
| | | |
| | | |

| | | | |
|---|---|---|---|
| ***Prepared By:*** | | ***Date:*** | *December 25, 2020* |
| | ***Project Engineer*** | | |
| ***Check By:*** | | ***Date:*** | *December 25, 2020* |
| | ***Reviewer*** | | |

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# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna requirement | 15.203 | Pass |
| AC Power Line Conducted Emission | 15.207 | N/A |
| Field strength of the fundamental signal | 15.249 (a) | Pass |
| Spurious emissions | 15.249 (a) (d)/15.209 | Pass |
| Band edge | 15.249 (d)/15.205 | Pass |
| 20dB Occupied Bandwidth | 15.215 (c) | Pass |

*Remarks:*

1. *Test according to ANSI C63.10: 2013.*
2. *Pass: The EUT complies with the essential requirements in the standard.*

## 4.1 Measurement Uncertainty

| Test Item | Frequency Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 30MHz-200MHz | 3.8039dB | (1) |
| Radiated Emission | 200MHz-1GHz | 3.9679dB | (1) |
| Radiated Emission | 1GHz-18GHz | 4.29dB | (1) |
| Radiated Emission | 18GHz-40GHz | 3.30dB | (1) |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | 3.44dB | (1) |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. | | | |

# 5 General Information

## 5.1 General Description of EUT

| | |
|---|---|
| Product Name: | Outdoor Bluetooth Speaker |
| Model No.: | smpl. audio1 |
| Serial No.: | N/A |
| Hardware Version: | 1.0 |
| Software Version: | N/A |
| Test sample(s) ID: | GTSL202101000013-1 |
| Sample(s) Status | Engineered sample |
| Operation Frequency: | 2402MHz~2480MHz |
| Channel numbers: | BLE:40<br>BT:79 |
| Channel separation: | BLE:2MHz<br>BT:1MHz |
| Modulation type: | BLE:GFSK<br>BT:GFSK, π /4-DQPSK, 8DPSK |
| Antenna Type: | PCB Antenna |
| Antenna gain: | 0.5dBi |
| Power supply: | Input: DC5V 1A |

BLE

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel | Frequency |
|---|---|
| The lowest channel | 2402MHz |
| The middle channel | 2440MHz |
| The Highest channel | 2480MHz |

BT

| Operation Frequency each of channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2402MHz | 21 | 2422MHz | 41 | 2442MHz | 61 | 2462MHz |
| 2 | 2403MHz | 22 | 2423MHz | 42 | 2443MHz | 62 | 2463MHz |
| 3 | 2404MHz | 23 | 2424MHz | 43 | 2444MHz | 63 | 2464MHz |
| 4 | 2405MHz | 24 | 2425MHz | 44 | 2445MHz | 64 | 2465MHz |
| 5 | 2406MHz | 25 | 2426MHz | 45 | 2446MHz | 65 | 2466MHz |
| 6 | 2407MHz | 26 | 2427MHz | 46 | 2447MHz | 66 | 2467MHz |
| 7 | 2408MHz | 27 | 2428MHz | 47 | 2448MHz | 67 | 2468MHz |
| 8 | 2409MHz | 28 | 2429MHz | 48 | 2449MHz | 68 | 2469MHz |
| 9 | 2410MHz | 29 | 2430MHz | 49 | 2450MHz | 69 | 2470MHz |
| 10 | 2411MHz | 30 | 2431MHz | 50 | 2451MHz | 70 | 2471MHz |
| 11 | 2412MHz | 31 | 2432MHz | 51 | 2452MHz | 71 | 2472MHz |
| 12 | 2413MHz | 32 | 2433MHz | 52 | 2453MHz | 72 | 2473MHz |
| 13 | 2414MHz | 33 | 2434MHz | 53 | 2454MHz | 73 | 2474MHz |
| 14 | 2415MHz | 34 | 2435MHz | 54 | 2455MHz | 74 | 2475MHz |
| 15 | 2416MHz | 35 | 2436MHz | 55 | 2456MHz | 75 | 2476MHz |
| 16 | 2417MHz | 36 | 2437MHz | 56 | 2457MHz | 76 | 2477MHz |
| 17 | 2418MHz | 37 | 2438MHz | 57 | 2458MHz | 77 | 2478MHz |
| 18 | 2419MHz | 38 | 2439MHz | 58 | 2459MHz | 78 | 2479MHz |
| 19 | 2420MHz | 39 | 2440MHz | 59 | 2460MHz | 79 | 2480MHz |
| 20 | 2421MHz | 40 | 2441MHz | 60 | 2461MHz | | |

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel | Frequency |
|---|---|
| The lowest channel | 2402MHz |
| The middle channel | 2441MHz |
| The Highest channel | 2480MHz |

## 5.2 Test mode

**BLE**

| | |
|---|---|
| Transmitting mode | Keep the EUT in continuously transmitting mode. |
| *Remark: During the test, the dutycycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.* | |

**Per-test mode.**

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis | X | Y | Z |
|---|---|---|---|
| Field Strength(dBuV/m) | 95.74 | 93.39 | 94.60 |

**BT**

| | |
|---|---|
| Transmitting mode | Keep the EUT in continuously transmitting mode. |
| *Remark: During the test, the dutycycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.* | |

**Per-test mode.**

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis | X | Y | Z |
|---|---|---|---|
| Field Strength(dBuV/m) | 96.47 | 90.53 | 89.67 |

## 5.3 Description of Support Units

None.

## 5.4 Deviation from Standards

None.

## 5.5 Abnormalities from Standard Conditions

None.

## 5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

| |
|---|
| ● **NVLAP (LAB CODE:600179-0)**<br>Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0 |

## 5.7 Test Location

| |
|---|
| All tests were performed at: |
| Global United Technology Services Co., Ltd.<br>Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102<br>Tel: 0755-27798480<br>Fax: 0755-27798960 |

## 5.8 Additional Instructions

| | |
|---|---|
| Test Software | Special test command provided by manufacturer |
| Power level setup | Default |

# 6 Test Instruments list

| Radiated Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | July. 02 2020 | July. 01 2025 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | June. 25 2020 | June. 24 2021 |
| 4 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | June. 25 2020 | June. 24 2021 |
| 5 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D | GTS208 | June. 25 2020 | June. 24 2021 |
| 6 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | June. 25 2020 | June. 24 2021 |
| 7 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 8 | Coaxial Cable | GTS | N/A | GTS213 | June. 25 2020 | June. 24 2021 |
| 9 | Coaxial Cable | GTS | N/A | GTS211 | June. 25 2020 | June. 24 2021 |
| 10 | Coaxial cable | GTS | N/A | GTS210 | June. 25 2020 | June. 24 2021 |
| 11 | Coaxial Cable | GTS | N/A | GTS212 | June. 25 2020 | June. 24 2021 |
| 12 | Amplifier(100kHz-3GHz) | HP | 8347A | GTS204 | June. 25 2020 | June. 24 2021 |
| 13 | Amplifier(2GHz-20GHz) | HP | 84722A | GTS206 | June. 25 2020 | June. 24 2021 |
| 14 | Amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | June. 25 2020 | June. 24 2021 |
| 15 | Band filter | Amindeon | 82346 | GTS219 | June. 25 2020 | June. 24 2021 |
| 16 | Power Meter | Anritsu | ML2495A | GTS540 | June. 25 2020 | June. 24 2021 |
| 17 | Power Sensor | Anritsu | MA2411B | GTS541 | June. 25 2020 | June. 24 2021 |
| 18 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | GTS575 | June. 25 2020 | June. 24 2021 |
| 19 | Splitter | Agilent | 11636B | GTS237 | June. 25 2020 | June. 24 2021 |
| 20 | Loop Antenna | ZHINAN | ZN30900A | GTS534 | June. 25 2020 | June. 24 2021 |
| 21 | Breitband hornantenne | SCHWARZBECK | BBHA 9170 | GTS579 | Oct. 18 2020 | Oct. 17 2021 |
| 22 | Amplifier | TDK | PA-02-02 | GTS574 | Oct. 18 2020 | Oct. 17 2021 |
| 23 | Amplifier | TDK | PA-02-03 | GTS576 | Oct. 18 2020 | Oct. 17 2021 |
| 24 | PSA Series Spectrum Analyzer | Rohde & Schwarz | FSP | GTS578 | June. 25 2020 | June. 24 2021 |

| RF Conducted Test: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | MXA Signal Analyzer | Agilent | N9020A | GTS566 | June. 25 2020 | June. 24 2021 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | June. 25 2020 | June. 24 2021 |
| 3 | Spectrum Analyzer | Agilent | E4440A | GTS533 | June. 25 2020 | June. 24 2021 |
| 4 | MXG vector Signal Generator | Agilent | N5182A | GTS567 | June. 25 2020 | June. 24 2021 |
| 5 | ESG Analog Signal Generator | Agilent | E4428C | GTS568 | June. 25 2020 | June. 24 2021 |
| 6 | USB RF Power Sensor | DARE | RPR3006W | GTS569 | June. 25 2020 | June. 24 2021 |
| 7 | RF Switch Box | Shongyi | RFSW3003328 | GTS571 | June. 25 2020 | June. 24 2021 |
| 8 | Programmable Constant Temp & Humi Test Chamber | WEWON | WHTH-150L-40-880 | GTS572 | June. 25 2020 | June. 24 2021 |

| General used equipment: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Humidity/ Temperature Indicator | KTJ | TA328 | GTS243 | June. 25 2020 | June. 24 2021 |
| 2 | Barometer | ChangChun | DYM3 | GTS255 | June. 25 2020 | June. 24 2021 |

# 7 Test results and Measurement Data

## 7.1 Antenna requirement

| **Standard requirement:** | FCC Part15 C Section 15.203 |
|---|---|
| **15.203 requirement:**<br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.<br>**15.247(c) (1)(i) requirement:**<br>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi. | |
| **EUT Antenna:** | |
| *The antenna is PCB antenna, the best case gain of the antenna is 0.5dBi, reference to the appendix II for details* | |

## 7.2 Radiated Emission Method

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.209 |
| Test Method: | ANSI C63.10:2013 |
| Test Frequency Range: | 9kHz to 25GHz |
| Test site: | Measurement Distance: 3m |

**Receiver setup:**

| Frequency | Detector | RBW | VBW | Remark |
|---|---|---|---|---|
| 9kHz-150kHz | Quasi-peak | 200Hz | 300Hz | Quasi-peak Value |
| 150kHz-30MHz | Quasi-peak | 9kHz | 10kHz | Quasi-peak Value |
| 30MHz-1GHz | Quasi-peak | 120KHz | 300KHz | Quasi-peak Value |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak Value |
| | Peak | 1MHz | 10Hz | Average Value |

**Limit: (Field strength of the fundamental signal)**

| Frequency | Limit (dBuV/m @3m) | Remark |
|---|---|---|
| 2400MHz-2483.5MHz | 94.00 | Average Value |
| | 114.00 | Peak Value |

**Limit: (Spurious Emissions)**

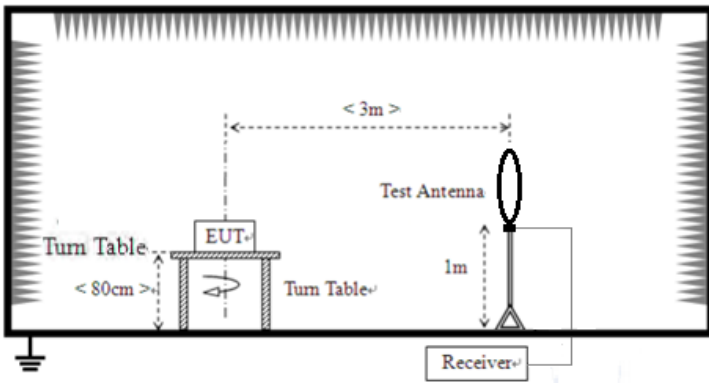
| Frequency | Limit (uV/m) | Remark |
|---|---|---|
| 0.009MHz-0.490MHz | 2400/F(kHz) @300m | Quasi-peak Value |
| 0.490MHz-1.705MHz | 24000/F(kHz) @30m | Quasi-peak Value |
| 1.705MHz-30.0MHz | 30 @30m | Quasi-peak Value |
| 30MHz-88MHz | 100 @3m | Quasi-peak Value |
| 88MHz-216MHz | 150 @3m | Quasi-peak Value |
| 216MHz-960MHz | 200 @3m | Quasi-peak Value |
| 960MHz-1GHz | 500 @3m | Quasi-peak Value |
| Above 1GHz | 500 @3m | Average Value |
| | 5000 @3m | Peak Value |

**Limit: (band edge)**

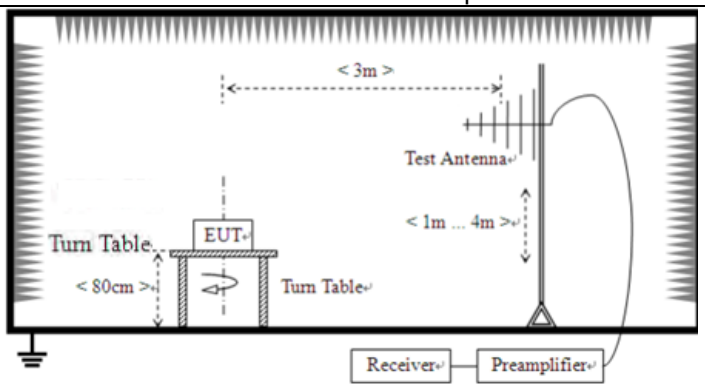
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

**Test setup:**

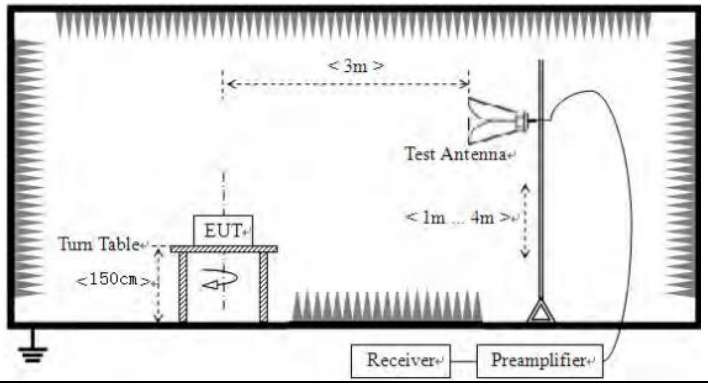
For radiated emissions from 9kHz to 30MHz




For radiated emissions from 30MHz to1GHz




For radiated emissions above 1GHz




| | |
|---|---|
| Test Procedure: | 1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test environment: | Temp.: 25 °C Humid.: 52% Press.: 1012mbar |
| Test voltage: | DC5V 1A |
| Test results: | Pass |

**Measurement data:**

### 7.2.1 Field Strength of The Fundamental Signal

**BLE**

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 2402.000 | 90.55 | 1.33 | 91.88 | 114 | 22.12 | Vertical |
| 2402.000 | 94.41 | 1.33 | 95.74 | 114 | 18.26 | Horizontal |
| 2440.000 | 88.54 | 1.55 | 90.09 | 114 | 23.91 | Vertical |
| 2440.000 | 90.19 | 1.55 | 91.74 | 114 | 22.26 | Horizontal |
| 2480.000 | 89.96 | 1.85 | 91.81 | 114 | 22.19 | Vertical |
| 2480.000 | 92.75 | 1.85 | 94.6 | 114 | 19.4 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 2402.000 | 89.13 | 1.33 | 90.46 | 94 | 3.54 | Vertical |
| 2402.000 | 92.08 | 1.33 | 93.41 | 94 | 0.59 | Horizontal |
| 2440.000 | 89.47 | 1.55 | 91.02 | 94 | 2.98 | Vertical |
| 2440.000 | 91.84 | 1.55 | 93.39 | 94 | 0.61 | Horizontal |
| 2480.000 | 88.57 | 1.85 | 90.42 | 94 | 3.58 | Vertical |
| 2480.000 | 91.34 | 1.85 | 93.19 | 94 | 0.81 | Horizontal |

**BT**

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 2402.000 | 84.51 | 1.33 | 85.54 | 114 | 28.46 | Vertical |
| 2402.000 | 95.14 | 1.33 | 96.47 | 114 | 17.53 | Horizontal |
| 2441.000 | 85.73 | 1.55 | 87.28 | 114 | 26.72 | Vertical |
| 2441.000 | 88.98 | 1.55 | 90.53 | 114 | 23.47 | Horizontal |
| 2480.000 | 86.03 | 1.85 | 87.88 | 114 | 26.12 | Vertical |
| 2480.000 | 87.82 | 1.85 | 89.67 | 114 | 24.33 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 2402.000 | 83.57 | 1.33 | 84.9 | 94 | 9.1 | Vertical |
| 2402.000 | 92.21 | 1.33 | 93.54 | 94 | 0.46 | Horizontal |
| 2441.000 | 84.62 | 1.55 | 86.17 | 94 | 7.83 | Vertical |
| 2441.000 | 85.19 | 1.55 | 86.74 | 94 | 7.26 | Horizontal |
| 2480.000 | 82.93 | 1.85 | 84.78 | 94 | 9.22 | Vertical |
| 2480.000 | 86.9 | 1.85 | 88.75 | 94 | 5.25 | Horizontal |

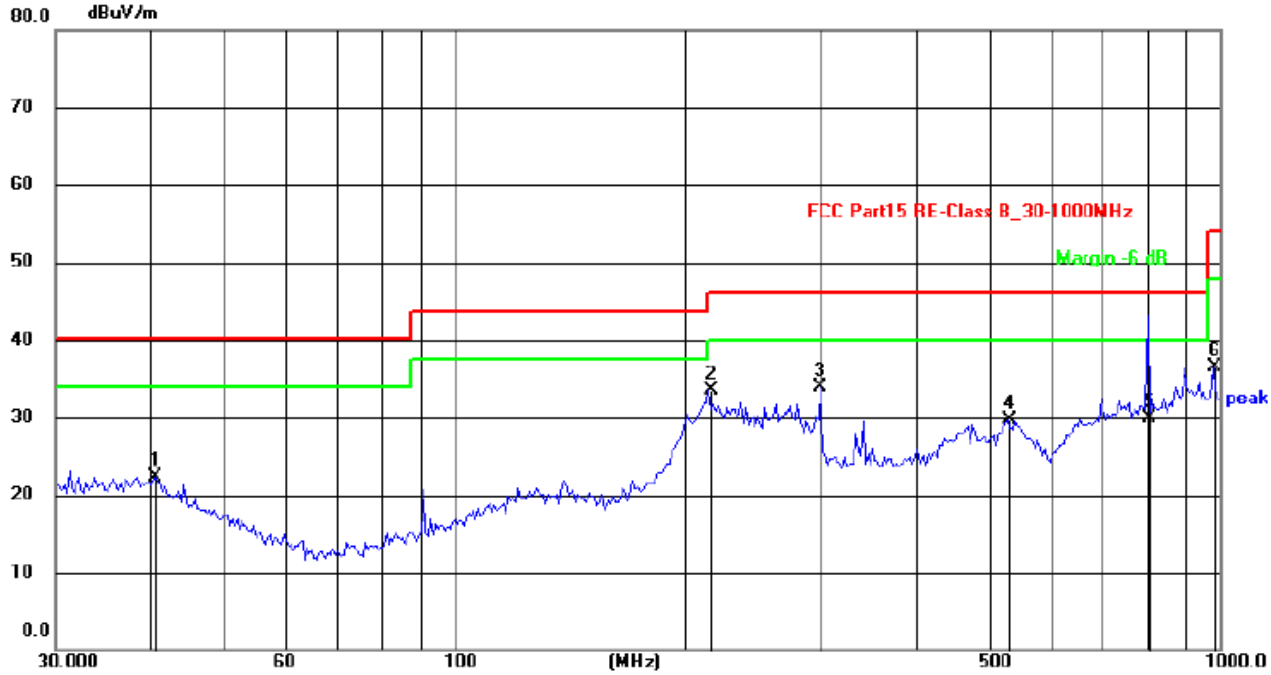
### 7.2.2 Spurious emissions

■ **Below 30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

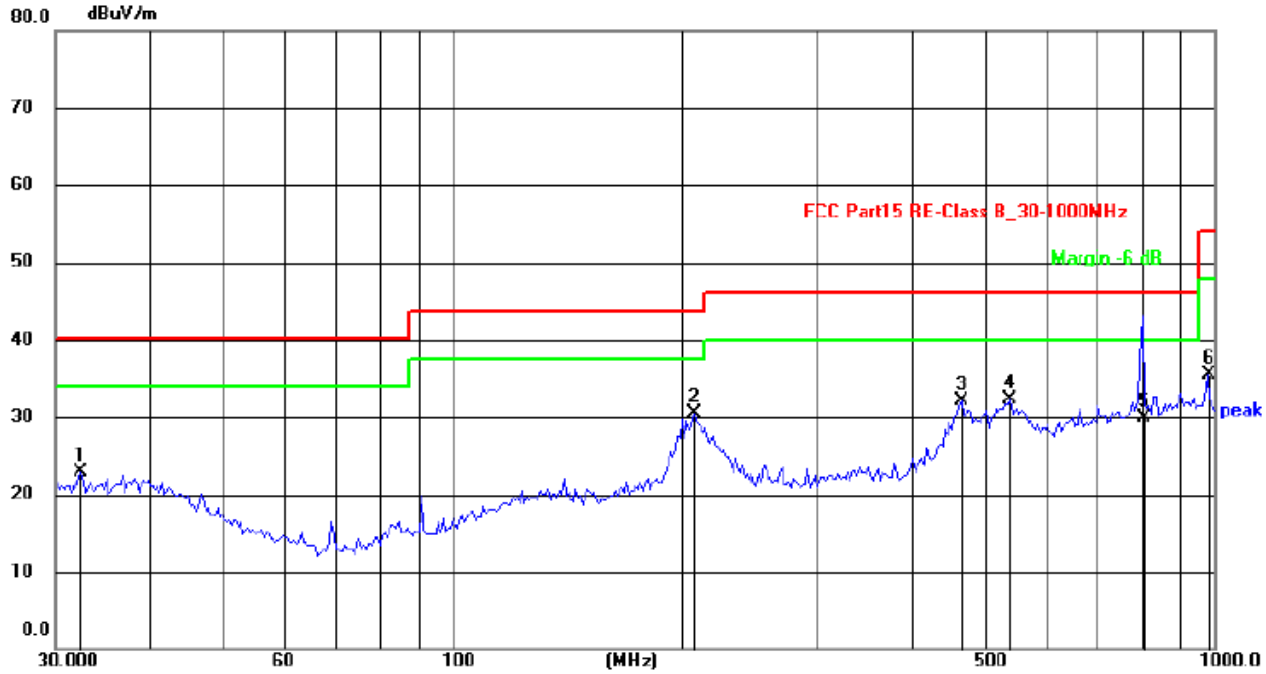
■ **Below 1GHz**

**Horizontal:**




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 40.2995 | 25.46 | -3.06 | 22.40 | 40.00 | -17.60 | QP |
| 2 | 214.6063 | 32.41 | 1.18 | 33.59 | 43.50 | -9.91 | QP |
| 3 | 300.6988 | 35.87 | -1.90 | 33.97 | 46.00 | -12.03 | QP |
| 4 | 527.5707 | 27.08 | 2.55 | 29.63 | 46.00 | -16.37 | QP |
| 5 | 804.2523 | 23.64 | 6.22 | 29.86 | 46.00 | -16.14 | QP |
| 6 | 979.1392 | 29.56 | 6.90 | 36.46 | 54.00 | -17.54 | QP |

**Vertical:**




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 32.4109 | 25.96 | -3.15 | 22.81 | 40.00 | -17.19 | QP |
| 2 | 207.1968 | 28.43 | 2.00 | 30.43 | 43.50 | -13.07 | QP |
| 3 | 464.8867 | 31.27 | 0.79 | 32.06 | 46.00 | -13.94 | QP |
| 4 | 538.8106 | 29.21 | 3.04 | 32.25 | 46.00 | -13.75 | QP |
| 5 | 804.2523 | 23.64 | 6.22 | 29.86 | 46.00 | -16.14 | QP |
| 6 | 979.1392 | 28.51 | 6.90 | 35.41 | 54.00 | -18.59 | QP |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

■ Above 1GHz

BLE

| Test channel:2402MHz | Lowest channel |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4803.630 | 41.69 | 13.01 | 54.70 | 74.00 | -19.30 | Vertical |
| 4803.722 | 42.17 | 13.01 | 55.18 | 74.00 | -18.82 | Vertical |
| 4804.439 | 44.65 | 13.01 | 57.66 | 74.00 | -16.34 | Vertical |
| 4803.639 | 41.63 | 13.01 | 54.64 | 74.00 | -19.36 | Horizontal |
| 4803.698 | 40.95 | 13.01 | 53.96 | 74.00 | -20.04 | Horizontal |
| 4804.088 | 41.40 | 13.01 | 54.41 | 74.00 | -19.59 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4803.749 | 31.42 | 13.01 | 44.43 | 54.00 | -9,57 | Vertical |
| 4803.852 | 31.65 | 13.01 | 44.66 | 54.00 | -9.34 | Vertical |
| 4804.078 | 27.90 | 13.01 | 40.91 | 54.00 | -13.09 | Vertical |
| 4803.566 | 27.76 | 13.01 | 40.77 | 54.00 | -13.23 | Horizontal |
| 4803.749 | 28.01 | 13.01 | 41.02 | 54.00 | -12.98 | Horizontal |
| 4804.162 | 28.94 | 13.01 | 41.95 | 54.00 | -12.05 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

| Test channel:2440MHz | Middle |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4881.702 | 42.52 | 13.59 | 56.11 | 74.00 | -17.89 | Vertical |
| 4882.272 | 42.46 | 13.59 | 56.05 | 74.00 | -17.95 | Vertical |
| 4883.584 | 42.34 | 13.59 | 55.93 | 74.00 | -18.07 | Vertical |
| 4881.796 | 43.05 | 13.59 | 56.64 | 74.00 | -17.36 | Horizontal |
| 4882.066 | 42.88 | 13.59 | 56.47 | 74.00 | -17.53 | Horizontal |
| 4883.766 | 43.02 | 13.59 | 56.61 | 74.00 | -17.39 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4881.513 | 28.74 | 13.59 | 42.33 | 54.00 | -11.67 | Vertical |
| 4882.070 | 28.90 | 13.59 | 42.49 | 54.00 | -11.51 | Vertical |
| 4883.766 | 28.44 | 13.59 | 42.03 | 54.00 | -11.97 | Vertical |
| 4881.909 | 28.79 | 13.59 | 42.38 | 54.00 | -11.62 | Horizontal |
| 4882.212 | 28.57 | 13.59 | 42.16 | 54.00 | -11.84 | Horizontal |
| 4883.820 | 28.81 | 13.59 | 42.40 | 54.00 | -11.60 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

| Test channel:2480MHz | Highest |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4959.536 | 41.32 | 14.15 | 55.47 | 74.00 | -18.53 | Vertical |
| 4959.992 | 42.01 | 14.15 | 56.16 | 74.00 | -17.84 | Vertical |
| 4960.180 | 41.58 | 14.15 | 55.73 | 74.00 | -18.27 | Vertical |
| 4959.386 | 41.44 | 14.15 | 55.59 | 74.00 | -18.41 | Horizontal |
| 4959.670 | 41.47 | 14.15 | 55.62 | 74.00 | -18.38 | Horizontal |
| 4960.578 | 41.82 | 14.15 | 55.97 | 74.00 | -18.03 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4959.534 | 28.25 | 14.15 | 42.40 | 54.00 | -11.60 | Vertical |
| 4959.902 | 28.09 | 14.15 | 42.24 | 54.00 | -11.76 | Vertical |
| 4960.349 | 28.33 | 14.15 | 42.48 | 54.00 | -11.52 | Vertical |
| 4959.096 | 28.41 | 14.15 | 42.56 | 54.00 | -111.44 | Horizontal |
| 4960.426 | 28.18 | 14.16 | 42.34 | 54.00 | -11.66 | Horizontal |
| 4960.458 | 28.05 | 14.15 | 42.20 | 54.00 | -11.80 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

BT

| Test channel:2402MHz | Lowest channel |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4803.820 | 42.70 | 13.01 | 55.71 | 74.00 | -18.29 | Vertical |
| 4804.431 | 44.07 | 13.01 | 57.08 | 74.00 | -16.92 | Vertical |
| 4804.436 | 44.05 | 13.03 | 57.08 | 74.00 | -16.92 | Vertical |
| 4803.636 | 41.66 | 13.01 | 54.67 | 74.00 | -19.33 | Horizontal |
| 4804.082 | 41.57 | 13.01 | 54.58 | 74.00 | -19.42 | Horizontal |
| 4804.086 | 41.43 | 13.02 | 54.45 | 74.00 | -19.55 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4803.874 | 31.79 | 13.01 | 44.80 | 54.00 | -9.20 | Vertical |
| 4803.932 | 31.77 | 13.01 | 44.78 | 54.00 | -9.22 | Vertical |
| 4803.996 | 31.54 | 13.01 | 44.55 | 54.00 | -9.45 | Vertical |
| 4803.794 | 28.36 | 13.01 | 41.37 | 54.00 | -12.63 | Horizontal |
| 4803.976 | 28.14 | 13.01 | 41.15 | 54.00 | -12.85 | Horizontal |
| 4804.052 | 28.31 | 13.01 | 41.32 | 54.00 | -12.68 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

| Test channel:2441MHz | Middle |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4881.762 | 42.50 | 13.59 | 56.09 | 74.00 | -17.91 | Vertical |
| 4882.202 | 42.26 | 13.59 | 55.85 | 74.00 | -18.15 | Vertical |
| 4882.508 | 42.33 | 13.59 | 55.92 | 74.00 | -18.08 | Vertical |
| 4881.471 | 43.09 | 13.59 | 56.68 | 74.00 | -17.32 | Horizontal |
| 4881.642 | 43.00 | 13.59 | 56.59 | 74.00 | -17.41 | Horizontal |
| 4882.062 | 42.81 | 13.59 | 56.40 | 74.00 | -17.60 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4881.512 | 28.83 | 13.59 | 42.42 | 54.00 | -11.58 | Vertical |
| 4882.074 | 28.77 | 13.59 | 42.36 | 54.00 | -11.64 | Vertical |
| 4882.173 | 28.54 | 13.59 | 42.13 | 54.00 | -11.87 | Vertical |
| 4881.878 | 28.82 | 13.59 | 42.41 | 54.00 | -11.59 | Horizontal |
| 4881.909 | 28.11 | 13.59 | 41.70 | 54.00 | -12.30 | Horizontal |
| 4882.202 | 28.63 | 13.59 | 42.22 | 54.00 | -11.78 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

| Test channel:2480MHz | Highest |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4959.952 | 42.00 | 14.15 | 56.15 | 74.00 | -17.85 | Vertical |
| 4960.184 | 41.54 | 14.15 | 55.69 | 74.00 | -18.31 | Vertical |
| 4960.195 | 41.22 | 14.15 | 55.37 | 74.00 | -18.63 | Vertical |
| 4959.376 | 41.58 | 14.15 | 55.73 | 74.00 | -18.27 | Horizontal |
| 4959.556 | 41.49 | 14.15 | 55.64 | 74.00 | -18.36 | Horizontal |
| 4960.278 | 41.87 | 14.15 | 56.02 | 74.00 | -17.98 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|
| 4959.962 | 28.46 | 14.15 | 42.61 | 54.00 | -11.39 | Vertical |
| 4960.333 | 28.35 | 14.15 | 42.50 | 54.00 | -11.50 | Vertical |
| 4960.336 | 28.31 | 14.16 | 42.47 | 54.00 | -11.53 | Vertical |
| 4959.705 | 28.33 | 14.15 | 42.48 | 54.00 | -11.52 | Horizontal |
| 4959.796 | 28.30 | 14.15 | 42.45 | 54.00 | -11.55 | Horizontal |
| 4960.440 | 28.11 | 14.16 | 42.27 | 54.00 | -11.73 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Correct Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

### 7.2.3 Bandedge emissions

*All of the restriction bands were tested, and only the data of worst case was exhibited.*

**BLE**

| Test channel:2402MHz | Lowest channel |
|---|---|

Peak value:

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2310.000 | 45.37 | 1.28 | 46.65 | 74.00 | -27.35 | Horizontal |
| 2390.000 | 45.68 | 1.28 | 46.96 | 74.00 | -27.04 | Horizontal |
| 2400.000 | 46.01 | 1.28 | 47.29 | 74.00 | -26.71 | Horizontal |
| 2310.000 | 44.57 | 1.28 | 45.85 | 74.00 | -28,15 | Vertical |
| 2390.000 | 46.04 | 1.28 | 47.32 | 74.00 | -26.68 | Vertical |
| 2400.000 | 46.85 | 1.28 | 48.13 | 74.00 | -25.87 | Vertical |

Average value:

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2310.000 | 33.05 | 1.28 | 34.33 | 54.00 | -19.67 | Horizontal |
| 2390.000 | 32.90 | 1.28 | 34.18 | 54.00 | -19.82 | Horizontal |
| 2400.000 | 33.95 | 1.28 | 35.23 | 54.00 | -18.77 | Horizontal |
| 2310.000 | 31.16 | 1.28 | 32.44 | 54.00 | -21.56 | Vertical |
| 2390.000 | 32.36 | 1.28 | 33.64 | 54.00 | -20.36 | Vertical |
| 2400.000 | 32.41 | 1.28 | 33.69 | 54.00 | -20.31 | Vertical |

| Test channel:2480MHz | Highest channel |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2483.500 | 51.08 | 1.88 | 52.96 | 74.00 | -21.04 | Horizontal |
| 2500.000 | 53.68 | 1.88 | 55.56 | 74.00 | -18.44 | Horizontal |
| 2483.500 | 48.33 | 1.88 | 50.21 | 74.00 | -23.79 | Vertical |
| 2500.000 | 51.34 | 1.88 | 53.22 | 74.00 | -20.78 | Vertical |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2483.500 | 45.28 | 1.88 | 47.16 | 54.00 | -6.84 | Horizontal |
| 2500.000 | 49.69 | 1.88 | 51.57 | 54.00 | -2.43 | Horizontal |
| 2483.500 | 41.97 | 1.88 | 43.85 | 54.00 | -10.15 | Vertical |
| 2500.000 | 46.87 | 1.88 | 48.75 | 54.00 | -5.25 | Vertical |

*Remark:*

*1. Final Level =Receiver Read level + Correct Factor*

BT

| Test channel:2402MHz | Lowest channel |
|---|---|

Peak value:

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2310.000 | 45.43 | 1.28 | 46.71 | 74.00 | -27.29 | Horizontal |
| 2390.000 | 44.96 | 1.28 | 46.24 | 74.00 | -27.76 | Horizontal |
| 2400.000 | 44.16 | 1.28 | 45.44 | 74.00 | -28.56 | Horizontal |
| 2310.000 | 44.92 | 1.28 | 46.20 | 74.00 | -27.80 | Vertical |
| 2390.000 | 45.42 | 1.28 | 46.70 | 74.00 | -27.30 | Vertical |
| 2400.000 | 45.72 | 1.28 | 47.00 | 74.00 | -27.00 | Vertical |

Average value:

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2310.000 | 33.23 | 1.28 | 34.51 | 54.00 | -19.49 | Horizontal |
| 2390.000 | 32.66 | 1.28 | 33.94 | 54.00 | -20.06 | Horizontal |
| 2400.000 | 32.77 | 1.28 | 34.05 | 54.00 | -19.95 | Horizontal |
| 2310.000 | 31.99 | 1.28 | 33.27 | 54.00 | -20.73 | Vertical |
| 2390.000 | 32.45 | 1.28 | 33.73 | 54.00 | -20.27 | Vertical |
| 2400.000 | 32.29 | 1.28 | 33.57 | 54.00 | -20.43 | Vertical |

| Test channel:2480MHz | Highest channel |
|---|---|

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2483.500 | 51.28 | 1.88 | 53.16 | 74.00 | -20.84 | Horizontal |
| 2500.000 | 49.07 | 1.88 | 50.95 | 74.00 | -23.05 | Horizontal |
| 2483.500 | 48.77 | 1.88 | 50.65 | 74.00 | -23.35 | Vertical |
| 2500.000 | 47.52 | 1.88 | 49.40 | 74.00 | -24.60 | Vertical |

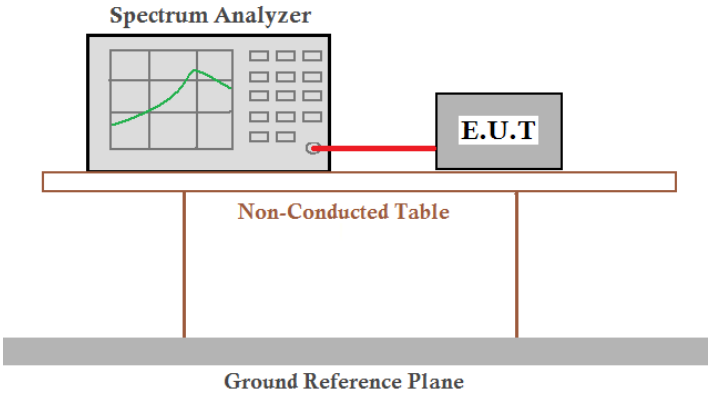
**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Correct Factor (dB/m) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 2483.500 | 45.25 | 1.88 | 47.13 | 54.00 | -6.87 | Horizontal |
| 2500.000 | 44.78 | 1.88 | 46.66 | 54.00 | -7.34 | Horizontal |
| 2483.500 | 41.60 | 1.88 | 43.48 | 54.00 | -10.52 | Vertical |
| 2500.000 | 40.96 | 1.88 | 42.84 | 54.00 | -11.16 | Vertical |

*Remark:*

1. *Final Level =Receiver Read level + Correct Factor*

## 7.3 20dB Occupy Bandwidth

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.249/15.215 |
| Test Method: | ANSI C63.10:2013 |
| Limit: | Operation Frequency range 2400MHz~2483.5MHz |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement Data**

BLE

| Test channel | 20dB bandwidth(MHz) | Result |
|---|---|---|
| Lowest | 1.186 | Pass |
| Middle | 1.184 | Pass |
| Highest | 1.184 | Pass |

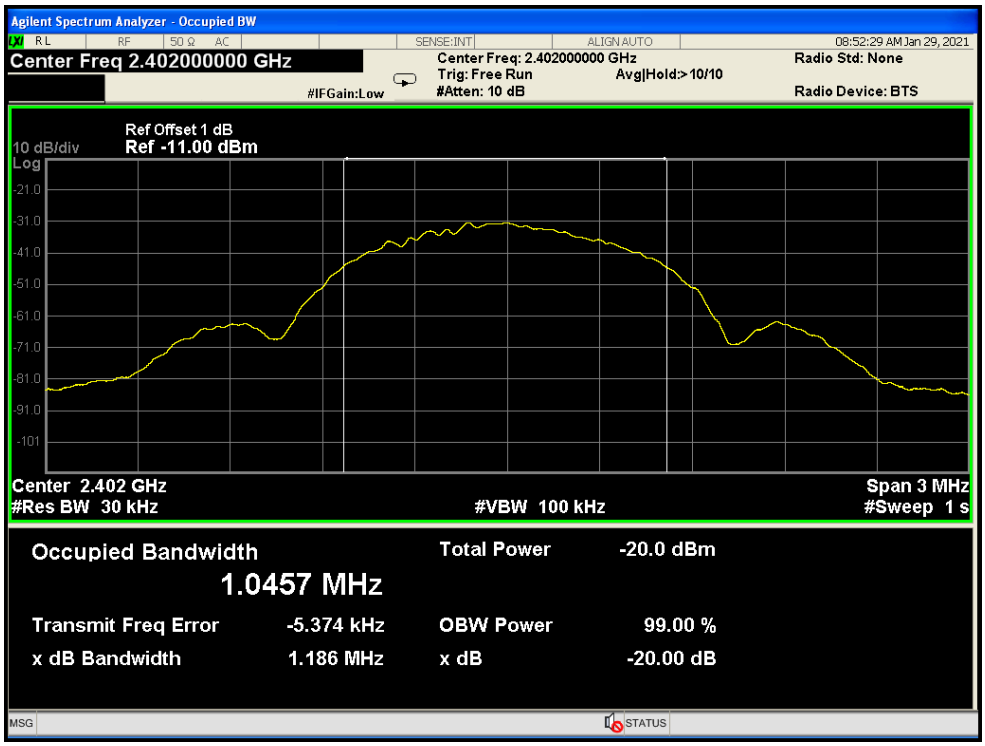
BT

| Test channel | 20dB bandwidth(MHz) | Result |
|---|---|---|
| Lowest | 1.247 | Pass |
| Middle | 1.263 | Pass |
| Highest | 1.258 | Pass |

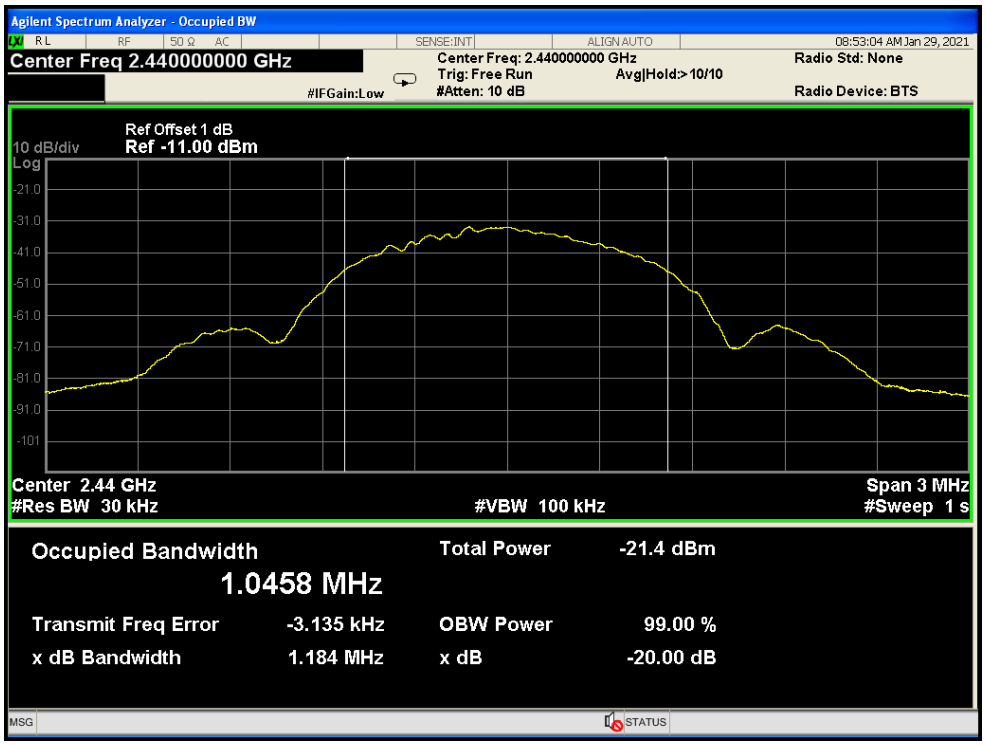
BLE

Test plot as follows:

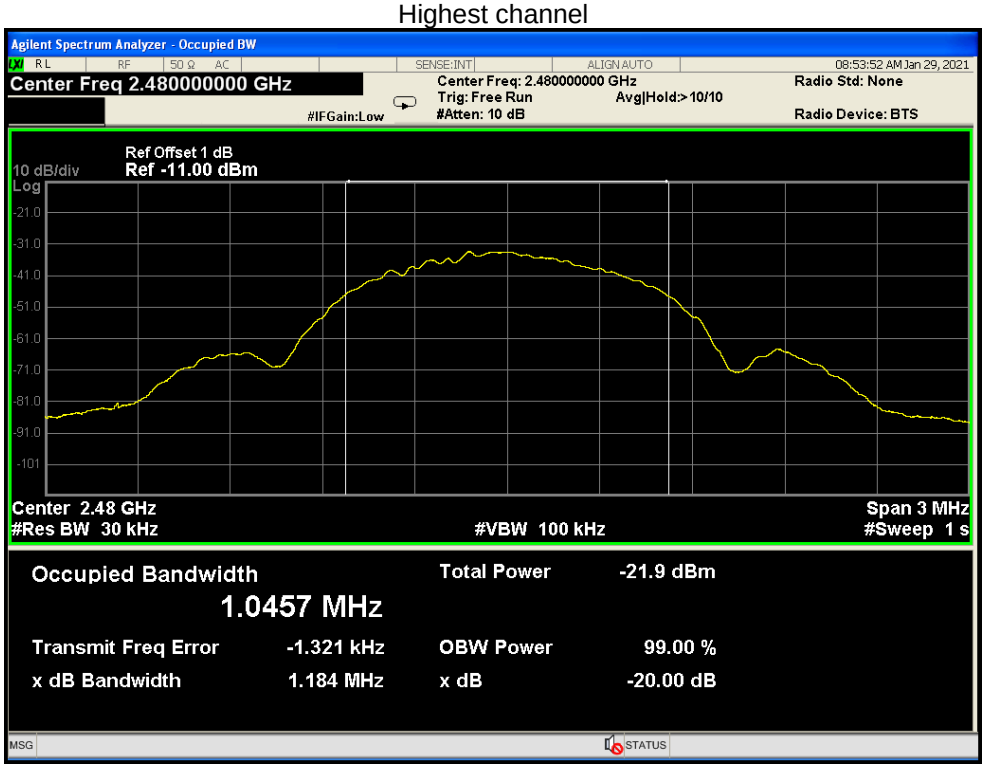
Lowest channel




Middle channel



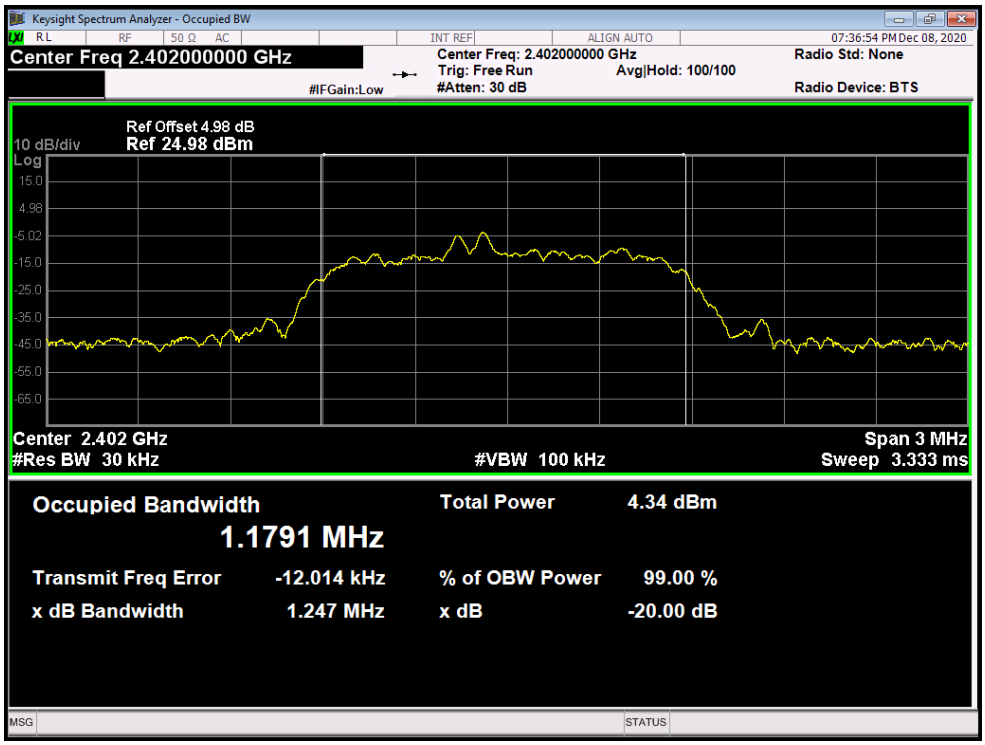
Highest channel



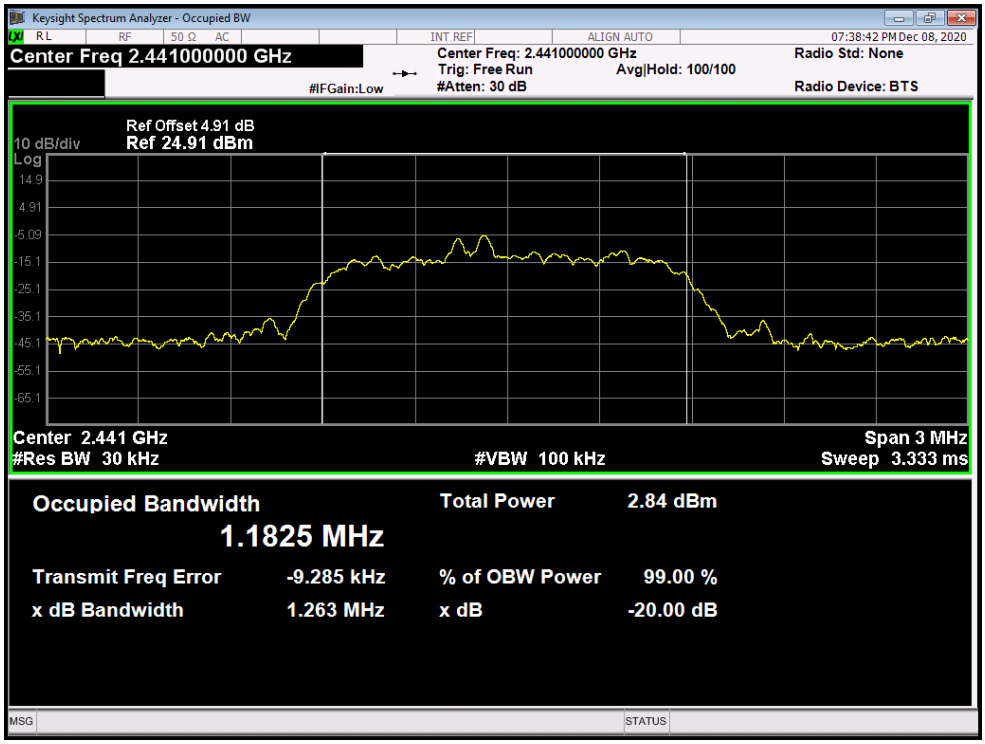

BT

Test plot as follows:

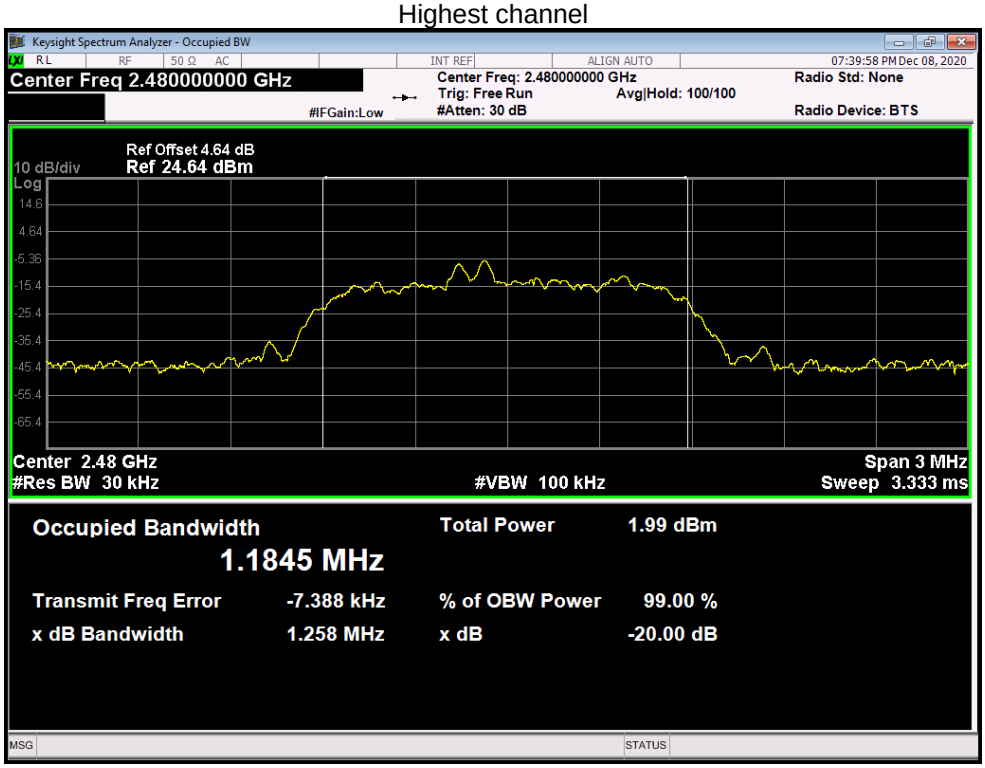
Lowest channel



Middle channel




Highest channel



# 8 Test Setup Photo

Reference to the **appendix I** for details.

# 9 EUT Constructional Details

Reference to the **appendix II&III** for details.

------End------