

# RF TEST REPORT

For

**Shenzhen Toptrone Technology Co.,Ltd**

**Product Name: Bluetooth 5.3 Adapter**

**Test Model(s): H9**

**Report Reference No.** : DACE250430009RL001

**FCC ID** : 2A484-H9

**Applicant's Name** : Shenzhen Toptrone Technology Co.,Ltd

**Address** : 3rd Floor,Building A4,Huimingsheng Industrial Park,Heping  
Community,Fuhai Street, Bao An District, SHENZHEN GUANGDONG  
518103, CHINA

**Testing Laboratory** : Shenzhen DACE Testing Technology Co., Ltd.

**Address** : 102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park,  
Tangtou Community, Shiyan Subdistrict, Bao'an District, Shenzhen,  
Guangdong, China

**Test Specification Standard** : 47 CFR Part 15.247

**Date of Receipt** : April 30, 2025

**Date of Test** : April 30, 2025 to May 9, 2025

**Data of Issue** : May 9, 2025

**Result** : Pass

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## Apply for company information

|                                       |   |                                                                                                                                     |
|---------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant's Name</b>               | : | Shenzhen Toptrone Technology Co.,Ltd                                                                                                |
| <b>Address</b>                        | : | 3rd Floor,Building A4,Huimingsheng Industrial Park,Heping Community,Fuhai Street, Bao An District, SHENZHEN GUANGDONG 518103, CHINA |
| <b>Product Name</b>                   | : | Bluetooth 5.3 Adapter                                                                                                               |
| <b>Test Model(s)</b>                  | : | H9                                                                                                                                  |
| <b>Test Specification Standard(s)</b> | : | 47 CFR Part 15.247                                                                                                                  |

### NOTE1:

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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May 9, 2025

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May 9, 2025

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May 9, 2025

## Revision History Of Report

| Version | Description | REPORT No.         | Issue Date  |
|---------|-------------|--------------------|-------------|
| V1.0    | Original    | DACE250430009RL001 | May 9, 2025 |
|         |             |                    |             |
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|         |             |                    |             |
|         |             |                    |             |

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# 1 TEST SUMMARY

## 1.1 Test Standards

The tests were performed according to following standards:

**47 CFR Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

## 1.2 Summary of Test Result

| Item                                        | Standard           | Method                                                                                  | Requirement                         | Result |
|---------------------------------------------|--------------------|-----------------------------------------------------------------------------------------|-------------------------------------|--------|
| Antenna requirement                         | 47 CFR Part 15.247 |                                                                                         | 47 CFR 15.203                       | Pass   |
| 6dB Bandwidth                               | 47 CFR Part 15.247 | ANSI C63.10-2013,<br>section 11.8<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02   | 47 CFR 15.247(a)(2)                 | Pass   |
| Maximum Conducted Output Power              | 47 CFR Part 15.247 | ANSI C63.10-2013,<br>section 11.9.1<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02 | 47 CFR 15.247(b)(3)                 | Pass   |
| Power Spectral Density                      | 47 CFR Part 15.247 | ANSI C63.10-2013,<br>section 11.10<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02  | 47 CFR 15.247(e)                    | Pass   |
| Emissions in non-restricted frequency bands | 47 CFR Part 15.247 | ANSI C63.10-2013<br>section 11.11<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02   | 47 CFR 15.247(d),<br>15.209, 15.205 | Pass   |
| Band edge emissions (Radiated)              | 47 CFR Part 15.247 | ANSI C63.10-2013<br>section 6.10<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02    | 47 CFR 15.247(d),<br>15.209, 15.205 | Pass   |
| Emissions in frequency bands (below 1GHz)   | 47 CFR Part 15.247 | ANSI C63.10-2013<br>section 6.6.4<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02   | 47 CFR 15.247(d),<br>15.209, 15.205 | Pass   |
| Emissions in frequency bands (above 1GHz)   | 47 CFR Part 15.247 | ANSI C63.10-2013<br>section 6.6.4<br>KDB 558074 D01<br>15.247 Meas Guidance<br>v05r02   | 47 CFR 15.247(d),<br>15.209, 15.205 | Pass   |

## 2 GENERAL INFORMATION

### 2.1 Client Information

**Applicant's Name** : Shenzhen Toptrone Technology Co.,Ltd  
**Address** : 3rd Floor,Building A4,Huimingsheng Industrial Park,Heping Community,Fuhai Street, Bao An District, SHENZHEN GUANGDONG 518103, CHINA

**Manufacturer** : Shenzhen Toptrone Technology Co.,Ltd  
**Address** : 3rd Floor,Building A4,Huimingsheng Industrial Park,Heping Community,Fuhai Street, Bao An District, SHENZHEN GUANGDONG 518103, CHINA

### 2.2 Description of Device (EUT)

|                       |                                |
|-----------------------|--------------------------------|
| Product Name:         | Bluetooth 5.3 Adapter          |
| Model/Type reference: | H9                             |
| Trade Mark:           | N/A                            |
| Power Supply:         | USB:5.0V                       |
| Operation Frequency:  | 2402MHz to 2480MHz             |
| Number of Channels:   | 40                             |
| Modulation Type:      | GFSK                           |
| Antenna Type:         | PCB                            |
| Antenna Gain:         | 0dBi                           |
| Hardware Version:     | IPG-G2-WR-V V102.000.000.000   |
| Software Version:     | V5.00.R02.000949U5 G2-WR-V_S38 |

### 2.3 Description of Test Modes

| No  | Title           | Description                                                                                             |
|-----|-----------------|---------------------------------------------------------------------------------------------------------|
| TM1 | Lowest channel  | Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation. |
| TM2 | Middle channel  | Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation. |
| TM3 | Highest channel | Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation. |

**Operation Frequency each of channel:**

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

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:

| Test channel    | Frequency (MHz) |
|-----------------|-----------------|
|                 | BLE             |
| Lowest channel  | 2402MHz         |
| Middle channel  | 2440MHz         |
| Highest channel | 2480MHz         |

**2.4 Description of Support Units**

| Title | Manufacturer | Model No.   | Serial No. |
|-------|--------------|-------------|------------|
| PC    | Lenovo       | Air 14 Plus |            |

## 2.5 Equipments Used During The Test

6dB Bandwidth

Maximum Conducted Output Power

Power Spectral Density

Emissions in non-restricted frequency bands

| Equipment                           | Manufacturer                                     | Model No | Inventory No | Cal Date   | Cal Due Date |
|-------------------------------------|--------------------------------------------------|----------|--------------|------------|--------------|
| RF Test Software                    | Tachoy Information Technology(shenzhen) Co.,Ltd. | RTS-01   | V1.0.0       | /          | /            |
| Power divider                       | MIDEWEST                                         | PWD-2533 | SMA-79       | 2023-05-11 | 2026-05-10   |
| RF Sensor Unit                      | Tachoy Information Technology(shenzhen) Co.,Ltd. | TR1029-2 | 000001       | /          | /            |
| Wideband radio communication tester | R&S                                              | CMW500   | 113410       | 2025-04-25 | 2026-04-24   |
| Vector Signal Generator             | Keysight                                         | N5181A   | MY50143455   | 2024-12-06 | 2025-12-05   |
| Signal Generator                    | Keysight                                         | N5182A   | MY48180415   | 2024-12-06 | 2025-12-05   |
| Spectrum Analyzer                   | Keysight                                         | N9020A   | MY53420323   | 2024-12-06 | 2025-12-05   |

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

| Equipment                           | Manufacturer   | Model No         | Inventory No           | Cal Date   | Cal Due Date |
|-------------------------------------|----------------|------------------|------------------------|------------|--------------|
| EMI Test software                   | Farad          | EZ -EMC          | V1.1.42                | /          | /            |
| Positioning Controller              | MF             | MF-7802          | /                      | /          | /            |
| Amplifier(18-40G)                   | COM-POWER      | AH-1840          | 10100008-1             | 2024-04-26 | 2027-04-25   |
| Horn antenna                        | COM-POWER      | AH-1840 (18-40G) | 10100008               | 2024-04-26 | 2027-04-25   |
| Loop antenna                        | ZHINAN         | ZN30900C         | ZN30900C               | 2024-06-14 | 2026-06-13   |
| Cable(LF)#2                         | Schwarzbeck    | /                | /                      | 2024-12-19 | 2025-12-18   |
| Cable(LF)#1                         | Schwarzbeck    | /                | /                      | 2024-12-19 | 2025-12-18   |
| Cable(HF)#2                         | Schwarzbeck    | AK9515E          | 96250                  | 2025-04-25 | 2026-04-24   |
| Cable(HF)#1                         | Schwarzbeck    | SYV-50-3-1       | /                      | 2025-04-25 | 2026-04-24   |
| Power amplifier(LF)                 | Schwarzbeck    | BBV9743          | 9743-151               | 2025-04-29 | 2026-04-28   |
| Power amplifier(HF)                 | Schwarzbeck    | BBV9718          | 9718-282               | 2025-04-29 | 2026-04-28   |
| Wideband radio communication tester | R&S            | CMW500           | 113410                 | 2025-04-25 | 2026-04-24   |
| Spectrum Analyzer                   | R&S            | FSP30            | 1321.3008K40-101729-jR | 2025-04-25 | 2026-04-24   |
| Test Receiver                       | R&S            | ESCI 3           | 1166.5950K03-101431-Jq | 2025-04-25 | 2026-04-24   |
| Horn Antenna                        | Sunol Sciences | DRH-118          | A091114                | 2025-04-28 | 2026-04-27   |
| Broadband Antenna                   | Sunol Sciences | JB6 Antenna      | A090414                | 2024-09-28 | 2026-09-27   |

## 2.6 Statement Of The Measurement Uncertainty

| Test Item                      | Measurement Uncertainty |
|--------------------------------|-------------------------|
| Occupied Bandwidth             | $\pm 3.63\%$            |
| RF conducted power             | $\pm 0.733\text{dB}$    |
| RF power density               | $\pm 0.234\%$           |
| Conducted Spurious emissions   | $\pm 1.98\text{dB}$     |
| Radiated Emission (Above 1GHz) | $\pm 5.46\text{dB}$     |
| Radiated Emission (Below 1GHz) | $\pm 5.79\text{dB}$     |

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 2.7 Identification of Testing Laboratory

|               |                                                                                                                                                            |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Company Name: | Shenzhen DACE Testing Technology Co., Ltd.                                                                                                                 |
| Address:      | 102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Community, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China |
| Phone Number: | +86-13267178997                                                                                                                                            |
| Fax Number:   | 86-755-29113252                                                                                                                                            |

### Identification of the Responsible Testing Location

|                                |                                                                                                                                                            |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Company Name:                  | Shenzhen DACE Testing Technology Co., Ltd.                                                                                                                 |
| Address:                       | 102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Community, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China |
| Phone Number:                  | +86-13267178997                                                                                                                                            |
| Fax Number:                    | 86-755-29113252                                                                                                                                            |
| Designation Number:            | CN1342                                                                                                                                                     |
| Test Firm Registration Number: | 778666                                                                                                                                                     |
| A2LA Certificate Number:       | 6270.01                                                                                                                                                    |

## 2.8 Announcement

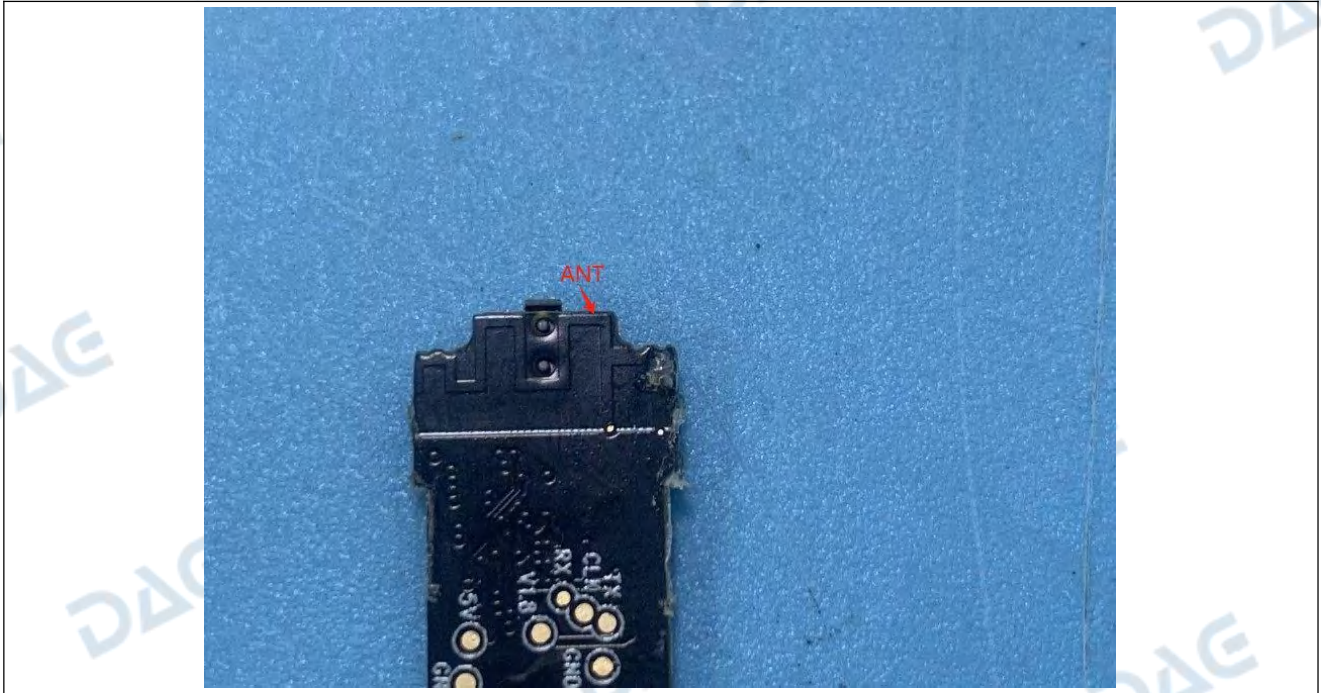
- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by DACE and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client(item 2.2). When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

### 3 Evaluation Results (Evaluation)

#### 3.1 Antenna requirement

|                   |                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

##### 3.1.1 Conclusion:



## 4 Radio Spectrum Matter Test Results (RF)

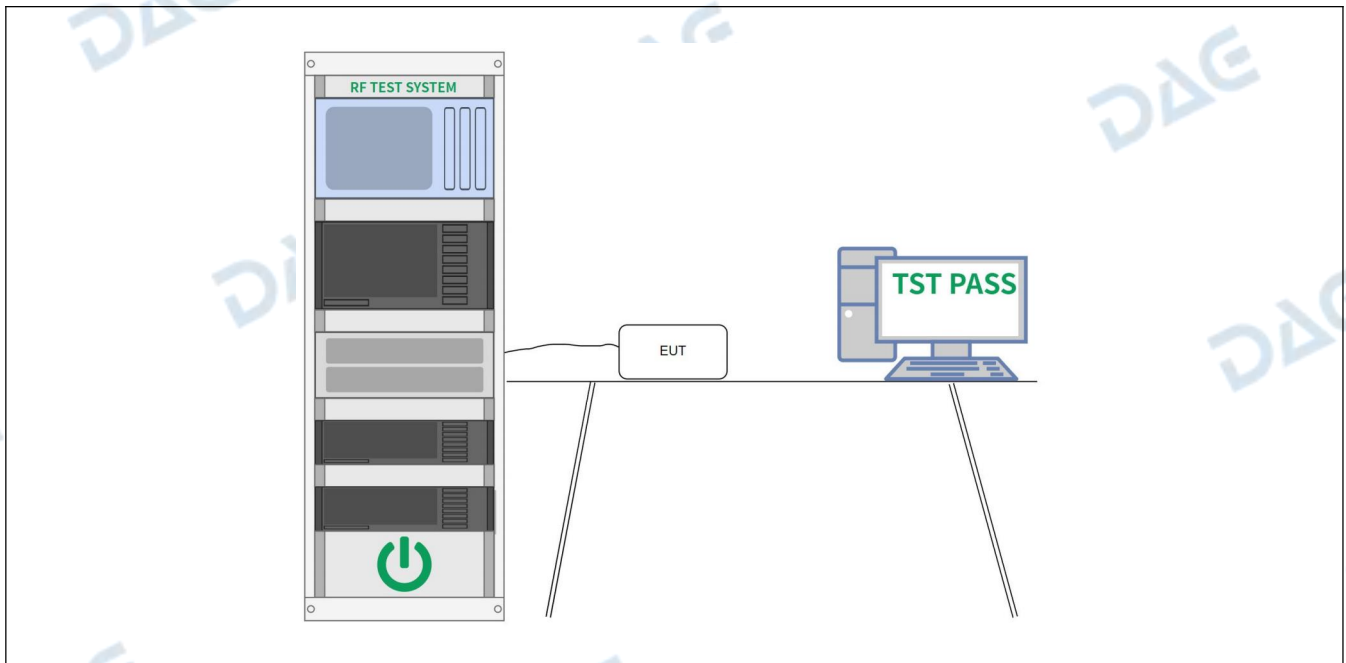
### 4.1 6dB Bandwidth

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(a)(2)                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Test Limit:       | Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.                                                                                                                                                                                                                                                                        |
| Test Method:      | ANSI C63.10-2013, section 11.8<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                      |
| Procedure:        | a) Set RBW = 100 kHz.<br>b) Set the VBW $\geq [3 \times \text{RBW}]$ .<br>c) Detector = peak.<br>d) Trace mode = max hold.<br>e) Sweep = auto couple.<br>f) Allow the trace to stabilize.<br>g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. |

#### 4.1.1 E.U.T. Operation:

|                        |               |           |      |                       |         |
|------------------------|---------------|-----------|------|-----------------------|---------|
| Operating Environment: |               |           |      |                       |         |
| Temperature:           | 23.3 °C       | Humidity: | 53 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode:          | TM1, TM2, TM3 |           |      |                       |         |
| Final test mode:       | TM1, TM2, TM3 |           |      |                       |         |

#### 4.1.2 Test Setup Diagram:



#### 4.1.3 Test Data:

Please Refer to Appendix for Details.

## 4.2 Maximum Conducted Output Power

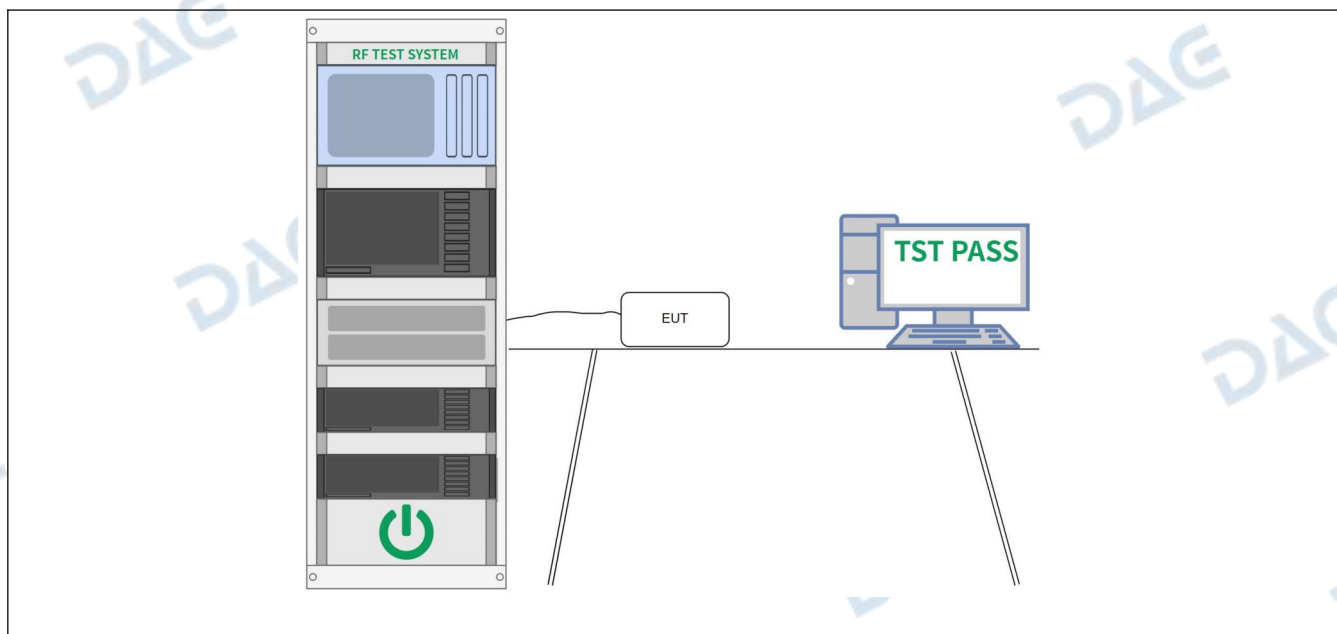
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(b)(3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Test Limit:       | Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.                                                                                                                                                                                        |
| Test Method:      | ANSI C63.10-2013, section 11.9.1<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Procedure:        | ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power<br>Note:<br>Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,..., Core i were first measured separately, as shown in the section above(this product only have one antenna). The measured values were then summed in linear power units then converted back to dBm.<br>Per ANSI C63.10-2013 Section 14.4.3.2.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.<br>For correlated unequal antenna gain<br>Directional gain = $10 \cdot \log[(10G1/20 + 10G2/20 + \dots + 10GN/20)^2 / NANT]$ dBi<br>For completely uncorrelated unequal antenna gain<br>Directional gain = $10 \cdot \log[(10G1/10 + 10G2/10 + \dots + 10GN/10) / NANT]$ dBi<br>Sample Multiple antennas Calculation: Core 0 + Core 1 + ... Core i. = MIMO/CDD<br>(i is the number of antennas)<br>(#VALUE! mW + mW) = #VALUE! mW = dBm<br>Sample e.i.r.p. Calculation:<br>e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi) |

### 4.2.1 E.U.T. Operation:

|                        |               |           |      |                       |         |
|------------------------|---------------|-----------|------|-----------------------|---------|
| Operating Environment: |               |           |      |                       |         |
| Temperature:           | 23.3 °C       | Humidity: | 53 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode:          | TM1, TM2, TM3 |           |      |                       |         |
| Final test mode:       | TM1, TM2, TM3 |           |      |                       |         |

### 4.2.2 Test Setup Diagram:

|  |
|--|
|  |
|--|



#### 4.2.3 Test Data:

Please Refer to Appendix for Details.

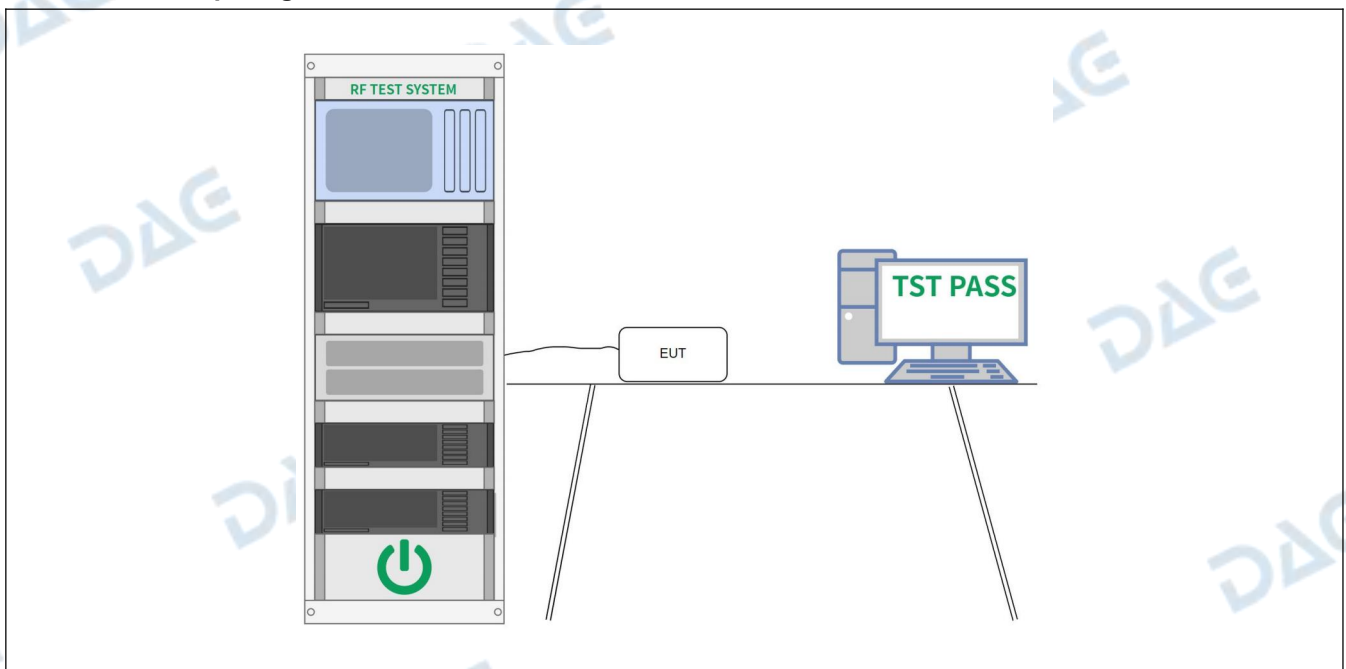
### 4.3 Power Spectral Density

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Test Limit:       | Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density. |
| Test Method:      | ANSI C63.10-2013, section 11.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                             |
| Procedure:        | ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission                                                                                                                                                                                                                                                                                                                                                                                         |

#### 4.3.1 E.U.T. Operation:

|                        |               |           |      |                       |         |
|------------------------|---------------|-----------|------|-----------------------|---------|
| Operating Environment: |               |           |      |                       |         |
| Temperature:           | 23.3 °C       | Humidity: | 53 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode:          | TM1, TM2, TM3 |           |      |                       |         |
| Final test mode:       | TM1, TM2, TM3 |           |      |                       |         |

#### 4.3.2 Test Setup Diagram:



#### 4.3.3 Test Data:

Please Refer to Appendix for Details.

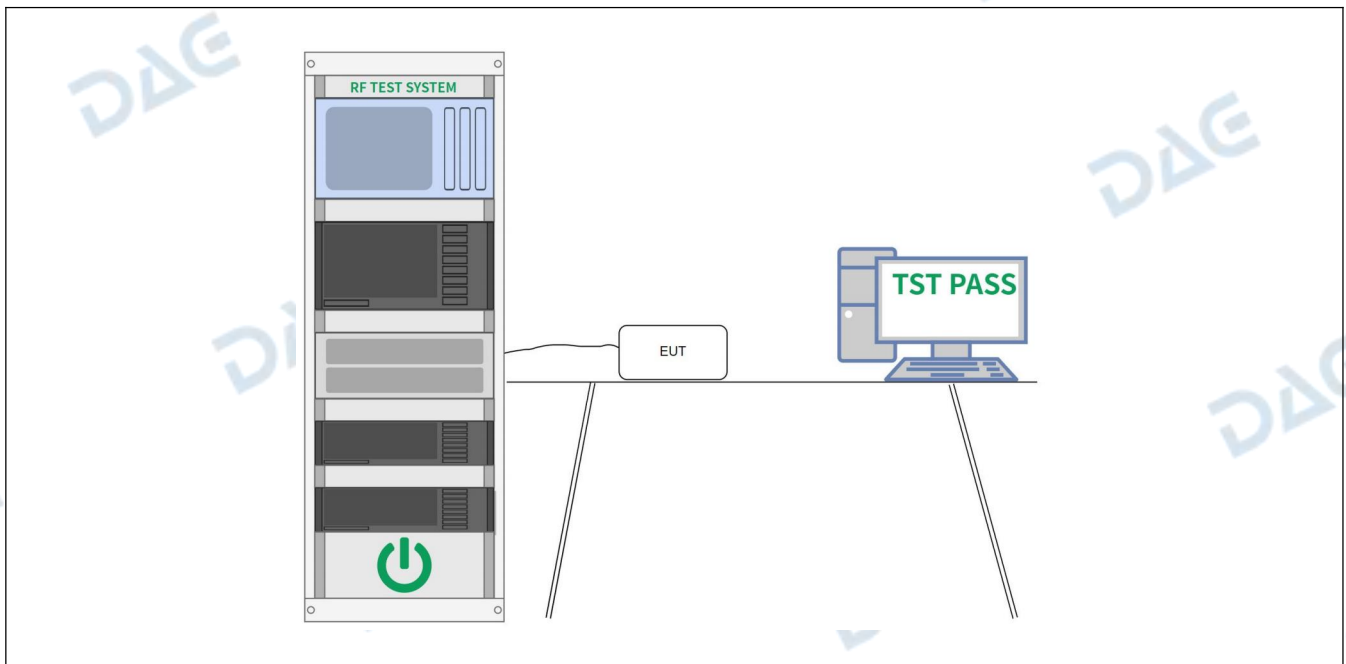
#### 4.4 Emissions in non-restricted frequency bands

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(d), 15.209, 15.205                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Test Limit:       | Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. |
| Test Method:      | ANSI C63.10-2013 section 11.11<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Procedure:        | ANSI C63.10-2013<br>Section 11.11.1, Section 11.11.2, Section 11.11.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

##### 4.4.1 E.U.T. Operation:

|                        |               |           |      |                       |         |
|------------------------|---------------|-----------|------|-----------------------|---------|
| Operating Environment: |               |           |      |                       |         |
| Temperature:           | 23.3 °C       | Humidity: | 53 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode:          | TM1, TM2, TM3 |           |      |                       |         |
| Final test mode:       | TM1, TM2, TM3 |           |      |                       |         |

##### 4.4.2 Test Setup Diagram:



##### 4.4.3 Test Data:

Please Refer to Appendix for Details.

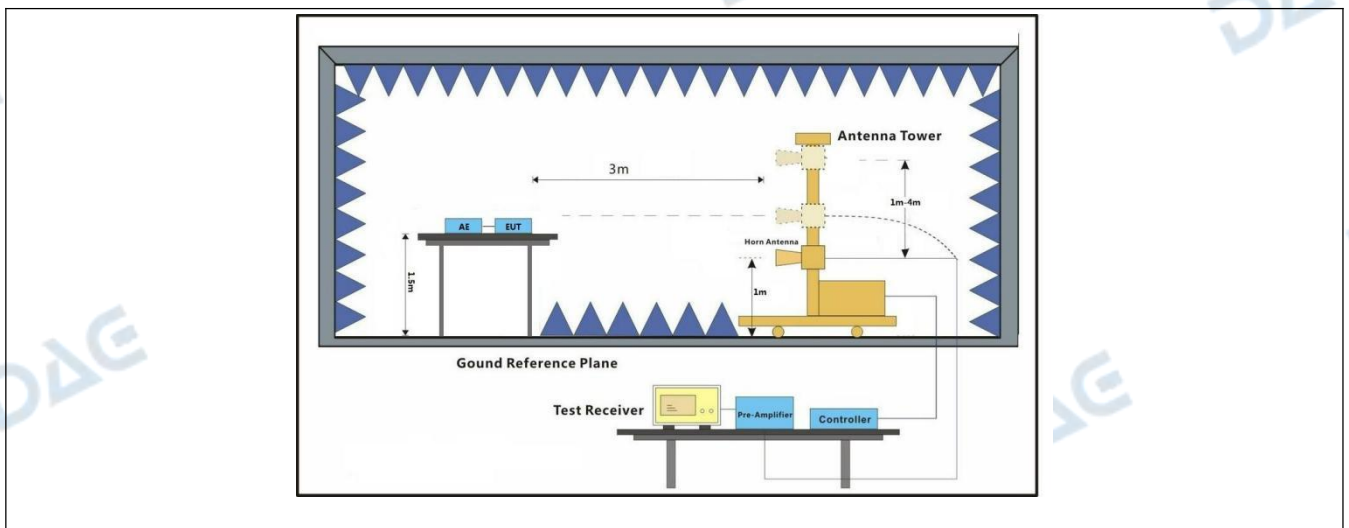
#### 4.5 Band edge emissions (Radiated)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                         |                                   |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)). |                                   |                               |
| Test Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 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                             |
| <p>** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> |                                                                                                                                                                                                                         |                                   |                               |
| Test Method:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ANSI C63.10-2013 section 6.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                             |                                   |                               |
| Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ANSI C63.10-2013 section 6.10.5.2                                                                                                                                                                                       |                                   |                               |

##### 4.5.1 E.U.T. Operation:

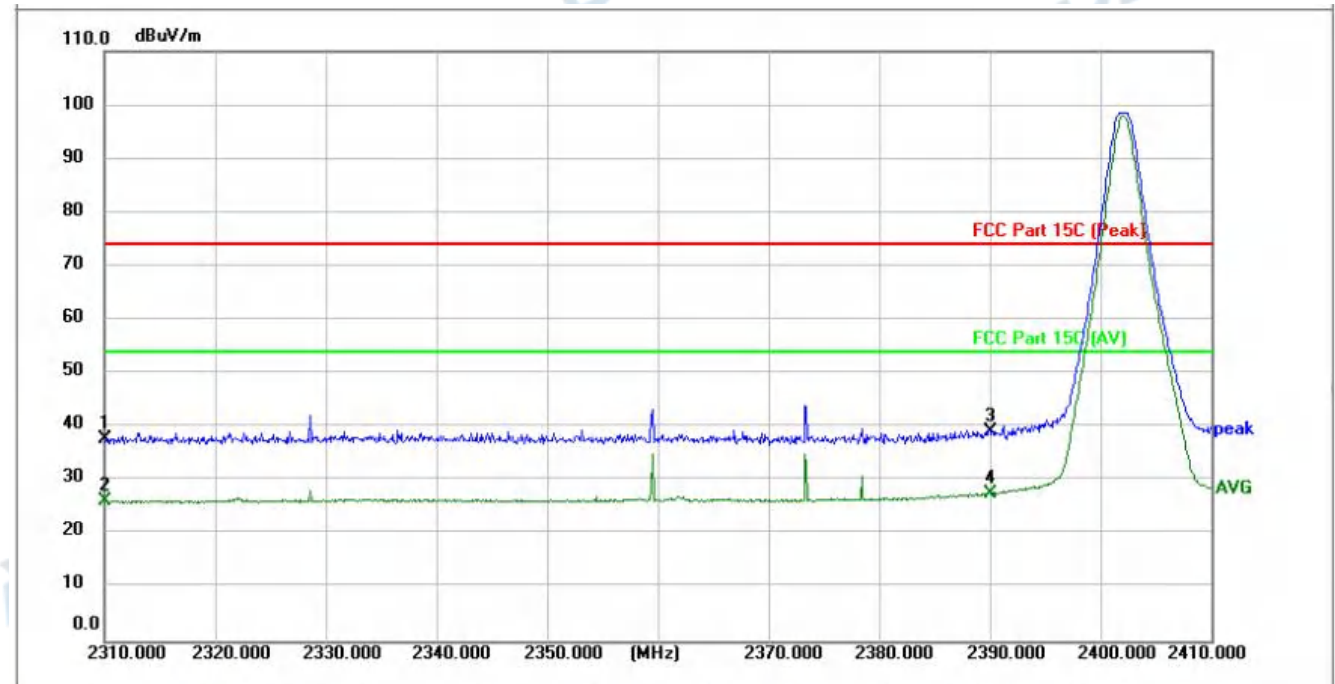
|                        |         |               |      |                       |         |
|------------------------|---------|---------------|------|-----------------------|---------|
| Operating Environment: |         |               |      |                       |         |
| Temperature:           | 23.3 °C | Humidity:     | 53 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode:          |         | TM1, TM2, TM3 |      |                       |         |
| Final test mode:       |         | TM1, TM2, TM3 |      |                       |         |

##### 4.5.2 Test Setup Diagram:



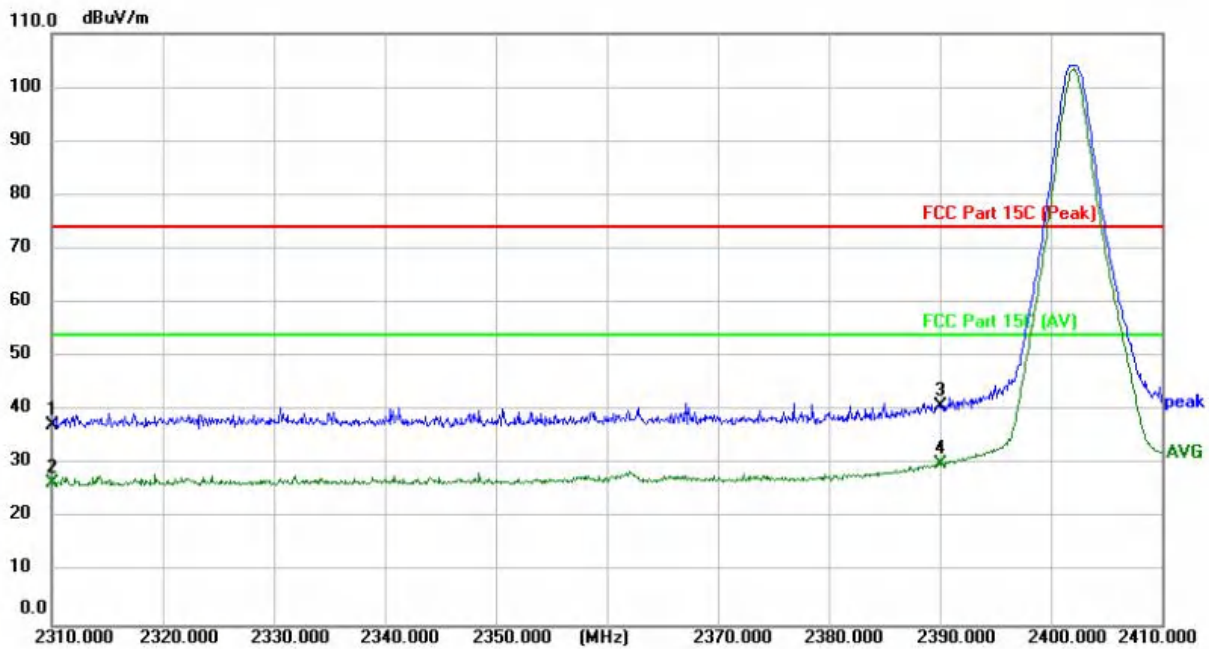
### 4.5.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



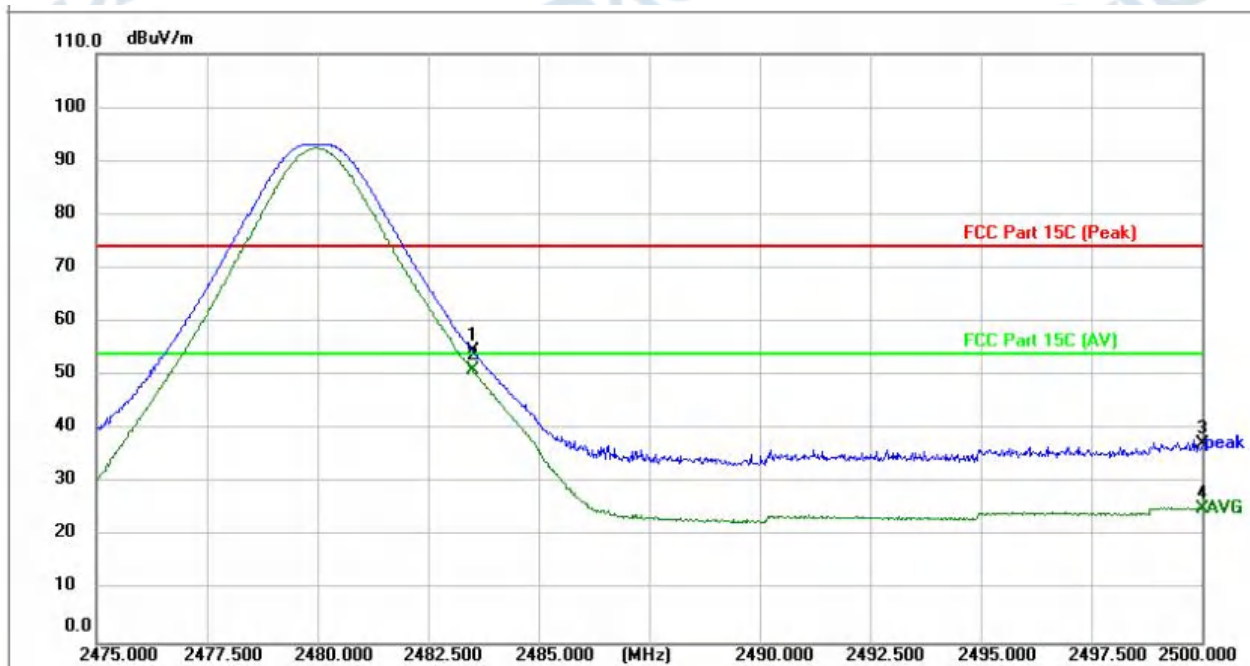
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 2310.000        | 41.54          | -3.63         | 37.91          | 74.00          | -36.09      | peak     | 150         |                | P   |        |
| 2   | 2310.000        | 29.78          | -3.63         | 26.15          | 54.00          | -27.85      | AVG      | 150         |                | P   |        |
| 3   | 2390.000        | 42.62          | -3.42         | 39.20          | 74.00          | -34.80      | peak     | 150         |                | P   |        |
| 4 * | 2390.000        | 31.11          | -3.42         | 27.69          | 54.00          | -26.31      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



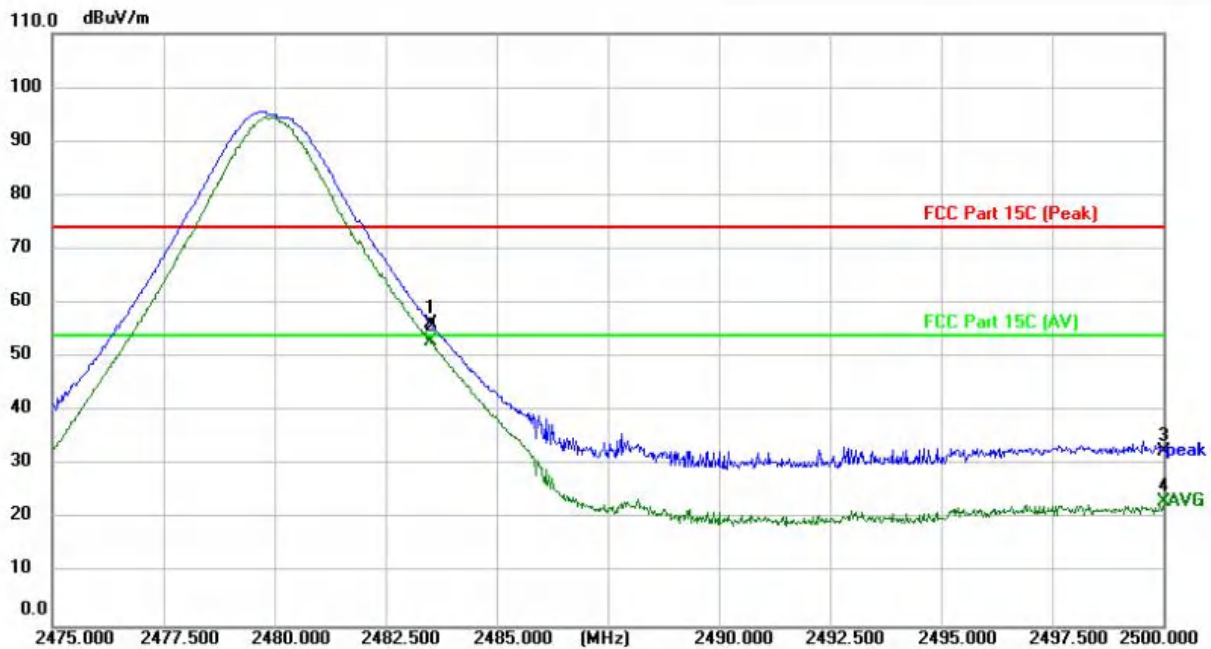
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 2310.000        | 40.93          | -3.63         | 37.30          | 74.00          | -36.70      | peak     | 150         |                | P   |        |
| 2   | 2310.000        | 30.06          | -3.63         | 26.43          | 54.00          | -27.57      | AVG      | 150         |                | P   |        |
| 3   | 2390.000        | 44.28          | -3.42         | 40.86          | 74.00          | -33.14      | peak     | 150         |                | P   |        |
| 4 * | 2390.000        | 33.42          | -3.42         | 30.00          | 54.00          | -24.00      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 2483.500        | 57.66          | -3.17         | 54.49          | 74.00          | -19.51      | peak     |             |                | P   |        |
| 2 * | 2483.500        | 54.16          | -3.17         | 50.99          | 54.00          | -3.01       | AVG      |             |                | P   |        |
| 3   | 2500.000        | 40.36          | -3.13         | 37.23          | 74.00          | -36.77      | peak     |             |                | P   |        |
| 4   | 2500.000        | 28.37          | -3.13         | 25.24          | 54.00          | -28.76      | AVG      |             |                | P   |        |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 2483.500        | 59.53          | -3.17         | 56.36          | 74.00          | -17.64      | peak     |             |                | P   |        |
| 2 * | 2483.500        | 56.05          | -3.17         | 52.88          | 54.00          | -1.12       | AVG      |             |                | P   |        |
| 3   | 2500.000        | 35.81          | -3.13         | 32.68          | 74.00          | -41.32      | peak     |             |                | P   |        |
| 4   | 2500.000        | 26.36          | -3.13         | 23.23          | 54.00          | -30.77      | AVG      |             |                | P   |        |

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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |                               |
| Test Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 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                             |
| <p>** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |                               |
| Test Method:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ANSI C63.10-2013 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                   |                               |
| Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>d. 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.</p> <p>e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. 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.</p> <p>h. Test the EUT in the lowest channel, the middle channel, the Highest channel.</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p> <p>Remark:</p> <p>1) For emission below 1GHz, through pre-scan found the worst case is the lowest</p> |                                   |                               |

channel. Only the worst case is recorded in the report.  
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + Preamplifier Factor  
3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

#### 4.6.1 E.U.T. Operation:

Operating Environment:

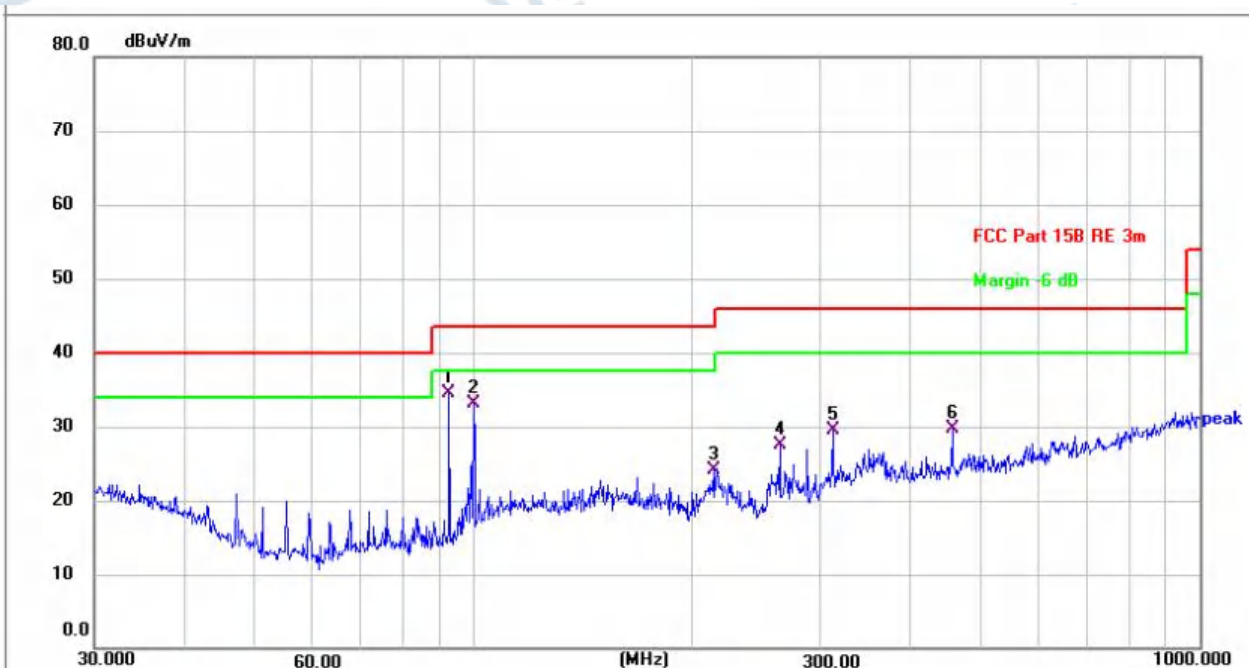
Temperature: 23.3 °C Humidity: 53 % Atmospheric Pressure: 101 kPa

Pretest mode: TM1

Final test mode: TM1

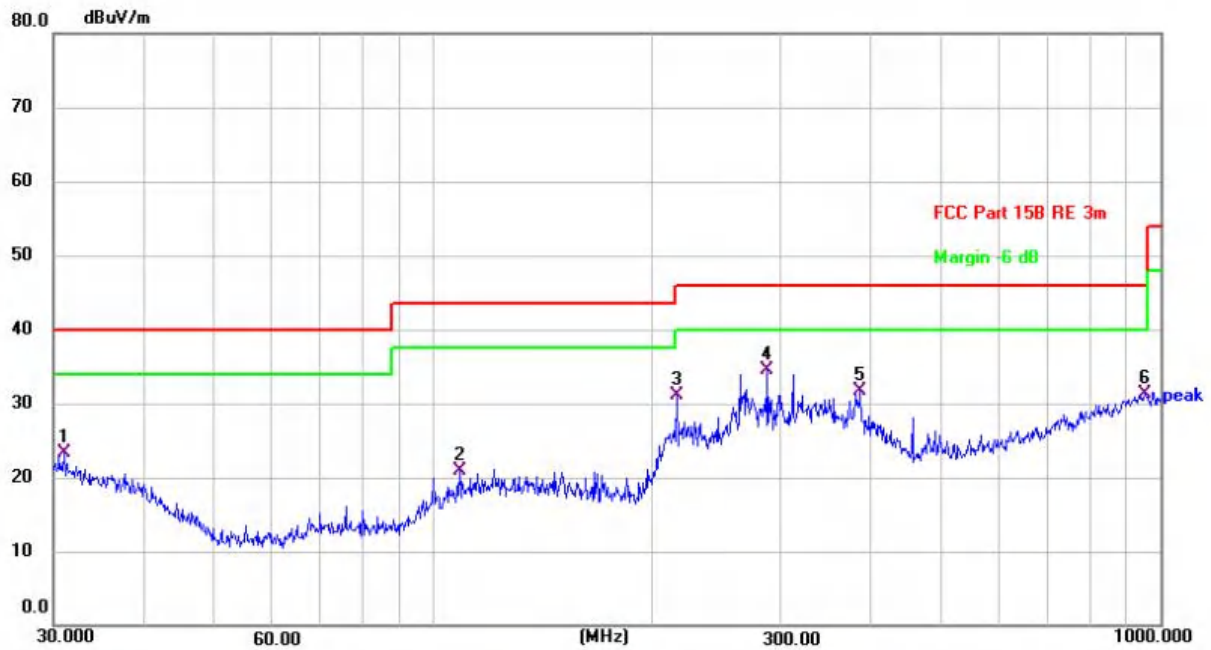
#### 4.6.2 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1 * | 92.4624         | 46.73          | -12.24        | 34.49          | 43.50          | -9.01       | QP       | 100         |                | P   |        |
| 2   | 99.8777         | 42.16          | -9.14         | 33.02          | 43.50          | -10.48      | QP       | 100         |                | P   |        |
| 3   | 213.7634        | 33.78          | -9.70         | 24.08          | 43.50          | -19.42      | QP       | 100         |                | P   |        |
| 4   | 263.8190        | 36.62          | -9.14         | 27.48          | 46.00          | -18.52      | QP       | 100         |                | P   |        |
| 5   | 312.1794        | 37.55          | -7.99         | 29.56          | 46.00          | -16.44      | QP       | 100         |                | P   |        |
| 6   | 455.9058        | 33.95          | -4.34         | 29.61          | 46.00          | -16.39      | QP       | 100         |                | P   |        |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 31.0706         | 25.83          | -2.57         | 23.26          | 40.00          | -16.74      | QP       | 100         |                | P   |        |
| 2   | 108.6470        | 28.18          | -7.37         | 20.81          | 43.50          | -22.69      | QP       | 100         |                | P   |        |
| 3   | 216.0240        | 41.35          | -10.26        | 31.09          | 46.00          | -14.91      | QP       | 100         |                | P   |        |
| 4 * | 287.9904        | 42.37          | -7.96         | 34.41          | 46.00          | -11.59      | QP       | 100         |                | P   |        |
| 5   | 386.6338        | 37.92          | -6.29         | 31.63          | 46.00          | -14.37      | QP       | 100         |                | P   |        |
| 6   | 952.0937        | 26.77          | 4.44          | 31.21          | 46.00          | -14.79      | QP       | 100         |                | P   |        |

#### 4.7 Emissions in frequency bands (above 1GHz)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                   |                               |
| Test Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 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                             |
| <p>** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |                               |
| Test Method:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ANSI C63.10-2013 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                   |                               |
| Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>d. 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.</p> <p>e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. 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.</p> <p>h. Test the EUT in the lowest channel, the middle channel, the Highest channel.</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p> <p>Remark:</p> <p>1) For emission below 1GHz, through pre-scan found the worst case is the lowest</p> |                                   |                               |

channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

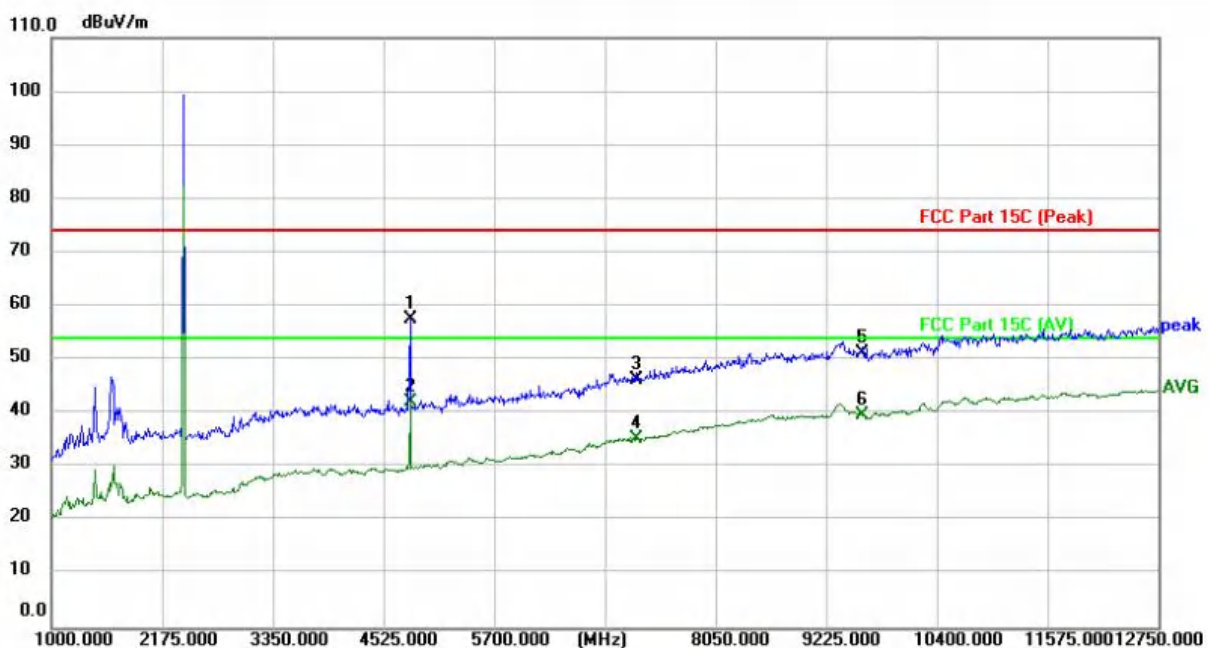
#### 4.7.1 E.U.T. Operation:

Operating Environment:

|                  |               |           |      |                       |         |
|------------------|---------------|-----------|------|-----------------------|---------|
| Temperature:     | 23.3 °C       | Humidity: | 53 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode:    | TM1, TM2, TM3 |           |      |                       |         |
| Final test mode: | TM1, TM2, TM3 |           |      |                       |         |

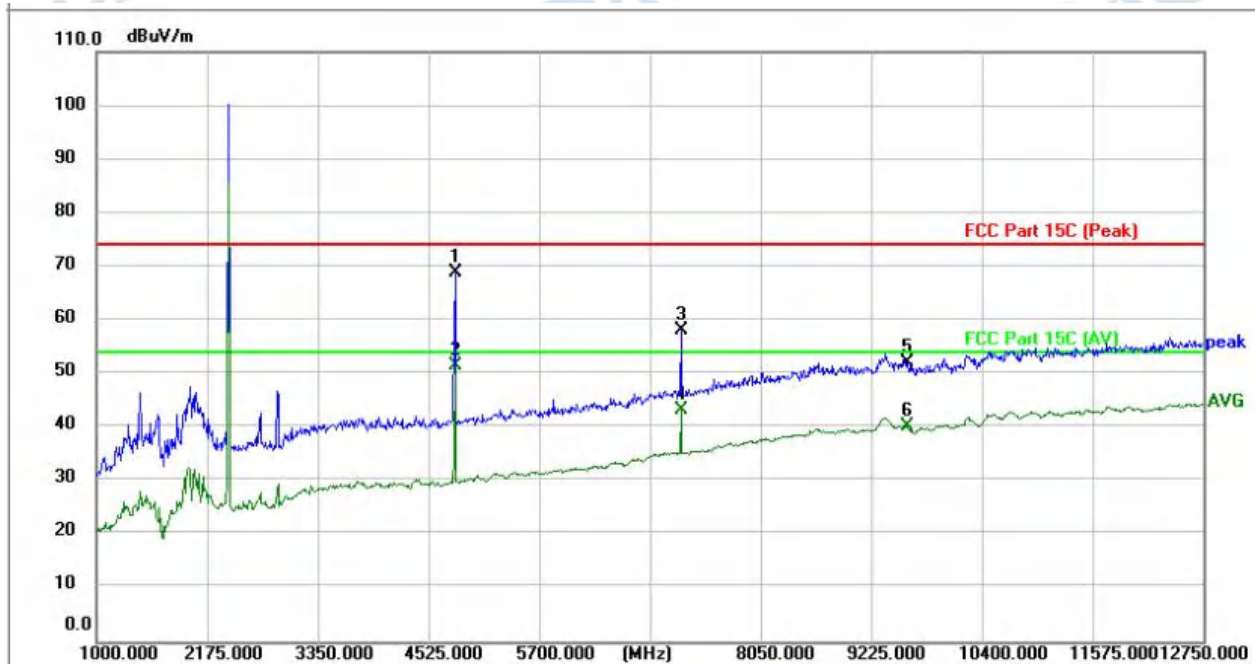
#### 4.7.2 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 2 / CH: L



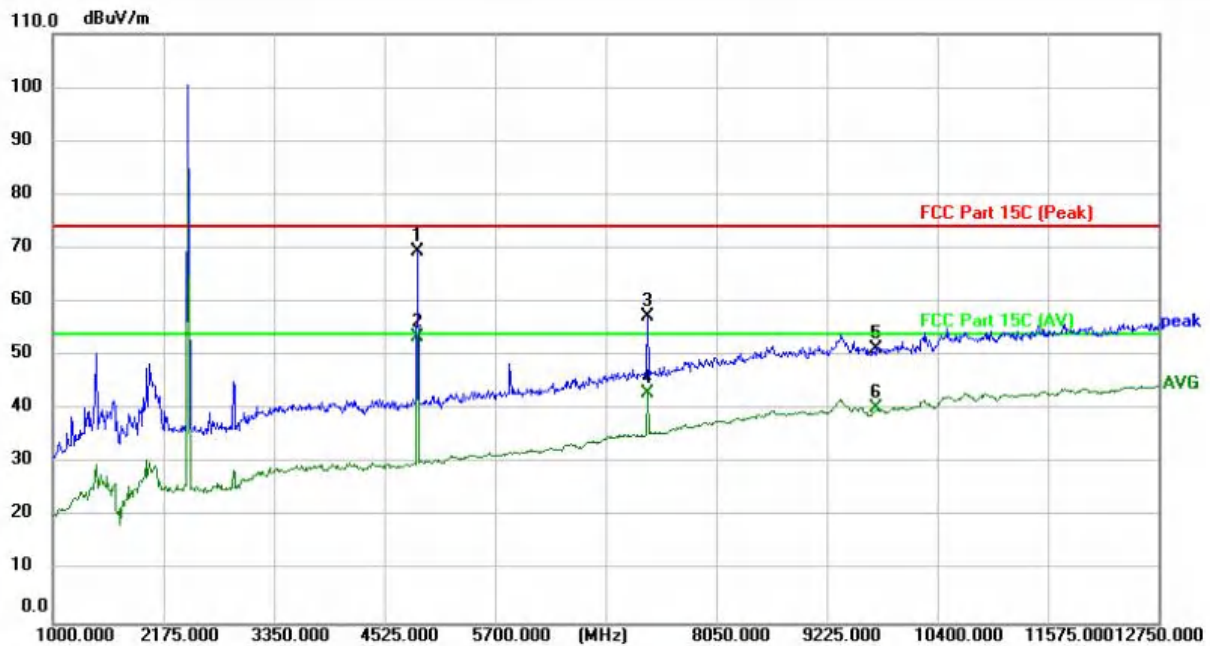
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 4807.000        | 54.42          | 3.31          | 57.73          | 74.00          | -16.27      | peak     | 150         |                | P   |        |
| 2 * | 4807.000        | 38.91          | 3.31          | 42.22          | 54.00          | -11.78      | AVG      | 150         |                | P   |        |
| 3   | 7206.000        | 36.07          | 10.37         | 46.44          | 74.00          | -27.56      | peak     | 150         |                | P   |        |
| 4   | 7206.000        | 24.98          | 10.37         | 35.35          | 54.00          | -18.65      | AVG      | 150         |                | P   |        |
| 5   | 9608.000        | 36.18          | 15.09         | 51.27          | 74.00          | -22.73      | peak     | 150         |                | P   |        |
| 6   | 9608.000        | 24.78          | 15.09         | 39.87          | 54.00          | -14.13      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 2 / CH: L



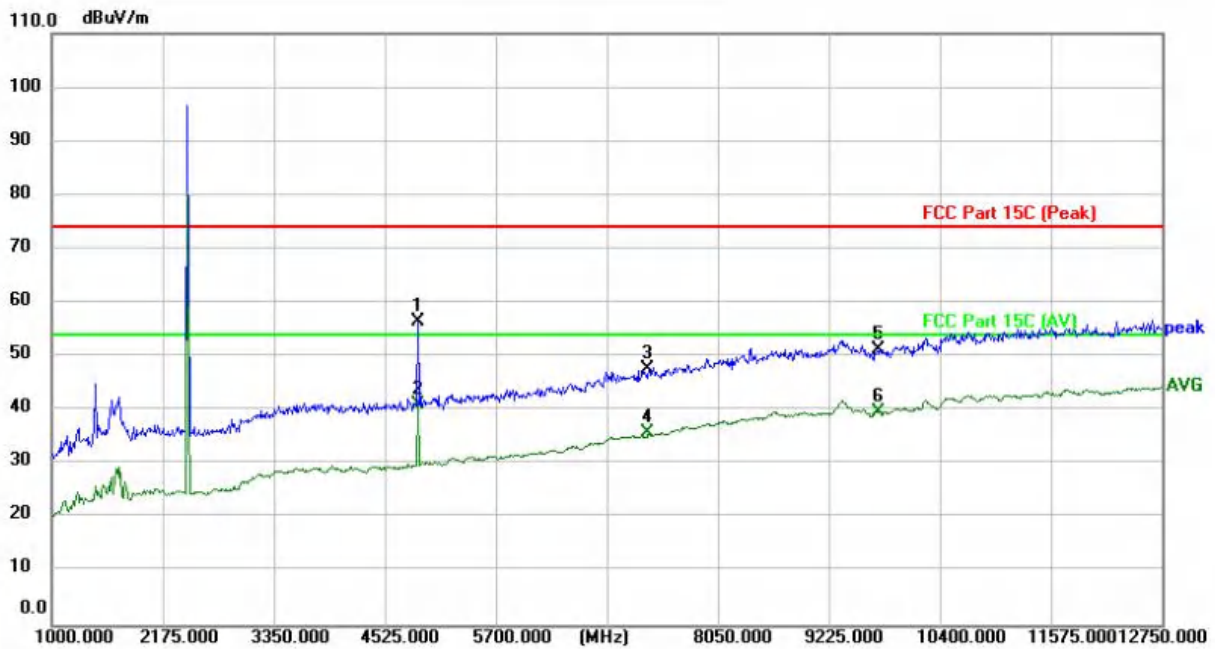
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 4807.000        | 65.64          | 3.31          | 68.95          | 74.00          | -5.05       | peak     | 150         |                | P   |        |
| 2 * | 4807.000        | 48.20          | 3.31          | 51.51          | 54.00          | -2.49       | AVG      | 150         |                | P   |        |
| 3   | 7204.000        | 47.77          | 10.37         | 58.14          | 74.00          | -15.86      | peak     | 150         |                | P   |        |
| 4   | 7204.000        | 32.96          | 10.37         | 43.33          | 54.00          | -10.67      | AVG      | 150         |                | P   |        |
| 5   | 9608.000        | 36.93          | 15.09         | 52.02          | 74.00          | -21.98      | peak     | 150         |                | P   |        |
| 6   | 9608.000        | 25.07          | 15.09         | 40.16          | 54.00          | -13.84      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 2 / CH: M



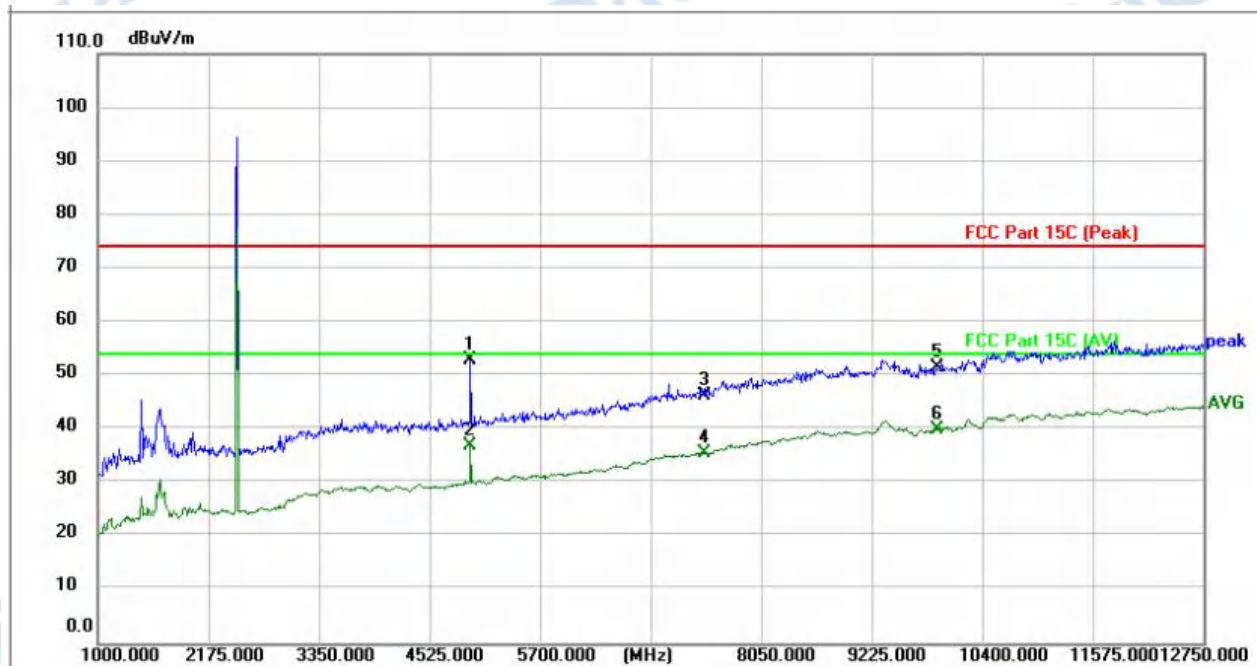
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 4877.500        | 65.78          | 3.55          | 69.33          | 74.00          | -4.67       | peak     | 150         |                | P   |        |
| 2 * | 4877.500        | 49.85          | 3.55          | 53.40          | 54.00          | -0.60       | AVG      | 150         |                | P   |        |
| 3   | 7321.500        | 46.86          | 10.57         | 57.43          | 74.00          | -16.57      | peak     | 150         |                | P   |        |
| 4   | 7321.500        | 32.56          | 10.57         | 43.13          | 54.00          | -10.87      | AVG      | 150         |                | P   |        |
| 5   | 9760.000        | 36.15          | 15.09         | 51.24          | 74.00          | -22.76      | peak     | 150         |                | P   |        |
| 6   | 9760.000        | 25.18          | 15.09         | 40.27          | 54.00          | -13.73      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 2 / CH: M



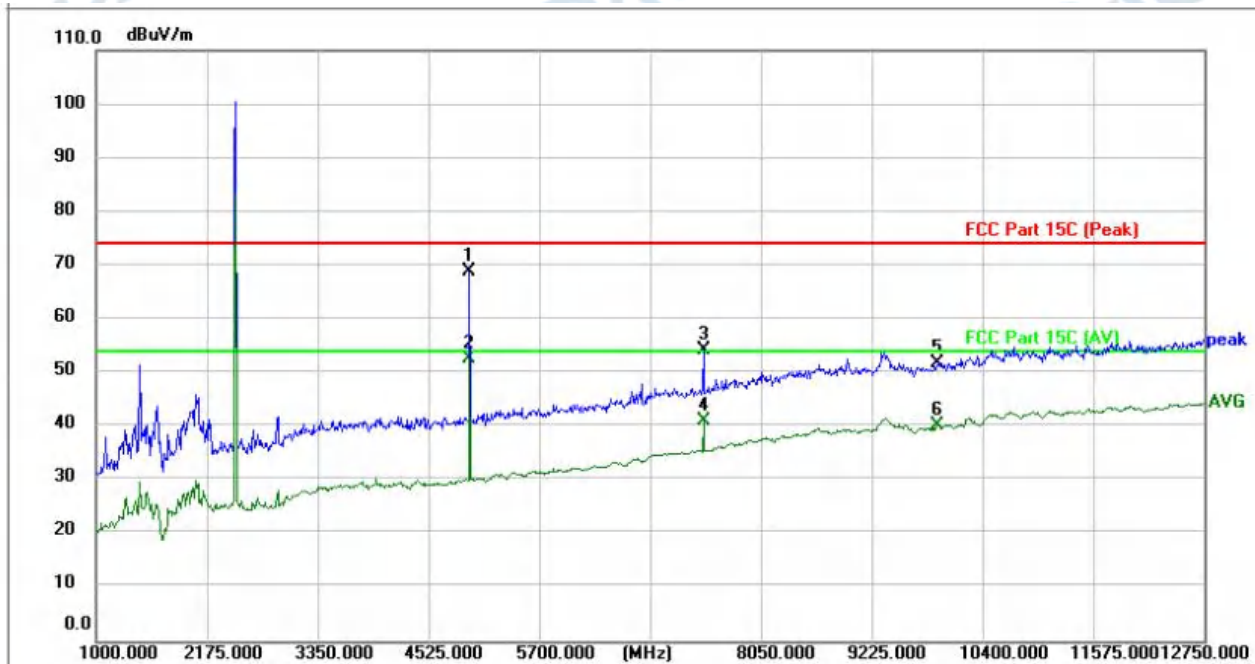
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 4877.500        | 52.94          | 3.55          | 56.49          | 74.00          | -17.51      | peak     | 150         |                | P   |        |
| 2 * | 4877.500        | 37.50          | 3.55          | 41.05          | 54.00          | -12.95      | AVG      | 150         |                | P   |        |
| 3   | 7320.000        | 37.27          | 10.57         | 47.84          | 74.00          | -26.16      | peak     | 150         |                | P   |        |
| 4   | 7320.000        | 25.45          | 10.57         | 36.02          | 54.00          | -17.98      | AVG      | 150         |                | P   |        |
| 5   | 9760.000        | 36.13          | 15.09         | 51.22          | 74.00          | -22.78      | peak     | 150         |                | P   |        |
| 6   | 9760.000        | 24.62          | 15.09         | 39.71          | 54.00          | -14.29      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 2 / CH: H



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 4959.750        | 48.98          | 3.83          | 52.81          | 74.00          | -21.19      | peak     | 150         |                | P   |        |
| 2   | 4959.750        | 33.11          | 3.83          | 36.94          | 54.00          | -17.06      | AVG      | 150         |                | P   |        |
| 3   | 7440.000        | 35.69          | 10.78         | 46.47          | 74.00          | -27.53      | peak     | 150         |                | P   |        |
| 4   | 7440.000        | 24.71          | 10.78         | 35.49          | 54.00          | -18.51      | AVG      | 150         |                | P   |        |
| 5   | 9920.000        | 36.50          | 15.08         | 51.58          | 74.00          | -22.42      | peak     | 150         |                | P   |        |
| 6 * | 9920.000        | 25.04          | 15.08         | 40.12          | 54.00          | -13.88      | AVG      | 150         |                | P   |        |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 2 / CH: H



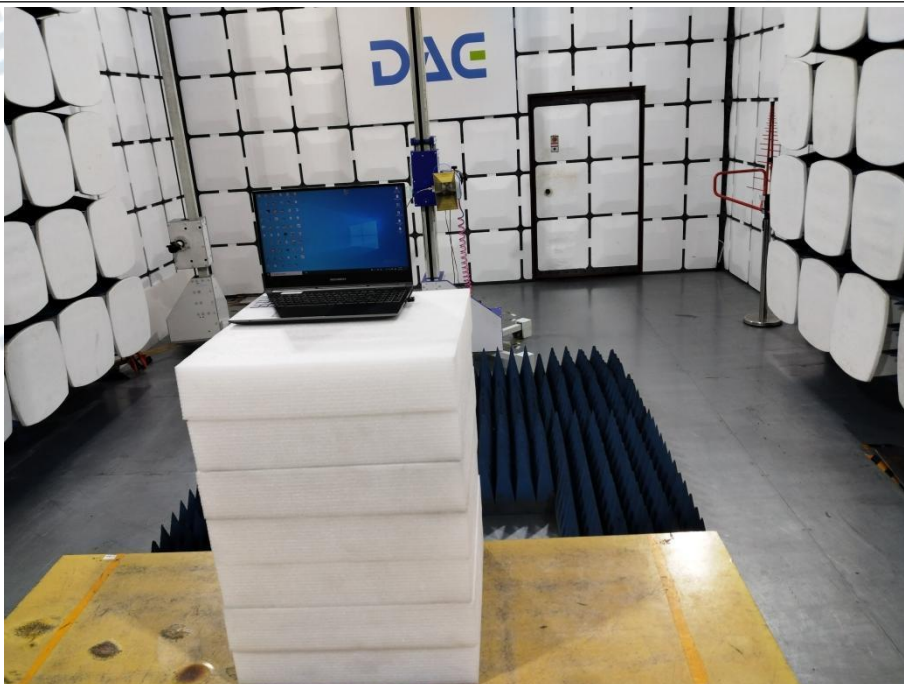
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 4959.750        | 65.11          | 3.83          | 68.94          | 74.00          | -5.06       | peak     | 150         |                | P   |        |
| 2 * | 4959.750        | 48.80          | 3.83          | 52.63          | 54.00          | -1.37       | AVG      | 150         |                | P   |        |
| 3   | 7439.000        | 43.56          | 10.78         | 54.34          | 74.00          | -19.66      | peak     | 150         |                | P   |        |
| 4   | 7439.000        | 30.35          | 10.78         | 41.13          | 54.00          | -12.87      | AVG      | 150         |                | P   |        |
| 5   | 9920.000        | 36.67          | 15.08         | 51.75          | 74.00          | -22.25      | peak     | 150         |                | P   |        |
| 6   | 9920.000        | 25.22          | 15.08         | 40.30          | 54.00          | -13.70      | AVG      | 150         |                | P   |        |

## 5 TEST SETUP PHOTOS

Emissions in frequency bands (below 1GHz)



Emissions in frequency bands (above 1GHz)

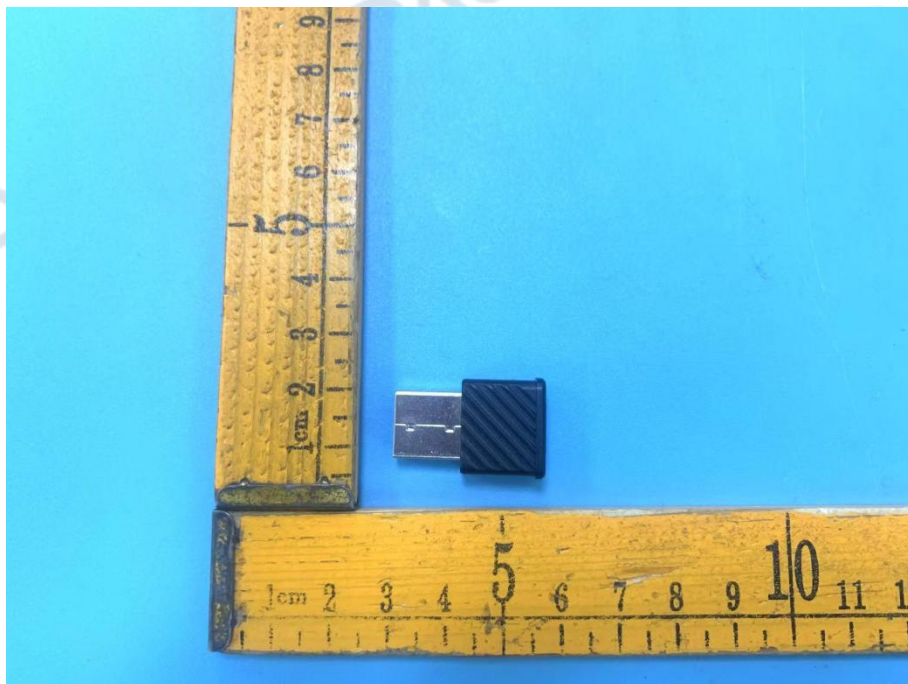


## 6 PHOTOS OF THE EUT

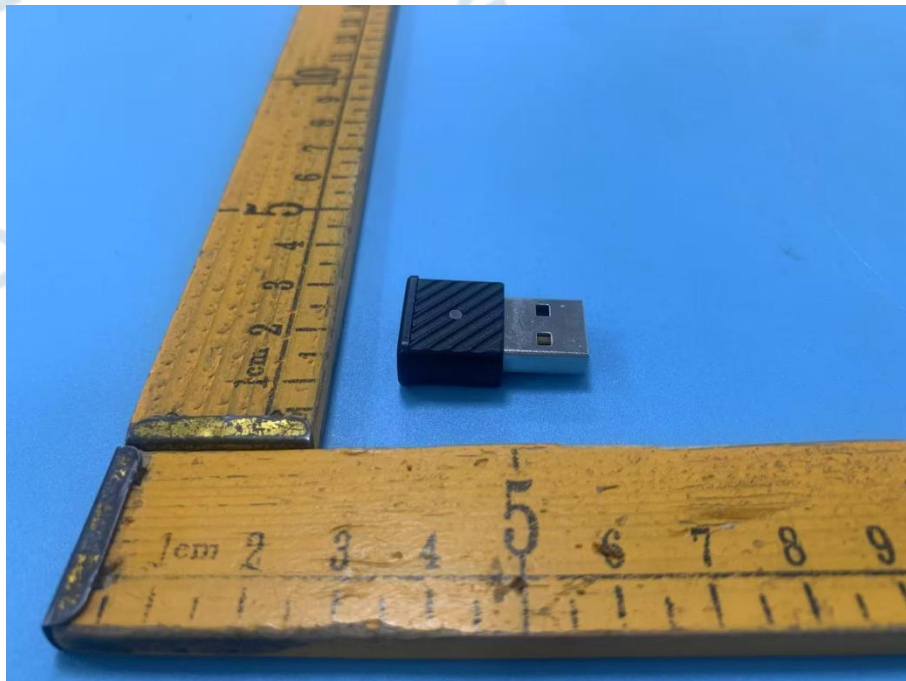
External



**External**



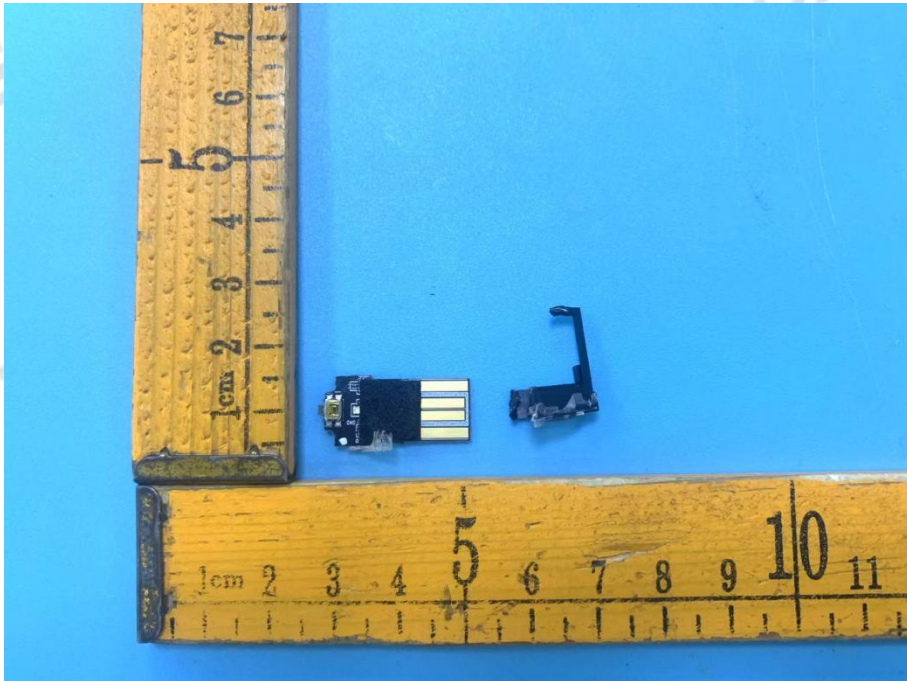


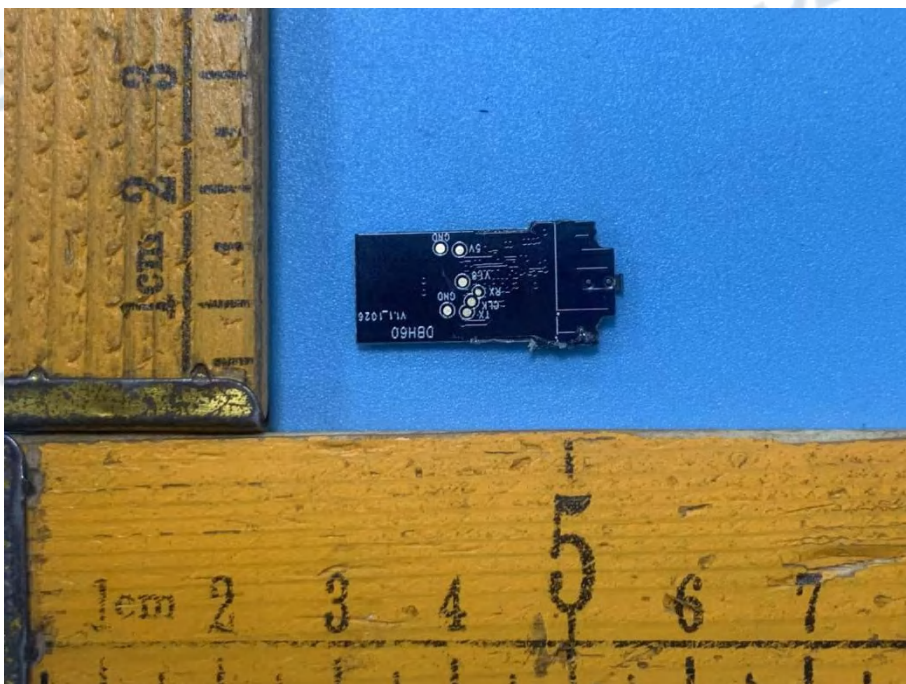
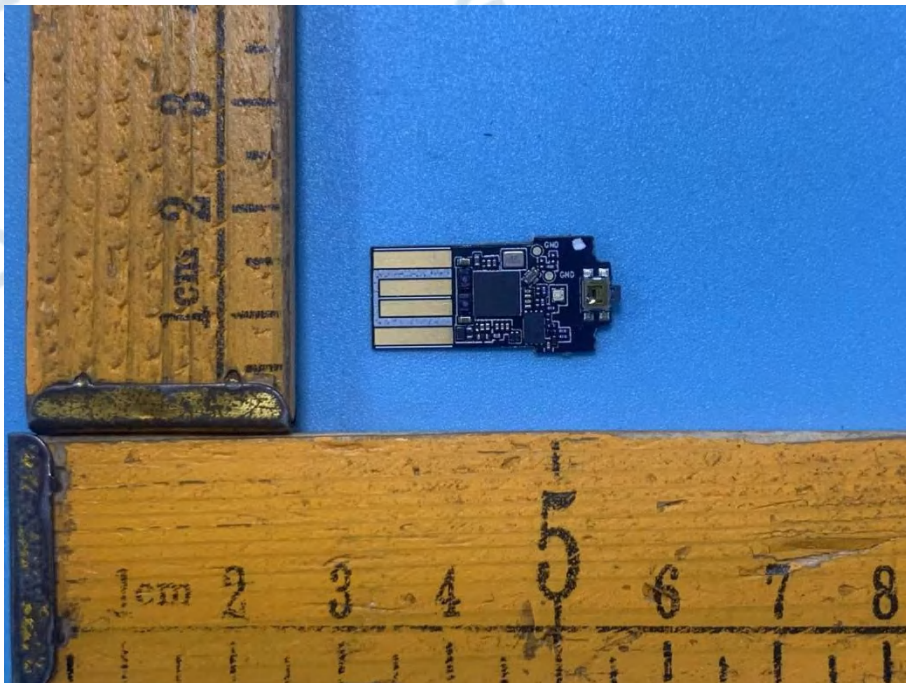


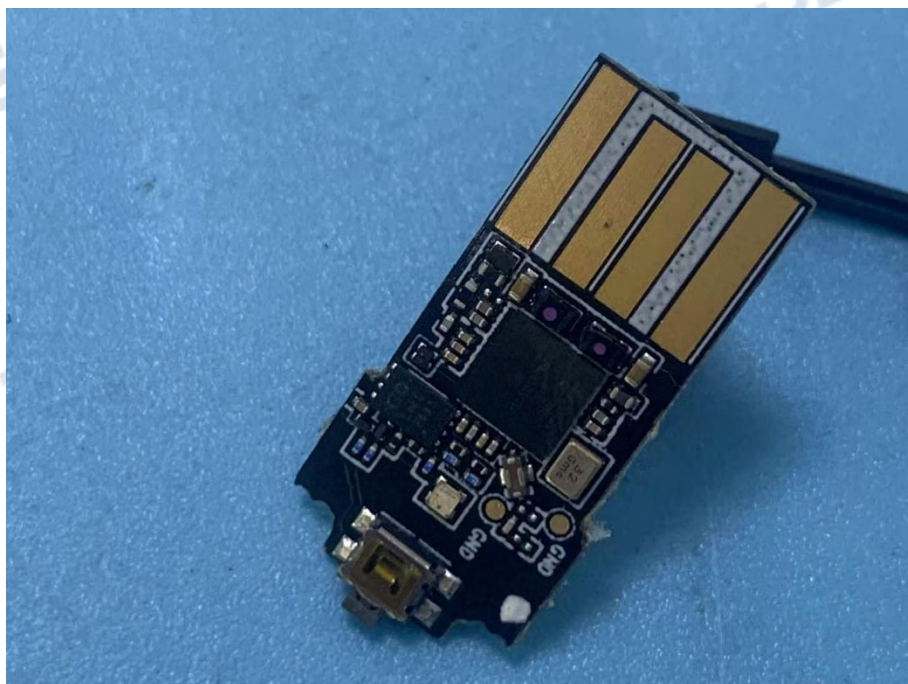
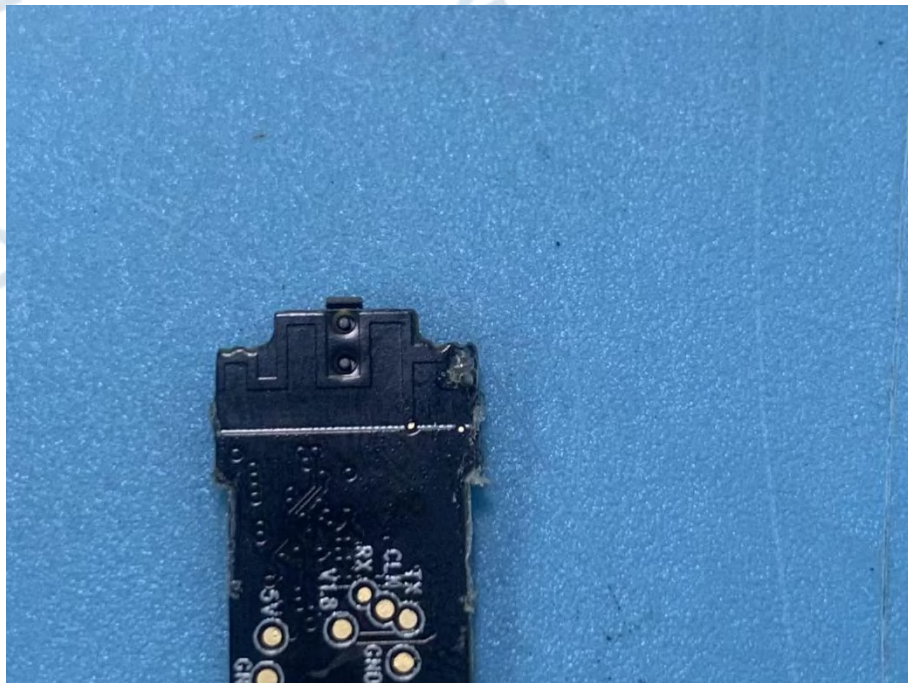


**Internal**









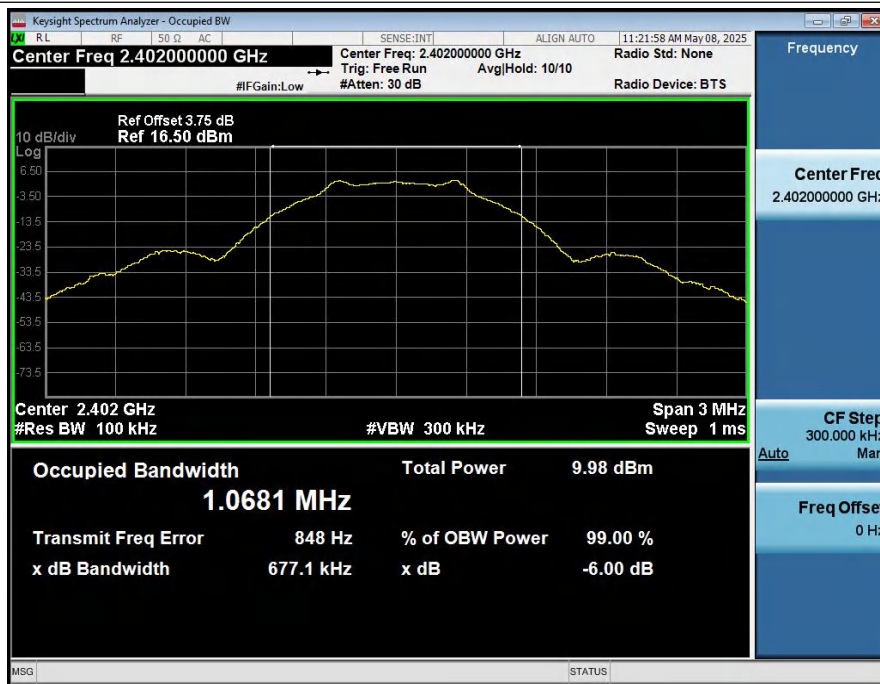
# Appendix

# HT250430006--H9--BLE--FCC FCC\_BLE (Part15.247) Test Data

## 1. -6dB Bandwidth

| Condition | Antenna | Rate  | Frequency (MHz) | -6dB BW(kHz) | limit(kHz) | Result |
|-----------|---------|-------|-----------------|--------------|------------|--------|
| NVNT      | ANT1    | 1Mbps | 2402.00         | 677.05       | 500        | Pass   |
| NVNT      | ANT1    | 1Mbps | 2440.00         | 676.20       | 500        | Pass   |
| NVNT      | ANT1    | 1Mbps | 2480.00         | 687.05       | 500        | Pass   |

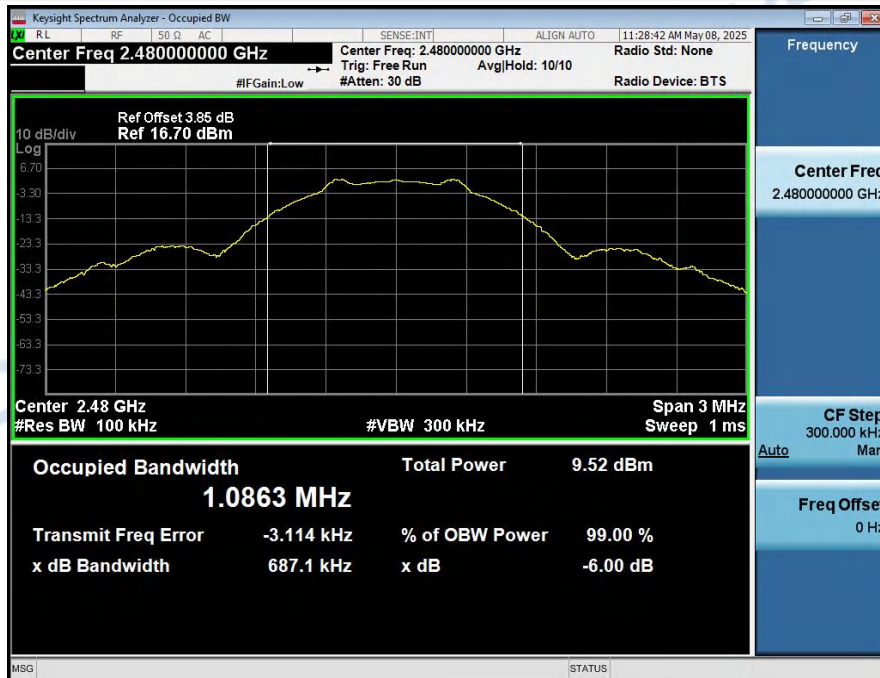
-6dB\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2402



### -6dB\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2440



### -6dB\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2480



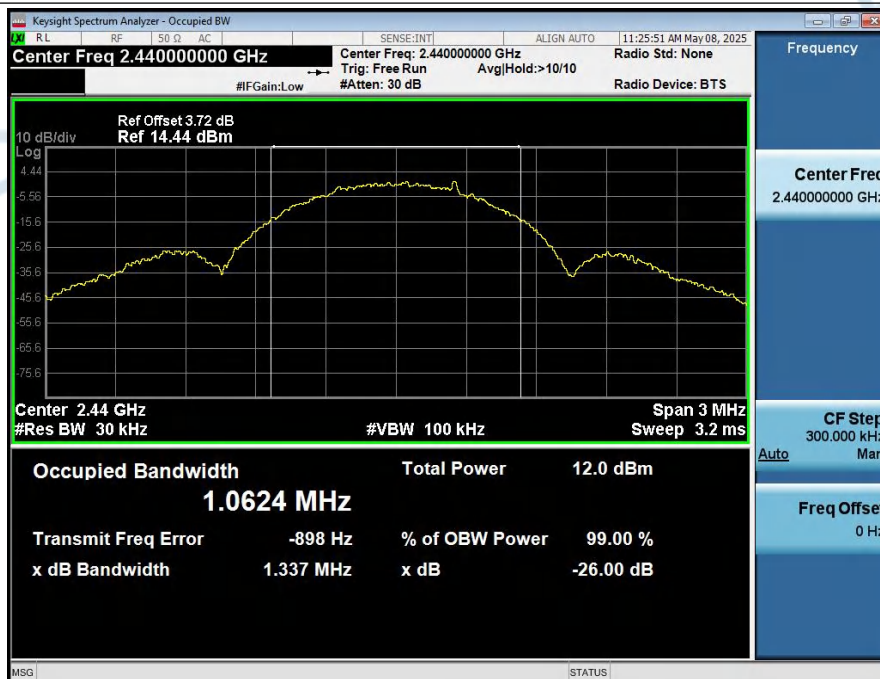
## 2. 99% Occupied Bandwidth

| Condition | Antenna | Rate  | Frequency (MHz) | 99% BW (MHz) |
|-----------|---------|-------|-----------------|--------------|
| NVNT      | ANT1    | 1Mbps | 2402.00         | 1.056        |
| NVNT      | ANT1    | 1Mbps | 2440.00         | 1.062        |
| NVNT      | ANT1    | 1Mbps | 2480.00         | 1.068        |

99%\_Occupied\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2402



99%\_Occupied\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2440



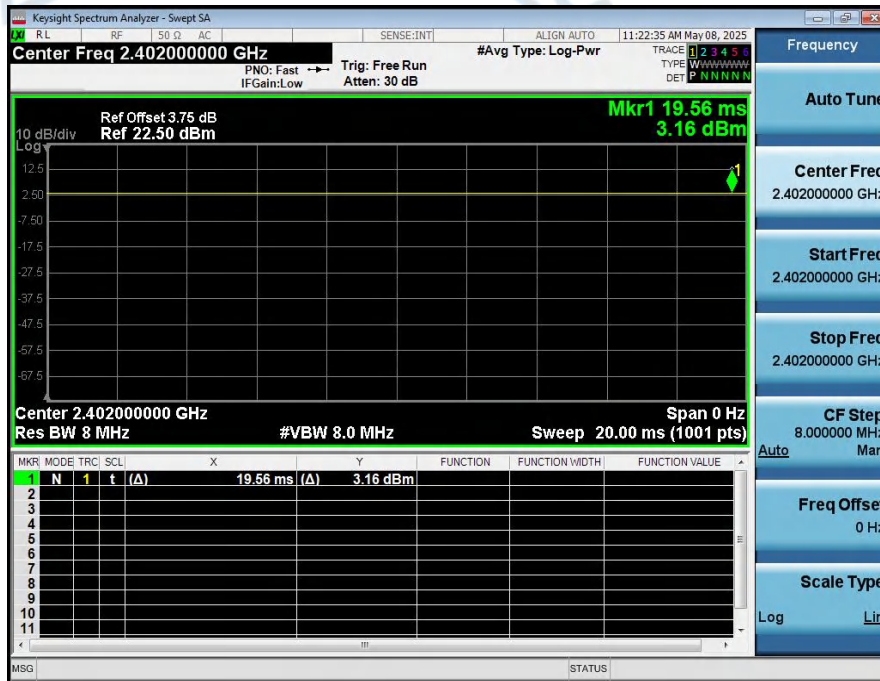
99%\_Occupied\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2480



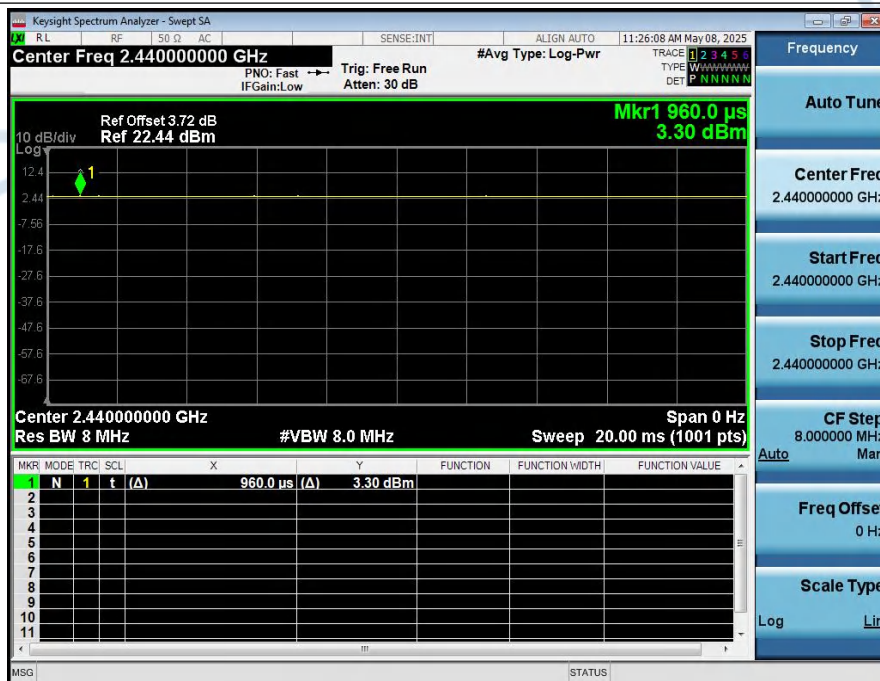
### 3. Duty Cycle

| Condition | Antenna | Rate  | Frequency (MHz) | Dutycycle(%) | Duty_factor |
|-----------|---------|-------|-----------------|--------------|-------------|
| NVNT      | ANT1    | 1Mbps | 2402.00         | 100          | 0.00        |
| NVNT      | ANT1    | 1Mbps | 2440.00         | 100          | 0.00        |
| NVNT      | ANT1    | 1Mbps | 2480.00         | 100          | 0.00        |

Duty\_Cycle\_NVNT\_ANT1\_1Mbps\_2402



Duty\_Cycle\_NVNT\_ANT1\_1Mbps\_2440



Duty\_Cycle\_NVNT\_ANT1\_1Mbps\_2480



#### 4. Peak Output Power

| Condition | Antenna | Rate  | Frequency (MHz) | Max. Conducted Power(dBm) | Max. Conducted Power(mW) | Limit(mW) | Result |
|-----------|---------|-------|-----------------|---------------------------|--------------------------|-----------|--------|
| NVNT      | ANT1    | 1Mbps | 2402.00         | 3.08                      | 2.03                     | 1000      | Pass   |
| NVNT      | ANT1    | 1Mbps | 2440.00         | 3.25                      | 2.12                     | 1000      | Pass   |
| NVNT      | ANT1    | 1Mbps | 2480.00         | 2.82                      | 1.92                     | 1000      | Pass   |

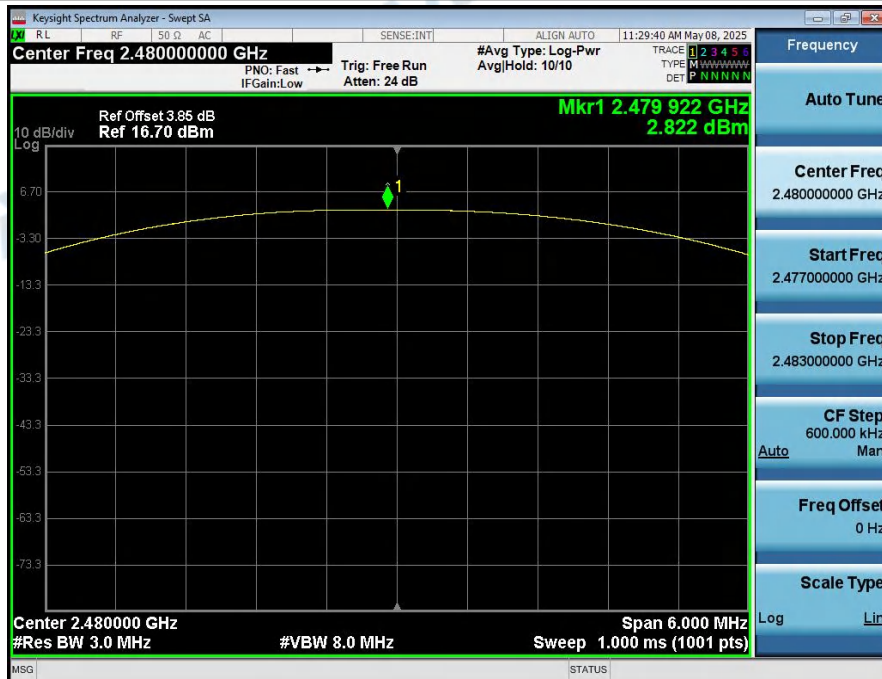
Peak\_Output\_Power\_NVNT\_ANT1\_1Mbps\_2402



Peak\_Output\_Power\_NVNT\_ANT1\_1Mbps\_2440



### Peak\_Output\_Power\_NVNT\_ANT1\_1Mbps\_2480



## 5. Power Spectral Density

| Condition | Antenna | Rate  | Frequency (MHz) | Power Spectral Density(dBm/3kHz) | Limit(dBm/3kHz) | Result |
|-----------|---------|-------|-----------------|----------------------------------|-----------------|--------|
| NVNT      | ANT1    | 1Mbps | 2402.00         | -9.50                            | 8               | Pass   |
| NVNT      | ANT1    | 1Mbps | 2440.00         | -8.16                            | 8               | Pass   |
| NVNT      | ANT1    | 1Mbps | 2480.00         | -9.84                            | 8               | Pass   |

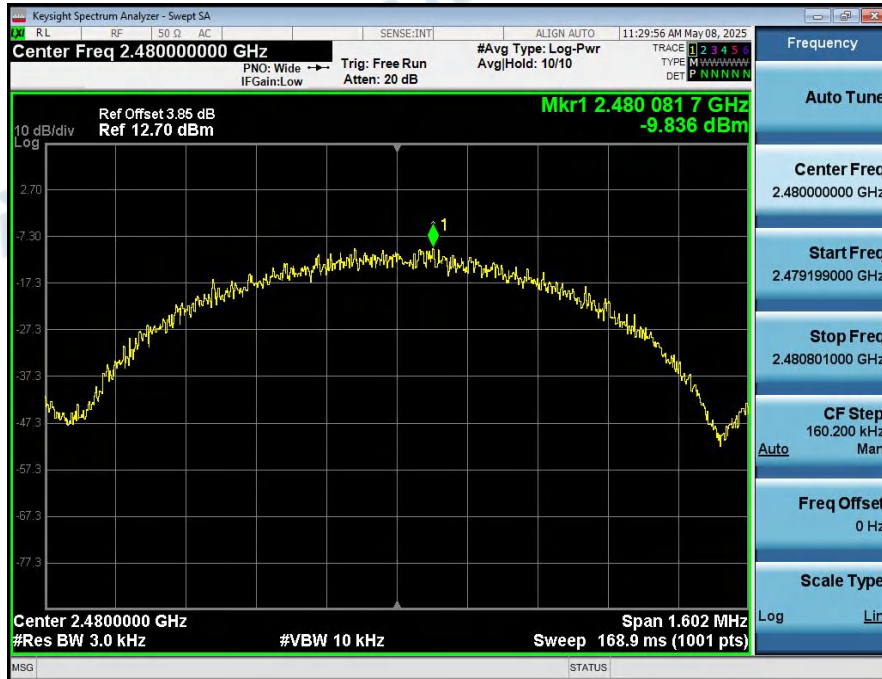
Power\_Spectral\_Density\_NVNT\_ANT1\_1Mbps\_2402



Power\_Spectral\_Density\_NVNT\_ANT1\_1Mbps\_2440



Power\_Spectral\_Density\_NVNT\_ANT1\_1Mbps\_2480



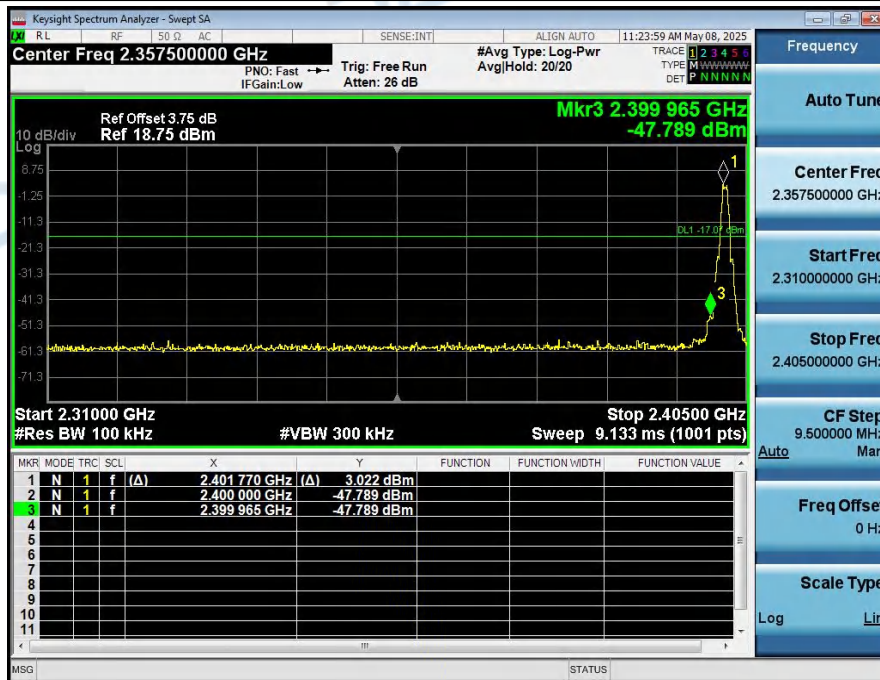
## 6. Bandedge

| Condition | Antenna | Modulation | TX_Frequency (MHz) | Max. Mark_freq(MHz) | Ref_level(dBm) | Spurious level(dBm) | limit(dBm) | Result |
|-----------|---------|------------|--------------------|---------------------|----------------|---------------------|------------|--------|
| NVNT      | ANT1    | 1Mbps      | 2402.00            | 2399.965            | 2.931          | -47.789             | -17.069    | Pass   |
| NVNT      | ANT1    | 1Mbps      | 2480.00            | 2483.575            | 2.610          | -60.911             | -17.390    | Pass   |

1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2402



2\_Bandedge\_NVNT\_ANT1\_1Mbps\_2402



### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2480



### 2\_Bandedge\_NVNT\_ANT1\_1Mbps\_2480



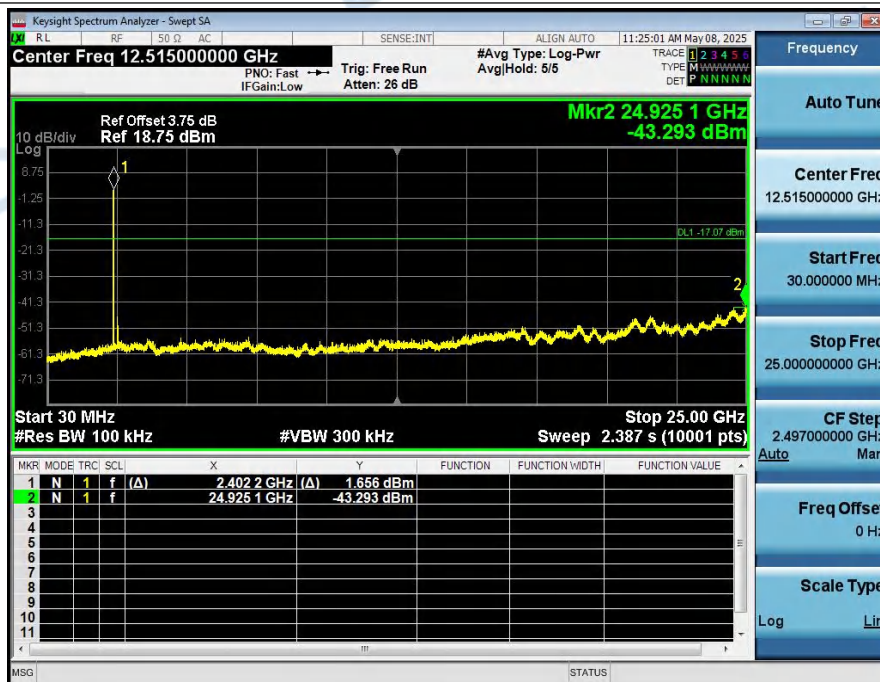
## 7. Spurious Emission

| Condition | Antenna | Modulation | TX_Frequency (MHz) | Ref_level(dBm) | Spurious level(dBm) | limit(dBm) | Result |
|-----------|---------|------------|--------------------|----------------|---------------------|------------|--------|
| NVNT      | ANT1    | 1Mbps      | 2402.00            | 2.931          | -43.293             | -17.069    | Pass   |
| NVNT      | ANT1    | 1Mbps      | 2440.00            | 3.092          | -38.909             | -16.908    | Pass   |
| NVNT      | ANT1    | 1Mbps      | 2480.00            | 2.610          | -38.223             | -17.390    | Pass   |

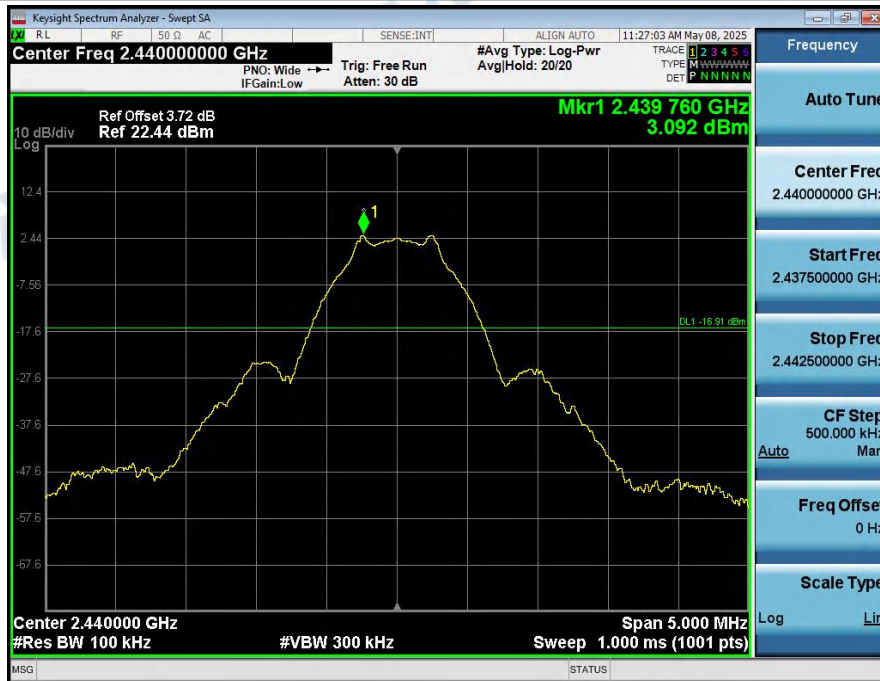
### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2402



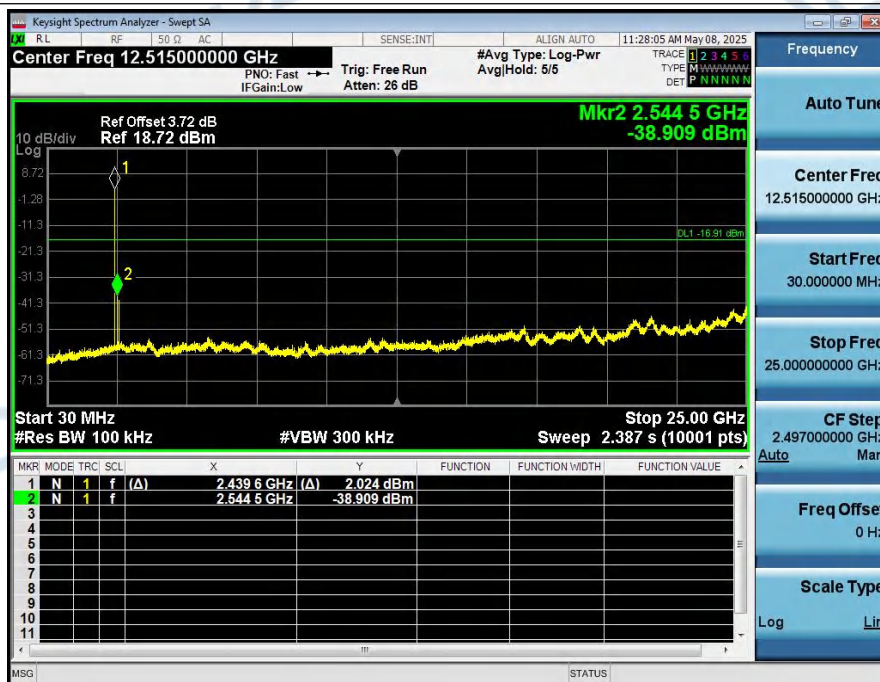
### 2\_Spurious\_Emission\_NVNT\_ANT1\_1Mbps\_2402



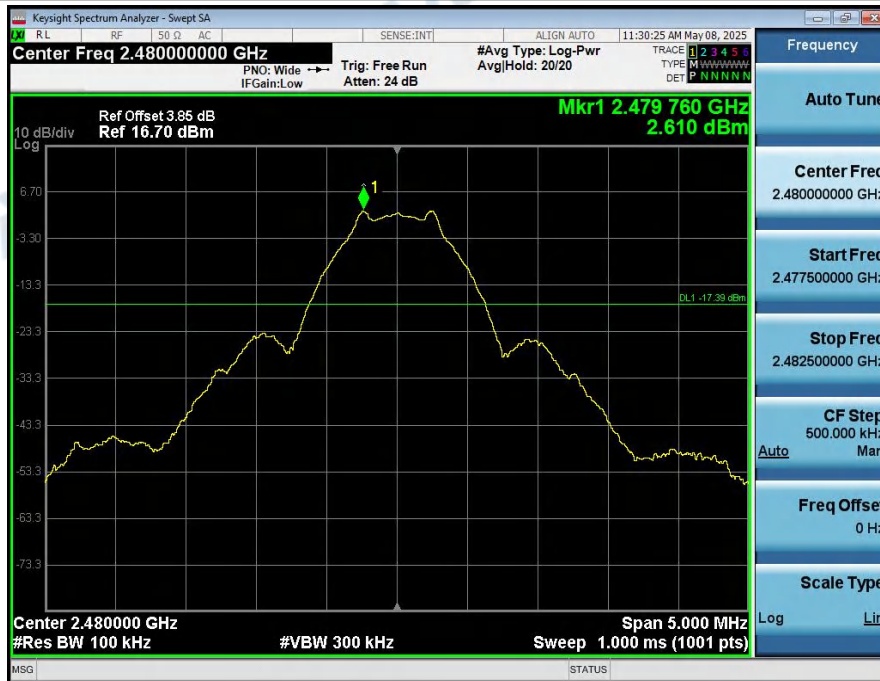
### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2440



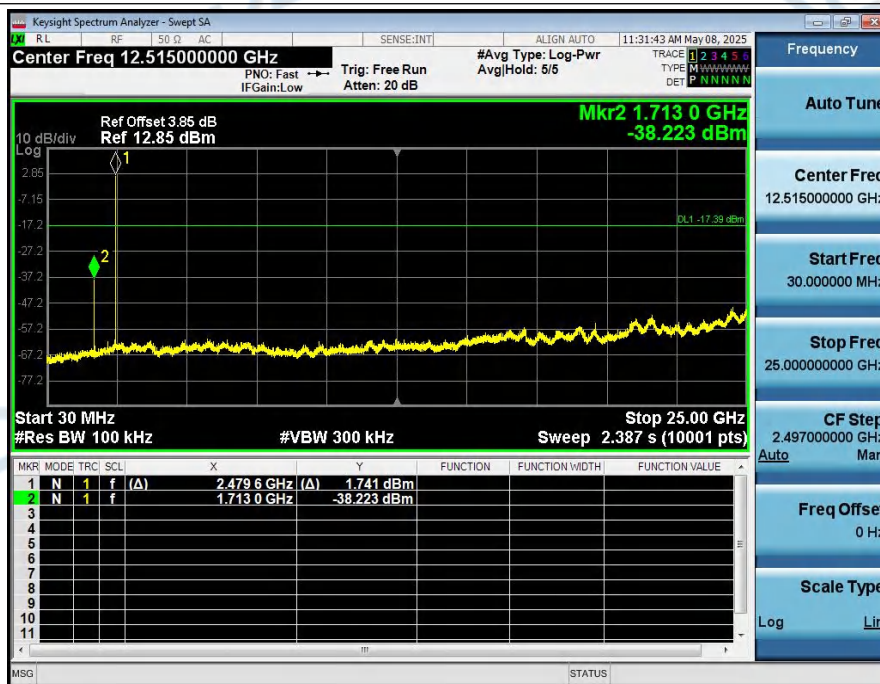
### 2\_Spurious\_Emission\_NVNT\_ANT1\_1Mbps\_2440



### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2480



### 2\_Spurious\_Emission\_NVNT\_ANT1\_1Mbps\_2480



\*\*\*\*\* End of Report \*\*\*\*\*