

# Test Report

**Applicant** : Felion Technologies Company Limited  
Room 304 3F Fuxing Building No.6 Binglang  
**Address** : Road Fubao Community Futian District  
Shenzhen  
**Product Name** : VOS TAG  
**Brand Mark** : ATUVOS/VOCOLINC/ISOOCO  
**Model** : AT2301  
**Series model** : VT2201  
**FCC ID** : 2AXT8-2301T  
**Report Number** : BLA-EMC-202404-A3202  
**Date of Receipt** : 2024.4.15  
**Date of Test** : 2024.4.16 to 2024.4.24  
**Test Standard** : 47 CFR Part 15, Subpart C 15.247  
**Test Result** : Pass

Compiled by:

charlie

Review by:

Sueels

Approved by:

Blue Zheng

Issued Date:

2024.04.25



## BlueAsia of Technical Services(Shenzhen) Co.,Ltd.

Address: Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District,  
Shenzhen, Guangdong Province, China



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## Revise Record

| Version No. | Date       | Description |
|-------------|------------|-------------|
| 01          | 2024.04.25 | Original    |
|             |            |             |
|             |            |             |
|             |            |             |

## 1 General information

### 1.1 General information

|              |                                                                                         |
|--------------|-----------------------------------------------------------------------------------------|
| Applicant    | Felion Technologies Company Limited                                                     |
| Address      | Room 304 3F Fuxing Building No.6 Binglang Road Fubao Community Futian District Shenzhen |
| Manufacturer | Felion Technologies Company Limited                                                     |
| Address      | Room 304 3F Fuxing Building No.6 Binglang Road Fubao Community Futian District Shenzhen |
| Factory      | N/A                                                                                     |
| Address      | N/A                                                                                     |

### 1.2 General description of EUT

|                                     |                                                                                |
|-------------------------------------|--------------------------------------------------------------------------------|
| Product Name                        | VOS TAG                                                                        |
| Model No.                           | AT2301                                                                         |
| Series model                        | VT2201                                                                         |
| Differences of Series model         | All models are electrically identical, only the model and color are different. |
| Operation Frequency:                | 2402MHz-2480MHz                                                                |
| Modulation Type:                    | GFSK                                                                           |
| Channel Spacing:                    | 2MHz                                                                           |
| Number of Channels:                 | 40                                                                             |
| Antenna Type:                       | PCB Antenna                                                                    |
| Antenna Gain:                       | 1.13dBi(Provided by customer)                                                  |
| Power supply or adapter information | Battery:DC3V                                                                   |
| Hardware Version                    | VT2301T-V01                                                                    |
| Software Version                    | 1.2.0                                                                          |

*Note: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.*

## 2 Test summary

| No. | Test item                                             | Result | Remark |
|-----|-------------------------------------------------------|--------|--------|
| 1   | Antenna Requirement                                   | Pass   |        |
| 2   | Conducted Emissions at AC Power Line (150kHz-30MHz)   | N/A    |        |
| 3   | Conducted Peak Output Power                           | Pass   |        |
| 4   | Minimum 6dB Bandwidth                                 | Pass   |        |
| 5   | Power Spectrum Density                                | Pass   |        |
| 6   | Conducted Band Edges Measurement                      | Pass   |        |
| 7   | Conducted Spurious Emissions                          | Pass   |        |
| 8   | Radiated Spurious Emissions                           | Pass   |        |
| 9   | Radiated Emissions which fall in the restricted bands | Pass   |        |

N/A: Not Applicable

### 3 Test Configuration

#### 3.1 Test mode

| Test Mode <sup>Note 1</sup> | Description                                                      |
|-----------------------------|------------------------------------------------------------------|
| TX                          | Keep the EUT in continuously transmitting with modulation mode.  |
| RX                          | Keep the EUT in receiving mode                                   |
| TX Low channel              | Keep the EUT in continuously transmitting mode in low channel    |
| TX middle channel           | Keep the EUT in continuously transmitting mode in middle channel |
| TX high channel             | Keep the EUT in continuously transmitting mode in high channel   |

*Note 1: The EUT was configured to measure its highest possible emission and/or immunity level. The test modes were adapted according to the operation manual for use; the EUT was operated in the engineering mode <sup>Note 2</sup> to fix the TX or Rx frequency that was for the purpose of the measurements.*

#### 3.2 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   |
| ...     | ...       | ...     | ...       | ...     | ...       | ...     | ...       |
| 9       | 2418MHz   | 19      | 2438MHz   | 29      | 2458MHz   | 39      | 2478MHz   |
| 10      | 2420MHz   | 20      | 2440MHz   | 30      | 2460MHz   | 40      | 2480MHz   |

#### 3.3 Test channel

| Channel             | Frequency |
|---------------------|-----------|
| The lowest channel  | 2402MHz   |
| The middle channel  | 2442MHz   |
| The Highest channel | 2480MHz   |

### 3.4 Auxiliary equipment

| Device Type | Manufacturer | Model Name | Serial No. | Remark                             |
|-------------|--------------|------------|------------|------------------------------------|
| PC          | Lenovo       | E460C      | N/A        | From lab<br>(No.BLA-ZC-BS-2022005) |

**Note:**

“--” mean no any auxiliary device during testing.

### 3.5 Test environment

| Environment | Temperature | Voltage |
|-------------|-------------|---------|
| Normal      | 25°C        | DC 3V   |

## 4 Laboratory information

### 4.1 Laboratory and accreditations

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

|                          |                                                                                                             |
|--------------------------|-------------------------------------------------------------------------------------------------------------|
| Company name:            | BlueAsia of Technical Services(Shenzhen) Co., Ltd.                                                          |
| Address:                 | Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China |
| CNAS accredited No.:     | L9788                                                                                                       |
| A2LA Cert. No.:          | 5071.01                                                                                                     |
| FCC Designation No.:     | CN1252                                                                                                      |
| ISED CAB identifier No.: | CN0028                                                                                                      |
| Telephone:               | +86-755-28682673                                                                                            |
| FAX:                     | +86-755-28682673                                                                                            |

### 4.2 Measurement uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=1.96$ .

| Parameter                                      | Expanded Uncertainty            |
|------------------------------------------------|---------------------------------|
| Radiated Emission(9kHz-30MHz)                  | $\pm 4.34\text{dB}$             |
| Radiated Emission(30Mz-1000MHz)                | $\pm 4.24\text{dB}$             |
| Radiated Emission(1GHz-18GHz)                  | $\pm 4.68\text{dB}$             |
| AC Power Line Conducted Emission(150kHz-30MHz) | $\pm 3.45\text{dB}$             |
| Occupied Channel Bandwidth                     | $\pm 5\%$                       |
| RF output power, conducted                     | $\pm 1.5\text{ dB}$             |
| Power Spectral Density, conducted              | $\pm 3.0\text{ dB}$             |
| Unwanted Emissions, conducted                  | $\pm 3.0\text{ dB}$             |
| Temperature                                    | $\pm 3\text{ }^{\circ}\text{C}$ |
| Supply voltages                                | $\pm 3\%$                       |
| Time                                           | $\pm 5\%$                       |

## 5 Test equipment

| Equipment No. | Equipment Name                      | Model No.           | Manufacture  | S/N              | Cal. Date  | Next Cal. Date |
|---------------|-------------------------------------|---------------------|--------------|------------------|------------|----------------|
| BLA-EMC-008   | Spectrum                            | FSP40               | R&S          | 100817           | 2023/08/30 | 2024/08/29     |
| BLA-EMC-009   | EMI Receiver                        | ESR7                | R&S          | 101199           | 2023/08/30 | 2024/08/29     |
| BLA-EMC-012   | broad band Antenna                  | VULB9168            | Schwarz beck | 00836<br>P:00227 | 2022/10/12 | 2025/10/11     |
| BLA-EMC-013   | Horn Antenna                        | BBHA9120D           | Schwarz beck | 01892            | 2022/09/13 | 2025/09/12     |
| BLA-EMC-014   | Amplifier                           | PA_000318G-45       | SKET         | PA2018043003     | 2023/08/30 | 2024/08/29     |
| BLA-EMC-016   | Signal Generator                    | N5182A              | Agilent      | MY52420567       | 2023/11/16 | 2024/11/15     |
| BLA-EMC-028   | Spectrum                            | N9020A              | Agilent      | MY53420839       | 2023/11/16 | 2024/11/15     |
| BLA-EMC-038   | Spectrum                            | N9020A              | Agilent      | MY49100060       | 2023/08/30 | 2024/08/29     |
| BLA-EMC-042   | Power sensor                        | RPR3006W            | DARE         | 14I00889SN042    | 2023/09/01 | 2024/08/31     |
| BLA-EMC-043   | Loop antenna                        | FMZB1519B           | SCHNARZBECK  | 00102            | 2022/09/14 | 2025/09/13     |
| BLA-EMC-044   | Wideband radio communication tester | CMW500              | R&S          | 132429           | 2023/08/30 | 2024/08/29     |
| BLA-EMC-046   | Filter bank                         | 2.4G/5G Filter bank | SKET         | N/A              | 2023/07/07 | 2024/07/06     |
| BLA-EMC-061   | Receiver                            | ESPI7               | R&S          | 101477           | 2023/07/07 | 2024/07/06     |
| BLA-EMC-062   | Signal Generator                    | N5181A              | Agilent      | MY46240904       | 2023/07/07 | 2024/07/06     |
| BLA-EMC-064   | Signal Generator                    | N5182B              | KEYSIGHT     | MY58108892       | 2023/07/07 | 2024/07/06     |
| BLA-EMC-065   | broadband Antenna                   | VULB9168            | Schwarz beck | 01065P           | 2022/12/12 | 2025/12/11     |
| BLA-EMC-066   | Amplifier                           | LNPA_30M01G-30      | SKET         | SK2021060801     | 2023/07/07 | 2024/07/06     |
| BLA-EMC-079   | Spectrum                            | N9020A              | Agilent      | MY54420161       | 2023/08/30 | 2024/08/29     |
| BLA-EMC-080   | Signal Generator                    | N5182A              | Agilent      | MY47420955       | 2023/08/30 | 2024/08/29     |
| BLA-EMC-086   | Amplifier                           | LNPA_18G40G-50dB    | SKET         | SK2022071301     | 2023/08/14 | 2024/08/13     |

## 6 Test result

### 6.1 Antenna requirement

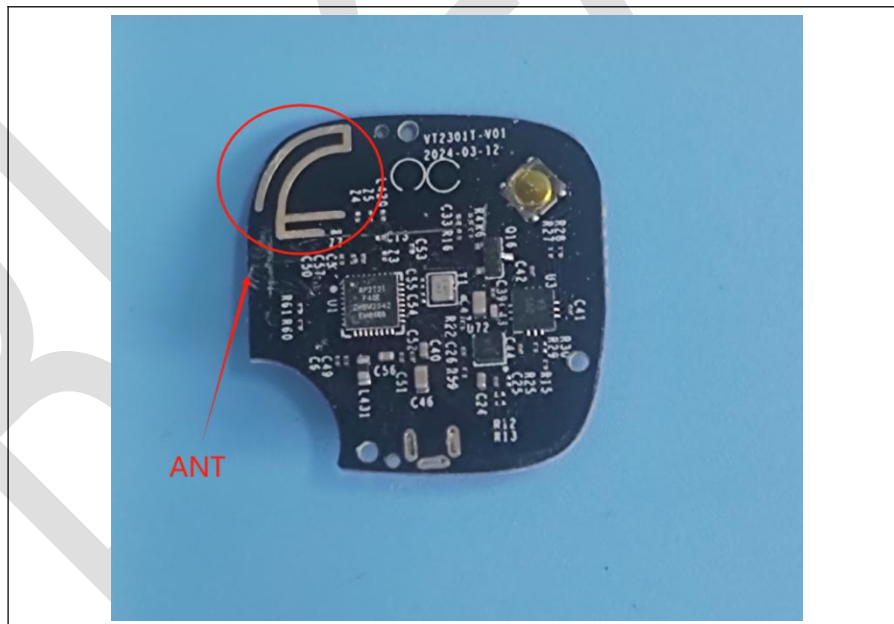
|               |                                  |
|---------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method   | N/A                              |

#### 6.1.1 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of a so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.13 dBi.



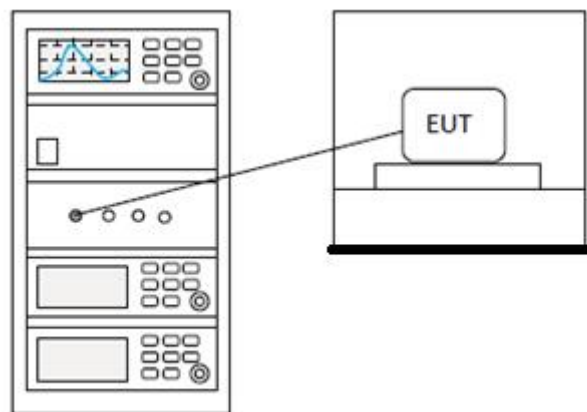
## 6.2 Conducted peak output Power

|                               |                                  |
|-------------------------------|----------------------------------|
| <b>Test Standard</b>          | 47 CFR Part 15, Subpart C 15.247 |
| <b>Test Method</b>            | ANSI C63.10 (2013) Section 7.8.5 |
| <b>Test Mode (Pre-Scan)</b>   | TX                               |
| <b>Test Mode (Final Test)</b> | TX                               |

### 6.2.1 Limit

| Frequency range(MHz) | Output power of the intentional radiator(watt)         |
|----------------------|--------------------------------------------------------|
| 902-928              | 1 for $\geq 50$ hopping channels                       |
|                      | 0.25 for $25 \leq$ hopping channels $< 50$             |
|                      | 1 for digital modulation                               |
| 2400-2483.5          | 1 for $\geq 75$ non-overlapping hopping channels       |
|                      | 0.125 for all other frequency hopping systems          |
|                      | 1 for digital modulation                               |
| 5725-5850            | 1 for frequency hopping systems and digital modulation |

### 6.2.2 Test setup



### 6.2.3 Test data

Pass: Please refer to appendix A for details

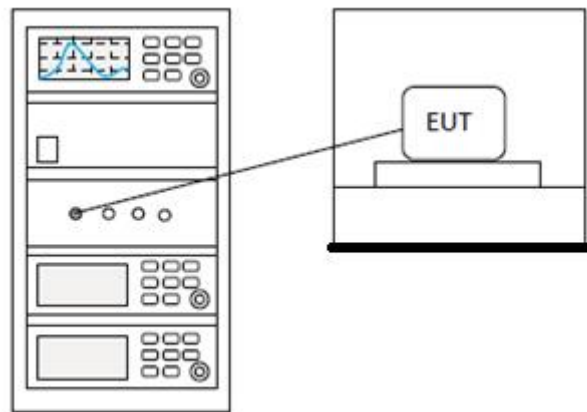
### 6.3 Minimum 6dB bandwidth

|                        |                                   |
|------------------------|-----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247  |
| Test Method            | ANSI C63.10 (2013) Section 11.8.1 |
| Test Mode (Pre-Scan)   | TX                                |
| Test Mode (Final Test) | TX                                |

#### 6.3.1 Limit

≥500 kHz

#### 6.3.2 Test setup



#### 6.3.3 Test data

Pass: Please refer to appendix A for details

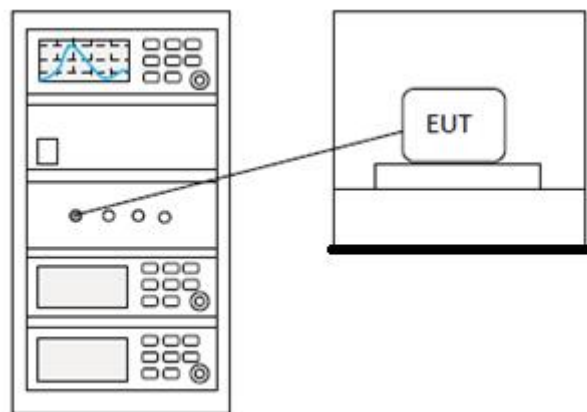
## 6.4 Power spectrum density

|                        |                                    |
|------------------------|------------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247   |
| Test Method            | ANSI C63.10 (2013) Section 11.10.2 |
| Test Mode (Pre-Scan)   | TX                                 |
| Test Mode (Final Test) | TX                                 |

### 6.4.1 Limit

≤8dBm in any 3 kHz band during any time interval of continuous transmission

### 6.4.2 Test setup



### 6.4.3 Test data

Pass: Please refer to appendix A for details

## 6.5 Conducted Band Edges Measurement

|                               |                                                      |
|-------------------------------|------------------------------------------------------|
| <b>Test Standard</b>          | 47 CFR Part 15, Subpart C 15.247                     |
| <b>Test Method</b>            | ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2 |
| <b>Test Mode (Pre-Scan)</b>   | TX                                                   |
| <b>Test Mode (Final Test)</b> | TX                                                   |

### 6.5.1 Limit

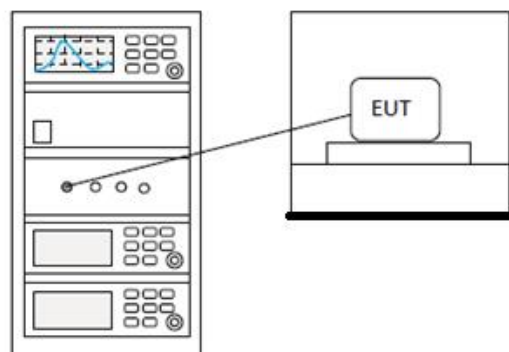
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 20dB.

Attenuation below the general limits specified in §15.209(a) is not required.

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)).

### 6.5.2 Test setup



### 6.5.3 Test data

Pass: Please refer to appendix A for details

## 6.6 Conducted spurious emissions

|                               |                                                  |
|-------------------------------|--------------------------------------------------|
| <b>Test Standard</b>          | 47 CFR Part 15, Subpart C 15.247                 |
| <b>Test Method</b>            | ANSI C63.10 (2013) Section 7.8.6 & Section 11.11 |
| <b>Test Mode (Pre-Scan)</b>   | TX                                               |
| <b>Test Mode (Final Test)</b> | TX                                               |

### 6.6.1 Limit

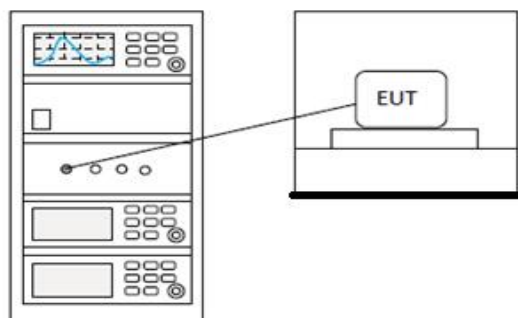
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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 20dB.

Attenuation below the general limits specified in §15.209(a) is not required.

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)).

### 6.6.2 Test setup



### 6.6.3 Test data

Pass: Please refer to appendix A for details

## 6.7 Radiated spurious emissions

|                        |                                        |
|------------------------|----------------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247       |
| Test Method            | ANSI C63.10 (2013) Section 6.4,6.5,6.6 |
| Test Mode (Pre-Scan)   | TX                                     |
| Test Mode (Final Test) | TX                                     |

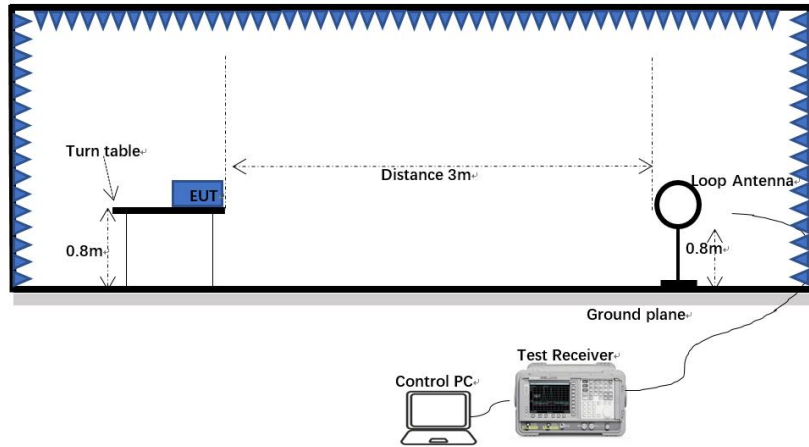
### 6.7.1 Limit

| 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                            |

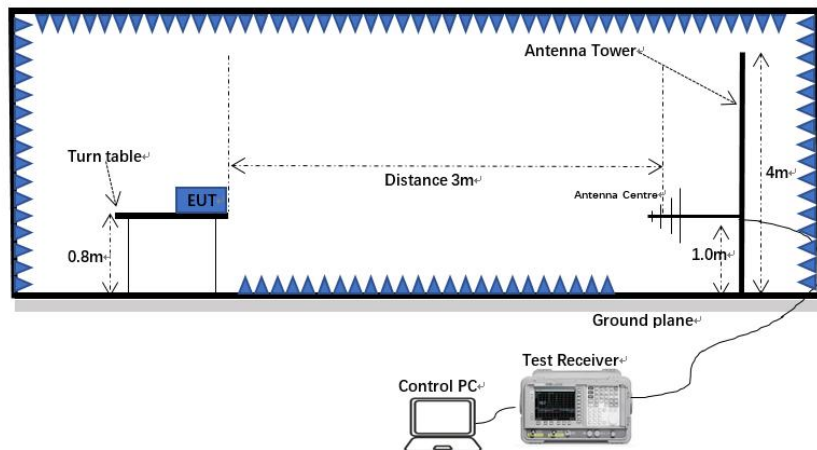
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

## 6.7.2 Test setup

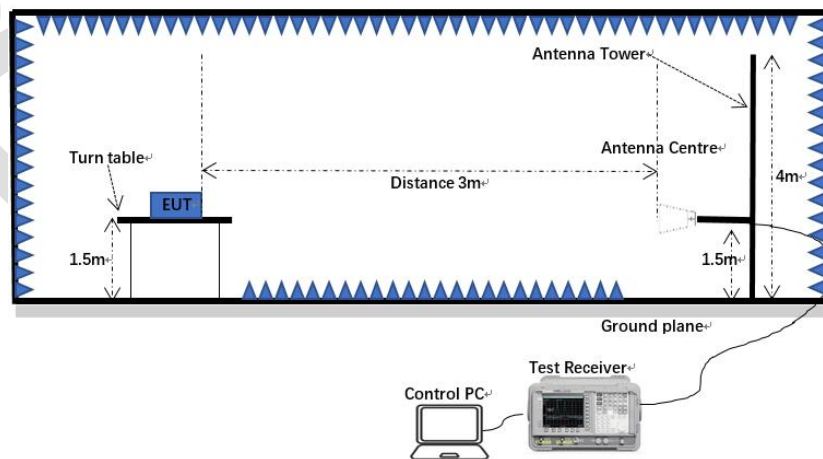
Below 1GHz:



30MHz-1GHz:



Above 1GHz:



### 6.7.3 Procedure

- 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.
- 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.
- 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.
- 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.
- 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.
- f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- h) Test the EUT in the lowest channel, the middle channel, the highest channel.
- 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.
- j) Repeat above procedures until all frequencies measured was complete.

*Note 1: Scan from 9 kHz 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.*

*Note 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.*

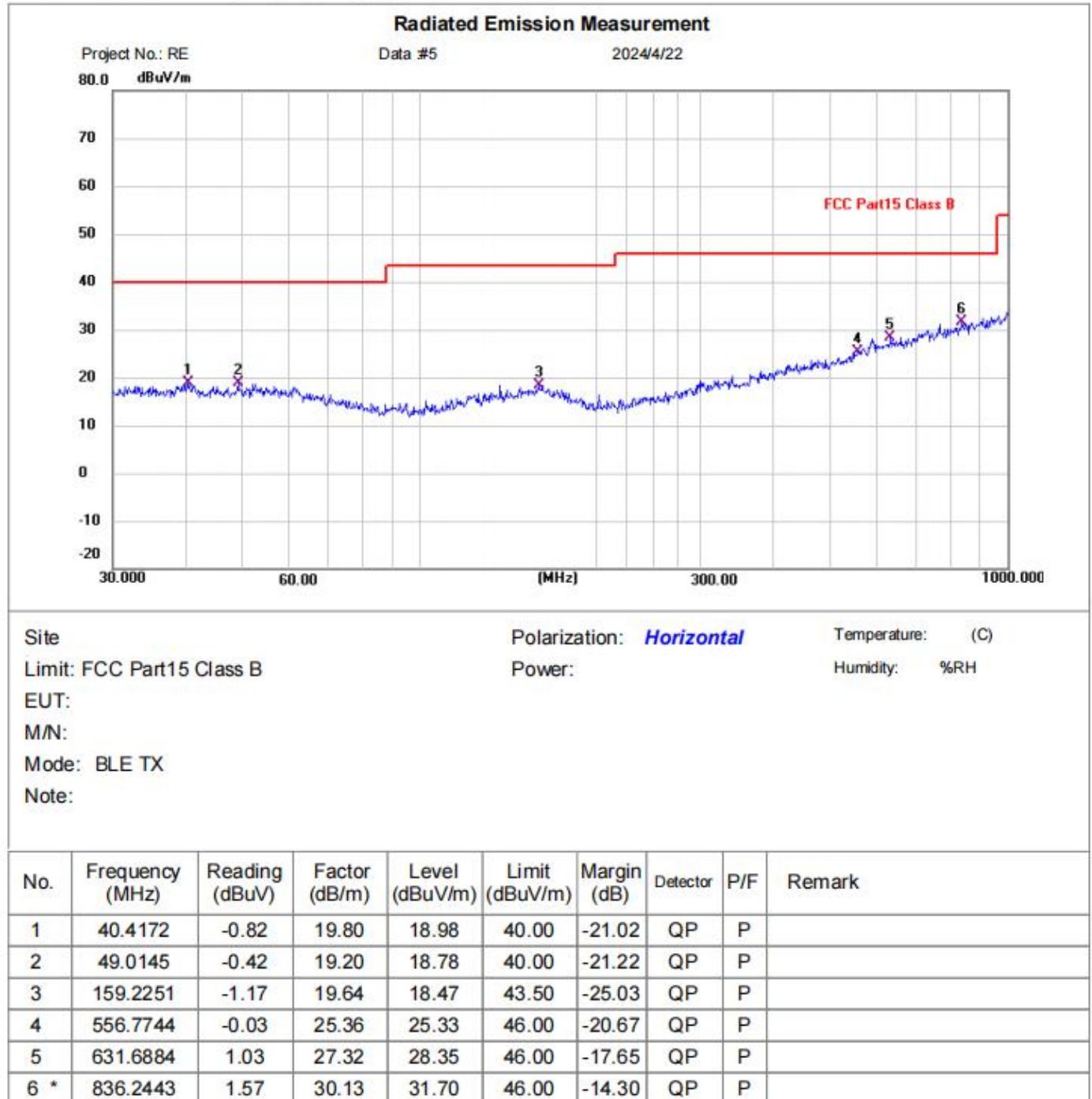
*Note 3: The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:*

$$\text{Level (dBuV)} = \text{Reading (dBuV)} + \text{Factor (dB/m)}$$

#### 6.7.4 Test data

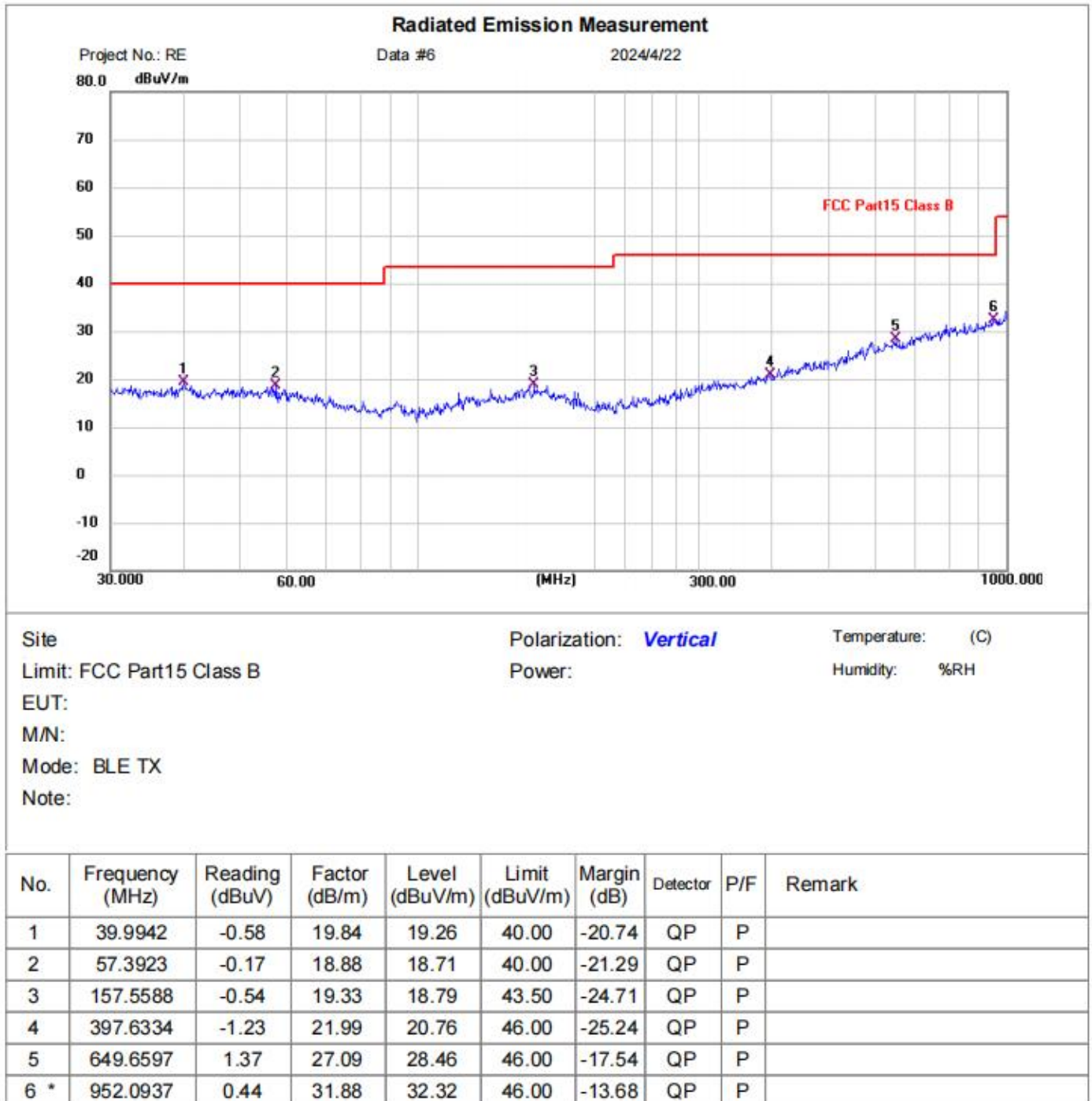
Below 1GHz

[Test mode: TX]; [Polarity: Horizontal]



**Test Result: Pass**

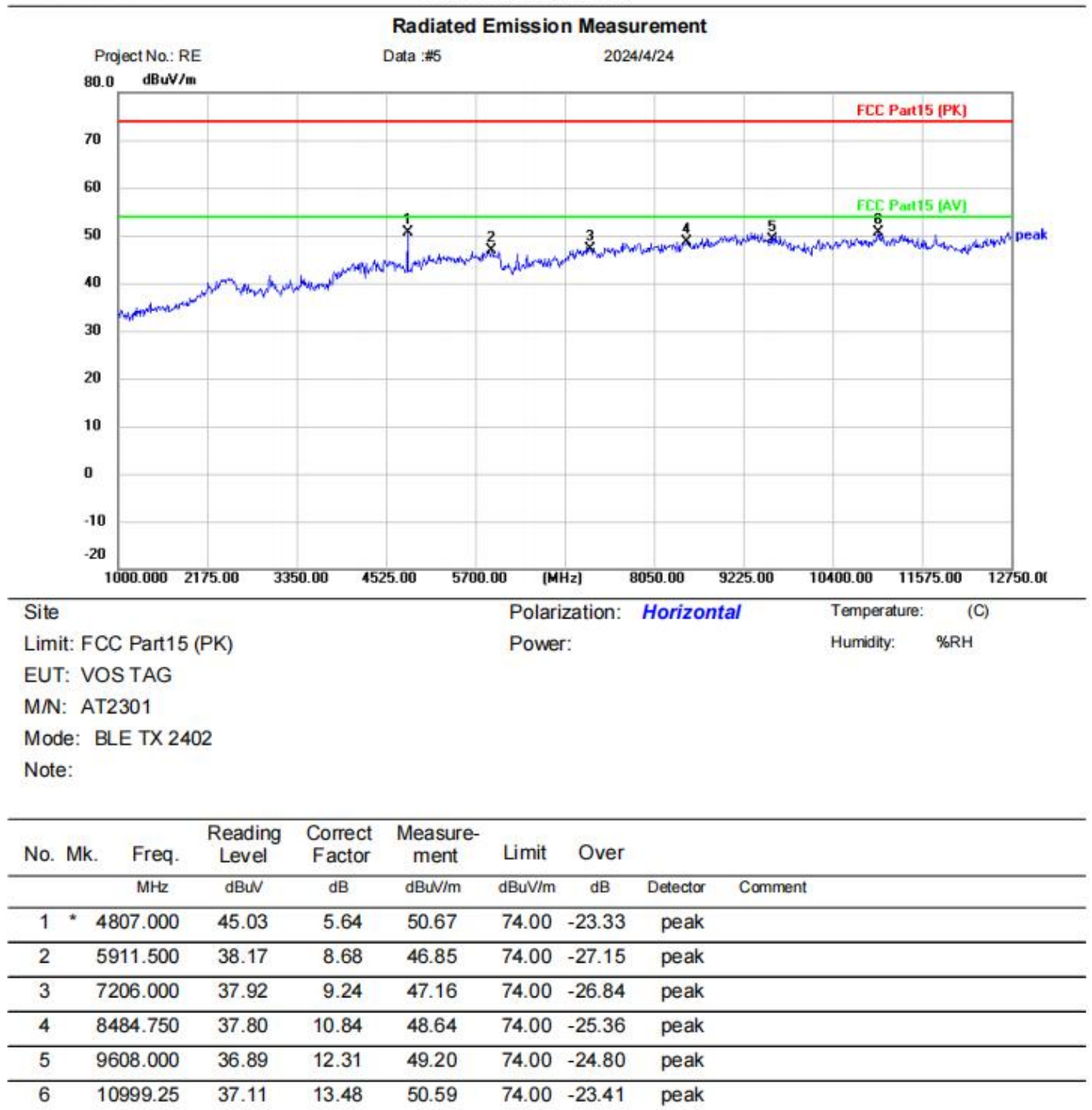
[Test mode: TX]; [Polarity: Vertical]



**Test Result: Pass**

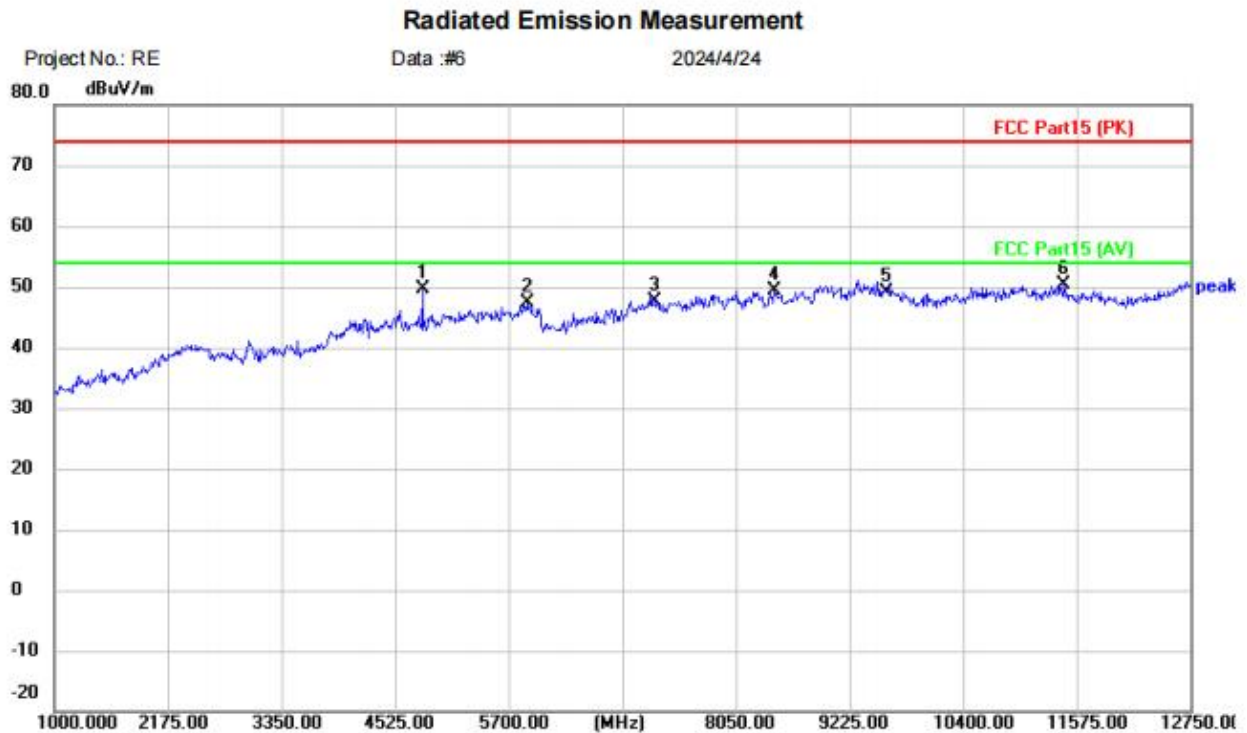
Above 1GHz:

[Test mode: TX low channel]; [Polarity: Horizontal]



**Test Result: Pass**

[Test mode: TX low channel]; [Polarity: Vertical]



Site:      Polarization: **Vertical**      Temperature: (C)

Limit: FCC Part15 (PK)      Power:      Humidity: %RH

EUT: VOS TAG

M/N: AT2301

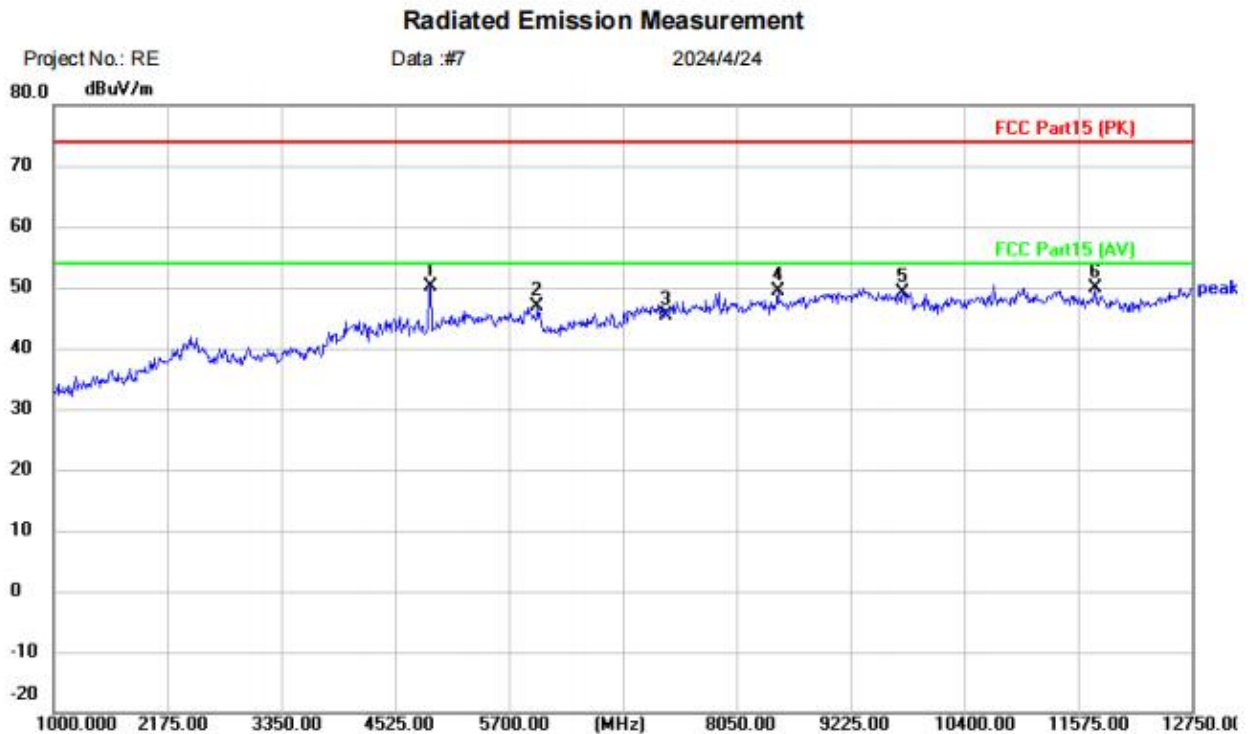
Mode: BLE TX 2402

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   |     | 4807.000     | 43.96                    | 5.64                    | 49.60                      | 74.00           | -24.40     | peak     |         |
| 2   |     | 5888.000     | 38.88                    | 8.60                    | 47.48                      | 74.00           | -26.52     | peak     |         |
| 3   |     | 7206.000     | 38.27                    | 9.24                    | 47.51                      | 74.00           | -26.49     | peak     |         |
| 4   |     | 8449.500     | 38.72                    | 10.63                   | 49.35                      | 74.00           | -24.65     | peak     |         |
| 5   |     | 9608.000     | 36.89                    | 12.31                   | 49.20                      | 74.00           | -24.80     | peak     |         |
| 6   | *   | 11445.75     | 37.80                    | 12.62                   | 50.42                      | 74.00           | -23.58     | peak     |         |

**Test Result: Pass**

[Test mode: TX middle channel]; [Polarity: Horizontal]

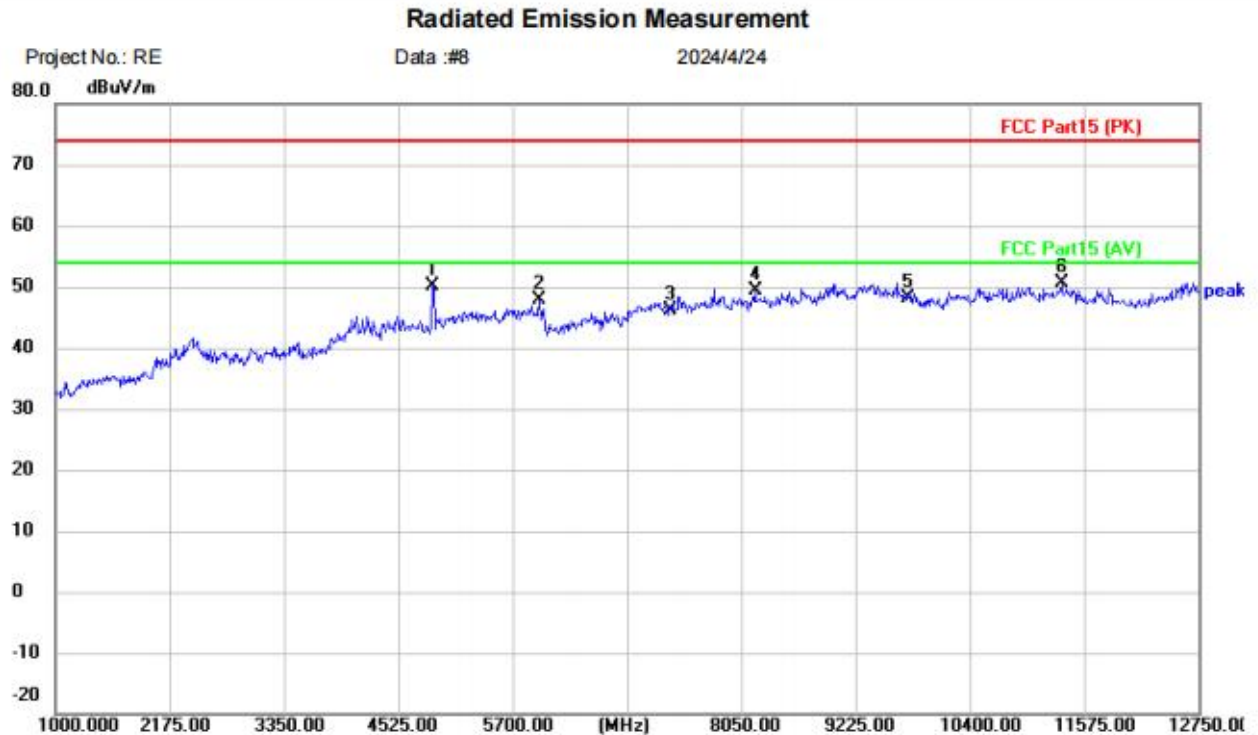


Site:      Polarization: **Horizontal**      Temperature: (C)  
 Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
 EUT: VOS TAG  
 M/N: AT2301  
 Mode: BLE TX 2442  
 Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   | *   | 4889.250     | 44.49                    | 5.75                    | 50.24                      | 74.00           | -23.76     | peak     |         |
| 2   |     | 5993.750     | 38.02                    | 8.75                    | 46.77                      | 74.00           | -27.23     | peak     |         |
| 3   |     | 7326.000     | 36.01                    | 9.43                    | 45.44                      | 74.00           | -28.56     | peak     |         |
| 4   |     | 8473.000     | 38.57                    | 10.77                   | 49.34                      | 74.00           | -24.66     | peak     |         |
| 5   |     | 9768.000     | 36.79                    | 12.22                   | 49.01                      | 74.00           | -24.99     | peak     |         |
| 6   |     | 11751.25     | 38.09                    | 11.79                   | 49.88                      | 74.00           | -24.12     | peak     |         |

**Test Result: Pass**

[Test mode: TX middle channel]; [Polarity: Vertical]



Site:      Polarization: **Vertical**      Temperature: (C)

Limit: FCC Part15 (PK)      Power:      Humidity: %RH

EUT: VOSTAG

M/N: AT2301

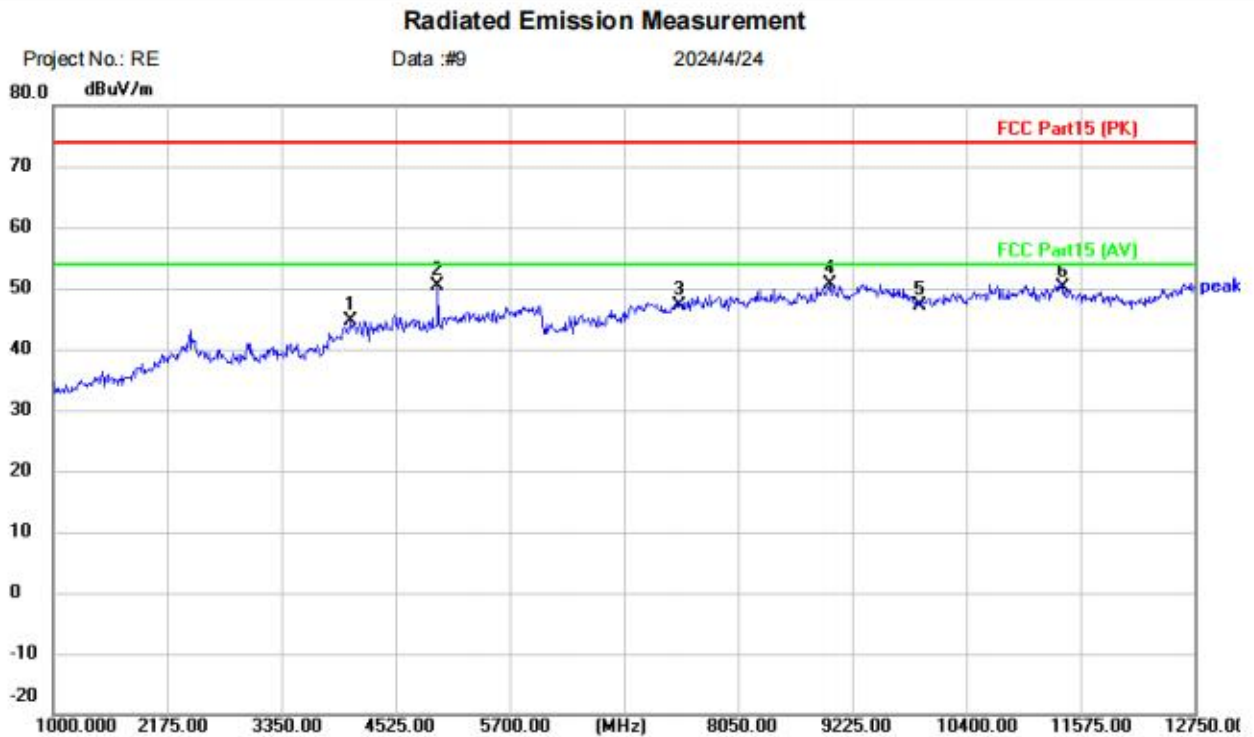
Mode: BLE TX 2442

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   |     | 4884.000     | 44.26                    | 5.75                    | 50.01                      | 74.00           | -23.99     | peak     |         |
| 2   |     | 5970.250     | 39.12                    | 8.72                    | 47.84                      | 74.00           | -26.16     | peak     |         |
| 3   |     | 7326.000     | 36.77                    | 9.43                    | 46.20                      | 74.00           | -27.80     | peak     |         |
| 4   |     | 8191.000     | 39.54                    | 9.88                    | 49.42                      | 74.00           | -24.58     | peak     |         |
| 5   |     | 9768.000     | 36.03                    | 12.22                   | 48.25                      | 74.00           | -25.75     | peak     |         |
| 6   | *   | 11340.00     | 38.02                    | 12.67                   | 50.69                      | 74.00           | -23.31     | peak     |         |

**Test Result: Pass**

[Test mode: TX High channel]; [Polarity: Horizontal]

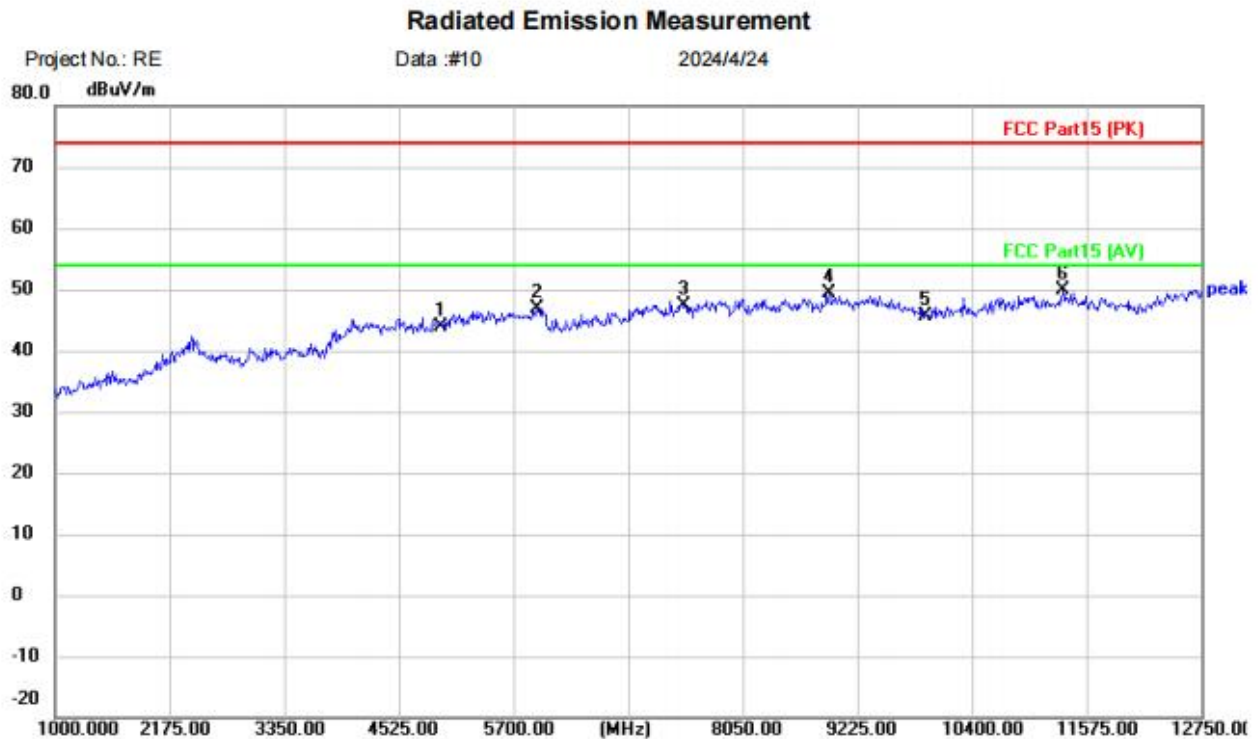


|                        |                                 |                  |
|------------------------|---------------------------------|------------------|
| Site                   | Polarization: <b>Horizontal</b> | Temperature: (C) |
| Limit: FCC Part15 (PK) | Power:                          | Humidity: %RH    |
| EUT: VOSTAG            |                                 |                  |
| M/N: AT2301            |                                 |                  |
| Mode: BLE TX 2480      |                                 |                  |
| Note:                  |                                 |                  |

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   |     | 4055.000     | 41.06                    | 3.62                    | 44.68                      | 74.00           | -29.32     | peak     |         |
| 2   |     | 4959.750     | 43.71                    | 6.60                    | 50.31                      | 74.00           | -23.69     | peak     |         |
| 3   |     | 7440.000     | 37.40                    | 9.64                    | 47.04                      | 74.00           | -26.96     | peak     |         |
| 4   | *   | 8990.000     | 38.32                    | 12.42                   | 50.74                      | 74.00           | -23.26     | peak     |         |
| 5   |     | 9920.000     | 35.06                    | 12.14                   | 47.20                      | 74.00           | -26.80     | peak     |         |
| 6   |     | 11398.75     | 37.52                    | 12.61                   | 50.13                      | 74.00           | -23.87     | peak     |         |

**Test Result: Pass**

[Test mode: TX High channel]; [Polarity: Vertical]



Site      Polarization: **Vertical**      Temperature: (C)

Limit: FCC Part15 (PK)      Power:      Humidity: %RH

EUT: VOSTAG

M/N: AT2301

Mode: BLE TX 2480

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   |     | 4960.000     | 37.26                    | 6.60                    | 43.86                      | 74.00           | -30.14     | peak     |         |
| 2   |     | 5946.750     | 38.26                    | 8.71                    | 46.97                      | 74.00           | -27.03     | peak     |         |
| 3   |     | 7440.000     | 37.66                    | 9.64                    | 47.30                      | 74.00           | -26.70     | peak     |         |
| 4   |     | 8931.250     | 37.26                    | 12.19                   | 49.45                      | 74.00           | -24.55     | peak     |         |
| 5   |     | 9920.000     | 33.38                    | 12.14                   | 45.52                      | 74.00           | -28.48     | peak     |         |
| 6   | *   | 11328.25     | 37.13                    | 12.67                   | 49.80                      | 74.00           | -24.20     | peak     |         |

**Test Result: Pass**

## 6.8 Radiated emissions which fall in the restricted bands

|                        |                                   |
|------------------------|-----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247  |
| Test Method            | ANSI C63.10 (2013) Section 6.10.5 |
| Test Mode (Pre-Scan)   | TX                                |
| Test Mode (Final Test) | TX                                |

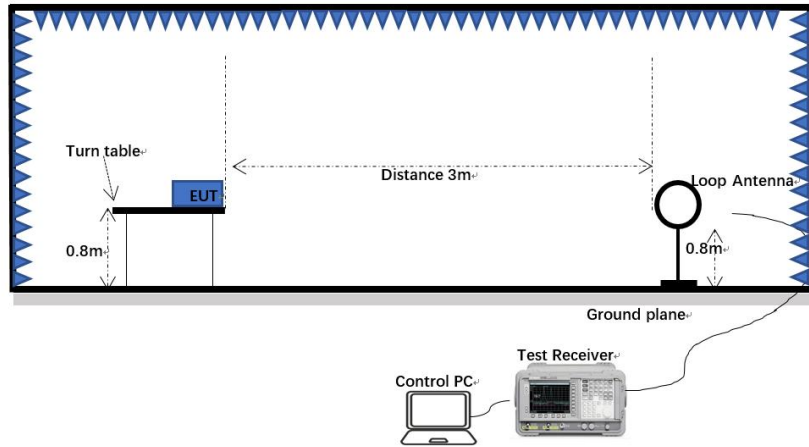
### 6.8.1 Limit

| 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                            |

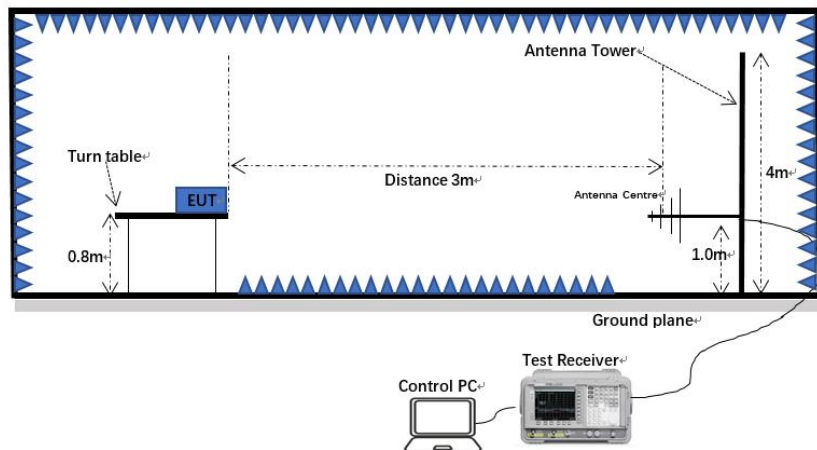
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

## 6.8.2 Test setup

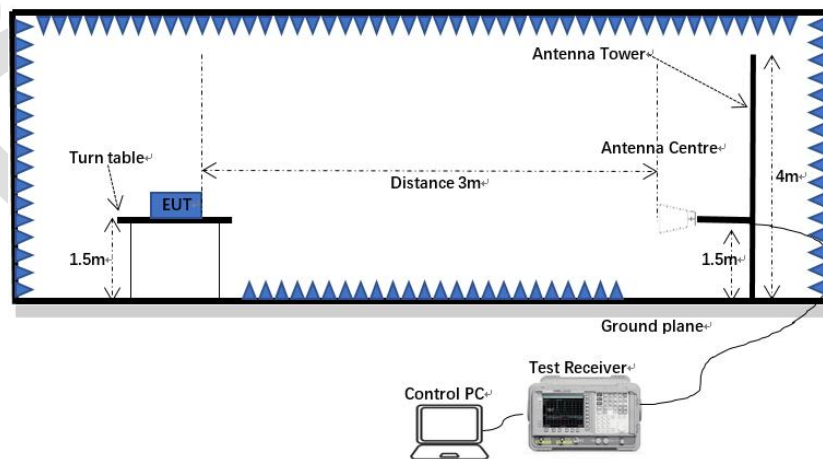
Below 1GHz:



30MHz-1GHz:



Above 1GHz:



### 6.8.3 Procedure

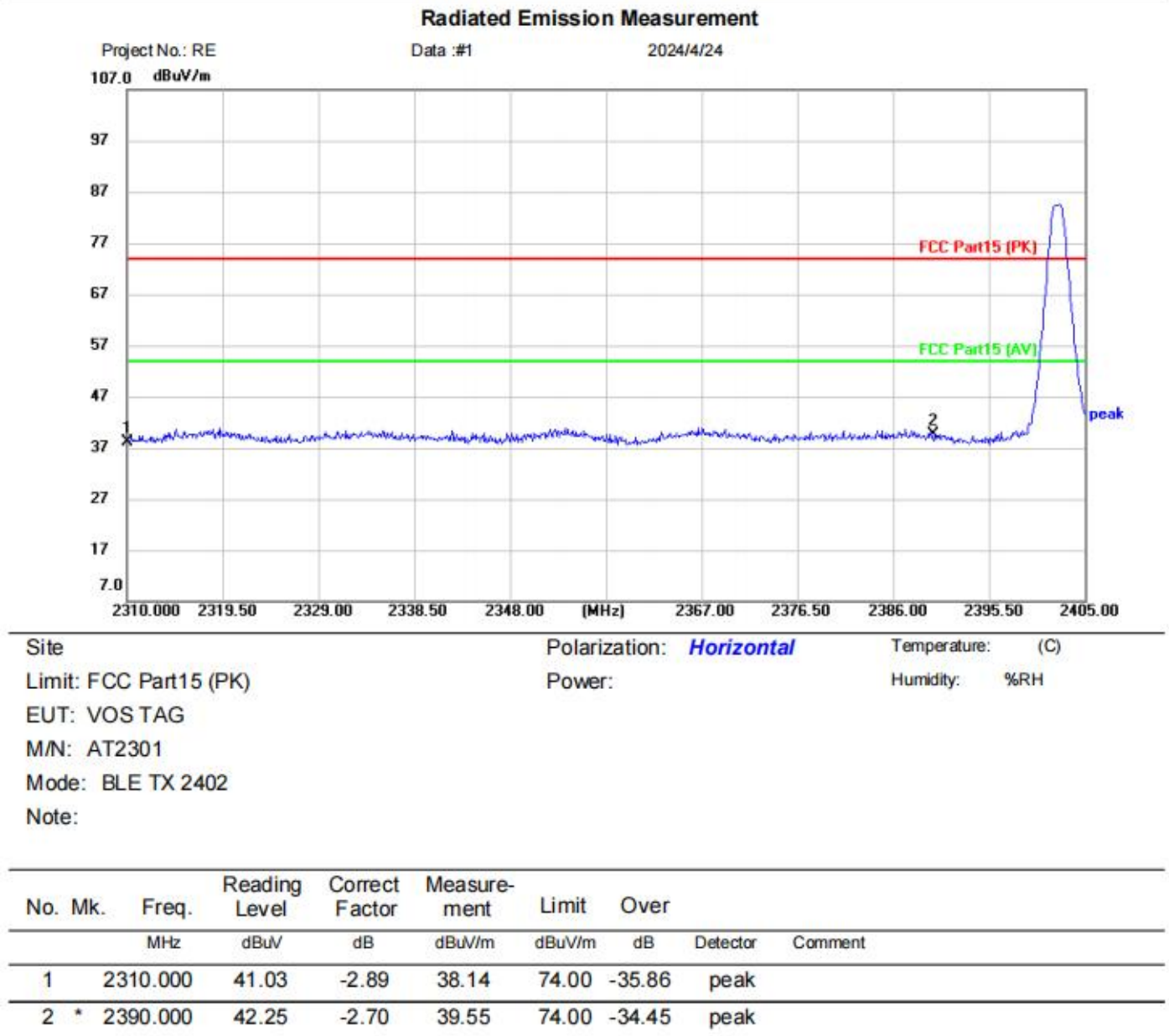
- a) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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.
- 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.
- 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.
- 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.
- f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- h) Test the EUT in the lowest channel, the middle channel, the highest channel.
- 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.
- j) Repeat above procedures until all frequencies measured was complete.

*Note 1: Level (dBuV) = Reading (dBuV) + Factor (dB/m)*

*Note 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.*

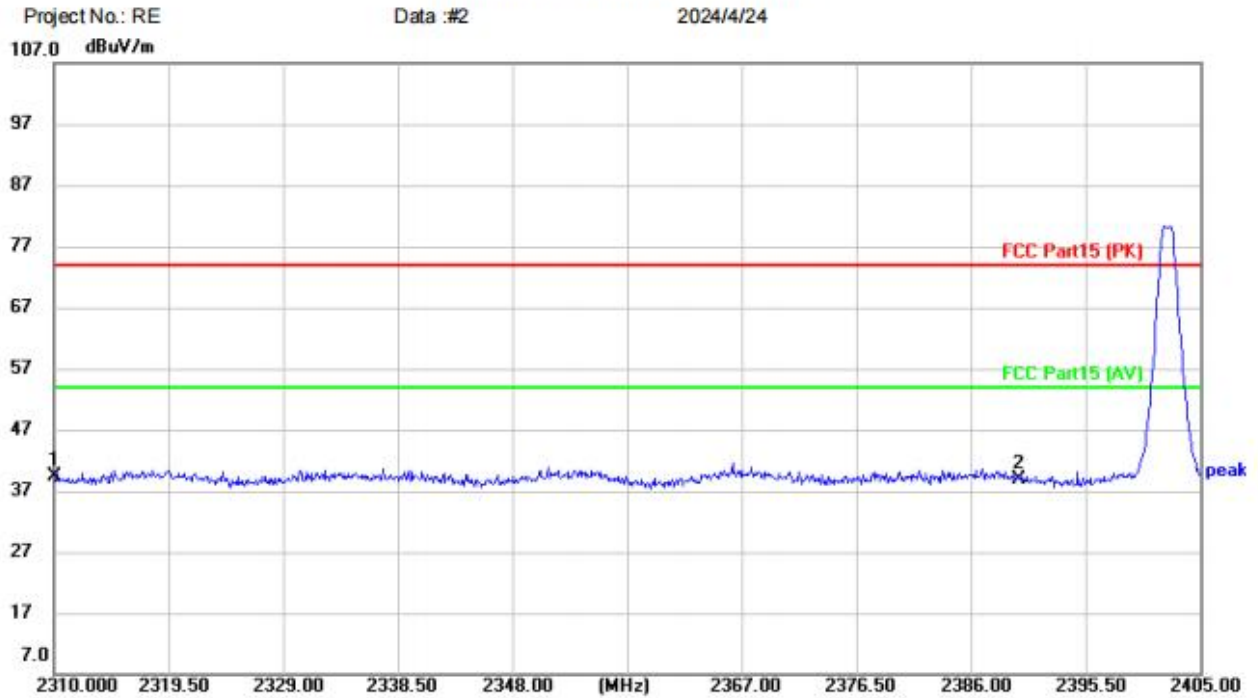
## 6.8.4 Test data

[Test mode: TX low channel]; [Polarity: Horizontal]

**Test Result: Pass**

[Test mode:TX low channel]; [Polarity: Vertical]

### Radiated Emission Measurement



Site Polarization: **Vertical** Temperature: (C)  
 Limit: FCC Part15 (PK) Power: Humidity: %RH  
 EUT: VOSTAG  
 M/N: AT2301  
 Mode: BLE TX 2402  
 Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | Detector | Comment |
| 1   | *   | 2310.000 | 42.28         | -2.89          | 39.39        | 74.00  | -34.61 | peak     |         |
| 2   |     | 2390.000 | 41.63         | -2.70          | 38.93        | 74.00  | -35.07 | peak     |         |

**Test Result: Pass**

[Test mode: TX High channel]; [Polarity: Horizontal]

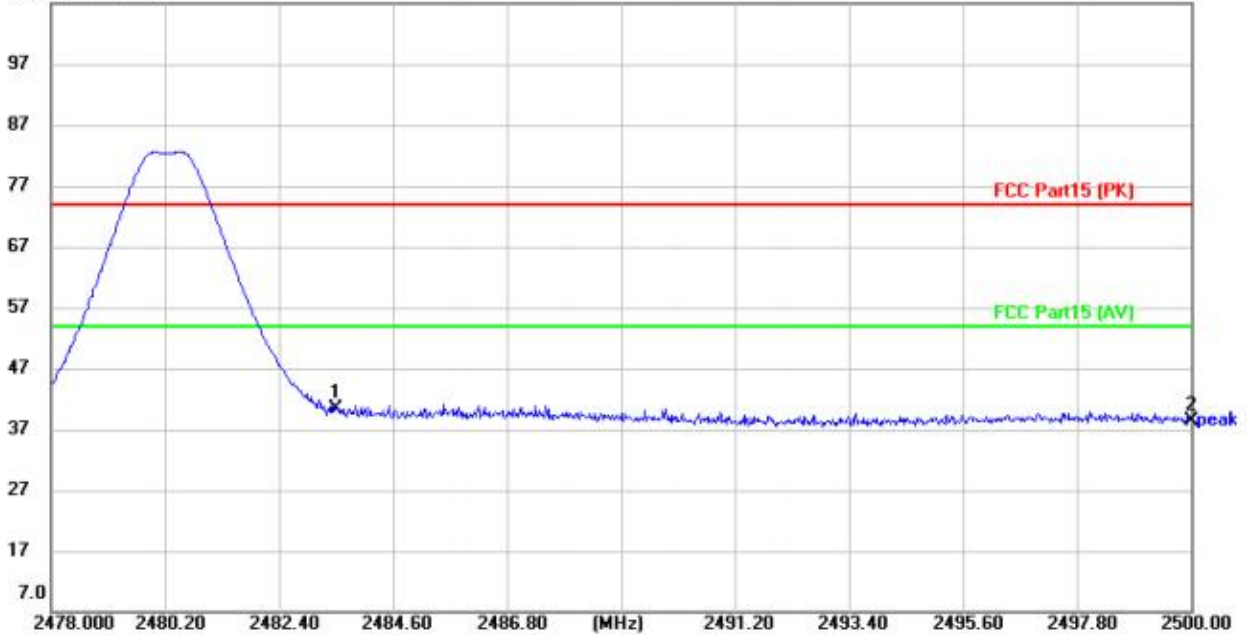
### Radiated Emission Measurement

Project No.: RE

Data :#3

2024/4/24

107.0 dBuV/m



Site

Polarization: **Horizontal**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: VOSTAG

M/N: AT2301

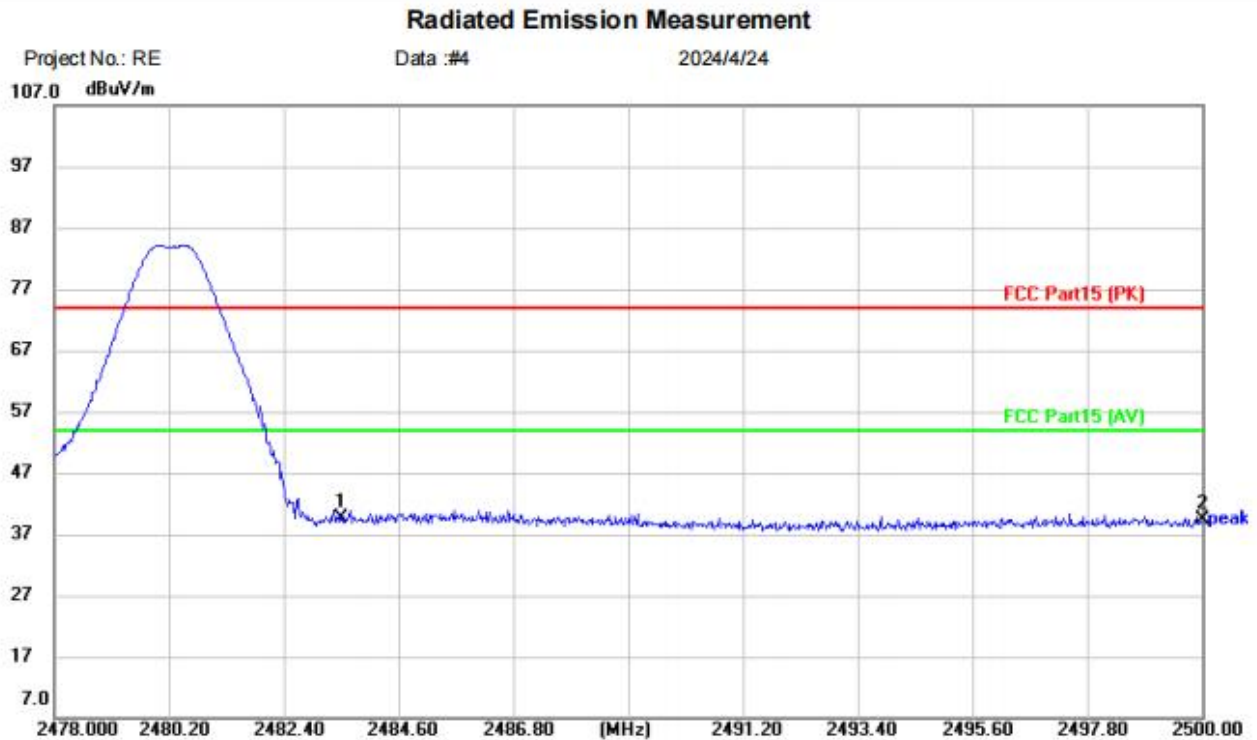
Mode: BLE TX 2480

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m       | dBuV/m | dB     | Detector | Comment |
| 1   | *   | 2483.500 | 43.25         | -2.91          | 40.34        | 74.00  | -33.66 | peak     |         |
| 2   |     | 2500.000 | 41.30         | -3.00          | 38.30        | 74.00  | -35.70 | peak     |         |

**Test Result: Pass**

[Test mode:TX High channel]; [Polarity: Vertical]



Site      Polarization: **Vertical**      Temperature: (C)  
 Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
 EUT: VOS TAG  
 M/N: AT2301  
 Mode: BLE TX 2480  
 Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | Detector | Comment |
| 1   | *   | 2483.500 | 42.50         | -2.91          | 39.59       | 74.00  | -34.41 | peak     |         |
| 2   |     | 2500.000 | 42.33         | -3.00          | 39.33       | 74.00  | -34.67 | peak     |         |

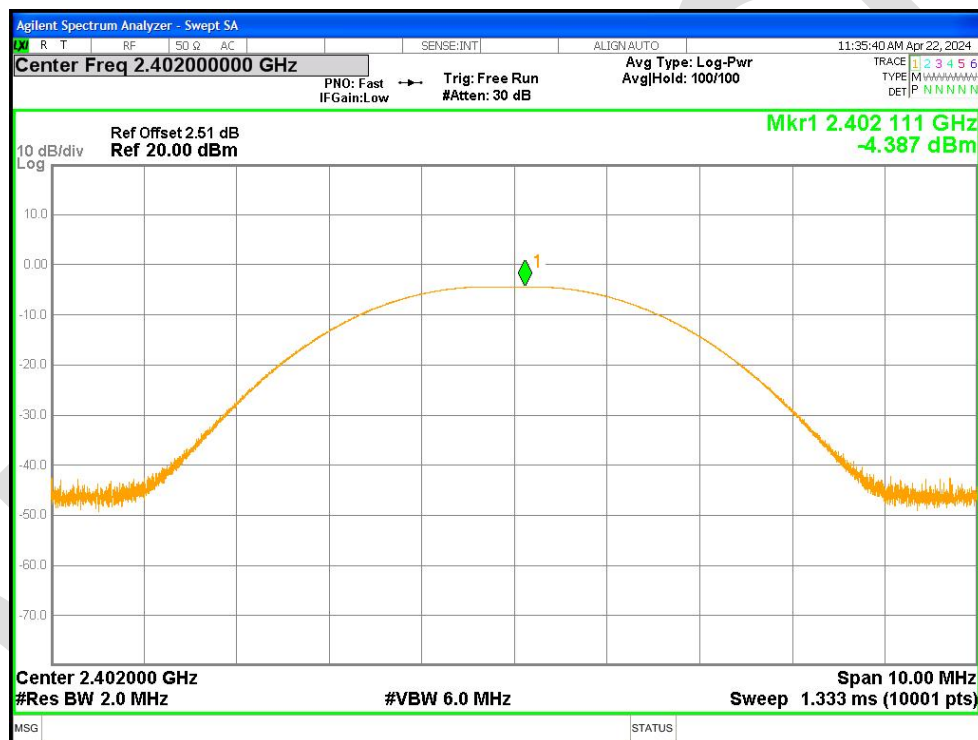
**Test Result: Pass**

## 7 Appendix A

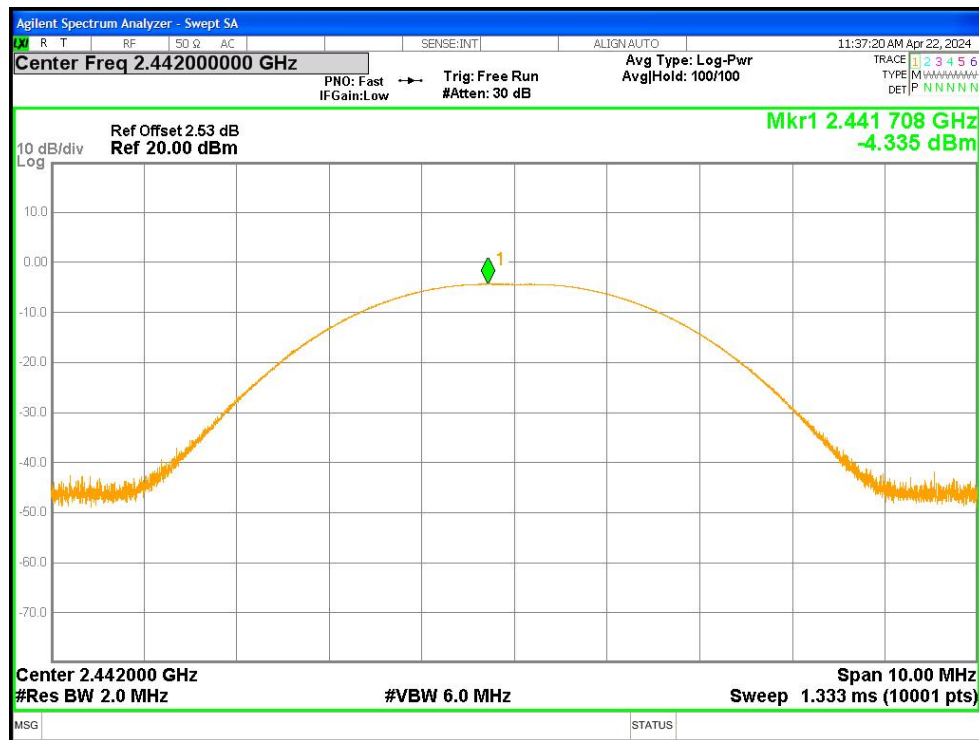
### 7.1 Maximum Conducted Output Power

| Condition | Mode   | Frequency (MHz) | Antenna | Conducted Power (dBm) | Limit (dBm) | Verdict |
|-----------|--------|-----------------|---------|-----------------------|-------------|---------|
| NVNT      | BLE 1M | 2402            | Ant1    | -4.387                | 30          | Pass    |
| NVNT      | BLE 1M | 2442            | Ant1    | -4.335                | 30          | Pass    |
| NVNT      | BLE 1M | 2480            | Ant1    | -6.065                | 30          | Pass    |

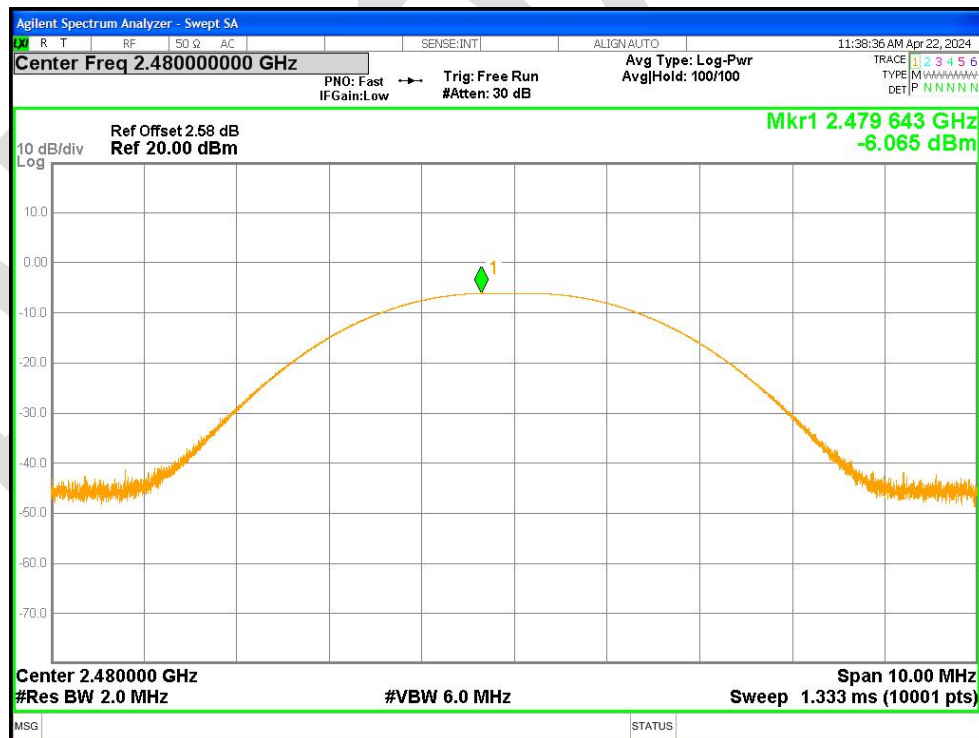
Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2442MHz Ant1



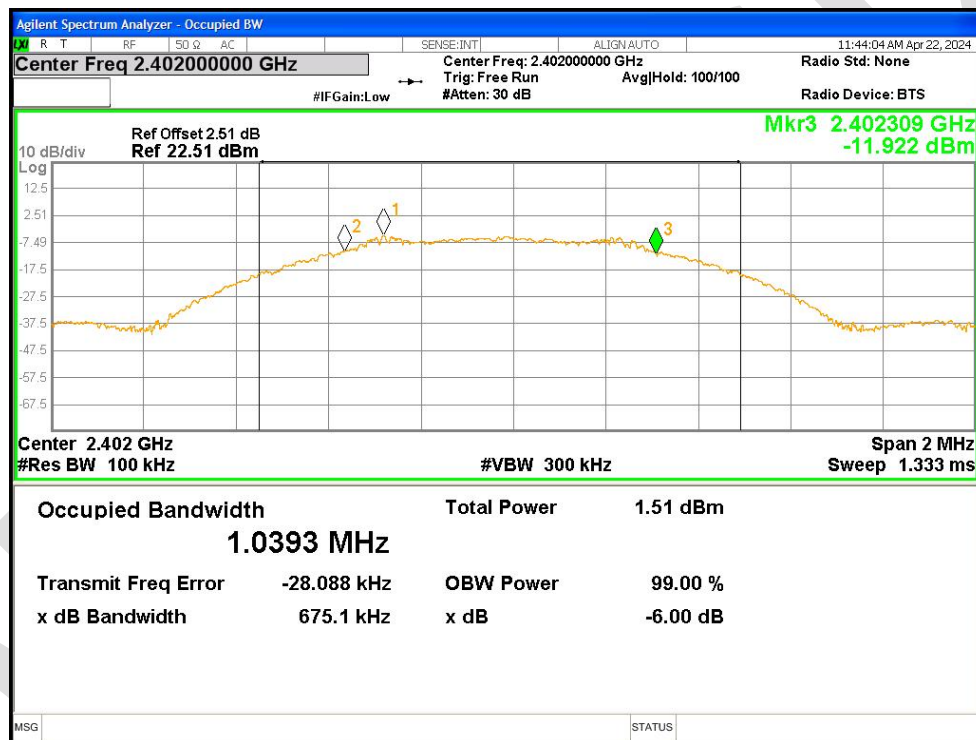
Power NVNT BLE 1M 2480MHz Ant1



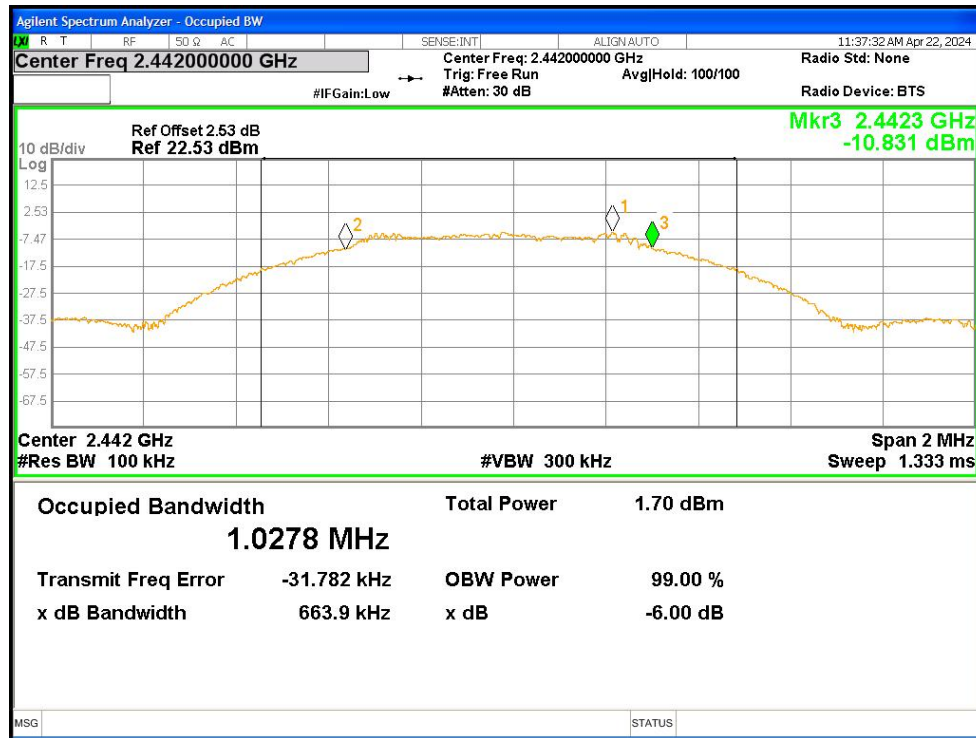
## 7.2 -6dB Bandwidth

| Condition | Mode   | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|--------|-----------------|---------|-----------------------|-----------------------------|---------|
| NVNT      | BLE 1M | 2402            | Ant1    | 0.675                 | 0.5                         | Pass    |
| NVNT      | BLE 1M | 2442            | Ant1    | 0.664                 | 0.5                         | Pass    |
| NVNT      | BLE 1M | 2480            | Ant1    | 0.668                 | 0.5                         | Pass    |

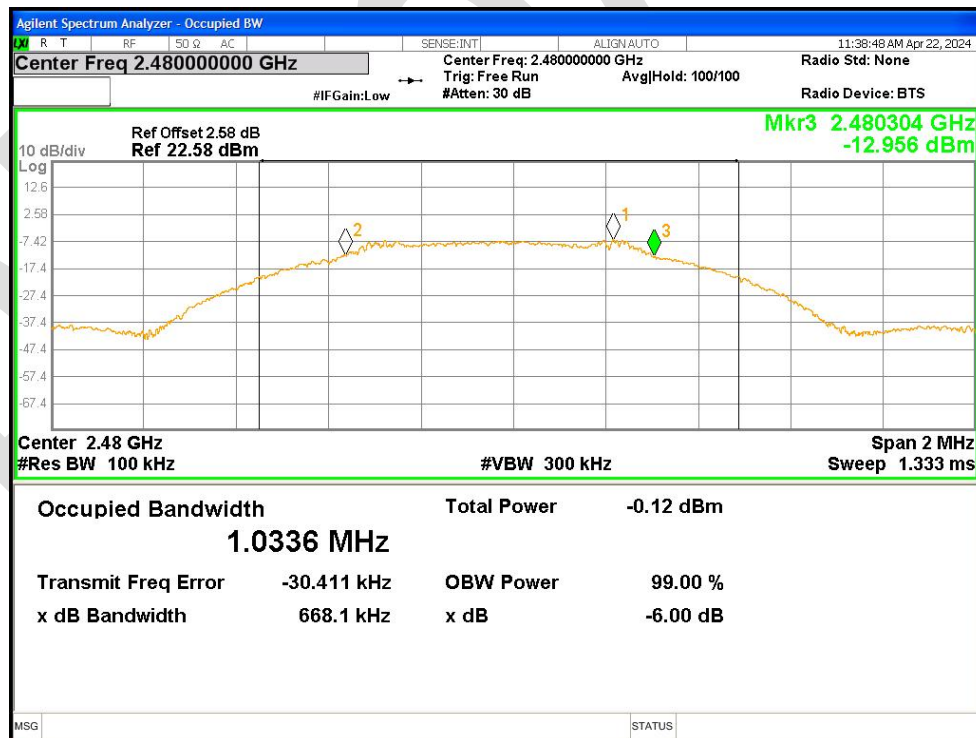
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1



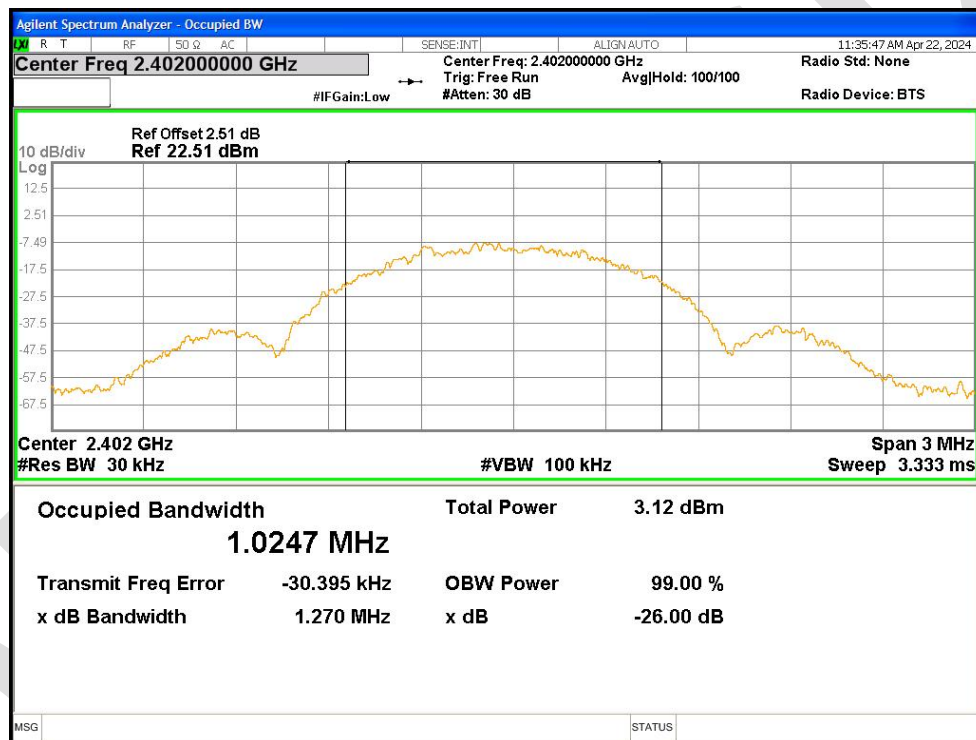
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



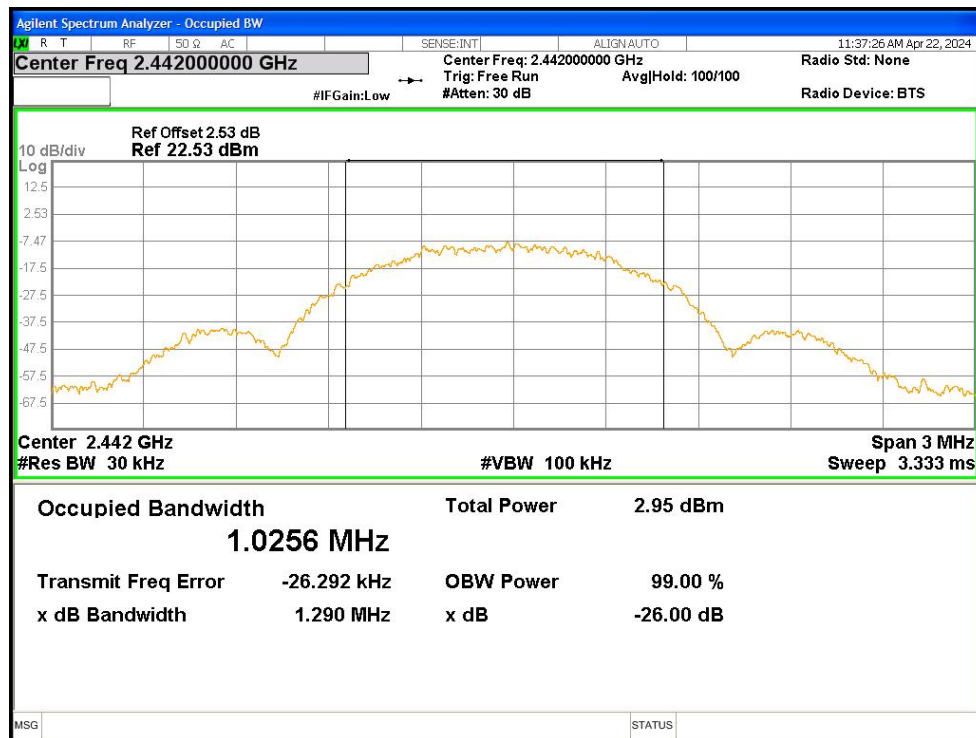
### 7.3 Occupied Channel Bandwidth

| Condition | Mode   | Frequency (MHz) | Antenna | 99% OBW (MHz) |
|-----------|--------|-----------------|---------|---------------|
| NVNT      | BLE 1M | 2402            | Ant1    | 1.0247        |
| NVNT      | BLE 1M | 2442            | Ant1    | 1.0256        |
| NVNT      | BLE 1M | 2480            | Ant1    | 1.0231        |

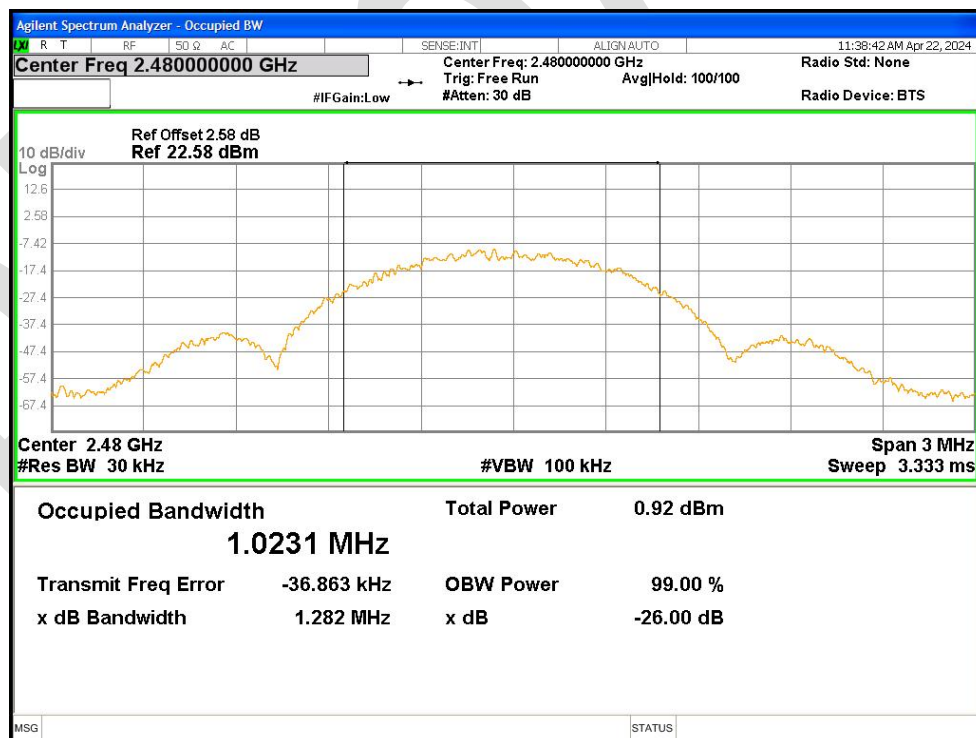
OBW NVNT BLE 1M 2402MHz Ant1



OBW NVNT BLE 1M 2442MHz Ant1



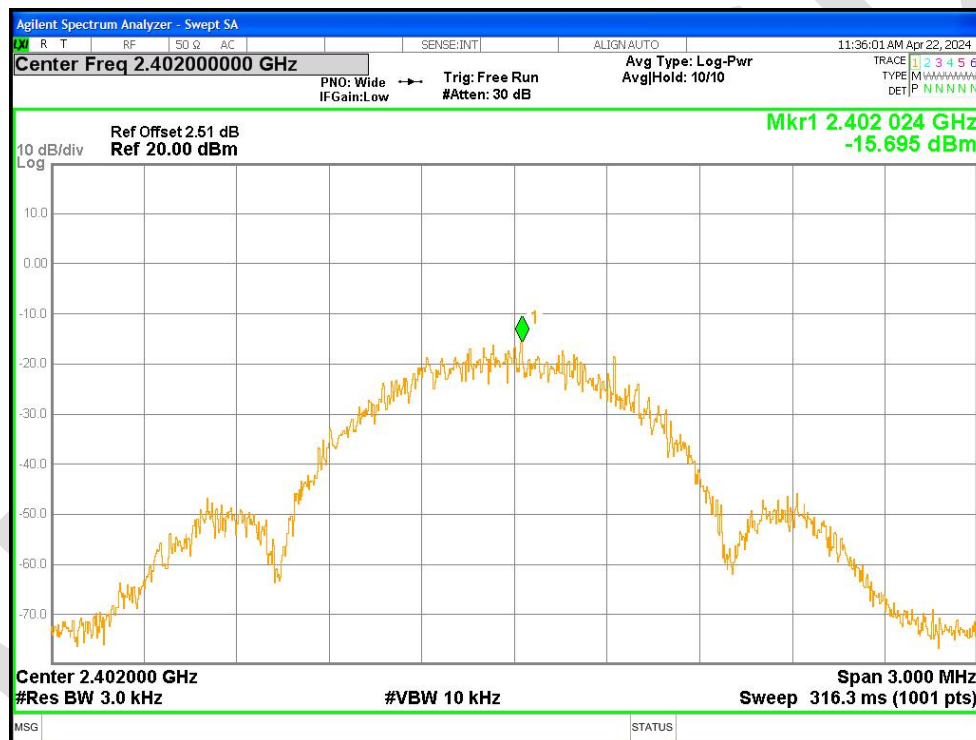
OBW NVNT BLE 1M 2480MHz Ant1



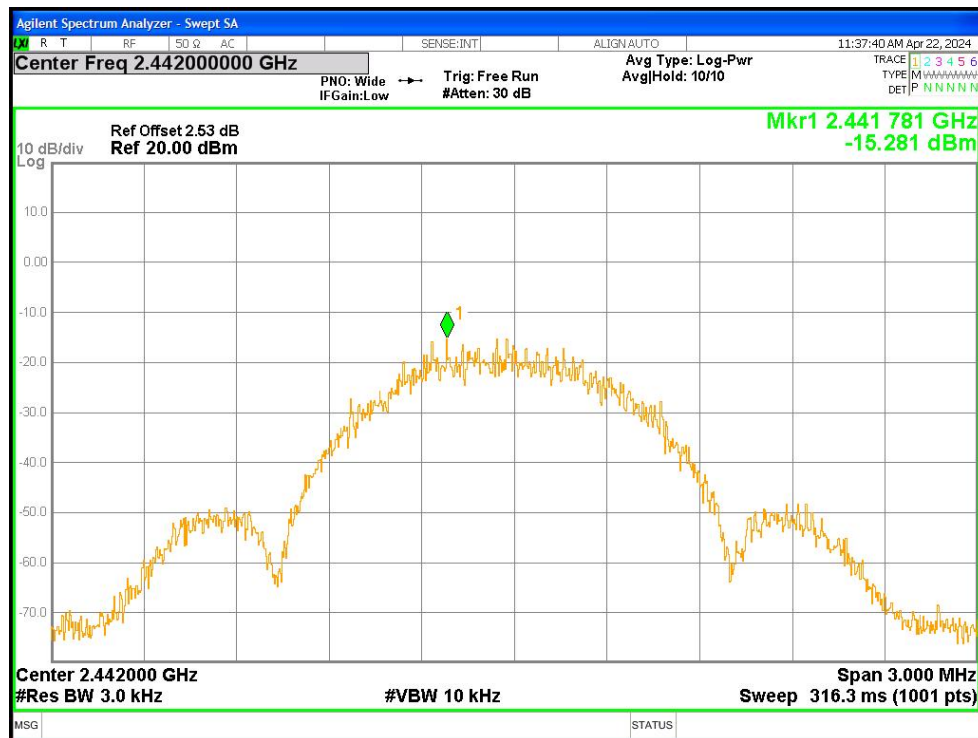
## 7.4 Maximum Power Spectral Density Level

| Condition | Mode   | Frequency (MHz) | Antenna | Max PSD (dBm) | Limit (dBm) | Verdict |
|-----------|--------|-----------------|---------|---------------|-------------|---------|
| NVNT      | BLE 1M | 2402            | Ant1    | -15.695       | 8           | Pass    |
| NVNT      | BLE 1M | 2442            | Ant1    | -15.281       | 8           | Pass    |
| NVNT      | BLE 1M | 2480            | Ant1    | -17.09        | 8           | Pass    |

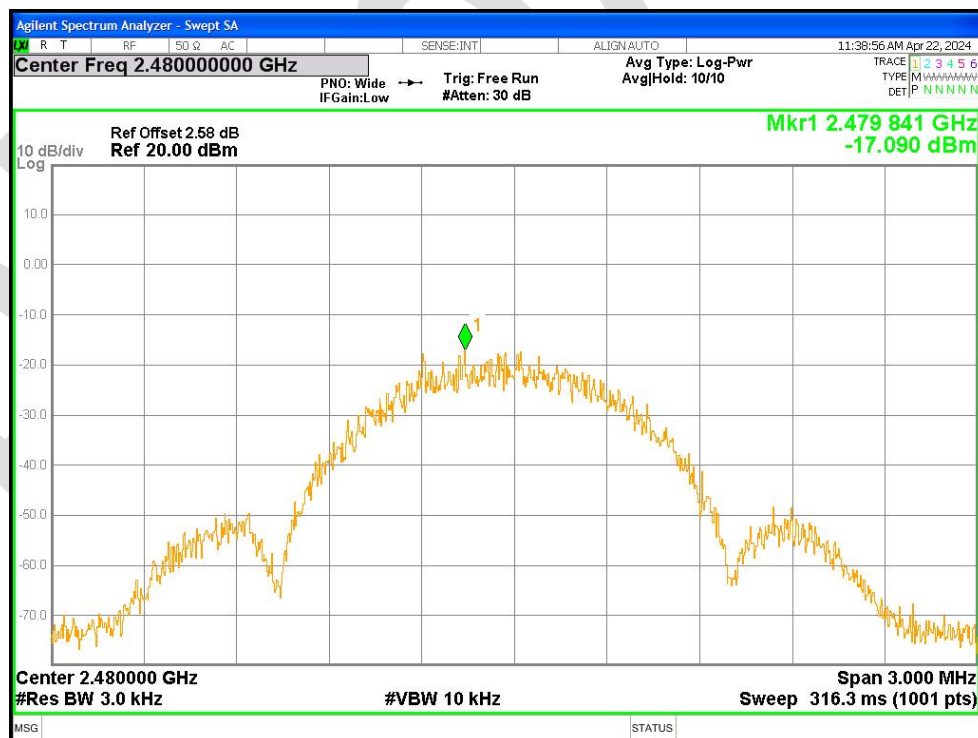
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2442MHz Ant1



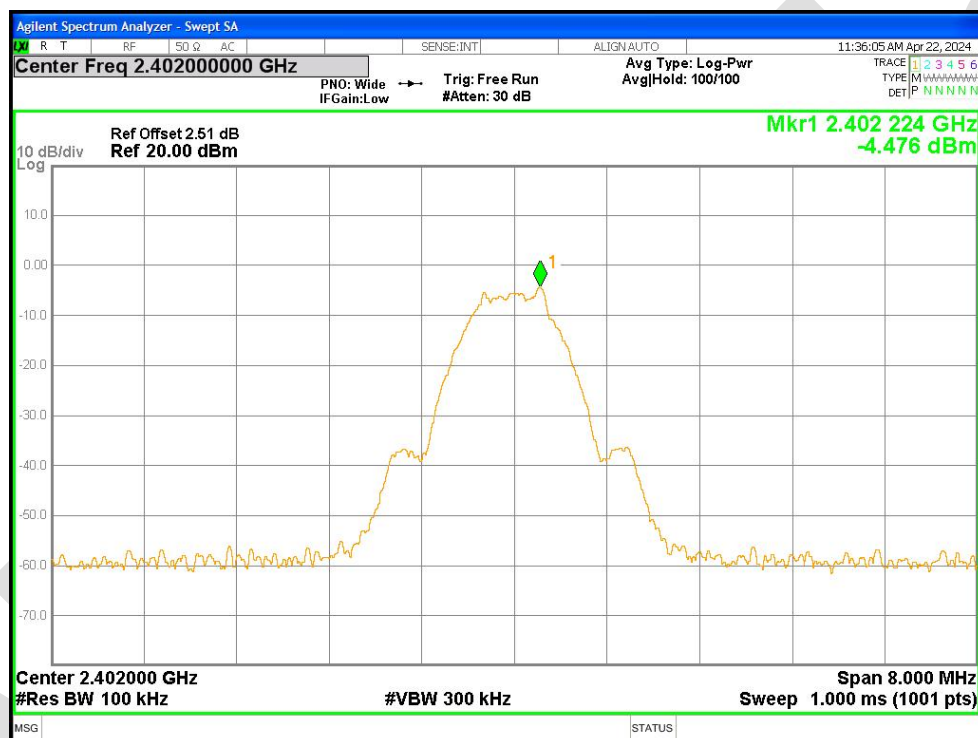
PSD NVNT BLE 1M 2480MHz Ant1



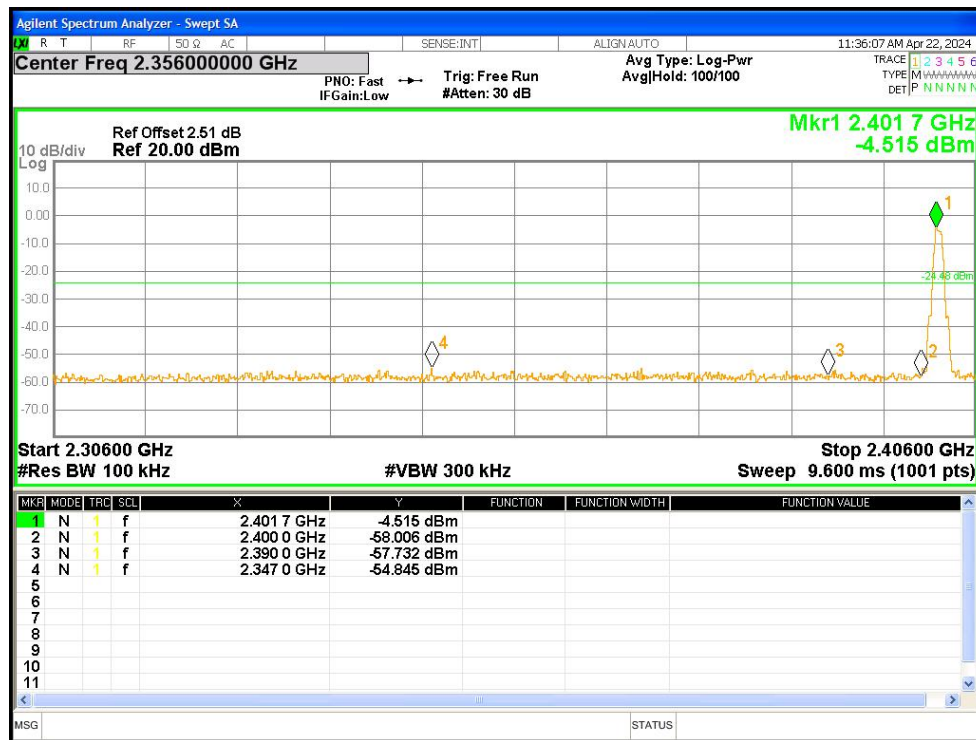
## 7.5 Band Edge

| Condition | Mode   | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|--------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | BLE 1M | 2402            | Ant1    | -50.36          | -20         | Pass    |
| NVNT      | BLE 1M | 2480            | Ant1    | -48.61          | -20         | Pass    |

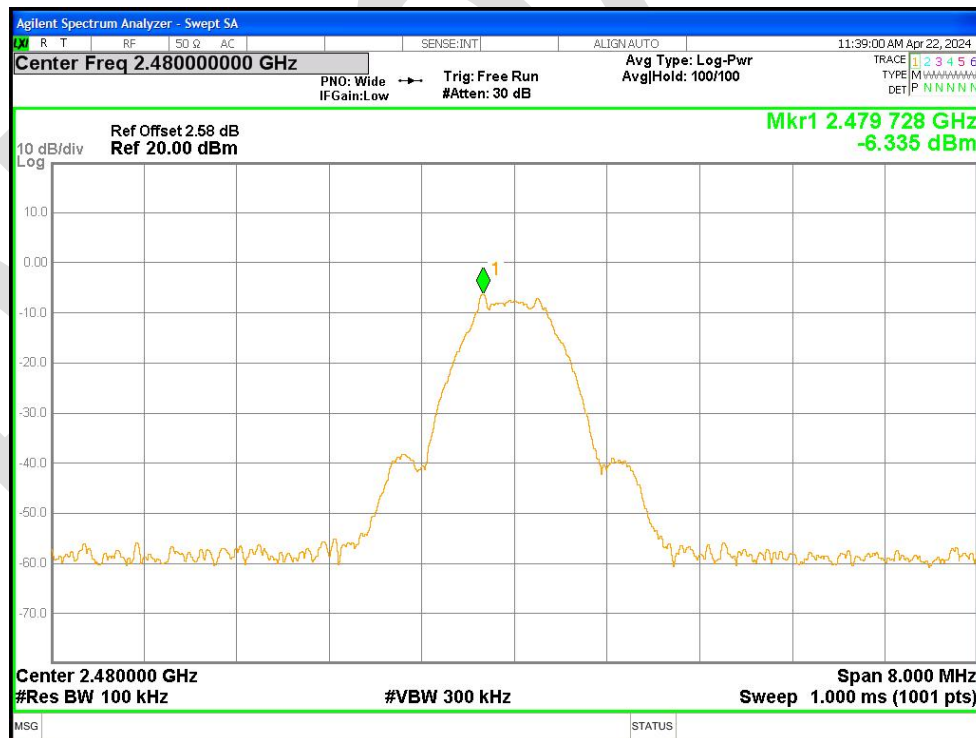
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



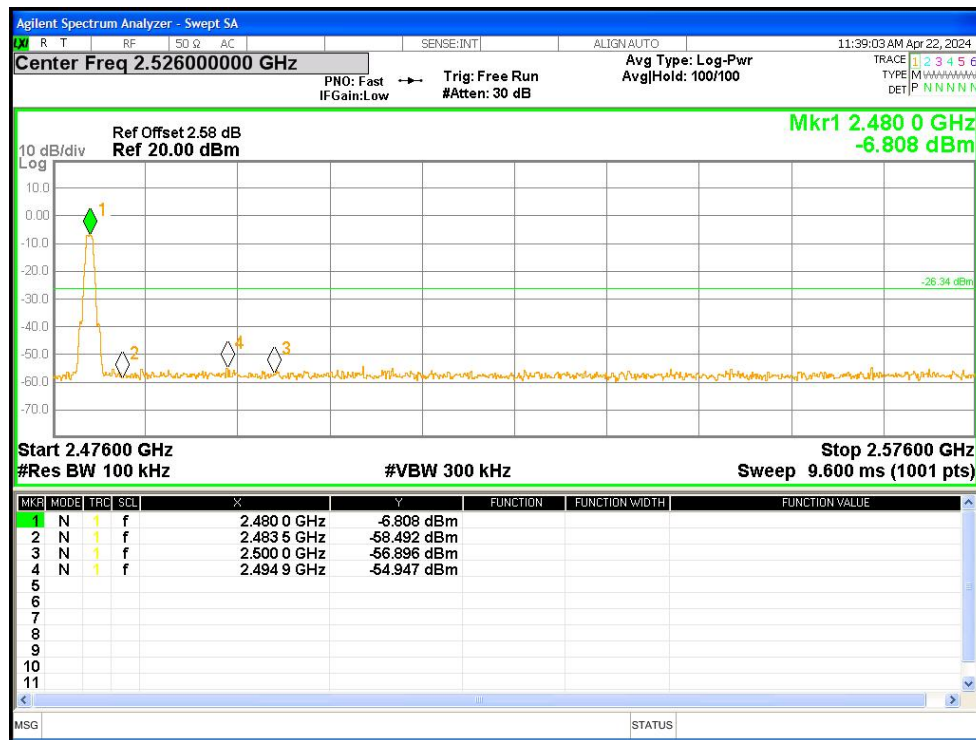
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



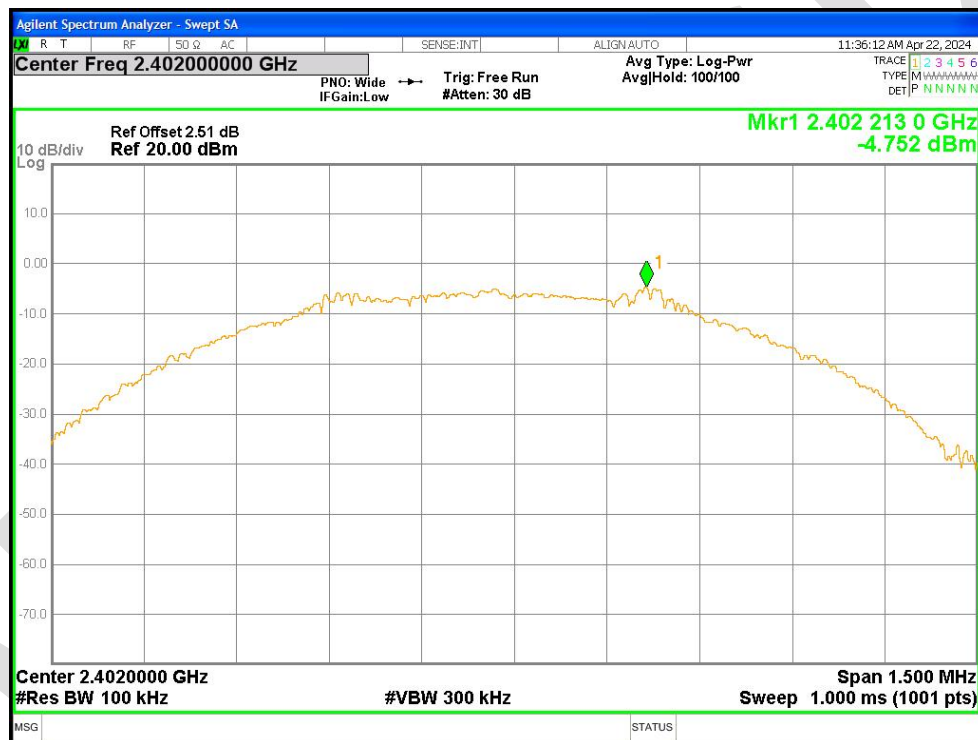
Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



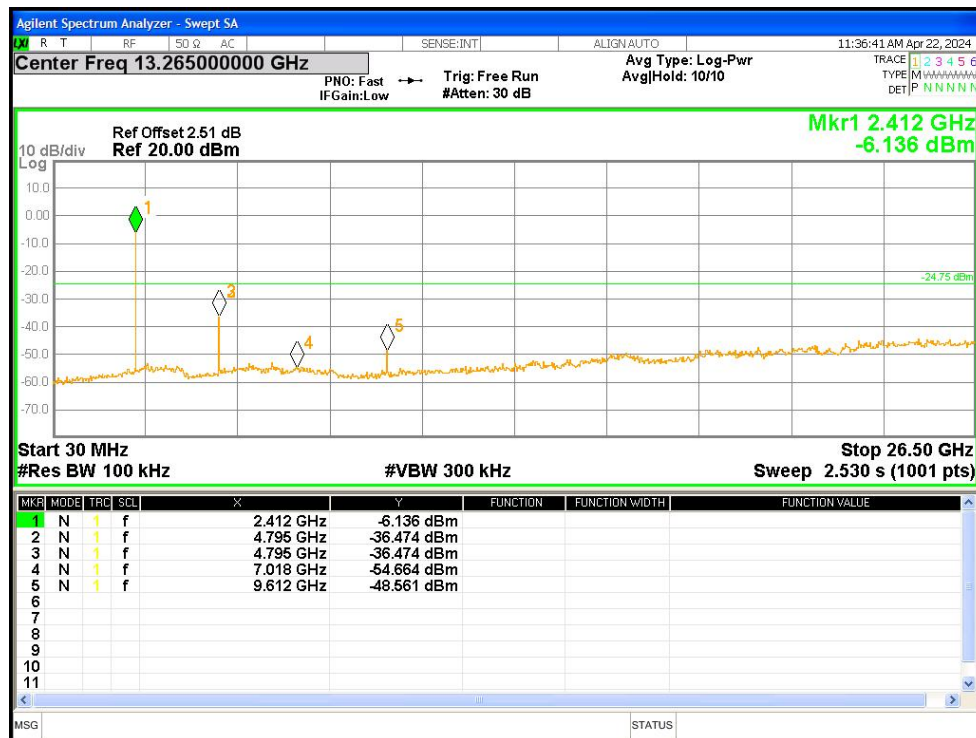
## 7.6 Conducted RF Spurious Emission

| Condition | Mode   | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|--------|-----------------|---------|-----------------|-------------|---------|
| NVNT      | BLE 1M | 2402            | Ant1    | -31.72          | -20         | Pass    |
| NVNT      | BLE 1M | 2442            | Ant1    | -30.42          | -20         | Pass    |
| NVNT      | BLE 1M | 2480            | Ant1    | -31.14          | -20         | Pass    |

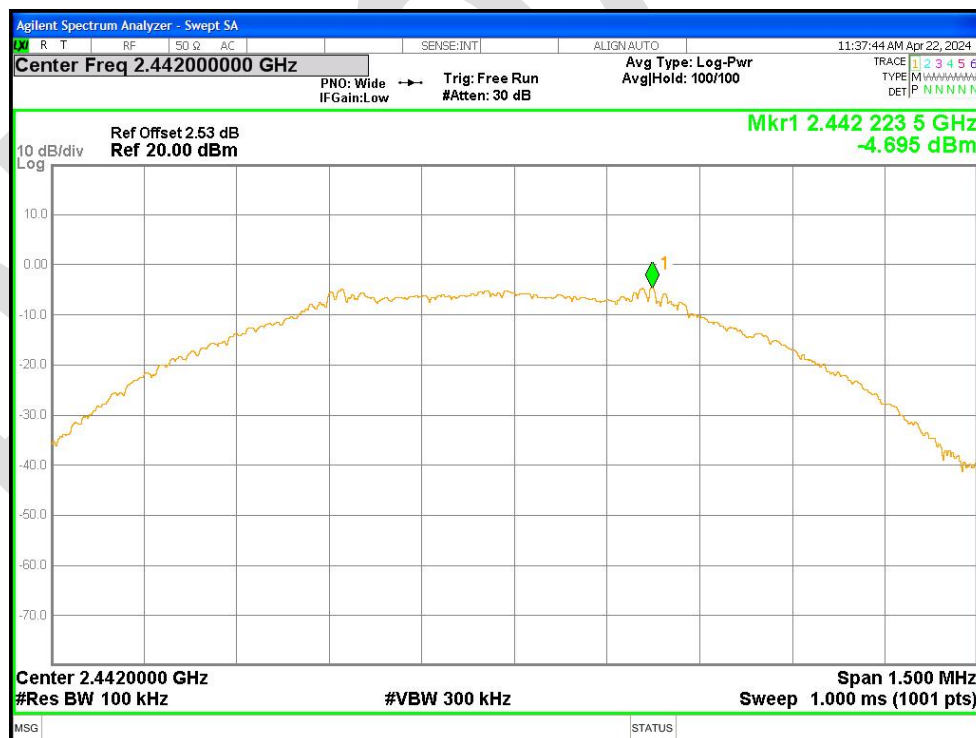
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



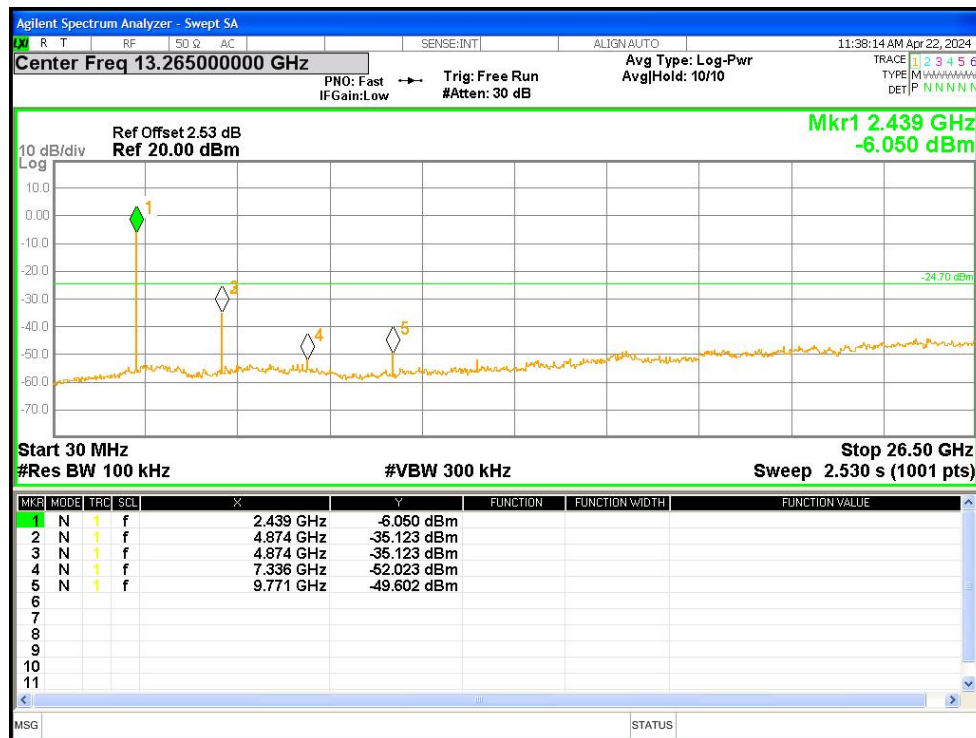
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



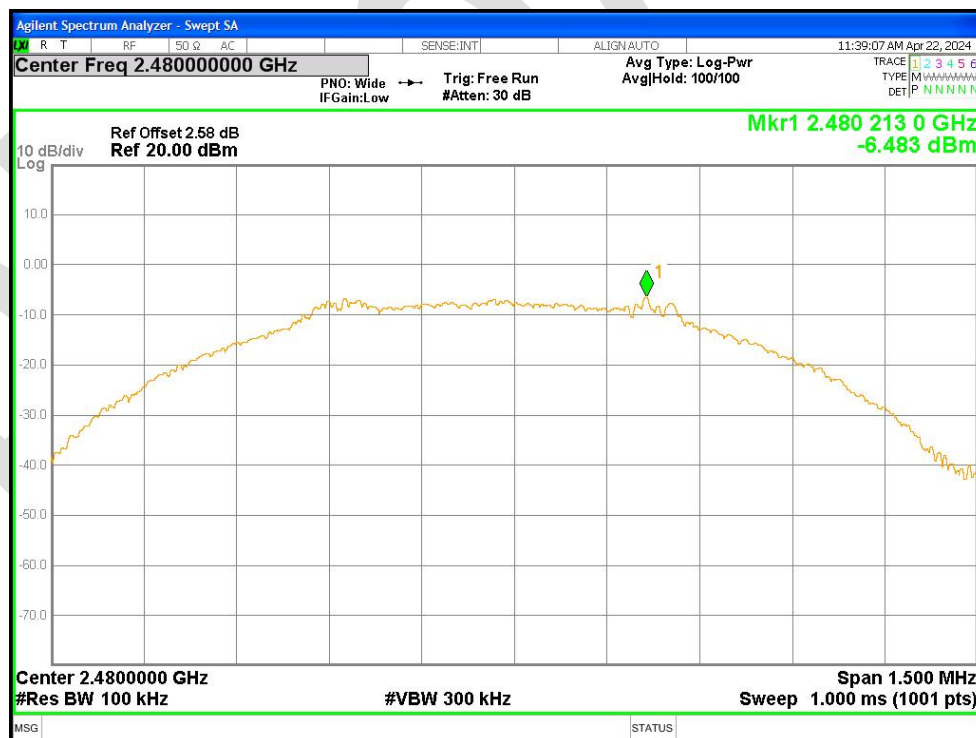
Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Ref



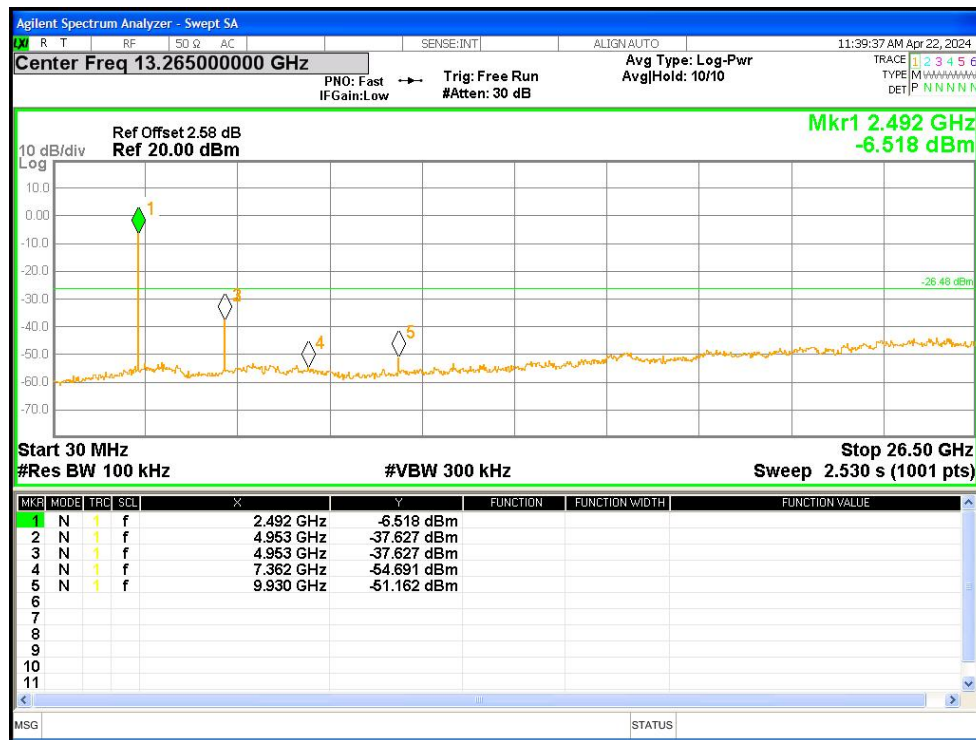
Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref

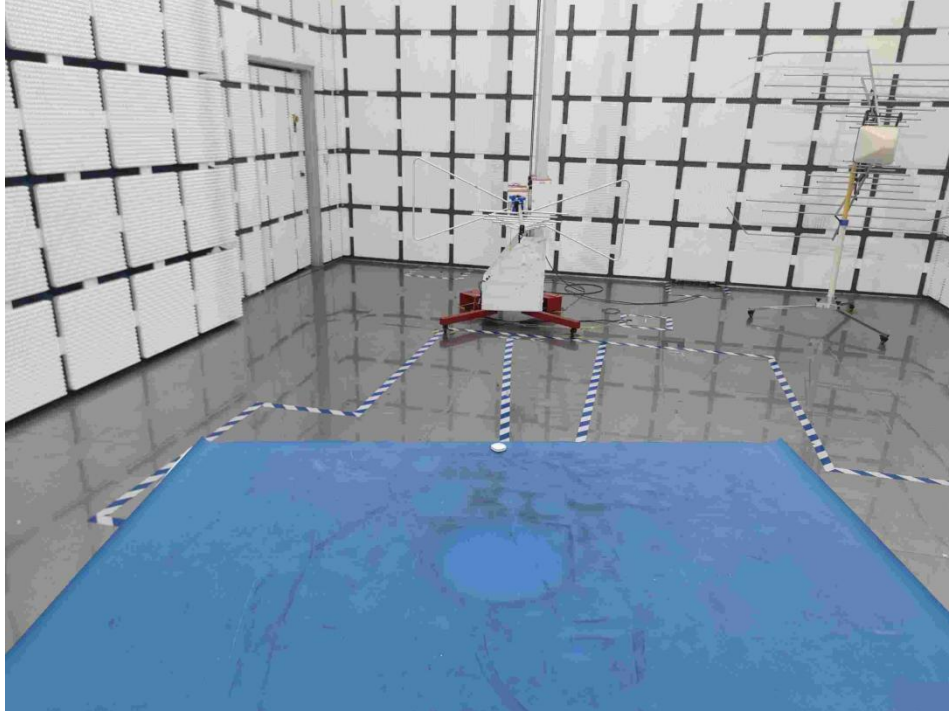


Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



## Appendix B: photographs of test setup

Radiated Emissions (30MHz-1GHz)



Radiated Emissions (above 1GHz)



## Appendix C: photographs of EUT

Reference to the test report no. BLA-EMC-202404-A3201

**----END OF REPORT----**

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