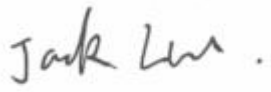


# FCC RF Test Report

For

**Hankyul Marketing Co, LTD**

|                              |  |
|------------------------------|--|
| <b>Test Standards:</b>       | <u>Part 15C Subpart C §15.249</u>  |
| <b>Product Description:</b>  | <u>Wireless Keyboard</u>   |
| <b>Tested Model:</b>         | <u>ENK100A</u>   |
| <b>Additional Model No.:</b> | <u>N/A</u>   |
| <b>FCC ID:</b>               | <u>2BA8D-ENK100A</u>   |
| <b>Classification</b>        | <u>DXX-Low Power Communication Device Transmitter</u>  |
| <b>Report No.:</b>           | <u>EC2305033RF03</u>   |
| <b>Tested Date:</b>          | <u>2023-05-17 to 2023-06-13</u>  |
| <b>Issued Date:</b>          | <u>2023-06-13</u>  |
| <b>Prepared By:</b>          | <u></u><br>Jack Liu / Engineer  |
| <b>Approved By:</b>          | <u></u><br>Tiny Yang / RF Manager   |
| <b>Testing laboratory:</b>   | <p><b>Hunan Ecloud Testing Technology Co., Ltd.</b><br/>Building A1, Changsha E Center, No. 18 Xiangtai Avenue, Liuyang Economic and<br/>Technological Development Zone, Hunan, P.R.C<br/>Tel.: +86-731-89634887 Fax.: +86-731-89634887<br/><a href="http://www.hn-ecloud.com">www.hn-ecloud.com</a></p> |

Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of Hunan Ecloud Testing Technology Co., Ltd., the test report shall not be reproduced except in full.

## Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes           |
|----------------|-------------|-------------|---------------|-----------------|
| V1.0           | /           | 2023.06.13  | Valid         | Original Report |

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## Summary of Test Result

| FCC Rule            | Description   | Limit               | Result       | Remark                                |
|---------------------|---|---------------------|--------------|---------------------------------------|
| 15.215(c)           | 20dB Bandwidth  | NA                  | Pass         | Test Engineer:<br>Luo Xiang           |
| 15.249(a)           | Field strength of the<br>fundamental signal           | 15.249(a)           | Pass         | Test Engineer:<br>Jack Liu            |
| 15.249(a)(d)/15.209 | Radiated Band Edges and<br>Radiated Spurious Emission | 15.249(a)(d)/15.209 | Pass         | Under limit<br>2.53 dB at<br>7440 MHz |
| 15.207              | AC Conducted Emission                                 | 15.207(a)           | Not Required | -                                     |
| 15.203              | Antenna Requirement                                   | N/A                 | Pass         | -                                     |

# **1 Test Laboratory**

## **1.1 Test facility**

### **CNAS ( accreditation number:L11138 )**

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

### **FCC (Designation number:CN1244 , Test Firm Registration**

### **Number:793308 )**

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

### **ISED(CAB identifier: CN0012, ISED# :24347)**

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

### **A2LA (Certificate Number:4895.01)**

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

## 2 General Description

### 2.1 Applicant

**Hankyul Marketing Co, LTD**

9-5 bamgogaero27gil, gangnamgu, seoul, south korea

### 2.2 Manufacturer

**Dongguan Lingjie Electronics & Technology Co., Ltd**

Building 3, No.23 Zhenxing North Road, Xiegang Town, Dongguan City, Guangdong Province, China

### 2.3 General Description Of EUT

|                               |                               |
|-------------------------------|-------------------------------|
| <b>Product</b>                | Wireless Keyboard             |
| <b>Model No.</b>              | ENK100A                       |
| <b>Additional No.</b>         | N/A                           |
| <b>Difference Description</b> | N/A                           |
| <b>FCC ID</b>                 | 2BA8D-ENK100A                 |
| <b>Power Supply</b>           | 3.0Vdc (dry battery)          |
| <b>Modulation Type</b>        | GFSK                          |
| <b>Operating Frequency</b>    | 2403MHz~2480MHz               |
| <b>Number Of Channel</b>      | 16                            |
| <b>Antenna Type</b>           | PCB Antenna with 2.34dBi gain |
| <b>Sample no.</b>             | 2305033R-1/2~2/2              |
| <b>Sample Received Date</b>   | 2023/05/17                    |
| <b>HW Version</b>             | V1.0                          |
| <b>SW Version</b>             | V1.0                          |
| <b>I/O Ports</b>              | Refer to user's manual        |
| <b>Accessory Devices</b>      | Refer to note as below        |

**NOTE:**

1. The above EUT information is declared by manufacturer. Our laboratory is not responsible for the information provided by the manufacturer.
2. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

## 2.4 Modification of EUT

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

## 2.5 Support equipment List

| Manufacturer | Description | Model | Serial Number | Certificate |
|--------------|-------------|-------|---------------|-------------|
| Lenovo       | Notebook    | E470C | N/A           | FCC sDoC    |

## 2.6 Applicable Standards

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

- FCC Part 15 Subpart C §15.249
- ANSI C63.10-2013

### Remark:

1. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

### 3 Test Configuration of Equipment Under Test

#### 3.1 Descriptions of Test Mode

The Operation Frequency each of channel as follows:

|           |      |      |      |      |      |      |      |      |
|-----------|------|------|------|------|------|------|------|------|
| Channel   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| Frequency | 2403 | 2426 | 2441 | 2463 | 2407 | 2422 | 2445 | 2466 |
| Channel   | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   |
| Frequency | 2414 | 2436 | 2459 | 2473 | 2419 | 2439 | 2453 | 2480 |

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

- a. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
- b. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

## 3.2 Test Mode

### 3.2.1 Antenna Port Conducted Measurement

| Summary table of Test Cases |                       |
|-----------------------------|-----------------------|
| Test Item                   | 2.4G Wireless         |
| Conducted Test Cases        | Mode 1: CH01_2403 MHz |
|                             | Mode 2: CH03_2441 MHz |
|                             | Mode 3: CH16_2480 MHz |

### 3.2.2 Radiated Emission Test (Below 1GHz)

|                     | 2.4G Wireless         |
|---------------------|-----------------------|
| Radiated Test Cases | Mode 3: CH16_2480 MHz |

- Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
2. All above modes were tested, but only the worst case test mode 1 while transmitting was reported.

### 3.2.3 Radiated Emission Test (Above 1GHz)

|                     | 2.4G Wireless         |
|---------------------|-----------------------|
| Radiated Test Cases | Mode 1: CH01_2403 MHz |
|                     | Mode 2: CH03_2441 MHz |
|                     | Mode 3: CH16_2480 MHz |

- Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
2. All above modes were tested, but only the worst case test mode 1 while transmitting was reported.

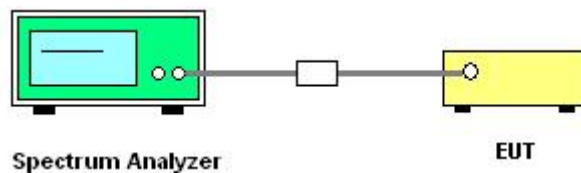
### 3.2.4 Power Line Conducted Emission Test:

|                       |                       |
|-----------------------|-----------------------|
| AC Conducted Emission | Mode 1 : Not Required |
|-----------------------|-----------------------|

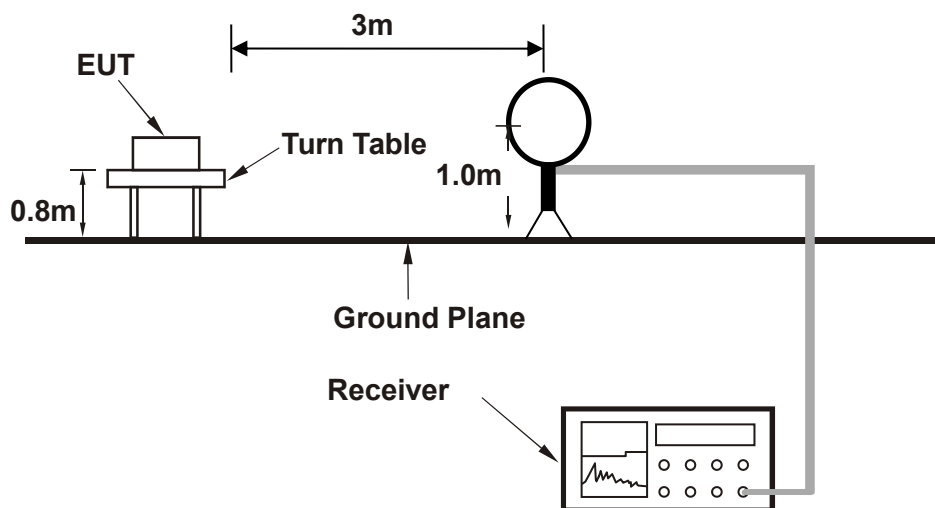
### 3.3 Test Setup

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

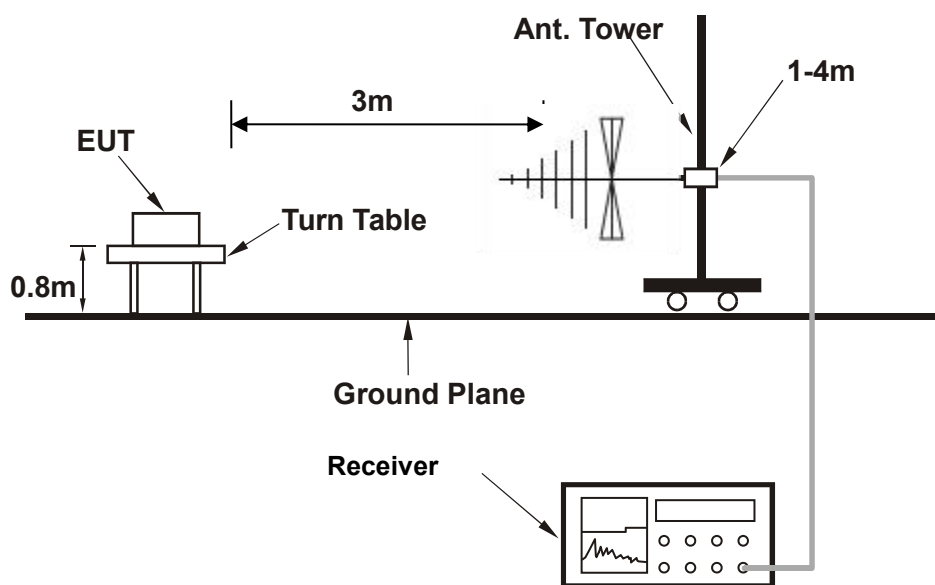
#### Setup diagram for Conducted Test



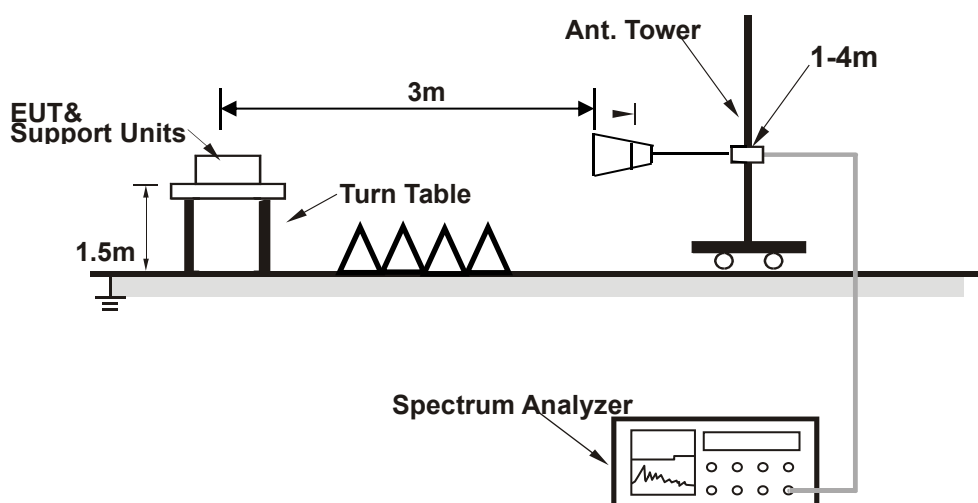
#### Setup diagram for Radiation(9KHz~30MHz) Test



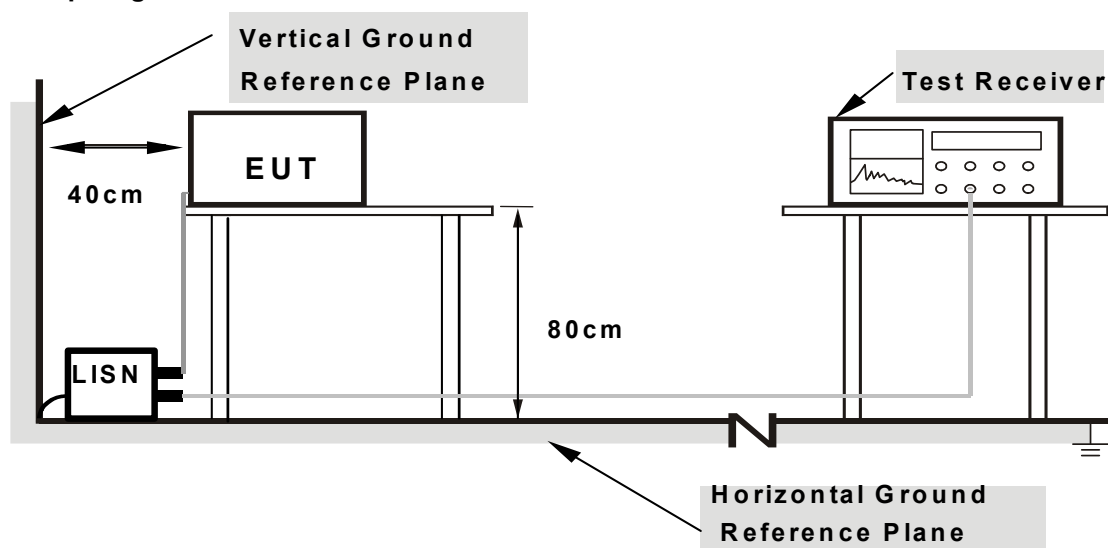
### Setup diagram for Radiation(Below 1G) Test



### Setup diagram for Radiation(Above 1G) Test



Setup diagram for AC Conducted Emission Test



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

### 3.4 Measurement Results Explanation Example

For all conducted test items:

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

Example:

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

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

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

*= 5 + 10 = 15 (dB)*

For all radiated test items:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Over Limit (dB  $\mu$  V/m) = Level(dB  $\mu$  V/m) - Limit Level (dB  $\mu$  V/m)

## 4 Test Result

### 4.1 20dB Occupy Bandwidth Measurement

#### 4.1.1 Limit of 20dB Occupy Bandwidth

None; for reporting purposes only.

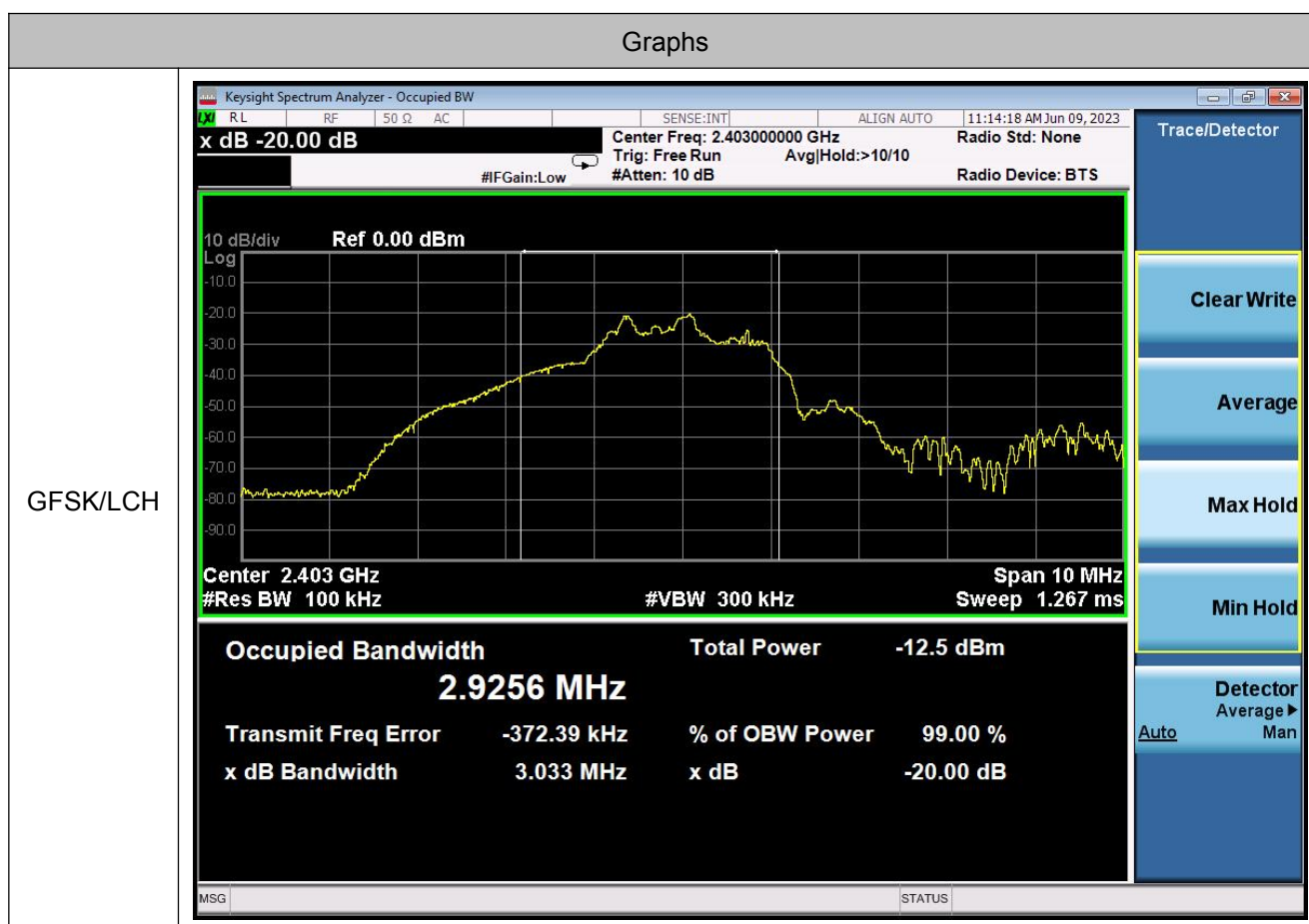
#### 4.1.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
  - Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
  - RBW = 1% to 5% of the 20 dB bandwidth; VBW = approximately 3 times RBW; Sweep = auto;
  - Detector function = peak; Trace = max hold.

### 4.1.3 Test Result of 20dB Bandwidth

| Test Mode :     | 2.4G Wireless Transmitting | Temperature :       | 22~24℃ |
|-----------------|----------------------------|---------------------|--------|
| Test Engineer : | Luo Xiang                  | Relative Humidity : | 51~53% |
| Channel.        | 20dB Bandwidth [MHz]       | Verdict             |        |
| LCH             | 3.033                      | PASS                |        |
| MCH             | 2.971                      | PASS                |        |
| HCH             | 3.000                      | PASS                |        |

### 20dB Plot



GFSK/MCH



GFSK/HCH



## 4.2 Field Strength of The Fundamental Signal, Radiated Band Edges and Spurious Emission Measurement

### 4.2.1 Limit of Fundamental Signal, Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209&15.249 limits as below.

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 0.009 – 0.490      | 2400/F(kHz)                          | 300                              |
| 0.490 – 1.705      | 24000/F(kHz)                         | 30                               |
| 1.705 – 30.0       | 30                                   | 30                               |
| 30 – 88            | 100                                  | 3                                |
| 88 – 216           | 150                                  | 3                                |
| 216 - 960          | 200                                  | 3                                |
| Above 960          | 500                                  | 3                                |

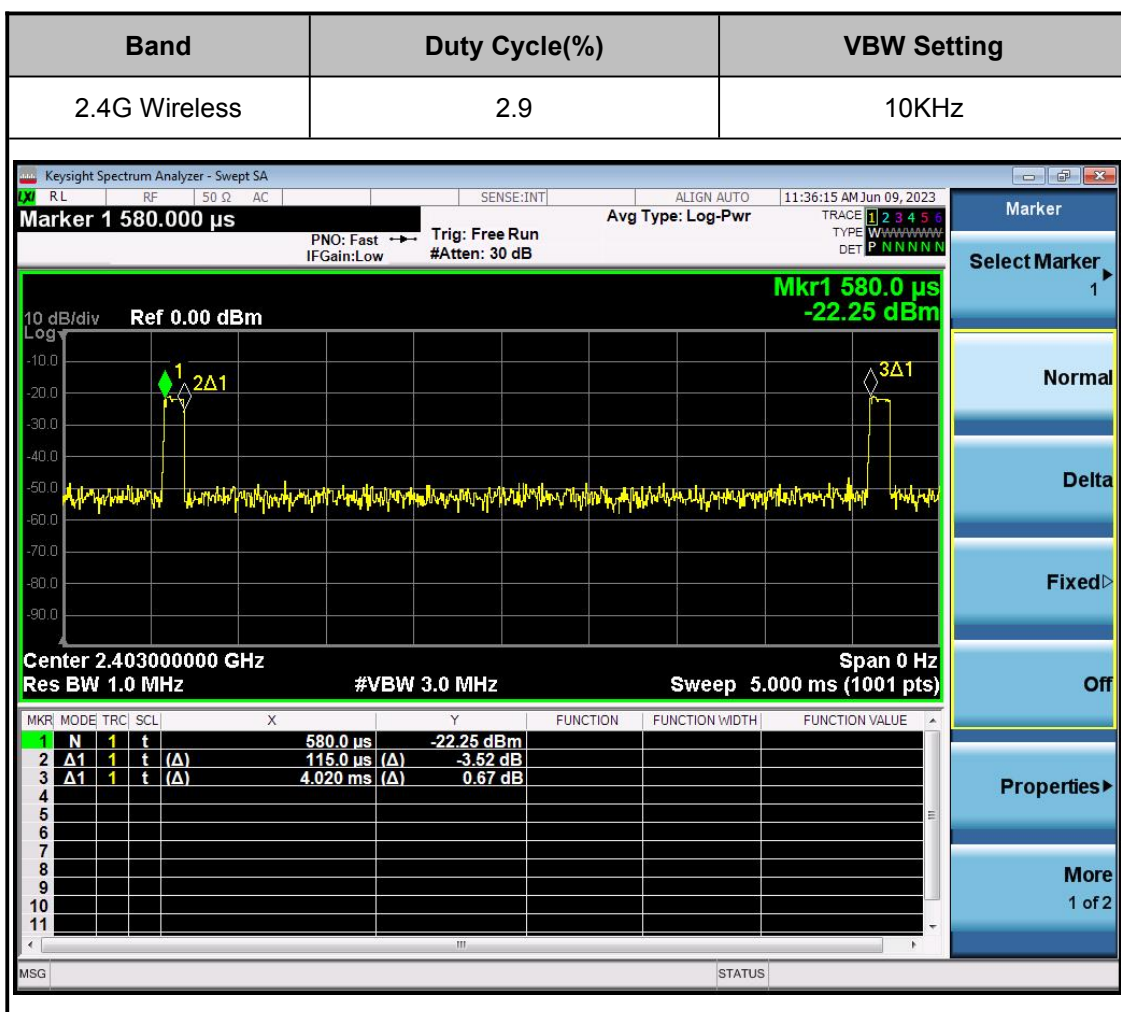
| Frequency<br>(MHz) | Field Strength<br>(millivolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 2400-2483.5        | 50                                   | 3m                               |

Note: The frequency range from 9KHz to 10th harmonic (25GHz) are checked, and no any emissions were found from 18GHz to 25GHz, So the radiated emissions from 18GHz to 25GHz were not record.

### 4.2.2 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The measurement distance is 3 meter.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:

- (1) Span shall wide enough to fully capture the emission being measured;
- (2) Set RBW=100 kHz for  $f < 1$  GHz, RBW=1MHz for  $f > 1$ GHz ; VBW >RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
- (3) For average measurement:  
 VBW = 10 Hz, when duty cycle is no less than 98 percent.  
 VBW  $\geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

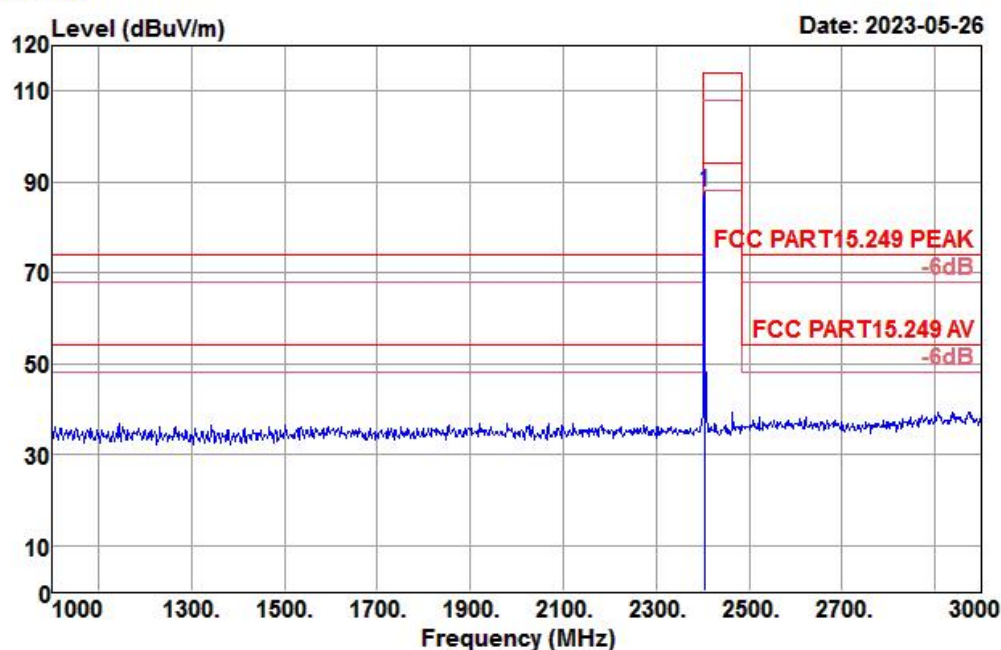
### 4.2.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 4.2.4 Field Strength of The Fundamental Signal

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 1GHz~3GHz             | Polarization :      | Horizontal |

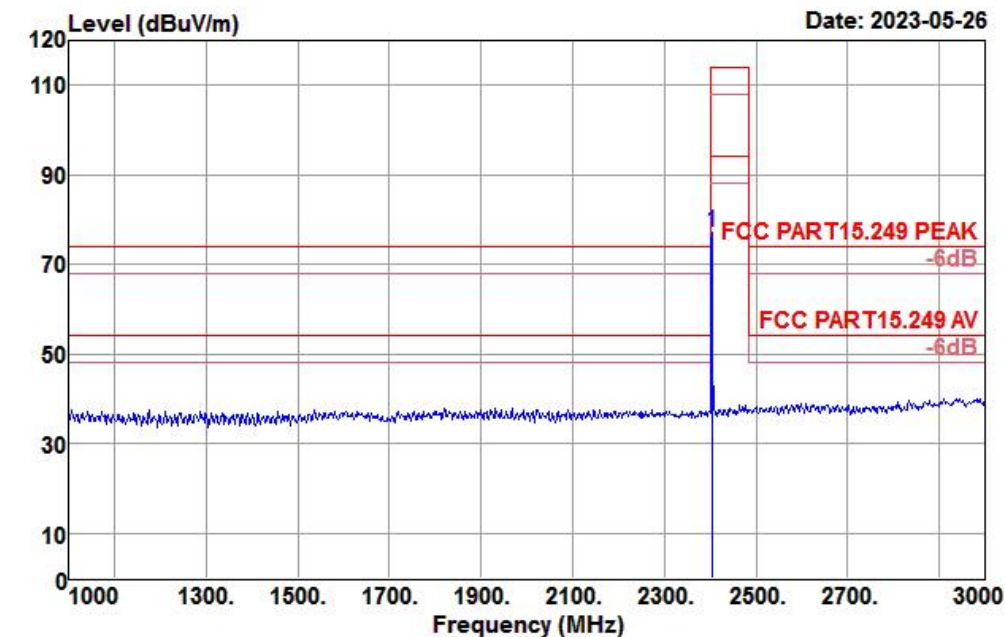
Data: 40



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2403.000    | 91.89                    | 27.31                     | 4.51                | 35.93                  | 87.78           | 114.00                   | -26.22              | Peak   |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 1GHz~3GHz             | Polarization :      | Vertical |

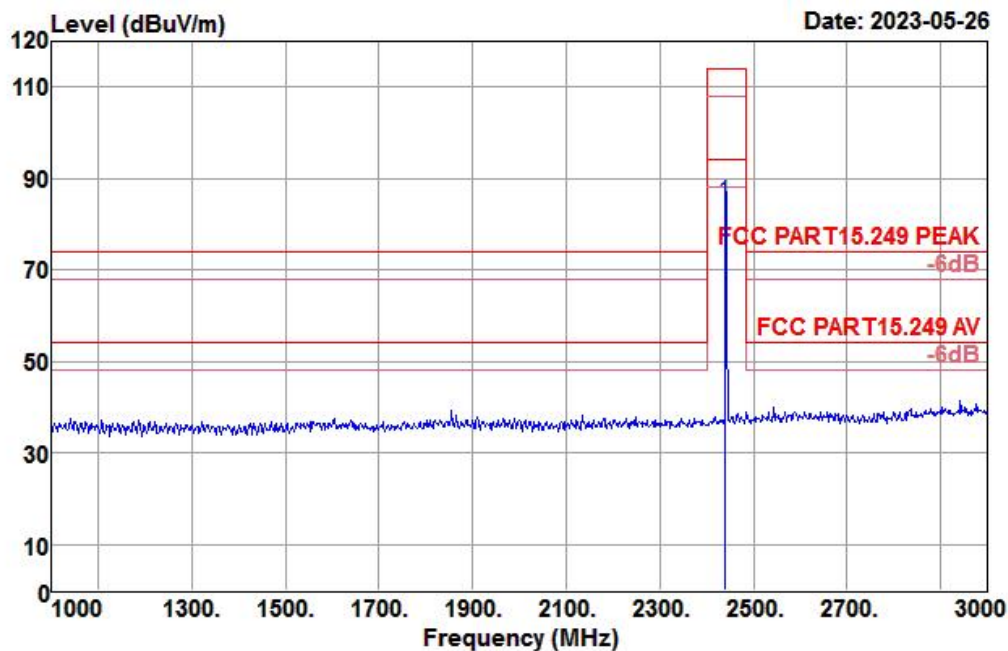
Data: 43



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2403.000    | 81.18                    | 27.31                     | 4.51                | 35.93                  | 77.07           | 114.00                   | -36.93              | Peak   |

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 2: CH03_2441 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 1GHz~3GHz             | Polarization :      | Horizontal |

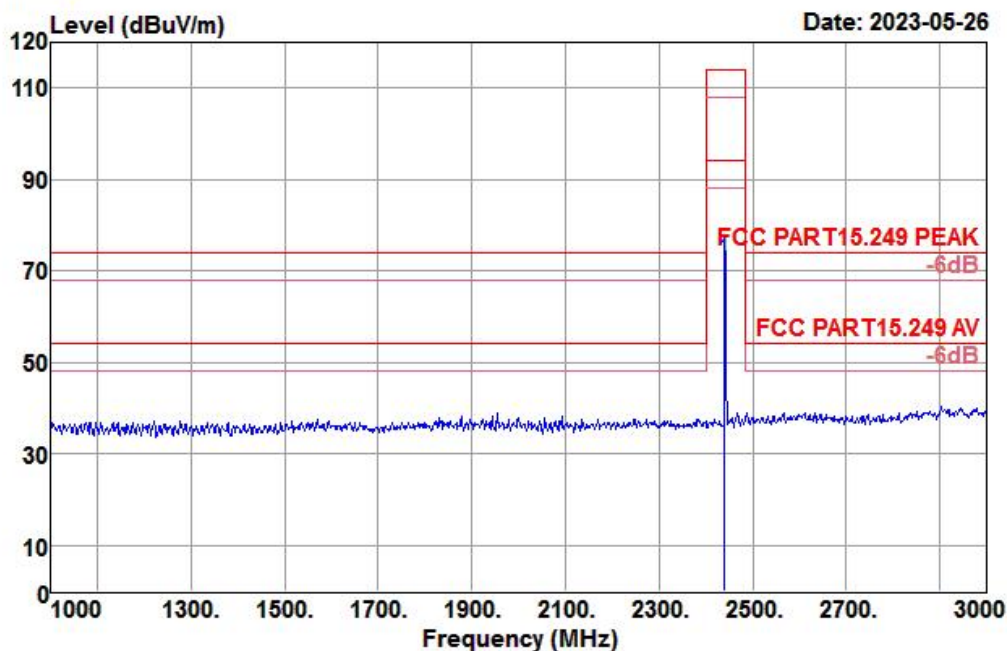
Data: 45



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamplifier<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------------|-----------------|--------------------------|---------------------|--------|
| 2441.000    | 88.68                    | 27.38                     | 4.63                | 36.01                        | 84.68           | 114.00                   | -29.32              | Peak   |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 2: CH03_2441 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 1GHz~3GHz             | Polarization :      | Vertical |

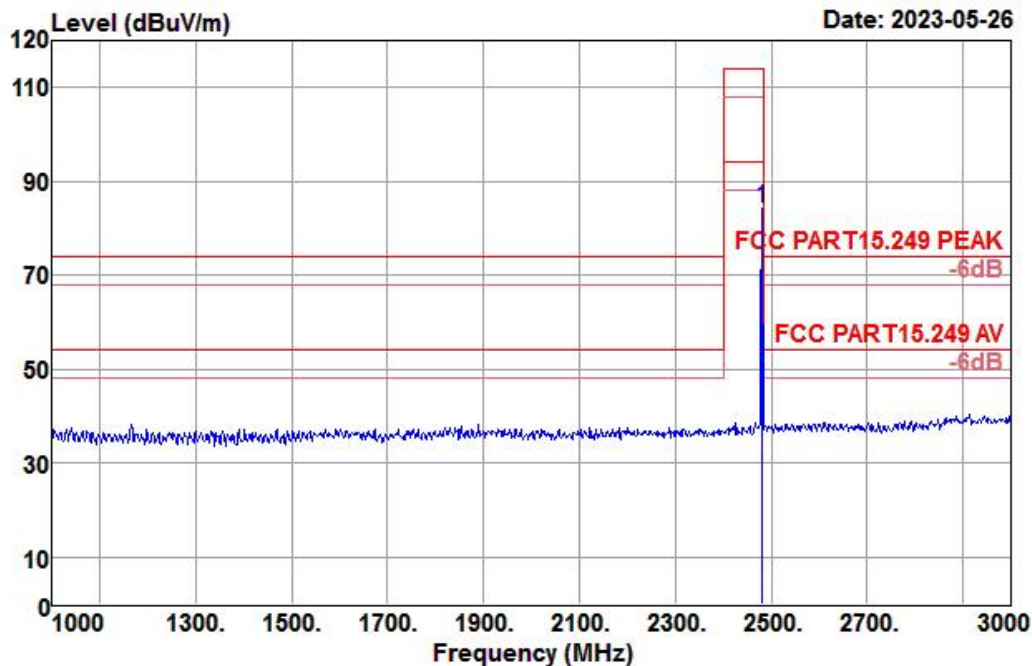
Data: 44



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2441.000    | 76.09                    | 27.38                     | 4.63                | 36.01                  | 72.09           | 114.00                   | -41.91              | Peak   |

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 1GHz~3GHz             | Polarization :      | Horizontal |

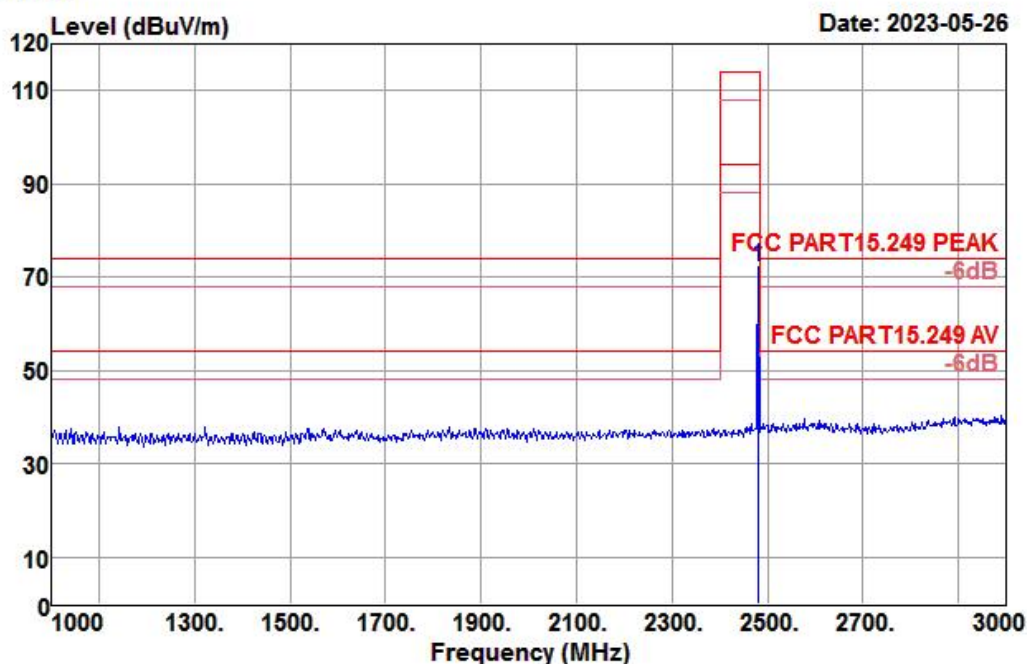
Data: 48



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2480.000    | 88.14                    | 27.46                     | 4.74                | 36.10                  | 84.24           | 114.00                   | -29.76              | Peak   |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 1GHz~3GHz             | Polarization :      | Vertical |

Data: 51

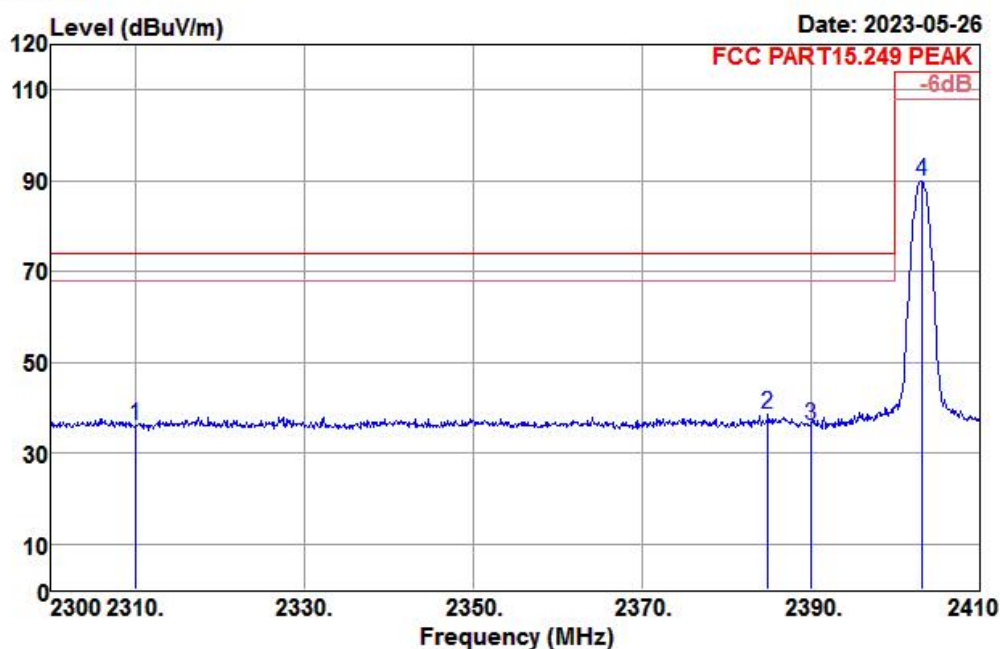


| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2480.000    | 76.29                    | 27.46                     | 4.74                | 36.10                  | 72.39           | 114.00                   | -41.61              | Peak   |

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

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 2.30GHz~2.41GHz       | Polarization :      | Horizontal |

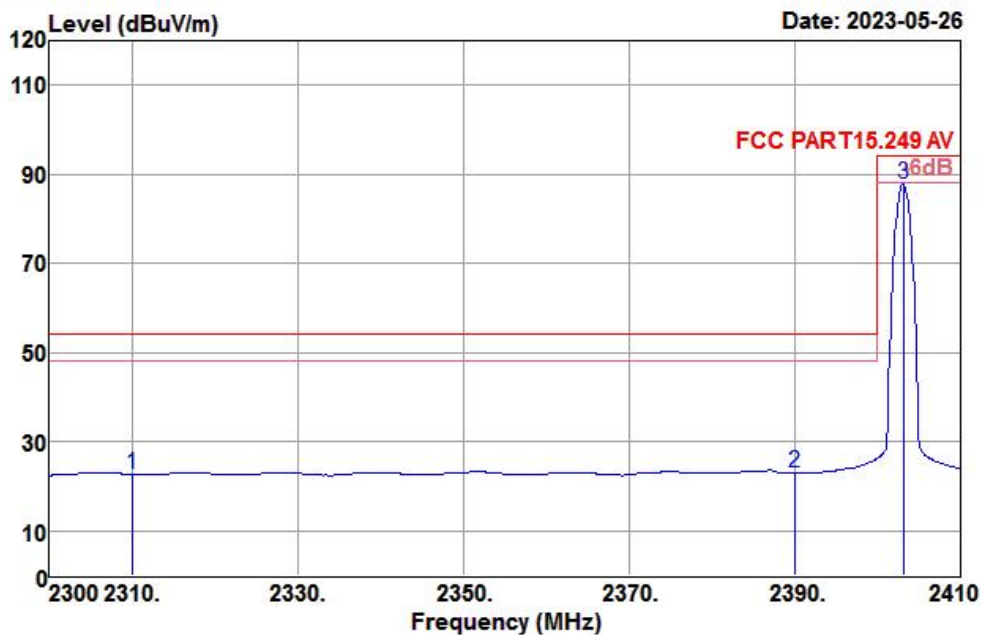
Data: 38



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2310.000    | 40.54                    | 27.12                     | 4.15                | 35.71                  | 36.10           | 74.00                    | -37.90              | Peak   |
| 2384.920    | 42.64                    | 27.27                     | 4.44                | 35.89                  | 38.46           | 74.00                    | -35.54              | Peak   |
| 2390.000    | 40.19                    | 27.28                     | 4.46                | 35.90                  | 36.03           | 74.00                    | -37.97              | Peak   |
| 2403.070    | 94.10                    | 27.31                     | 4.51                | 35.93                  | 89.99           | 114.00                   | -24.01              | Peak   |

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 2.30GHz~2.41GHz       | Polarization :      | Horizontal |

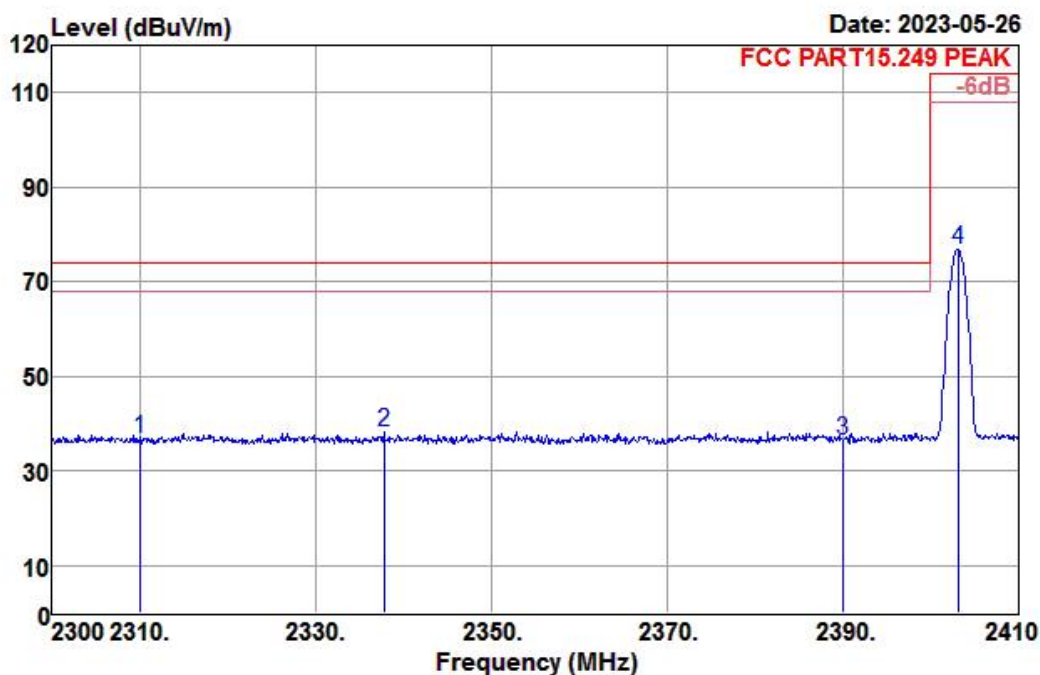
Data: 39



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 2310.000    | 27.21                    | 27.12                     | 4.15                | 35.71                  | 22.77           | 54.00                    | -31.23              | Average |
| 2390.000    | 27.09                    | 27.28                     | 4.46                | 35.90                  | 22.93           | 54.00                    | -31.07              | Average |
| 2403.070    | 91.91                    | 27.31                     | 4.51                | 35.93                  | 87.80           | 94.00                    | -6.20               | Average |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 2.30GHz~2.41GHz       | Polarization :      | Vertical |

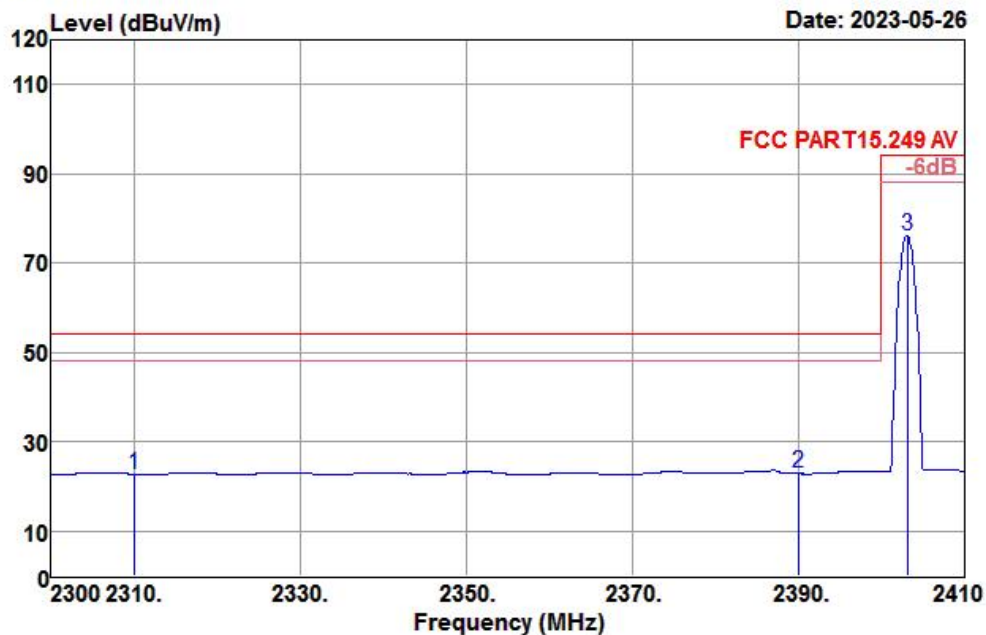
Data: 41



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2310.000    | 41.26                    | 27.12                     | 4.15                | 35.71                  | 36.82           | 74.00                    | -37.18              | Peak   |
| 2337.840    | 42.76                    | 27.18                     | 4.26                | 35.78                  | 38.42           | 74.00                    | -35.58              | Peak   |
| 2390.000    | 40.81                    | 27.28                     | 4.46                | 35.90                  | 36.65           | 74.00                    | -37.35              | Peak   |
| 2403.070    | 80.91                    | 27.31                     | 4.51                | 35.93                  | 76.80           | 114.00                   | -37.20              | Peak   |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 2.30GHz~2.41GHz       | Polarization :      | Vertical |

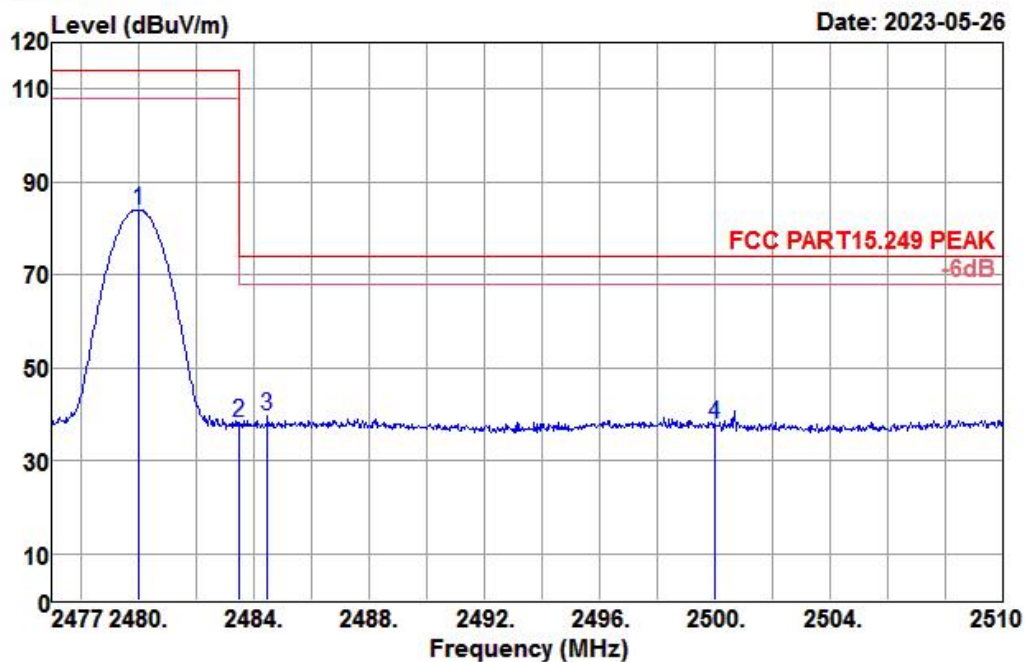
Data: 42



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamplifier<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------------|-----------------|--------------------------|---------------------|---------|
| 2310.000    | 27.24                    | 27.12                     | 4.15                | 35.71                        | 22.80           | 54.00                    | -31.20              | Average |
| 2390.000    | 27.05                    | 27.28                     | 4.46                | 35.90                        | 22.89           | 54.00                    | -31.11              | Average |
| 2403.070    | 80.41                    | 27.31                     | 4.51                | 35.93                        | 76.30           | 94.00                    | -17.70              | Average |

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 2.477GHz~2.51GHz      | Polarization :      | Horizontal |

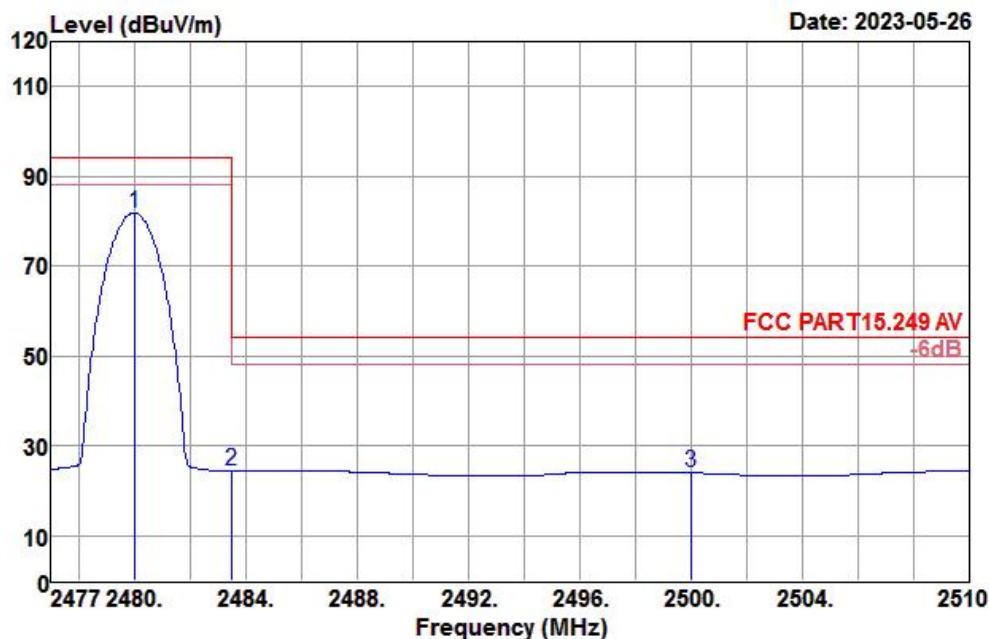
Data: 46



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2480.003    | 87.98                    | 27.46                     | 4.74                | 36.10                  | 84.08           | 114.00                   | -29.92              | Peak   |
| 2483.500    | 42.22                    | 27.47                     | 4.75                | 36.11                  | 38.33           | 74.00                    | -35.67              | Peak   |
| 2484.491    | 43.59                    | 27.47                     | 4.76                | 36.11                  | 39.71           | 74.00                    | -34.29              | Peak   |
| 2500.000    | 41.78                    | 27.50                     | 4.81                | 36.15                  | 37.94           | 74.00                    | -36.06              | Peak   |

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 2.477GHz~2.51GHz      | Polarization :      | Horizontal |

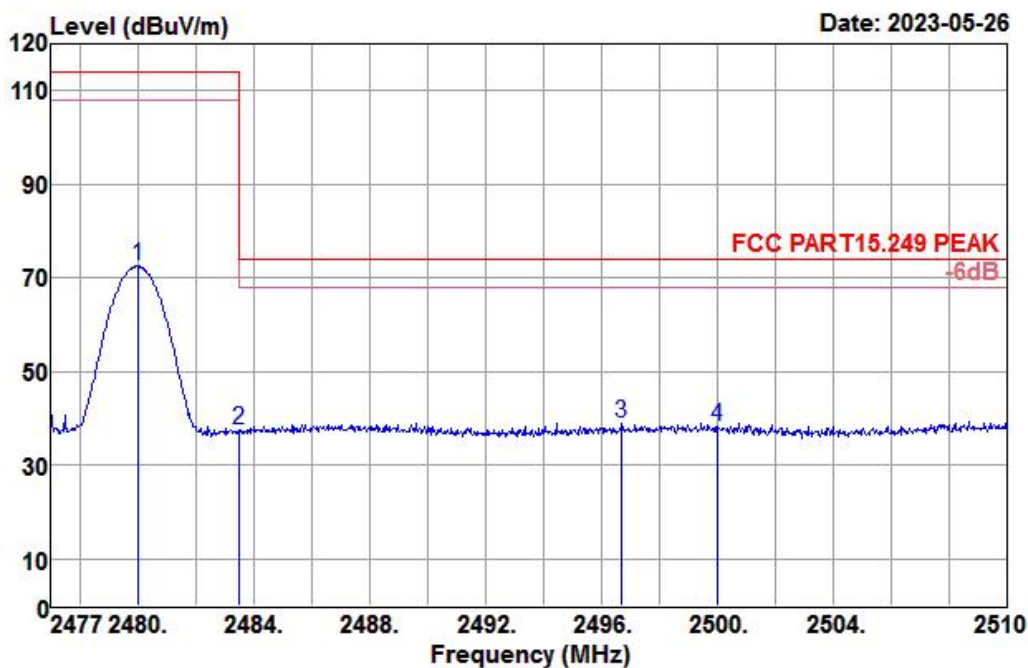
Data: 47



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 2480.003    | 85.76                    | 27.46                     | 4.74                | 36.10                  | 81.86           | 94.00                    | -12.14              | Average |
| 2483.500    | 28.27                    | 27.47                     | 4.75                | 36.11                  | 24.38           | 54.00                    | -29.62              | Average |
| 2500.000    | 27.80                    | 27.50                     | 4.81                | 36.15                  | 23.96           | 54.00                    | -30.04              | Average |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 2.477GHz~2.51GHz      | Polarization :      | Vertical |

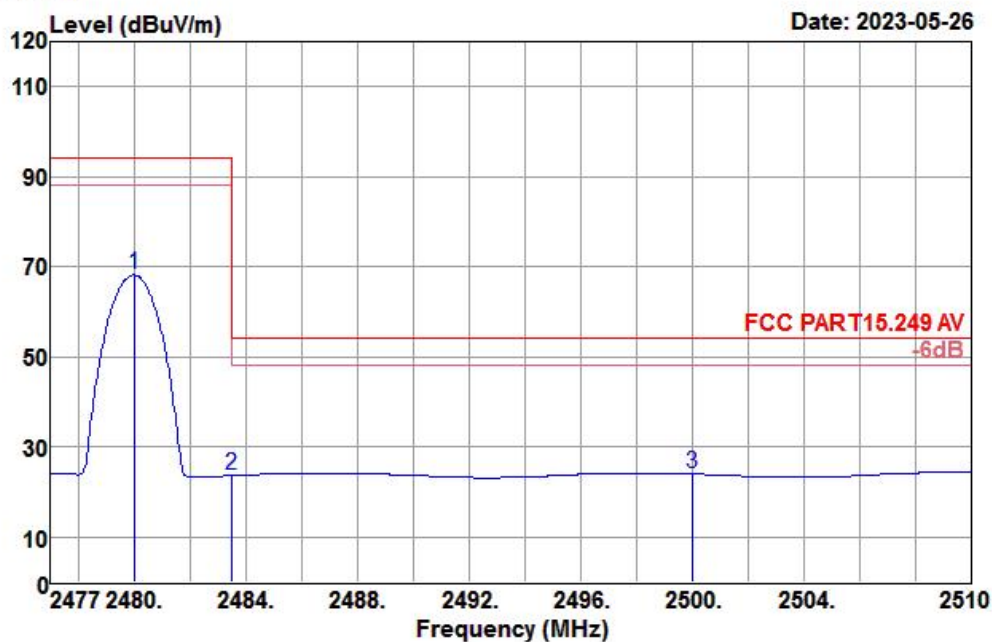
Data: 49



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 2480.003    | 76.36                    | 27.46                     | 4.74                | 36.10                  | 72.46           | 114.00                   | -41.54              | Peak   |
| 2483.500    | 41.43                    | 27.47                     | 4.75                | 36.11                  | 37.54           | 74.00                    | -36.46              | Peak   |
| 2496.701    | 42.98                    | 27.49                     | 4.79                | 36.14                  | 39.12           | 74.00                    | -34.88              | Peak   |
| 2500.000    | 41.94                    | 27.50                     | 4.81                | 36.15                  | 38.10           | 74.00                    | -35.90              | Peak   |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 2.477GHz~2.51GHz      | Polarization :      | Vertical |

Data: 50

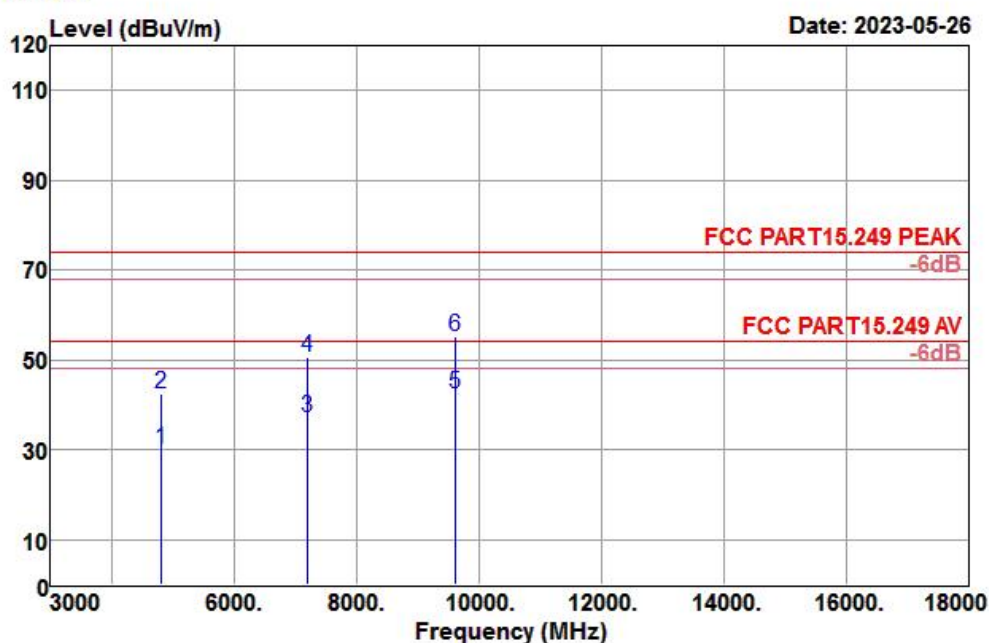


| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamplifier<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------------|-----------------|--------------------------|---------------------|---------|
| 2480.003    | 72.08                    | 27.46                     | 4.74                | 36.10                        | 68.18           | 94.00                    | -25.82              | Average |
| 2483.500    | 27.57                    | 27.47                     | 4.75                | 36.11                        | 23.68           | 54.00                    | -30.32              | Average |
| 2500.000    | 27.86                    | 27.50                     | 4.81                | 36.15                        | 24.02           | 54.00                    | -29.98              | Average |

#### 4.2.6 Test Result of Radiated Spurious Emission

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 3GHz~18GHz            | Polarization :      | Horizontal |

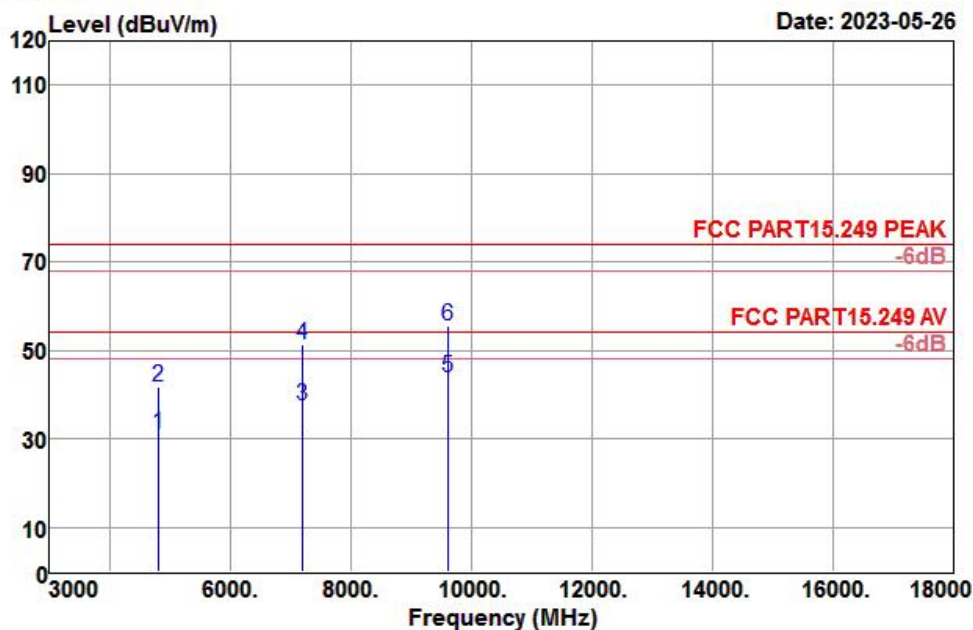
Data: 54



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 4806.000    | 28.04                    | 31.15                     | 6.28                | 35.52                  | 29.95           | 54.00                    | -24.05              | Average |
| 4806.000    | 40.49                    | 31.15                     | 6.28                | 35.52                  | 42.40           | 74.00                    | -31.60              | Peak    |
| 7209.000    | 25.58                    | 35.56                     | 8.60                | 32.46                  | 37.28           | 54.00                    | -16.72              | Average |
| 7209.000    | 39.08                    | 35.56                     | 8.60                | 32.46                  | 50.78           | 74.00                    | -23.22              | Peak    |
| 9612.000    | 26.50                    | 38.44                     | 11.35               | 33.64                  | 42.65           | 54.00                    | -11.35              | Average |
| 9612.000    | 39.12                    | 38.44                     | 11.35               | 33.64                  | 55.27           | 74.00                    | -18.73              | Peak    |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 1: CH01_2403 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 3GHz~18GHz            | Polarization :      | Vertical |

Data: 55

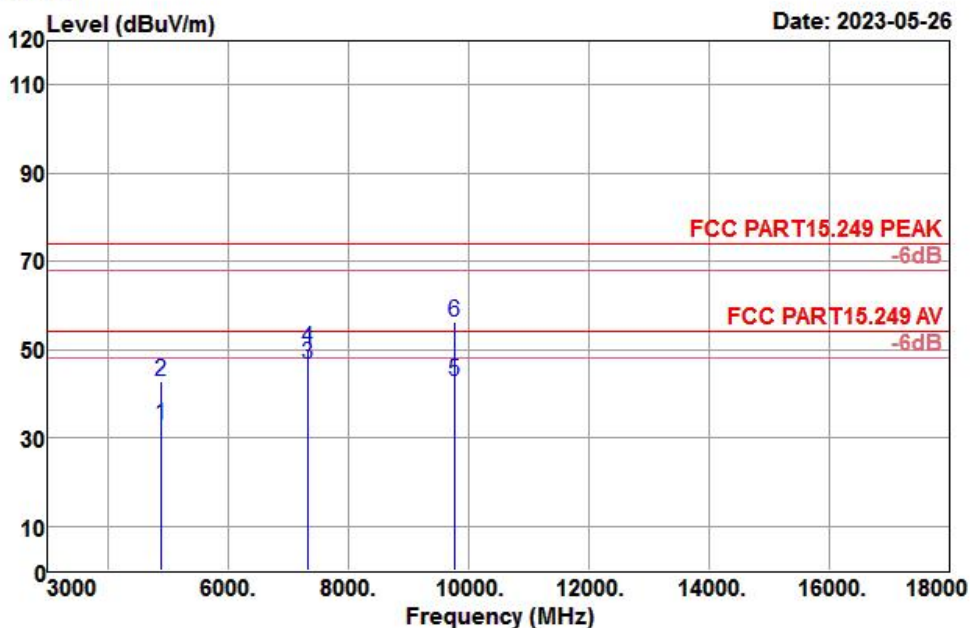


| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 4806.000    | 29.35                    | 31.15                     | 6.28                | 35.52                  | 31.26           | 54.00                    | -22.74              | Average |
| 4806.000    | 39.94                    | 31.15                     | 6.28                | 35.52                  | 41.85           | 74.00                    | -32.15              | Peak    |
| 7209.000    | 25.68                    | 35.56                     | 8.60                | 32.46                  | 37.38           | 54.00                    | -16.62              | Average |
| 7209.000    | 39.48                    | 35.56                     | 8.60                | 32.46                  | 51.18           | 74.00                    | -22.82              | Peak    |
| 9612.000    | 27.63                    | 38.44                     | 11.35               | 33.64                  | 43.78           | 54.00                    | -10.22              | Average |
| 9612.000    | 39.51                    | 38.44                     | 11.35               | 33.64                  | 55.66           | 74.00                    | -18.34              | Peak    |

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 2: CH03_2441 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 3GHz~18GHz            | Polarization :      | Horizontal |

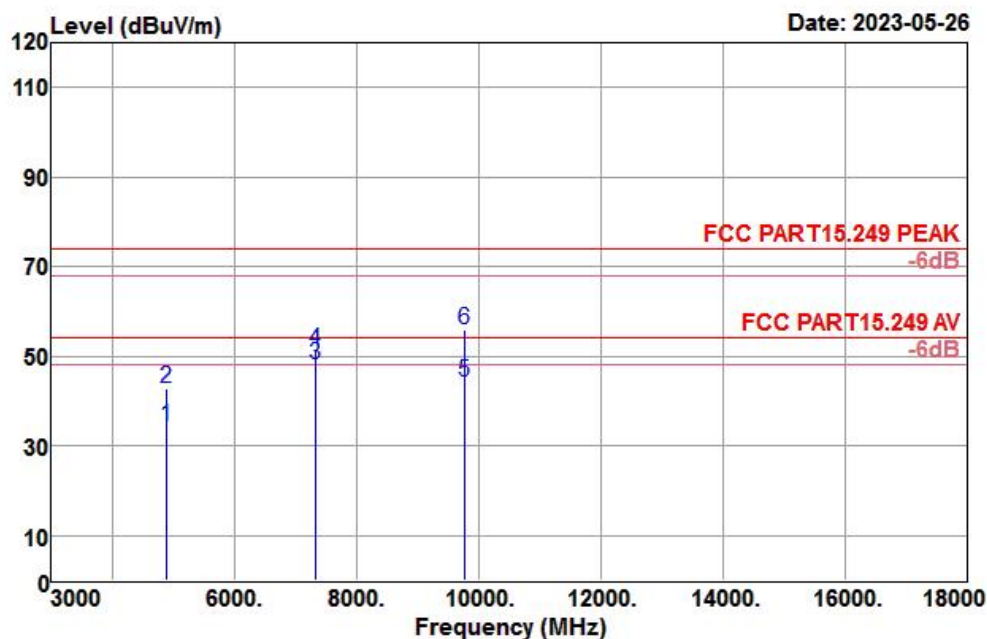
Data: 57



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamplifier<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------------|-----------------|--------------------------|---------------------|---------|
| 4882.000    | 30.12                    | 31.29                     | 6.91                | 35.51                        | 32.81           | 54.00                    | -21.19              | Average |
| 4882.000    | 40.09                    | 31.29                     | 6.91                | 35.51                        | 42.78           | 74.00                    | -31.22              | Peak    |
| 7323.000    | 34.36                    | 35.81                     | 9.10                | 32.65                        | 46.62           | 54.00                    | -7.38               | Average |
| 7323.000    | 38.18                    | 35.81                     | 9.10                | 32.65                        | 50.44           | 74.00                    | -23.56              | Peak    |
| 9764.000    | 27.13                    | 38.51                     | 11.27               | 33.90                        | 43.01           | 54.00                    | -10.99              | Average |
| 9764.000    | 40.29                    | 38.51                     | 11.27               | 33.90                        | 56.17           | 74.00                    | -17.83              | Peak    |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 2: CH03_2441 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 3GHz~18GHz            | Polarization :      | Vertical |

Data: 56

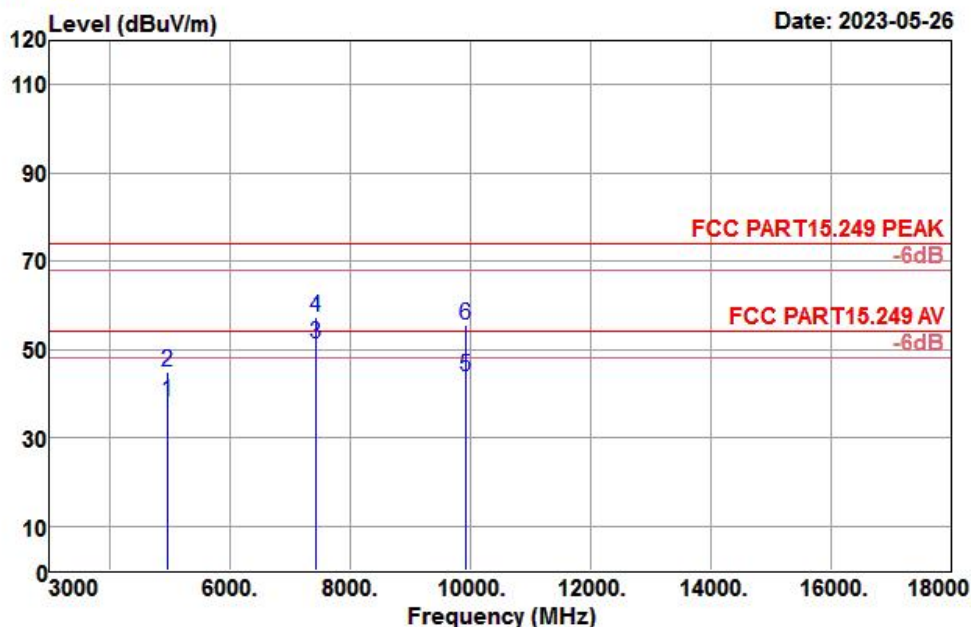


| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 4882.000    | 31.64                    | 31.29                     | 6.91                | 35.51                  | 34.33           | 54.00                    | -19.67              | Average |
| 4882.000    | 40.23                    | 31.29                     | 6.91                | 35.51                  | 42.92           | 74.00                    | -31.08              | Peak    |
| 7323.000    | 35.87                    | 35.81                     | 9.10                | 32.65                  | 48.13           | 54.00                    | -5.87               | Average |
| 7323.000    | 39.20                    | 35.81                     | 9.10                | 32.65                  | 51.46           | 74.00                    | -22.54              | Peak    |
| 9764.000    | 28.47                    | 38.51                     | 11.27               | 33.90                  | 44.35           | 54.00                    | -9.65               | Average |
| 9764.000    | 40.04                    | 38.51                     | 11.27               | 33.90                  | 55.92           | 74.00                    | -18.08              | Peak    |

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 3GHz~18GHz            | Polarization :      | Horizontal |

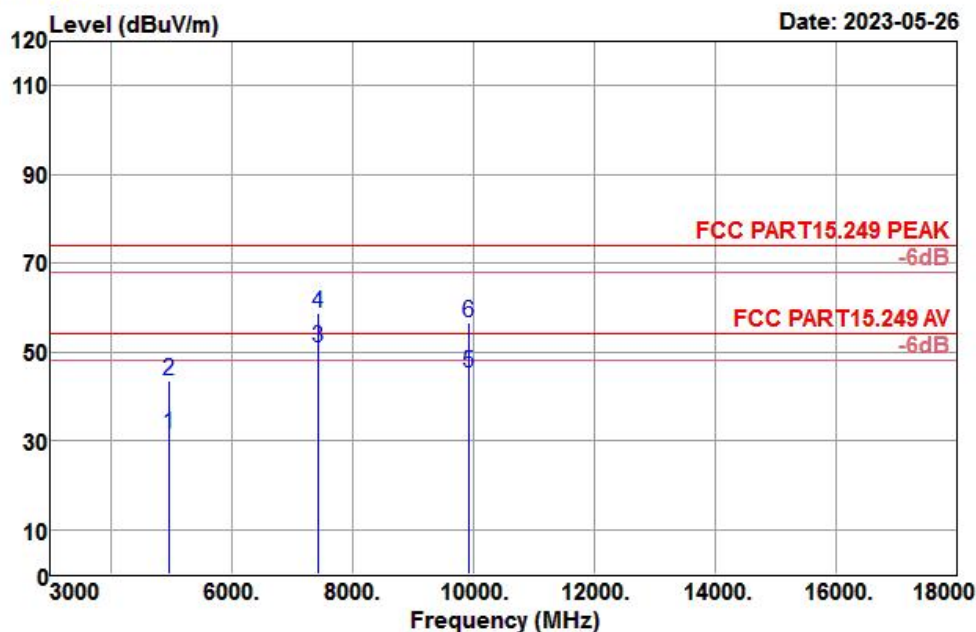
Data: 53



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 4960.000    | 35.24                    | 31.43                     | 7.56                | 35.92                  | 38.31           | 54.00                    | -15.69              | Average |
| 4960.000    | 41.76                    | 31.43                     | 7.56                | 35.92                  | 44.83           | 74.00                    | -29.17              | Peak    |
| 7440.000    | 40.97                    | 36.07                     | 8.97                | 34.54                  | 51.47           | 54.00                    | -2.53               | Average |
| 7440.000    | 46.86                    | 36.07                     | 8.97                | 34.54                  | 57.36           | 74.00                    | -16.64              | Peak    |
| 9920.000    | 27.79                    | 38.57                     | 11.98               | 34.37                  | 43.97           | 54.00                    | -10.03              | Average |
| 9920.000    | 39.53                    | 38.57                     | 11.98               | 34.37                  | 55.71           | 74.00                    | -18.29              | Peak    |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 3GHz~18GHz            | Polarization :      | Vertical |

Data: 52



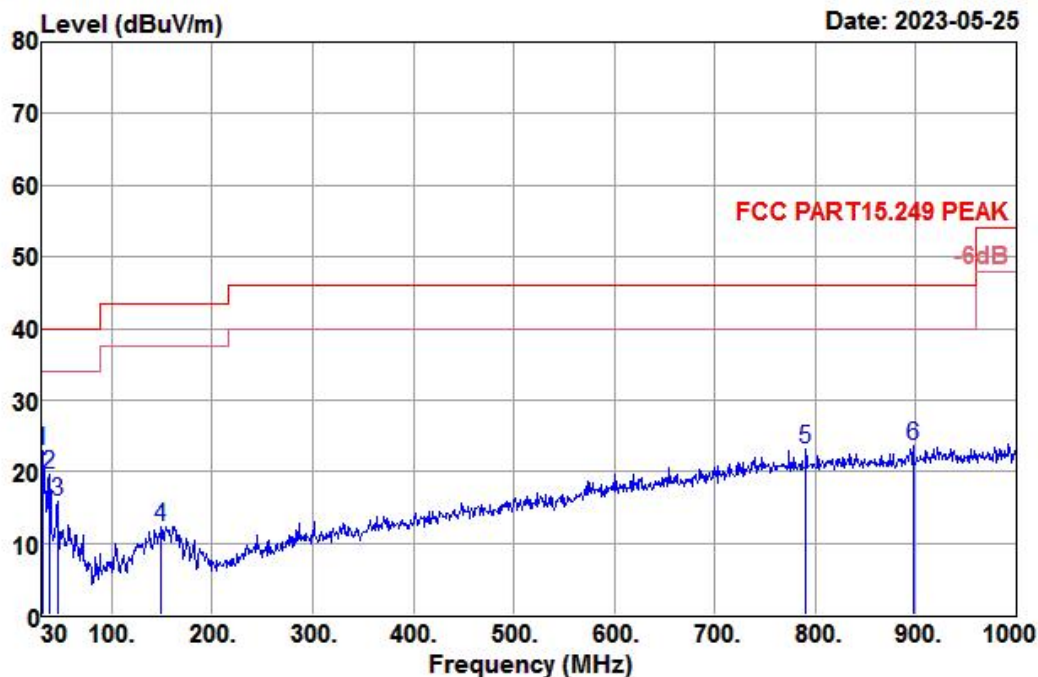
| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|---------|
| 4960.000    | 28.34                    | 31.43                     | 7.56                | 35.92                  | 31.41           | 54.00                    | -22.59              | Average |
| 4960.000    | 40.61                    | 31.43                     | 7.56                | 35.92                  | 43.68           | 74.00                    | -30.32              | Peak    |
| 7440.000    | 40.58                    | 36.07                     | 8.97                | 34.54                  | 51.08           | 54.00                    | -2.92               | Average |
| 7440.000    | 48.44                    | 36.07                     | 8.97                | 34.54                  | 58.94           | 74.00                    | -15.06              | Peak    |
| 9920.000    | 29.30                    | 38.57                     | 11.98               | 34.37                  | 45.48           | 54.00                    | -8.52               | Average |
| 9920.000    | 40.60                    | 38.57                     | 11.98               | 34.37                  | 56.78           | 74.00                    | -17.22              | Peak    |

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

#### 4.2.7 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

|                 |                       |                     |            |
|-----------------|-----------------------|---------------------|------------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃     |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%     |
| Frequency Range | 30MHz~1GHz            | Polarization :      | Horizontal |

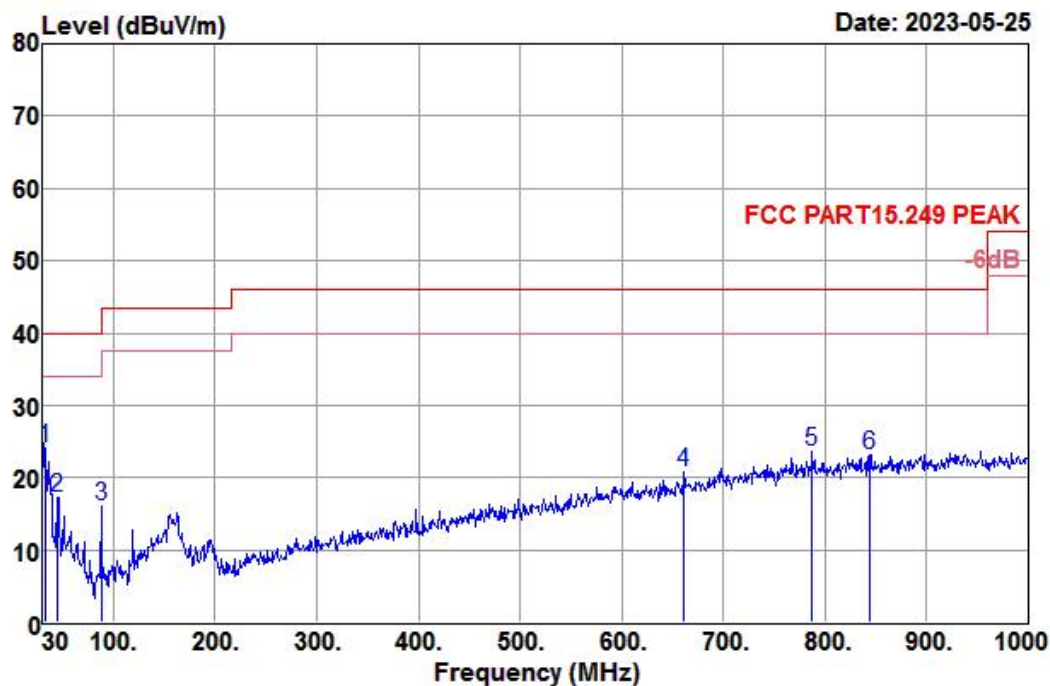
Data: 37



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 30.970      | 41.29                    | 13.81                     | 0.55                | 32.65                  | 23.00           | 40.00                    | -17.00              | QP     |
| 38.730      | 36.81                    | 14.22                     | 1.23                | 32.65                  | 19.61           | 40.00                    | -20.39              | QP     |
| 46.490      | 32.28                    | 14.94                     | 1.27                | 32.65                  | 15.84           | 40.00                    | -24.16              | QP     |
| 149.310     | 28.30                    | 14.40                     | 2.35                | 32.66                  | 12.39           | 43.50                    | -31.11              | QP     |
| 790.480     | 28.59                    | 20.93                     | 5.84                | 32.27                  | 23.09           | 46.00                    | -22.91              | QP     |
| 897.180     | 27.69                    | 21.79                     | 6.26                | 32.08                  | 23.66           | 46.00                    | -22.34              | QP     |

|                 |                       |                     |          |
|-----------------|-----------------------|---------------------|----------|
| Test Mode :     | Mode 3: CH16_2480 MHz | Temperature :       | 22~24℃   |
| Test Engineer : | Jack Liu              | Relative Humidity : | 62~64%   |
| Frequency Range | 30MHz~1GHz            | Polarization :      | Vertical |

Data: 36



| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB | level<br>dBuV/m | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark |
|-------------|--------------------------|---------------------------|---------------------|------------------------|-----------------|--------------------------|---------------------|--------|
| 33.880      | 41.96                    | 13.72                     | 1.01                | 32.65                  | 24.04           | 40.00                    | -15.96              | QP     |
| 44.550      | 33.68                    | 15.03                     | 1.24                | 32.65                  | 17.30           | 40.00                    | -22.70              | QP     |
| 88.200      | 38.30                    | 8.57                      | 1.78                | 32.66                  | 15.99           | 43.50                    | -27.51              | QP     |
| 661.470     | 28.71                    | 19.43                     | 5.16                | 32.53                  | 20.77           | 46.00                    | -25.23              | QP     |
| 787.570     | 29.10                    | 20.92                     | 5.81                | 32.28                  | 23.55           | 46.00                    | -22.45              | QP     |
| 843.830     | 28.08                    | 21.22                     | 6.02                | 32.18                  | 23.14           | 46.00                    | -22.86              | QP     |

## 4.3 AC Conducted Emission Measurement

### 4.3.1 Limit of AC Conducted Emission

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

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

\*Decreases with the logarithm of the frequency.

### 4.3.2 Test Procedures

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

### **4.3.3 Test Result of AC Conducted Emission**

Not Required

## **4.4 Antenna Requirements**

### **4.4.1 Standard Applicable**

According to antenna requirement of §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. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded..

### **4.4.2 Antenna Connected Construction**

An PCB antenna design is used.

### **4.4.3 Antenna Gain**

The antenna peak gain of EUT is 2.34 dBi.

## 5 List of Measuring Equipment

| Instrument                    | Manufacturer | Model No. | Serial No. | Calibration Date | Due Date   | Remark    |
|-------------------------------|--------------|-----------|------------|------------------|------------|-----------|
| Spectrum Analyzer             | Keysight     | N9010A    | MY56070788 | 2022-12-26       | 2023-12-25 | Conducted |
| Power Sensor                  | Keysight     | U2021XA   | MY56510025 | 2022-12-27       | 2023-12-26 | Conducted |
| Power Sensor                  | Keysight     | U2021XA   | MY57030005 | 2022-12-27       | 2023-12-26 | Conducted |
| Power Sensor                  | Keysight     | U2021XA   | MY56510018 | 2022-12-27       | 2023-12-26 | Conducted |
| Power Sensor                  | Keysight     | U2021XA   | MY56480002 | 2022-12-27       | 2023-12-26 | Conducted |
| Thermal Chamber               | Howkin       | UHL-34    | 19111801   | 2022-12-23       | 2023-12-22 | Conducted |
| Base Station                  | R&S          | CMW 270   | 101231     | 2022-12-26       | 2023-12-25 | Conducted |
| Signal Generator (Interferer) | Keysight     | N5182B    | MY56200384 | 2022-12-26       | 2023-12-25 | Conducted |
| Signal Generator (Blocker)    | Keysight     | N5171B    | MY56200661 | 2022-12-26       | 2023-12-25 | Conducted |

| Instrument           | Manufacturer  | Model No.     | Serial No. | Calibration Date | Due Date   | Remark    |
|----------------------|---------------|---------------|------------|------------------|------------|-----------|
| Spectrum Analyzer    | R&S           | FSV 40        | 101433     | 2022-12-26       | 2023-12-25 | Radiation |
| Amplifier            | Sonoma        | 310           | 363917     | 2022-12-26       | 2023-12-25 | Radiation |
| Amplifier            | Schwarzbeck   | BBV 9718      | 327        | 2022-12-27       | 2023-12-26 | Radiation |
| Amplifier            | Narda         | TTA1840-35-HG | 2034380    | 2023-01-04       | 2024-01-03 | Radiation |
| Loop Antenna         | Schwarzbeck   | FMZB 1519B    | 1519B-051  | 2023-02-12       | 2026-02-11 | Radiation |
| Broadband Antenna    | Schwarzbeck   | VULB 9168     | 9168-757   | 2020-09-27       | 2023-09-26 | Radiation |
| Horn Antenna         | Schwarzbeck   | BBHA 9120 D   | 1677       | 2023-02-12       | 2026-02-11 | Radiation |
| Horn Antenna         | COM-POWER     | AH-1840       | 101117     | 2021-06-05       | 2024-06-04 | Radiation |
| Test Software        | Auidx         | E3            | 6.111221a  | N/A              | N/A        | Radiation |
| Filter               | Micro-Tronics | BRM 50702     | G266       | N/A              | N/A        | Radiation |
| Communication Tester | R&S           | CMW270        | 101231     | 2022-12-26       | 2023-12-25 | Radiation |

| Instrument           | Manufacturer | Model No. | Serial No. | Calibration Date | Due Date   | Remark    |
|----------------------|--------------|-----------|------------|------------------|------------|-----------|
| LISN                 | R&S          | ENV216    | 102125     | 2023-12-19       | 2023-12-20 | Conducted |
| LISN                 | R&S          | ENV432    | 101327     | 2023-12-19       | 2023-12-20 | Conducted |
| EMI Test Receiver    | R&S          | ESR3      | 102143     | 2023-12-19       | 2023-12-20 | Conducted |
| EMI Test Software    | Audix        | E3        | N/A        | N/A              | N/A        | Conducted |
| Communication Tester | R&S          | CMW270    | 101231     | 2023-12-19       | 2023-12-20 | Radiation |

N/A: No Calibration Required

## 6 Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT         | FREQUENCY     | UNCERTAINTY |
|---------------------|---------------|-------------|
| Conducted emissions | 9kHz~30MHz    | 2.00 dB     |
| Radiated emission   | 30MHz ~ 1GHz  | 5.28 dB     |
|                     | 1GHz ~ 18GHz  | 5.12 dB     |
|                     | 18GHz ~ 40GHz | 5.27 dB     |

| MEASUREMENT                | UNCERTAINTY           |
|----------------------------|-----------------------|
| Occupied Channel Bandwidth | $\pm 71.333\text{Hz}$ |
| RF output power, conducted | $\pm 0.78\text{ dB}$  |
| Power density, conducted   | $\pm 2.02\text{dB}$   |
| Emissions, conducted       | $\pm 2.00\text{dB}$   |

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

## Appendix A. Setup Photographs

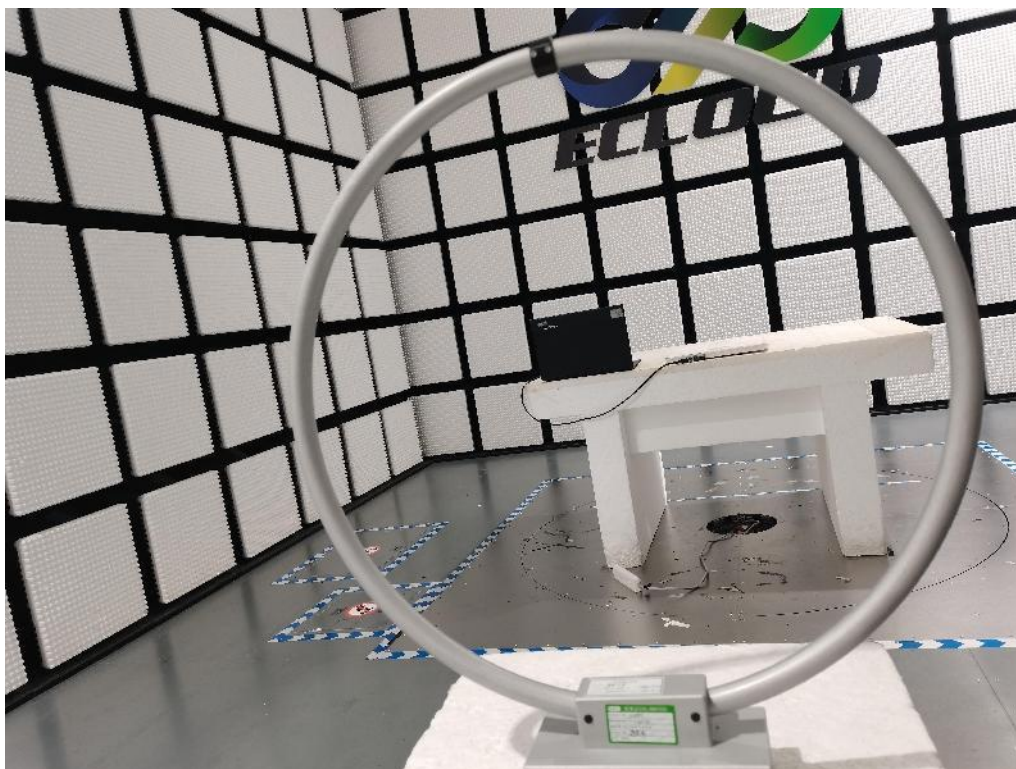


Fig. 1 Radiated emission setup photo(Below 30MHz)

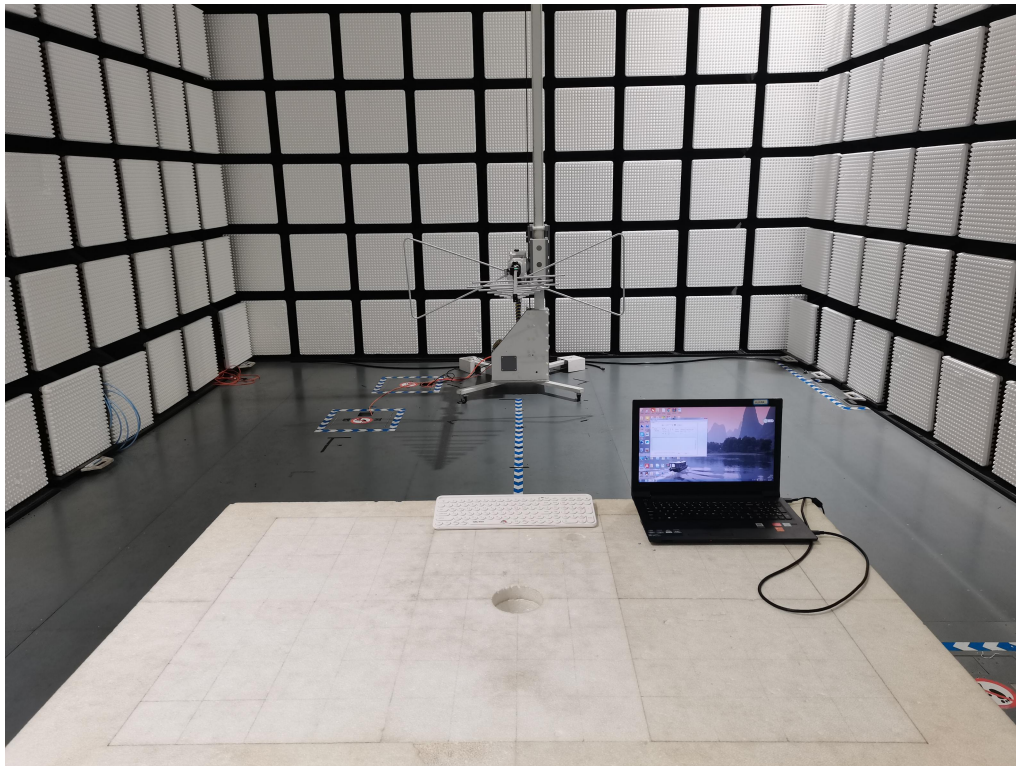


Fig. 2 Radiated emission setup photo(30MHz- 1GHz)



Fig. 3 Radiated emission setup photo(Above 1GHz)

-----End of the report-----