

# Test Report

Verified code: 662147

Report No.: E20240819312801-1

Customer: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

Sample Name: Dual Relay Module T2

Sample Model: DCM-K01

Receive Sample Test Date: Sep.20,2024

Test Date: Sep.26,2024 ~ Oct.10,2024

Reference Document: CFR 47 FCC Part 15 Subpart C  
RADIO FREQUENCY DEVICES:Subpart C—Intentional Radiators

Test Result: Pass

Prepared by: Lu Wei  
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Reviewed by: Jiang Tao  
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Approved by: Xiao Liang  
Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-10-18

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## Statement

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2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
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**REPORT ISSUED HISTORY**

| Report Version | Report No.        | Description    | Compile Date |
|----------------|-------------------|----------------|--------------|
| 1.0            | E20240819312801-1 | Original Issue | 2024-10-15   |

**Note:**

1. This report is based on the original report E20230411918001-1 to add an adapter with the model of SC06Z-240020. After evaluation, it is added to test Conducted Emissions and Radiated spurious emissions below 1GHz, other all test datas come from E20230411918001-1.
2. The difference between this report and E20230411918001-1 is:
  - a) The new adapter description and test mode was added in Section 2.3 to 2.7.
  - b) Update the calibration time for adapter test in section 6.
  - c) Add adapter test datas in sections 7&8.

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**1. TEST RESULT SUMMARY**

| Technical Requirements                                                                                          |                                             |        |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------|
| CFR 47 FCC Part 15 Subpart C (§15.247)<br>ANSI C63.10-2013<br>KDB 558074 D01 15.247 measurement guidance v05r02 |                                             |        |
| Limit / Severity                                                                                                | Item                                        | Result |
| §15.247(b)(3)                                                                                                   | Maximum peak output power                   | Pass   |
| §15.207 (a)                                                                                                     | Conducted Emissions                         | Pass   |
| §15.247(e)                                                                                                      | Power spectral density                      | Pass   |
| §15.247(a)(2)                                                                                                   | 6dB bandwidth                               | Pass   |
| §15.247(d)& §15.205&<br>§15.209                                                                                 | Restricted bands of operation               | Pass   |
| §15.247(d)                                                                                                      | Conducted band edges and spurious emissions | Pass   |
| §15.247(d) & §15.209 &<br>§15.205                                                                               | Radiated spurious emissions                 | Pass   |
| §15.203                                                                                                         | Antenna requirement                         | Pass   |

Note:

1) The EUT has one antenna. The max gain of antenna is 1dBi. The antenna is PIFA antenna, which accordance 15.203.is considered sufficient to comply with the provisions of this section.

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## 2. GENERAL DESCRIPTION OF EUT

### 2.1 APPLICANT

Name: Lumi United Technology Co., Ltd  
Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd  
Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Dual Relay Module T2  
Model No.: DCM-K01  
Adding Model: /  
Models Difference: /.  
Trade Name: Aqara  
FCC ID: 2AKIT-DCM-K01  
AC 100-250V, 50/60Hz, Max. 10A, Max 2500W; DC 24-30V, Max. 10A, Max 300W; DC 30-60V, Max. 1A, Max 60W  
Power Supply: Adapter  
Model: SC06Z-240020  
Input: 100-240V~50/60Hz 0.25A Max  
Output: 24.0V = 0.2A 4.8W  
Battery Specification: /  
Frequency Range: 2405MHz-2475MHz  
Transmit Power: 6.68dBm  
Modulation type: O-QPSK  
Antenna Specification: PIFA antenna 1dBi gain (Max.)  
Temperature Range: -10 °C ~ 40 °C  
Hardware Version: x4  
Software Version: 0.0.0\_0023  
Sample No: E20230411918001-0001, E20230411918001-0002, E20240819312801-0001  
Note: The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.

## 2.4 CHANNEL LIST

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| *11         | 2405            | 12          | 2410            | 13          | 2415            | 14          | 2420            |
| 15          | 2425            | 16          | 2430            | 17          | 2435            | *18         | 2440            |
| 19          | 2445            | 20          | 2450            | 21          | 2455            | 22          | 2460            |
| 23          | 2465            | 24          | 2470            | *25         | 2475            | /           | /               |

\* is the test frequency

## 2.5 TEST OPERATION MODE

| Mode No. | Description of the modes            |
|----------|-------------------------------------|
| 1        | Zigbee fixed frequency transmitting |

## 2.6 LOCAL SUPPORTIVE

| Name of Equipment | Manufacturer | Model            | Serial Number | Note |
|-------------------|--------------|------------------|---------------|------|
| Notebook          | LENOVO       | TianYi 310-14ISK | MP18DLC6      | /    |
| Test board        | /            | /                | /             | /    |
| Adapter           | SUNUN        | SC06Z-240020     | /             | /    |

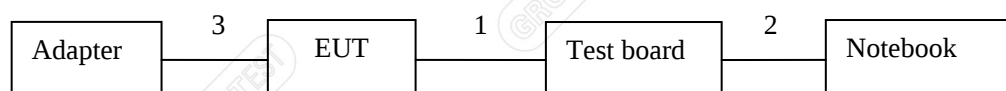
| No. | Cable Type | Qty. | Shielded Type | Ferrite Core(Qty.) | Length |
|-----|------------|------|---------------|--------------------|--------|
| 1   | DC cable   | 1    | No            | 0                  | 0.5m   |
| 2   | DC cable   | 1    | No            | 0                  | 0.2m   |
| 3   | DC cable   | 1    | No            | 0                  | 1.5m   |

Note :The notebook is just used to produce fixed frequency transmitting.

## 2.7 CONFIGURATION OF SYSTEM UNDER TEST



For Adapter



Test software:

| Software version | Test level                                |
|------------------|-------------------------------------------|
| QCOM_V1.0        | 2405MHz: 80<br>2440MHz: 80<br>2475MHz: 80 |

## 2.8 DUTY CYCLE

Environment: 24.6°C/65%RH/101.0kPa

Voltage: AC 120V/60Hz

Tested By: Qin Tingting

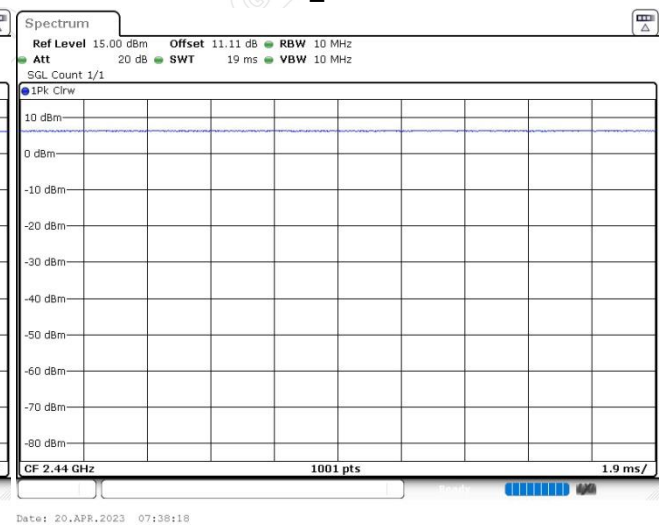
Date: 2023-04-20

| Test Mode | Antenna | Frequency (MHz) | Transmission Duration [ms] | Transmission Period [ms] | Duty Cycle [%] |
|-----------|---------|-----------------|----------------------------|--------------------------|----------------|
| Zigbee    | Ant1    | 2405            | 1.00                       | 1.00                     | 100            |
|           |         | 2440            | 1.00                       | 1.00                     | 100            |
|           |         | 2475            | 1.00                       | 1.00                     | 100            |

Lowest\_2405MHz



Middle\_2440MHz



Highest\_2475MHz



### 3. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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Shenzhen, 518110, People's Republic of China

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Fax : 0755-61180008

### 4. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:2017.

**USA** A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

**Canada** ISED (Company Number: 24897, CAB identifier:CN0069)

**USA** FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,  
<http://www.grgtest.com>

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## 5. MEASUREMENT UNCERTAINTY

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         |
|---------------------|------------|----------------|---------------------|
| Radiated Emission   | Horizontal | 9kHz~30MHz     | 5.1dB <sup>1)</sup> |
|                     |            | 30MHz~200MHz   | 4.5dB <sup>1)</sup> |
|                     |            | 200MHz~1000MHz | 4.4dB <sup>1)</sup> |
|                     |            | 1GHz~18GHz     | 5.6dB <sup>1)</sup> |
|                     |            | 18GHz~26.5GHz  | 3.7dB <sup>1)</sup> |
|                     | Vertical   | 9kHz~30MHz     | 5.1dB <sup>1)</sup> |
|                     |            | 30MHz~200MHz   | 4.4dB <sup>1)</sup> |
|                     |            | 200MHz~1000MHz | 4.5dB <sup>1)</sup> |
|                     |            | 1GHz~18GHz     | 5.6dB <sup>1)</sup> |
|                     |            | 18GHz~26.5GHz  | 3.7dB <sup>1)</sup> |
| Conduction Emission |            | 150kHz~30MHz   | 3.4dB <sup>1)</sup> |

| Measurement                      | Uncertainty          |
|----------------------------------|----------------------|
| RF frequency                     | $6.0 \times 10^{-6}$ |
| RF power conducted               | 0.8dB                |
| Power spectral density conducted | 0.8dB                |
| Occupied channel bandwidth       | 0.4dB                |
| Unwanted emission, conducted     | 0.7dB                |
| Humidity                         | 6%                   |
| Temperature                      | 2°C                  |

Note:

<sup>1)</sup> This uncertainty represents an expanded uncertainty expressed at approximately the 95%.  
This uncertainty represents an expanded uncertainty factor of  $k=2$ .

**6. LIST OF USED TEST EQUIPMENT AT GRGT**

| Name of Equipment                                                                              | Manufacturer       | Model           | Serial Number          | Calibration Due |
|------------------------------------------------------------------------------------------------|--------------------|-----------------|------------------------|-----------------|
| <b>Radiated Spurious Emission&amp;Restricted bands of operation</b>                            |                    |                 |                        |                 |
| Test S/W                                                                                       | EZ                 | CCS-03A1        |                        |                 |
| Test Receiver                                                                                  | R&S                | ESR7            | 102444                 | 2023-09-02      |
| Preamplifier                                                                                   | EMEC               | EM330           | I00426                 | 2024-02-06      |
| Bi-log Antenna                                                                                 | Schwarzbeck        | CBL6143A        | 26039                  | 2024-10-23      |
| Loop Antenna                                                                                   | Schwarzbeck        | FMZB 1513-60    | 1513-60-56             | 2023-08-06      |
| Spectrum Analyzer                                                                              | KEYSIGHT           | N9010A          | MY52221469             | 2023-06-29      |
| Horn Antenna                                                                                   | Schwarzbeck        | BBHA9120D       | 02143                  | 2023-10-15      |
| Board-Band Horn Antenna                                                                        | Schwarzbeck        | BBHA 9170       | BBHA9170-497           | 2023-10-14      |
| Amplifier                                                                                      | Tonscend           | TAP01018048     | AP20E8060075           | 2024-04-11      |
| Amplifier                                                                                      | Tonscend           | TAP184050       | AP20E806071            | 2024-04-16      |
| Amplifier                                                                                      | SHIRONG ELECTRONIC | DLNA-1G18G-G40  | 20200928005            | 2023-08-27      |
| Test S/W                                                                                       | Tonscend           | JS36-RE/2.5.1.5 |                        |                 |
| <b>6dB Bandwidth&amp;Conducted band edges and Spurious Emission&amp;Power Spectral Density</b> |                    |                 |                        |                 |
| Spectrum Analyzer                                                                              | R&S                | FSV30           | 1321.3008K30-104381-rH | 2023-11-17      |
| BT/WIFI System                                                                                 | Tonscend           | JS0806          |                        |                 |
| <b>Maximum Peak Output Power</b>                                                               |                    |                 |                        |                 |
| Pulse power sensor                                                                             | Anristu            | MA2411B         | 1126150                | 2024-02-12      |
| Power meter                                                                                    | Anristu            | ML2495A         | 1204003                | 2024-02-12      |
| <b>Conduction Emission</b>                                                                     |                    |                 |                        |                 |
| EMI TESTRECEIVER                                                                               | R&S                | ESCI            | 100783                 | 2023-08-28      |
| LISN(EUT)                                                                                      | R&S                | ENV216          | 101543                 | 2023-09-13      |
| Test S/W                                                                                       | EZ                 | CCS-3A1-CE      |                        |                 |

Note: The calibration cycle of the above instruments is 12 months.

For Adapter

| Name of Equipment                                    | Manufacturer       | Model         | Serial Number | Calibration Due |
|------------------------------------------------------|--------------------|---------------|---------------|-----------------|
| Conduction Emission                                  |                    |               |               |                 |
| Test Receiver                                        | R&S                | ESCI          | 100783        | 2025/07/19      |
| LISN(EUT)                                            | R&S                | ENV216        | 101543        | 2025/07/10      |
| Test S/W                                             | EZ                 | CCS-3A1-CE    |               |                 |
| Radiated Spurious Emission (Frequencies up to 1 GHz) |                    |               |               |                 |
| Test S/W                                             | Tonscend           | JS32-RE       | 5.0.0         | /               |
| Test Receiver                                        | R&S                | ESR26         | 101758        | 2025/09/10      |
| Preamplifier                                         | Shirong Electronic | DLNA-9k1G-G40 | 20200928003   | 2024/11/26      |
| Bi-log Antenna                                       | Schwarzbeck        | VULB 9160     | VULB9160-3401 | 2024/12/04      |

Note: The calibration cycle of the above instruments is 12 months.

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## 7. CONDUCTED EMISSION MEASUREMENT

### 7.1 LIMITS

| Frequency range | Limits (dB $\mu$ V) |         |
|-----------------|---------------------|---------|
|                 | Quasi-peak          | Average |
| 150kHz~0.5MHz   | 66~56               | 56~46   |
| 0.5MHz~5MHz     | 56                  | 46      |
| 5MHz~30MHz      | 60                  | 50      |

**NOTE:** (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

### 7.2 TEST PROCEDURES

#### Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2013.

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

- Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

- 1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

- 2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

- All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

- The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

- I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

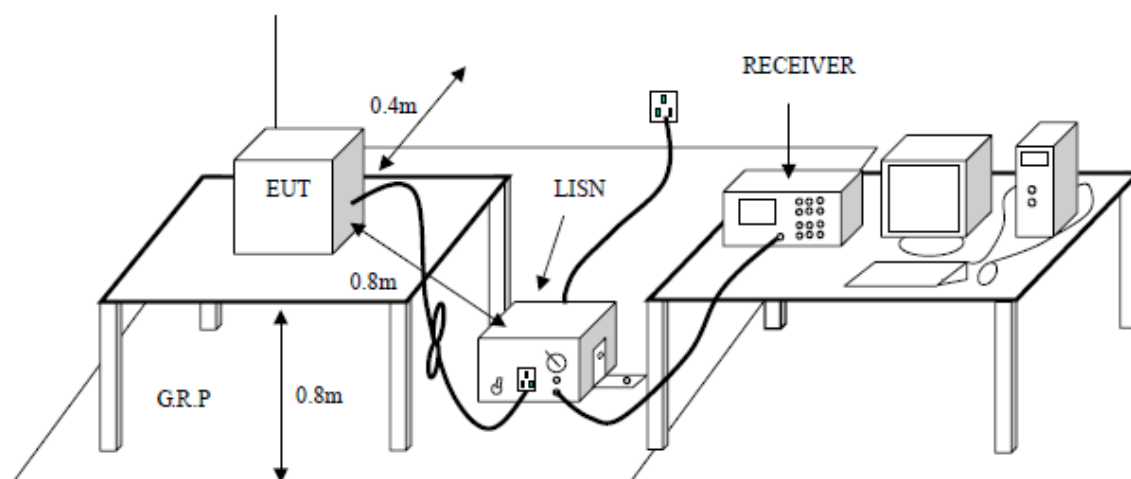
The test mode(s) described in Item 2.6 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.6 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

#### Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

### 7.3 TEST SETUP



### 7.4 DATA SAMPLE

| Frequency (MHz) | QuasiPeak Reading (dBuV) | Average Reading (dBuV) | Correction Factor (dB) | QuasiPeak Result (dBuV) | Average Result (dBuV) | QuasiPeak Limit (dBuV) | Average Limit (dBuV) | QuasiPeak Margin (dB) | Average Margin (dB) | Remark (Pass/Fail) |
|-----------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|---------------------|--------------------|
| X.XXXX          | 32.69                    | 25.65                  | 11.52                  | 44.21                   | 37.17                 | 65.78                  | 55.79                | -21.57                | -18.62              | Pass               |

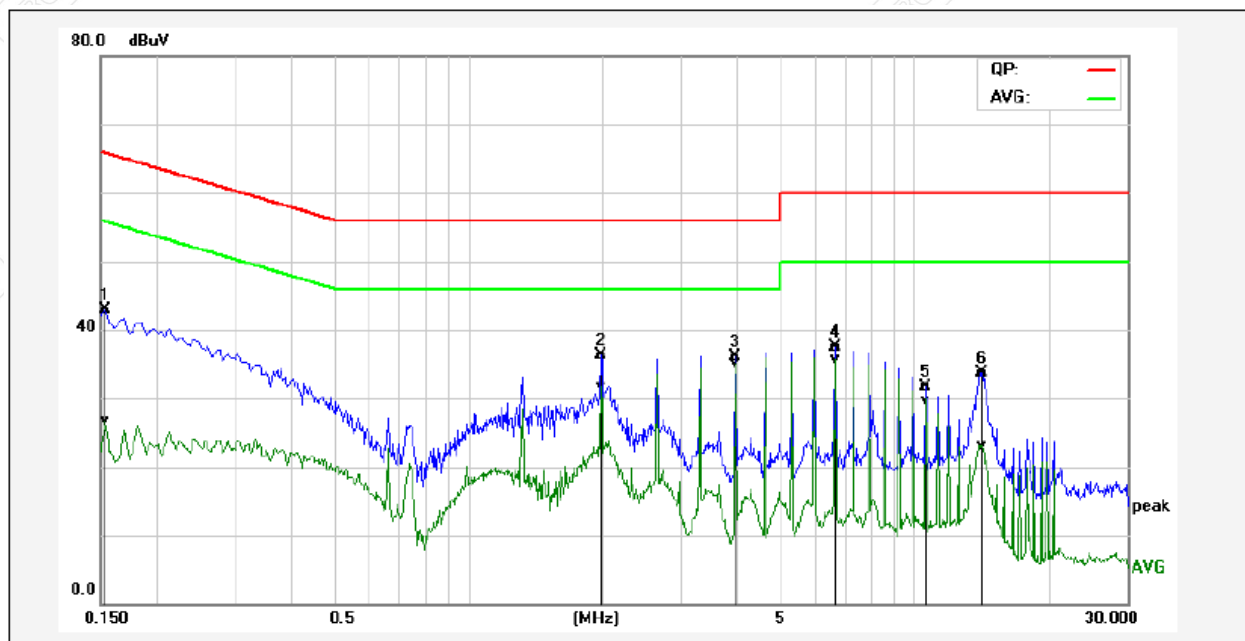
Factor = Insertion loss of LISN + Cable Loss  
 Result = Quasi-peak Reading/ Average Reading + Factor  
 Limit = Limit stated in standard  
 Margin = Result (dBuV) – Limit (dBuV)

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## 7.5 TEST RESULTS

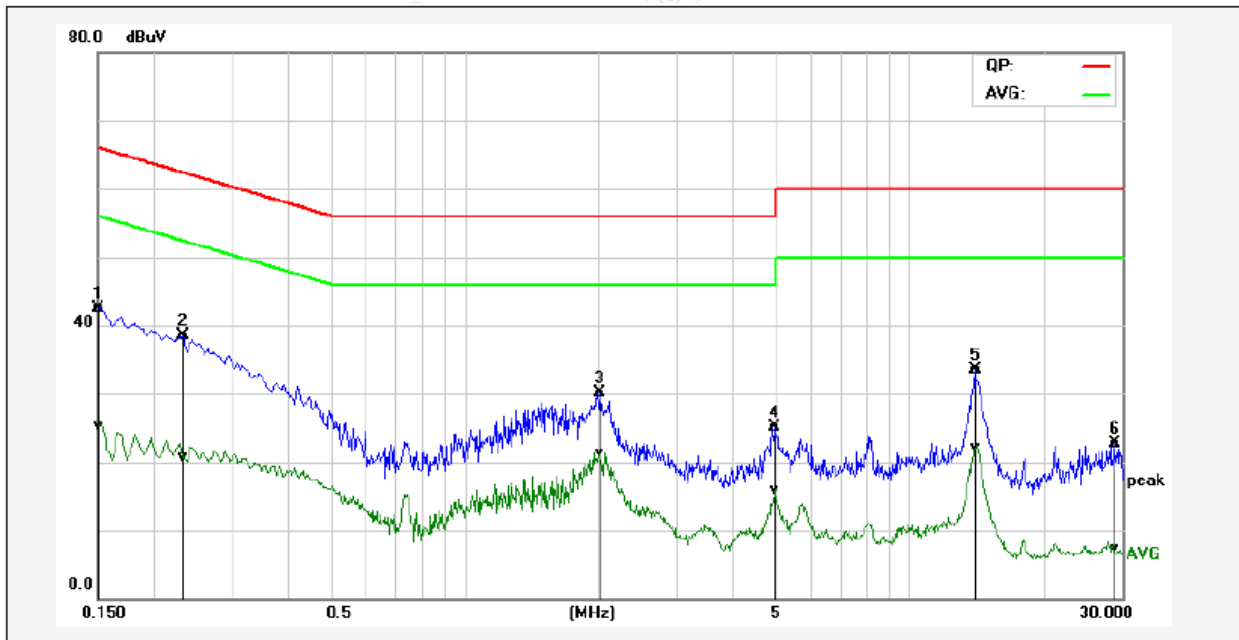
All modes were pretested and only the worst modes and channels were recorded in this report: Highest channel (2475MHz), Power supply: AC 120V/60Hz

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20230411918001-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 24.1°C/51%RH/101.0kPa |
| Test Engineer: | Huang Xinlong             | Test Date:                | 2023-05-10            |
| Channel        | Highest channel (2475MHz) | Line:                     | L                     |



| No. | Frequency (MHz) | QuasiPeak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | QuasiPeak result (dBuV) | Average result (dBuV) | QuasiPeak limit (dBuV) | Average limit (dBuV) | QuasiPeak margin (dB) | Average margin (dB) | Remark |
|-----|-----------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|---------------------|--------|
| 1   | 0.1539          | 33.34                    | 17.00                  | 9.61                   | 42.95                   | 26.61                 | 65.78                  | 55.79                | -22.83                | -29.18              | Pass   |
| 2   | 1.9900          | 26.62                    | 21.97                  | 9.65                   | 36.27                   | 31.62                 | 56.00                  | 46.00                | -19.73                | -14.38              | Pass   |
| 3*  | 3.9820          | 26.45                    | 25.37                  | 9.68                   | 36.13                   | 35.05                 | 56.00                  | 46.00                | -19.87                | -10.95              | Pass   |
| 4   | 6.6340          | 27.77                    | 26.02                  | 9.73                   | 37.50                   | 35.75                 | 60.00                  | 50.00                | -22.50                | -14.25              | Pass   |
| 5   | 10.6180         | 21.86                    | 20.03                  | 9.77                   | 31.63                   | 29.80                 | 60.00                  | 50.00                | -28.37                | -20.20              | Pass   |
| 6   | 14.1380         | 23.92                    | 13.29                  | 9.80                   | 33.72                   | 23.09                 | 60.00                  | 50.00                | -26.28                | -26.91              | Pass   |

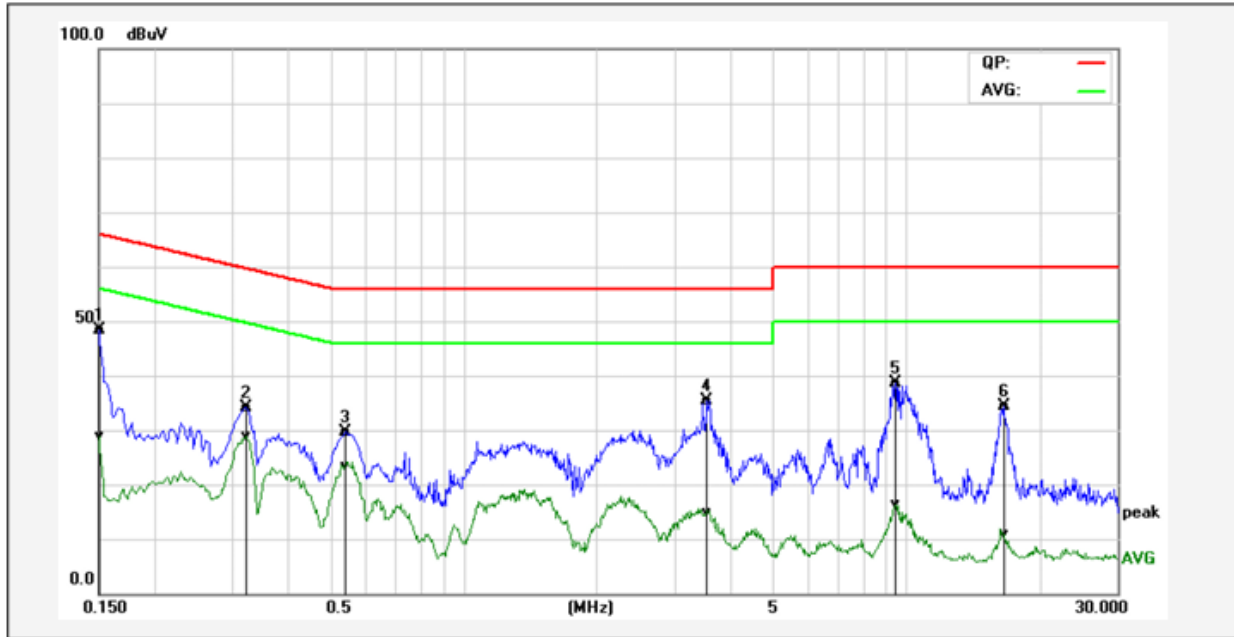
|                |                           |                           |                        |
|----------------|---------------------------|---------------------------|------------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                 |
| Model:         | DCM-K01                   | Sample No:                | E20230411918001-0001   |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 24.1 °C/51%RH/101.0kPa |
| Test Engineer: | Huang Xinlong             | Test Date:                | 2023-05-10             |
| Channel        | Highest channel (2475MHz) | Line:                     | N                      |



| No. | Frequency (MHz) | QuasiPeak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | QuasiPeak result (dBuV) | Average result (dBuV) | QuasiPeak limit (dBuV) | Average limit (dBuV) | QuasiPeak margin (dB) | Average margin (dB) | Remark |
|-----|-----------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|---------------------|--------|
| 1*  | 0.1500          | 32.94                    | 15.63                  | 9.60                   | 42.54                   | 25.23                 | 65.99                  | 56.00                | -23.45                | -30.77              | Pass   |
| 2   | 0.2340          | 28.91                    | 11.16                  | 9.60                   | 38.51                   | 20.76                 | 62.30                  | 52.31                | -23.79                | -31.55              | Pass   |
| 3   | 2.0180          | 20.45                    | 11.64                  | 9.64                   | 30.09                   | 21.28                 | 56.00                  | 46.00                | -25.91                | -24.72              | Pass   |
| 4   | 5.0020          | 15.47                    | 6.21                   | 9.70                   | 25.17                   | 15.91                 | 60.00                  | 50.00                | -34.83                | -34.09              | Pass   |
| 5   | 14.0180         | 23.71                    | 12.33                  | 9.86                   | 33.57                   | 22.19                 | 60.00                  | 50.00                | -26.43                | -27.81              | Pass   |
| 6   | 28.8300         | 12.67                    | -2.79                  | 10.05                  | 22.72                   | 7.26                  | 60.00                  | 50.00                | -37.28                | -42.74              | Pass   |

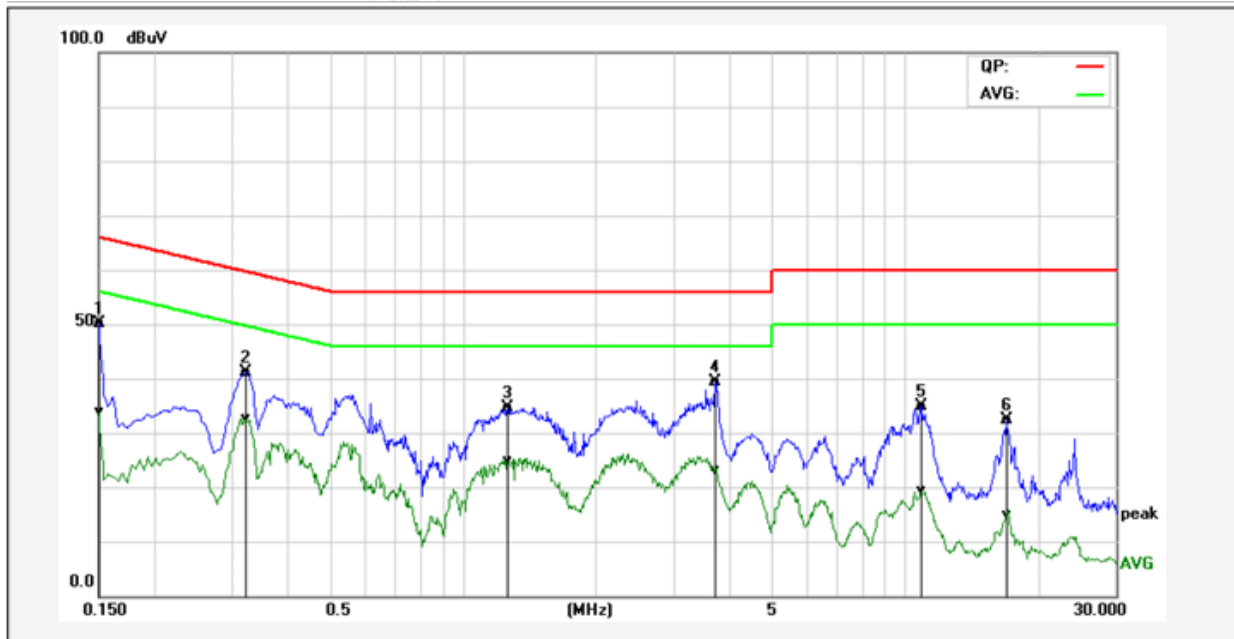
For Adapter

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20240819312801-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 22.9°C/49%RH/101.0kPa |
| Test Engineer: | Chen Zexin                | Test Date:                | 2024-10-10            |
| Channel        | Highest channel (2475MHz) | Line:                     | L1                    |



| No. | Frequency (MHz) | QuasiPeak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | QuasiPeak result (dBuV) | Average result (dBuV) | QuasiPeak limit (dBuV) | Average limit (dBuV) | QuasiPeak margin (dB) | Average margin (dB) | Remark |
|-----|-----------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|---------------------|--------|
| 1*  | 0.1500          | 38.64                    | 19.17                  | 9.82                   | 48.46                   | 28.99                 | 65.99                  | 56.00                | -17.53                | -27.01              | Pass   |
| 2   | 0.3220          | 24.56                    | 19.19                  | 9.68                   | 34.24                   | 28.87                 | 59.65                  | 49.66                | -25.41                | -20.79              | Pass   |
| 3   | 0.5420          | 19.94                    | 13.63                  | 9.69                   | 29.63                   | 23.32                 | 56.00                  | 46.00                | -26.37                | -22.68              | Pass   |
| 4   | 3.5580          | 25.45                    | 4.94                   | 9.94                   | 35.39                   | 14.88                 | 56.00                  | 46.00                | -20.61                | -31.12              | Pass   |
| 5   | 9.4580          | 28.73                    | 6.55                   | 9.88                   | 38.61                   | 16.43                 | 60.00                  | 50.00                | -21.39                | -33.57              | Pass   |
| 6   | 16.5860         | 24.25                    | 0.98                   | 10.01                  | 34.26                   | 10.99                 | 60.00                  | 50.00                | -25.74                | -39.01              | Pass   |

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20240819312801-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 22.9°C/49%RH/101.0kPa |
| Test Engineer: | Chen Zexin                | Test Date:                | 2024-10-10            |
| Channel        | Highest channel (2475MHz) | Line:                     | N                     |



| No. | Frequency (MHz) | QuasiPeak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | QuasiPeak result (dBuV) | Average result (dBuV) | QuasiPeak limit (dBuV) | Average limit (dBuV) | QuasiPeak margin (dB) | Average margin (dB) | Remark |
|-----|-----------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|---------------------|--------|
| 1*  | 0.1500          | 40.35                    | 24.01                  | 9.82                   | 50.17                   | 33.83                 | 65.99                  | 56.00                | -15.82                | -22.17              | Pass   |
| 2   | 0.3220          | 31.45                    | 23.02                  | 9.68                   | 41.13                   | 32.70                 | 59.65                  | 49.66                | -18.52                | -16.96              | Pass   |
| 3   | 1.2660          | 24.95                    | 15.10                  | 9.78                   | 34.73                   | 24.88                 | 56.00                  | 46.00                | -21.27                | -21.12              | Pass   |
| 4   | 3.7300          | 29.54                    | 13.23                  | 9.90                   | 39.44                   | 23.13                 | 56.00                  | 46.00                | -16.56                | -22.87              | Pass   |
| 5   | 10.9500         | 24.89                    | 9.44                   | 9.90                   | 34.79                   | 19.34                 | 60.00                  | 50.00                | -25.21                | -30.66              | Pass   |
| 6   | 16.9619         | 22.28                    | 4.79                   | 10.03                  | 32.31                   | 14.82                 | 60.00                  | 50.00                | -27.69                | -35.18              | Pass   |

## 8. RADIATED SPURIOUS EMISSIONS

### 8.1 LIMITS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

| Frequency (MHz) | Quasi-peak( $\mu\text{V/m}$ ) | Measurement distance(m) | Quasi-peak(dB $\mu\text{V/m}$ )@distance 3m |
|-----------------|-------------------------------|-------------------------|---------------------------------------------|
| 0.009-0.490     | 2400/F(kHz)                   | 300                     | 128.5~93.8                                  |
| 0.490-1.705     | 24000/F(kHz)                  | 30                      | 73.8~63                                     |
| 1.705-30.0      | 30                            | 30                      | 69.5                                        |
| 30~88           | 100                           | 3                       | 40                                          |
| 88~216          | 150                           | 3                       | 43.5                                        |
| 216~960         | 200                           | 3                       | 46                                          |
| Above 960       | 500                           | 3                       | 54                                          |

**NOTE:** (1) The lower limit shall apply at the transition frequencies.

(2) Above 18GHz test distance is 1m, so the Peak Limit=74+20\*log(3/1)=83.54 (dB $\mu\text{V/m}$ ).

The Avg Limit=54+20\*log(3/1)=63.54 (dB $\mu\text{V/m}$ ).

### 8.2 TEST PROCEDURES

#### 1) Sequence of testing 9kHz to 30MHz

##### Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.
- The EUT is placed on a desktop position in the center of the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

##### Pre measurement:

- The turntable rotates from 0 ° to 360 °.
- The antenna height is 1.0 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions.

##### Final measurement:

- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0 ° to 360 °) and by rotating the elevation axes (0 ° to 360 °).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QP detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

## 2) Sequence of testing 30MHz to 1GHz

### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

--- The EUT is placed on a desktop position in the center of the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

### Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 4 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

### Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of pre measurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

## 3) Sequence of testing 1GHz to 18GHz

### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

--- The EUT is placed on a desktop position in the center of the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Pre measurement:**

- The turntable rotates from 0 °to 360 °.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

**Final measurement:**

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of pre measurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

**4) Sequence of testing above 18GHz****Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.
- The EUT is placed on a desktop position in the center of the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

**Pre measurement:**

- The antenna is moved spherical over the EUT in different polarisations of the antenna.

**Final measurement:**

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the pre measurements with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

**NOTE:**

- (a).The frequency from 9kHz to 150kHz, Set RBW=300Hz(for Peak&AVG), RBW=300Hz(for Peak&AVG). the frequency from 150kHz to 30MHz, Set RBW=9kHz, RBW=9kHz, (for QP Detector).
- (b).The frequency from 30MHz to 1GHz, Set RBW=120kHz, RBW=300kHz, (for QP Detector).
- (c).The frequency above 1GHz, for Peak detector: Set RBW=1MHz, RBW=3MHz.
- (d).The frequency above 1GHz, for Avg detector: Set RBW=1MHz, the EUT is configured to transmit with duty cycle $\geq$ 98%, set VBW $\leq$ RBW/100 (i.e.,10kHz) but not less than 10 Hz.

### 8.3 TEST SETUP

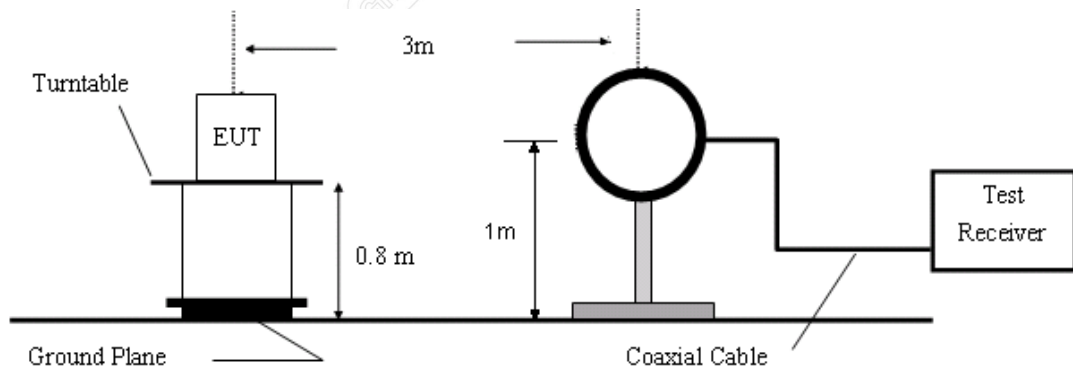


Figure 1. 9kHz to 30MHz radiated emissions test configuration

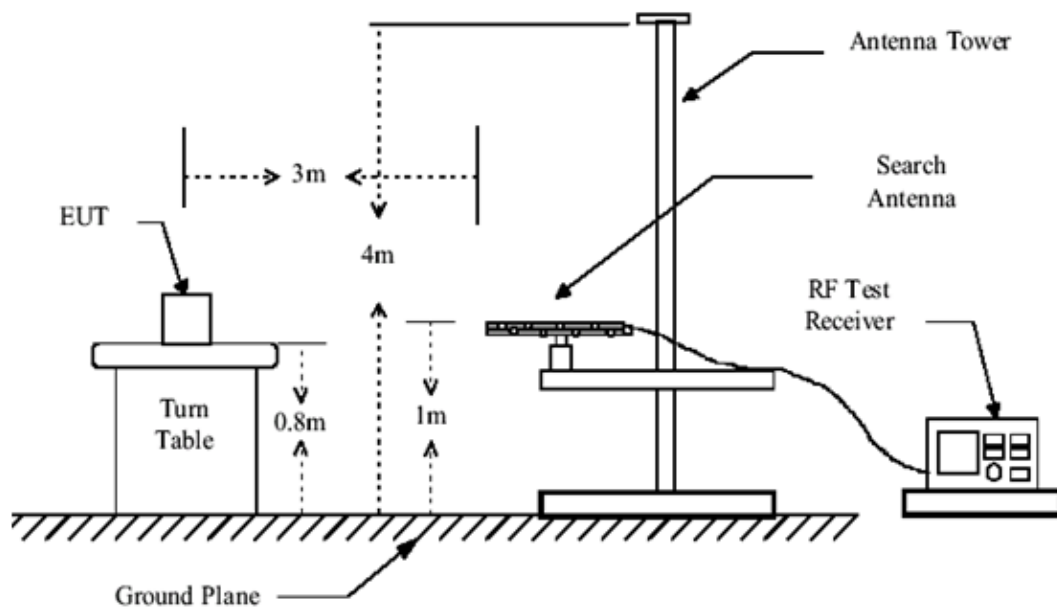


Figure 2. 30MHz to 1GHz radiated emissions test configuration

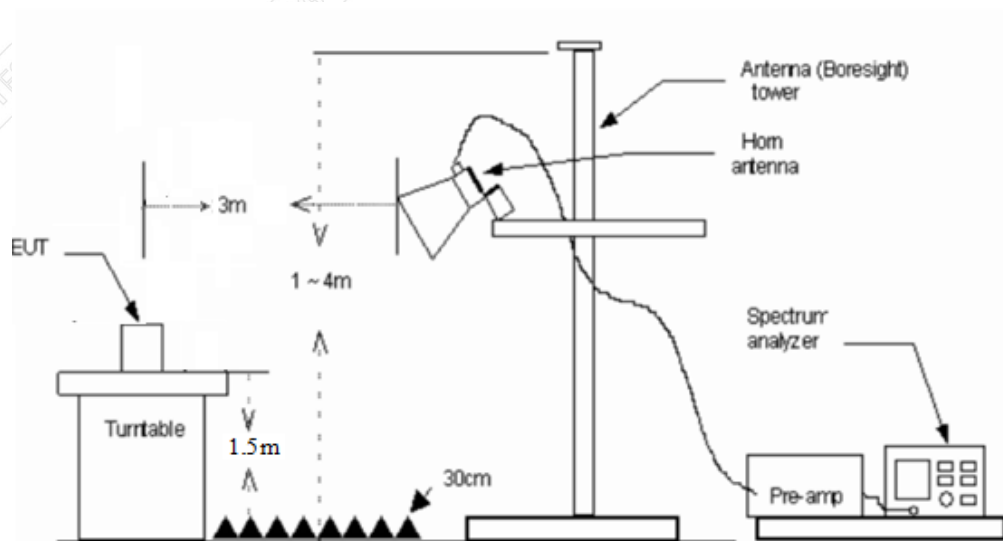


Figure 3. 1GHz-18GHz radiated emissions test configuration

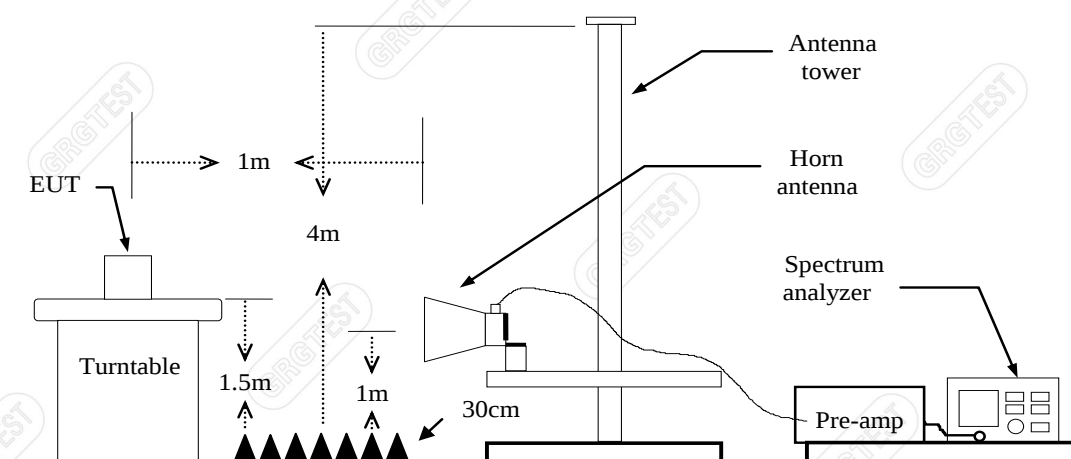


Figure 4. 18GHz-26.5GHz radiated emissions test configuration

#### 8.4 DATA SAMPLE

##### 30MHz to 1GHz

| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (deg.) | Height (cm) | Detector type |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|---------------|-------------|---------------|
| XXXX            | 63.53          | -27.15                | 36.38           | 43.50          | -7.12       | 0             | 100         | QP            |

Frequency (MHz) = Emission frequency in MHz

Reading (dBuV) = Uncorrected Analyzer / Receiver reading

Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)

Limit (dBuV/m) = Limit stated in standard

Margin (dB) = Result (dBuV/m) – Limit(dBuV/m)

QP = Quasi-peak Reading

**1GHz-18GHz**

| No. | Freq. [MHz] | Reading [dB $\mu$ V/m] | Level [dB $\mu$ V/m] | Factor [dB] | Limit [dB $\mu$ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   | Remark |
|-----|-------------|------------------------|----------------------|-------------|----------------------|-------------|-------------|-----------|------------|--------|
| xxx | xxxx        | 78.01                  | 55.30                | -22.71      | 74.00                | 18.70       | 100         | 50        | Horizontal | Peak   |
| xxx | xxxx        | 66.37                  | 43.66                | -22.71      | 54.00                | 10.34       | 100         | 50        | Horizontal | AVG    |

**Above 18GHz**

| No. | Freq. [MHz] | Reading [dB $\mu$ V/m] | Level [dB $\mu$ V/m] | Factor [dB] | Limit [dB $\mu$ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | Remark |
|-----|-------------|------------------------|----------------------|-------------|----------------------|-------------|-------------|-----------|----------|--------|
| xxx | xxxx        | 54.49                  | 42.38                | -12.11      | 83.54                | 41.16       | 100         | 211       | Vertical | Peak   |
| xxx | xxxx        | 43.99                  | 31.88                | -12.11      | 63.54                | 31.66       | 100         | 211       | Vertical | AVG    |

Frequency (MHz) = Emission frequency in MHz

Reading (dB $\mu$ V/m) = Uncorrected Analyzer / Receiver reading

Level (dB $\mu$ V/m) = Reading (dB $\mu$ V/m) + Factor (dB/m)

Limit (dB $\mu$ V/m) = Limit stated in standard

Margin (dB) = Limit (dB $\mu$ V/m) – Level (dB $\mu$ V/m)

Polarity = Antenna polarization

Peak = Peak Reading

AVG = Average Reading

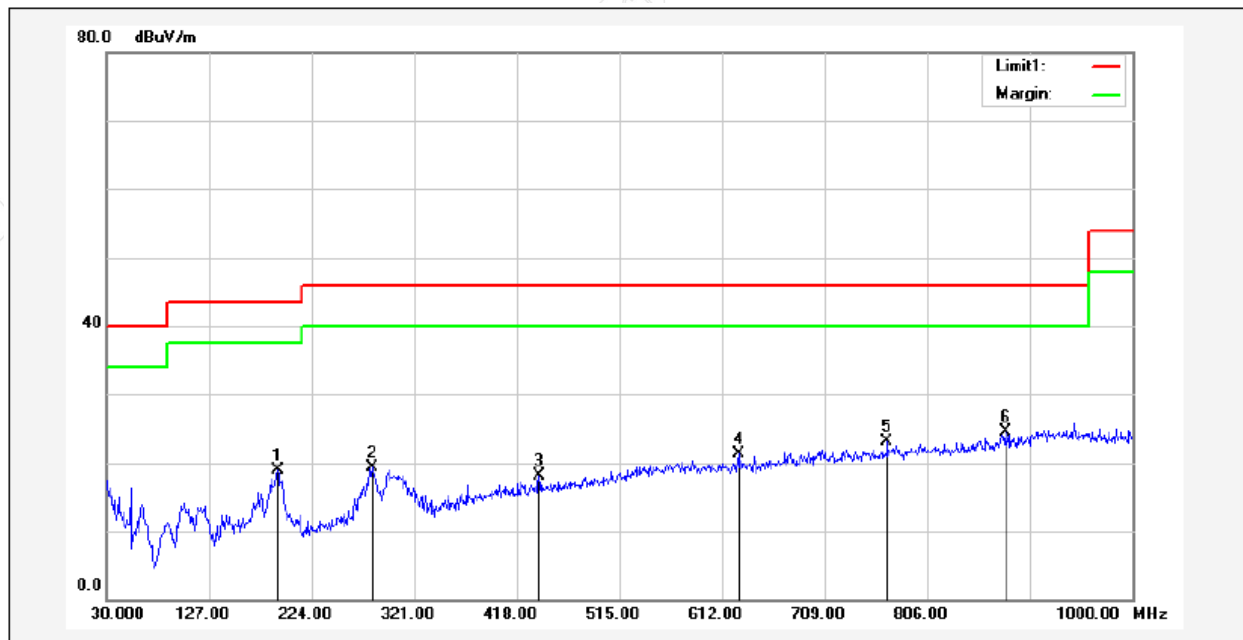
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## 8.5 TEST RESULTS

### Below 1GHz

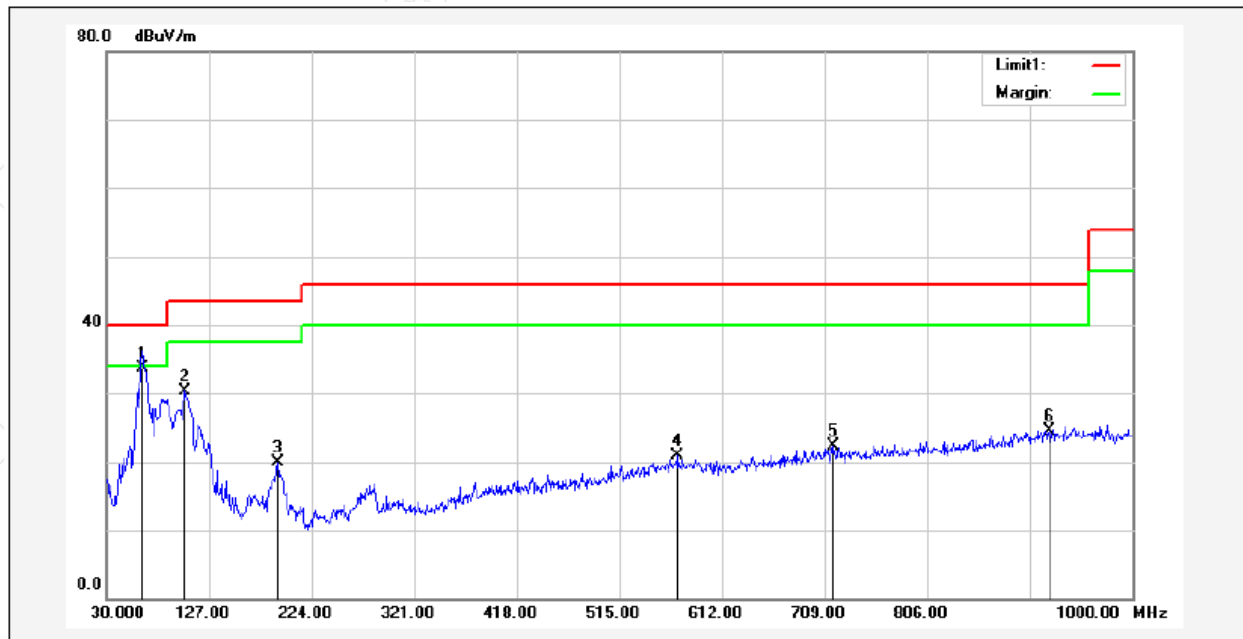
Pre-scan all mode(power supply:AC 120V/60Hz, DC 30V, DC 60V) and recorded the worst case results in this report (Highest channel (2475MHz),Power supply:AC 120V/60Hz)

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20230411918001-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 24.5°C/55%RH/101.0kPa |
| Test Engineer: | Huang Xinlong             | Test Date:                | 2023-05-06            |
| Channel        | Highest channel (2475MHz) | Polarity:                 | Horizontal            |



| No. | Frequency (MHz) | Reading (dBuV) | Correction factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (deg.) | Height (cm) | Detector type |
|-----|-----------------|----------------|-------------------------|-----------------|----------------|-------------|---------------|-------------|---------------|
| 1   | 191.9900        | 45.79          | -26.80                  | 18.99           | 43.50          | -24.51      | 34            | 200         | QP            |
| 2   | 281.2300        | 43.11          | -23.77                  | 19.34           | 46.00          | -26.66      | 185           | 100         | QP            |
| 3   | 439.3400        | 37.15          | -19.13                  | 18.02           | 46.00          | -27.98      | 221           | 100         | QP            |
| 4   | 627.5200        | 37.07          | -15.76                  | 21.31           | 46.00          | -24.69      | 96            | 200         | QP            |
| 5   | 768.1700        | 37.03          | -13.92                  | 23.11           | 46.00          | -22.89      | 238           | 200         | QP            |
| 6*  | 879.7200        | 37.36          | -12.92                  | 24.44           | 46.00          | -21.56      | 112           | 100         | QP            |

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20230411918001-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 24.5°C/55%RH/101.0kPa |
| Test Engineer: | Huang Xinlong             | Test Date:                | 2023-05-06            |
| Channel        | Highest channel (2475MHz) | Polarity:                 | Vertical              |



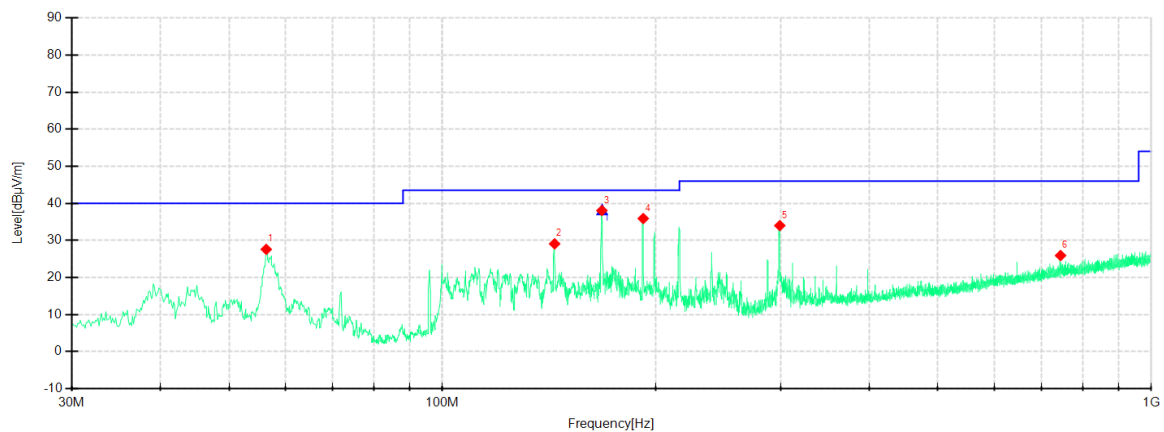
| No. | Frequency (MHz) | Reading (dBuV) | Correction factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (deg.) | Height (cm) | Detector type |
|-----|-----------------|----------------|-------------------------|-----------------|----------------|-------------|---------------|-------------|---------------|
| 1*  | 63.9500         | 63.32          | -29.52                  | 33.80           | 40.00          | -6.20       | 358           | 100         | QP            |
| 2   | 104.6900        | 57.81          | -27.41                  | 30.40           | 43.50          | -13.10      | 14            | 100         | QP            |
| 3   | 191.9900        | 46.69          | -26.80                  | 19.89           | 43.50          | -23.61      | 1             | 200         | QP            |
| 4   | 570.2900        | 36.96          | -16.15                  | 20.81           | 46.00          | -25.19      | 163           | 200         | QP            |
| 5   | 717.7300        | 36.49          | -14.26                  | 22.23           | 46.00          | -23.77      | 358           | 100         | QP            |
| 6   | 921.4300        | 37.03          | -12.51                  | 24.52           | 46.00          | -21.48      | 134           | 200         | QP            |

#### Remark:

- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

For Adapter

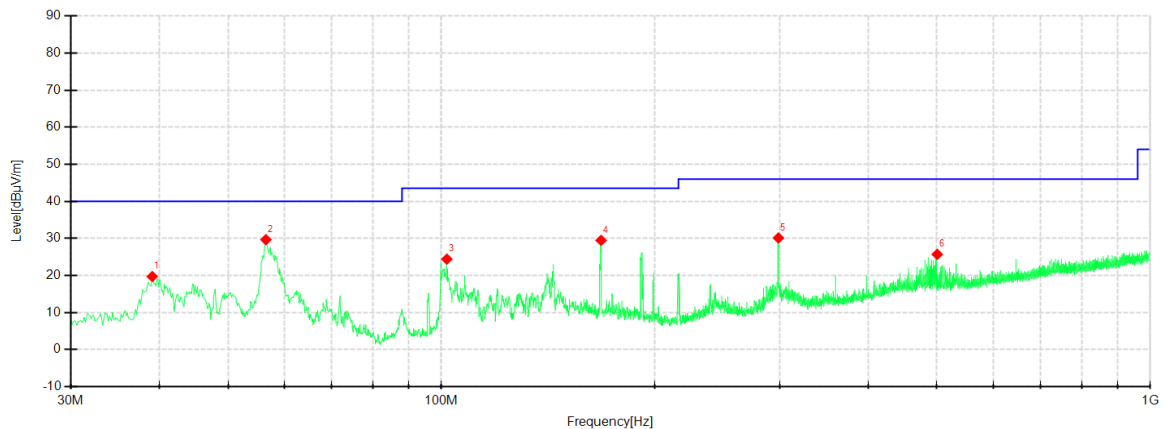
|                |                           |                           |                      |
|----------------|---------------------------|---------------------------|----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1               |
| Model:         | DCM-K01                   | Sample No:                | E20240819312801-0001 |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 25.8℃/64%RH/101.0kPa |
| Test Engineer: | Chen Zexin                | Test Date:                | 2024-09-26           |
| Channel        | Highest channel (2475MHz) | Polarity:                 | Horizontal           |



| Suspected Data List |             |                  |                |             |                |             |             |           |       |
|---------------------|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|-------|
| NO.                 | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Trace |
| 1                   | 56.4358     | 56.84            | 27.57          | -29.27      | 40.00          | 12.43       | 200         | 275       | QP    |
| 2                   | 143.9892    | 57.37            | 29.07          | -28.30      | 43.50          | 14.43       | 200         | 326       | QP    |
| 3                   | 167.8785    | 66.86            | 38.04          | -28.82      | 43.50          | 5.46        | 200         | 184       | QP    |
| 4                   | 192.0103    | 66.88            | 35.89          | -30.99      | 43.50          | 7.61        | 200         | 339       | QP    |
| 5                   | 299.2087    | 61.51            | 33.99          | -27.52      | 46.00          | 12.01       | 100         | 186       | QP    |
| 6                   | 744.7368    | 43.15            | 25.91          | -17.24      | 46.00          | 20.09       | 200         | 312       | QP    |

| Final Data List |             |             |                  |                |                |             |             |           |       |
|-----------------|-------------|-------------|------------------|----------------|----------------|-------------|-------------|-----------|-------|
| NO.             | Freq. [MHz] | Factor [dB] | Reading [dBμV/m] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Trace |
| 1               | 168.0048    | -28.82      | 67.11            | 38.29          | 43.50          | 5.21        | 198         | 174.3     | QP    |

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20240819312801-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 25.8°C/64%RH/101.0kPa |
| Test Engineer: | Chen Zexin                | Test Date:                | 2024-09-26            |
| Channel        | Highest channel (2475MHz) | Polarity:                 | Vertical              |



| Suspected Data List |             |                  |                |             |                |             |             |           |       |
|---------------------|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|-------|
| NO.                 | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Trace |
| 1                   | 39.0949     | 49.06            | 19.71          | -29.35      | 40.00          | 20.29       | 100         | 275       | QP    |
| 2                   | 56.5571     | 58.94            | 29.66          | -29.28      | 40.00          | 10.34       | 200         | 20        | QP    |
| 3                   | 101.7890    | 56.10            | 24.40          | -31.70      | 43.50          | 19.10       | 100         | 162       | QP    |
| 4                   | 167.9998    | 58.29            | 29.46          | -28.83      | 43.50          | 14.04       | 100         | 162       | QP    |
| 5                   | 298.8449    | 57.62            | 30.10          | -27.52      | 46.00          | 15.90       | 200         | 200       | QP    |
| 6                   | 500.5088    | 47.20            | 25.69          | -21.51      | 46.00          | 20.31       | 100         | 340       | QP    |

**Remark:**

- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of Receiver between 30MHz to 1GHz was 120kHz.

**1GHz-18GHz:**

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Pre-scan all mode(Power supply:AC 120V/60Hz, DC 30V, DC 60V) and recorded the worst case results in this report (Power supply:AC 120V/60Hz)

|                |                          |                           |                      |
|----------------|--------------------------|---------------------------|----------------------|
| EUT Name:      | Dual Relay Module T2     | Test Mode:                | Mode 1               |
| Model:         | DCM-K01                  | Sample No:                | E20230411918001-0001 |
| Power supply:  | AC 120V/60Hz             | Environmental Conditions: | 18.9℃/65%RH/101.0kPa |
| Test Engineer: | Zhang Zishan             | Test Date:                | 2023-04-25           |
| Channel        | Lowest channel (2405MHz) | /                         | /                    |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1   | 1115.0115   | 72.90            | 47.54          | -25.36      | 74.00          | 26.46       | 100         | 240       | Horizontal |
| 2   | 1307.8308   | 71.09            | 48.25          | -22.84      | 74.00          | 25.75       | 200         | 173       | Horizontal |
| 3   | 1683.0683   | 64.54            | 41.63          | -22.91      | 74.00          | 32.37       | 200         | 222       | Horizontal |
| 4   | 2367.1367   | 64.70            | 44.52          | -20.18      | 74.00          | 29.48       | 100         | 121       | Horizontal |
| 5   | 4809.1809   | 60.73            | 48.13          | -12.60      | 74.00          | 25.87       | 200         | 229       | Horizontal |
| 6   | 17894.9895  | 46.96            | 55.49          | 8.53        | 74.00          | 18.51       | 200         | 350       | Horizontal |

**AV Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | AV Reading [dBμV/m] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|-------------|---------------------|-------------------|-------------------|----------------|-------------|-----------|------------|
| 1   | 1307.8218   | -22.84      | 60.36               | 37.52             | 54.00             | 16.48          | 200         | 173       | Horizontal |
| 2   | 4810.382    | -12.60      | 49.88               | 37.28             | 54.00             | 16.72          | 152         | 269.8     | Horizontal |
| 3   | 17883.1946  | 8.53        | 32.10               | 40.63             | 54.00             | 13.37          | 200         | 0         | Horizontal |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 1113.8114   | 72.72            | 50.00          | -22.72      | 74.00          | 24.00       | 200         | 301       | Vertical |
| 2   | 1320.432    | 73.61            | 50.69          | -22.92      | 74.00          | 23.31       | 200         | 241       | Vertical |
| 3   | 3498.0498   | 61.53            | 44.82          | -16.71      | 74.00          | 29.18       | 200         | 139       | Vertical |
| 4   | 4810.6811   | 60.58            | 47.70          | -12.88      | 74.00          | 26.30       | 100         | 238       | Vertical |
| 5   | 9771.6772   | 50.00            | 54.31          | 4.31        | 74.00          | 19.69       | 100         | 147       | Vertical |
| 6   | 17962.4962  | 46.67            | 57.32          | 10.65       | 74.00          | 16.68       | 200         | 320       | Vertical |

**AV Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | AV Reading [dBμV/m] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|-------------|---------------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| 1   | 1114.1783   | -22.72      | 55.57               | 32.85             | 54.00             | 11.15          | 151         | 297.6     | Vertical |
| 2   | 1320.4318   | -22.92      | 68.43               | 45.51             | 54.00             | 8.49           | 200         | 230.6     | Vertical |
| 3   | 9759.6698   | 4.31        | 36.47               | 40.78             | 54.00             | 13.22          | 107         | 168.1     | Vertical |
| 4   | 17884.345   | 10.65       | 32.29               | 42.94             | 54.00             | 11.06          | 123         | 17        | Vertical |

|                |                          |                           |                       |
|----------------|--------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2     | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                  | Sample No:                | E20230411918001-0001  |
| Power supply:  | AC 120V/60Hz             | Environmental Conditions: | 18.9°C/65%RH/101.0kPa |
| Test Engineer: | Zhang Zishan             | Test Date:                | 2023-04-25            |
| Channel        | Middle channel (2440MHz) | /                         | /                     |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1   | 1117.2117   | 73.89            | 48.55          | -25.34      | 74.00          | 25.45       | 200         | 237       | Horizontal |
| 2   | 1307.2307   | 72.14            | 49.31          | -22.83      | 74.00          | 24.69       | 200         | 177       | Horizontal |
| 3   | 2377.1377   | 64.31            | 44.18          | -20.13      | 74.00          | 29.82       | 100         | 128       | Horizontal |
| 4   | 4879.688    | 60.36            | 48.75          | -11.61      | 74.00          | 25.25       | 100         | 315       | Horizontal |
| 5   | 9777.6778   | 50.77            | 54.78          | 4.01        | 74.00          | 19.22       | 100         | 346       | Horizontal |
| 6   | 17834.9835  | 46.95            | 55.94          | 8.99        | 74.00          | 18.06       | 200         | 183       | Horizontal |

**AV Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | AV Reading [dBμV/m] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|-------------|---------------------|-------------------|-------------------|----------------|-------------|-----------|------------|
| 1   | 1117.2102   | -25.34      | 60.17               | 34.83             | 54.00             | 19.17          | 200         | 237       | Horizontal |
| 2   | 1307.7925   | -22.83      | 60.32               | 37.49             | 54.00             | 16.51          | 180         | 166.7     | Horizontal |
| 3   | 4855.3136   | -11.61      | 50.18               | 38.57             | 54.00             | 15.43          | 196         | 126.4     | Horizontal |
| 4   | 9758.9234   | 4.01        | 36.49               | 40.50             | 54.00             | 13.50          | 200         | 23.9      | Horizontal |
| 5   | 17755.8786  | 8.99        | 31.93               | 40.92             | 54.00             | 13.08          | 200         | 155       | Horizontal |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 1120.6121   | 73.14            | 50.19          | -22.95      | 74.00          | 23.81       | 100         | 302       | Vertical |
| 2   | 1320.032    | 73.04            | 50.11          | -22.93      | 74.00          | 23.89       | 200         | 239       | Vertical |
| 3   | 1667.8668   | 67.31            | 44.99          | -22.32      | 74.00          | 29.01       | 200         | 178       | Vertical |
| 4   | 4881.1881   | 59.78            | 48.27          | -11.51      | 74.00          | 25.73       | 100         | 173       | Vertical |
| 5   | 9761.1761   | 50.96            | 55.21          | 4.25        | 74.00          | 18.79       | 100         | 203       | Vertical |
| 6   | 17942.9943  | 46.51            | 57.22          | 10.71       | 74.00          | 16.78       | 100         | 243       | Vertical |

**AV Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | AV Reading [dBμV/m] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|-------------|---------------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| 1   | 1121.261    | -22.95      | 56.09               | 33.14             | 54.00             | 10.86          | 148         | 297.6     | Vertical |
| 2   | 1319.8998   | -22.93      | 51.58               | 28.65             | 54.00             | 15.35          | 123         | 250       | Vertical |
| 3   | 4857.6352   | -11.51      | 42.25               | 30.74             | 54.00             | 13.26          | 122         | 201.8     | Vertical |
| 4   | 9759.7132   | 4.25        | 36.49               | 40.74             | 54.00             | 13.26          | 109         | 176.2     | Vertical |
| 5   | 17892.0001  | 10.71       | 32.29               | 43.00             | 54.00             | 11.00          | 100         | 214.3     | Vertical |

|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20230411918001-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 18.9°C/65%RH/101.0kPa |
| Test Engineer: | Zhang Zishan              | Test Date:                | 2023-04-25            |
| Channel        | Highest channel (2475MHz) | /                         | /                     |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1   | 1112.4112   | 74.28            | 48.88          | -25.40      | 74.00          | 25.12       | 100         | 249       | Horizontal |
| 2   | 1247.8248   | 70.34            | 48.35          | -21.99      | 74.00          | 25.65       | 200         | 178       | Horizontal |
| 3   | 1672.4672   | 65.09            | 42.06          | -23.03      | 74.00          | 31.94       | 200         | 15        | Horizontal |
| 4   | 4950.195    | 62.83            | 51.28          | -11.55      | 74.00          | 22.72       | 100         | 224       | Horizontal |
| 5   | 9803.1803   | 50.68            | 54.96          | 4.28        | 74.00          | 19.04       | 100         | 131       | Horizontal |
| 6   | 17837.9838  | 46.63            | 55.62          | 8.99        | 74.00          | 18.38       | 100         | 160       | Horizontal |

**AV Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | AV Reading [dBμV/m] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|-------------|---------------------|-------------------|-------------------|----------------|-------------|-----------|------------|
| 1   | 1116.7451   | -25.40      | 55.82               | 30.42             | 54.00             | 23.58          | 144         | 252.4     | Horizontal |
| 2   | 1244.2847   | -21.99      | 60.04               | 38.05             | 54.00             | 15.95          | 178         | 205.1     | Horizontal |
| 3   | 4950.393    | -11.55      | 54.24               | 42.69             | 54.00             | 11.31          | 141         | 226.7     | Horizontal |
| 4   | 9758.4244   | 4.28        | 36.53               | 40.81             | 54.00             | 13.19          | 200         | 157.9     | Horizontal |
| 5   | 17885.0339  | 8.99        | 32.26               | 41.25             | 54.00             | 12.75          | 100         | 133.1     | Horizontal |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 1119.4119   | 72.64            | 49.74          | -22.90      | 74.00          | 24.26       | 200         | 289       | Vertical |
| 2   | 1320.032    | 73.77            | 50.84          | -22.93      | 74.00          | 23.16       | 200         | 239       | Vertical |
| 3   | 1747.6748   | 68.68            | 46.94          | -21.74      | 74.00          | 27.06       | 100         | 249       | Vertical |
| 4   | 3492.0492   | 66.20            | 49.53          | -16.67      | 74.00          | 24.47       | 100         | 292       | Vertical |
| 5   | 4950.195    | 61.47            | 50.22          | -11.25      | 74.00          | 23.78       | 100         | 343       | Vertical |
| 6   | 17854.4854  | 46.73            | 57.54          | 10.81       | 74.00          | 16.46       | 100         | 261       | Vertical |

**AV Final Data List**

| NO. | Freq. [MHz] | Factor [dB] | AV Reading [dBμV/m] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|-------------|---------------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| 1   | 1119.4898   | -22.90      | 56.06               | 33.16             | 54.00             | 20.84          | 165         | 283.4     | Vertical |
| 2   | 1320.1638   | -22.93      | 61.90               | 38.97             | 54.00             | 15.03          | 180         | 244.5     | Vertical |
| 3   | 3506.108    | -16.67      | 54.13               | 37.46             | 54.00             | 16.54          | 100         | 302.3     | Vertical |
| 4   | 4950.343    | -11.25      | 50.23               | 38.98             | 54.00             | 15.02          | 121         | 344.2     | Vertical |

**18GHz-26.5GHz:**

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Pre-scan all mode and recorded the worst case results in this report (Power supply:AC 120V/60Hz)

|                |                          |                           |                      |
|----------------|--------------------------|---------------------------|----------------------|
| EUT Name:      | Dual Relay Module T2     | Test Mode:                | Mode 1               |
| Model:         | DCM-K01                  | Sample No:                | E20230411918001-0001 |
| Power supply:  | AC 120V/60Hz             | Environmental Conditions: | 18.9℃/65%RH/101.0kPa |
| Test Engineer: | Zhang Zishan             | Test Date:                | 2023-04-25           |
| Channel        | Lowest channel (2405MHz) | /                         | /                    |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| 1   | 18586.925   | 54.09            | 41.97          | -12.12      | 83.54          | 41.57       | 100         | 85        | Horizontal |
| 2   | 21179.85    | 53.77            | 43.71          | -10.06      | 83.54          | 39.83       | 100         | 111       | Horizontal |
| 3   | 22661.825   | 51.72            | 42.80          | -8.92       | 83.54          | 40.74       | 100         | 181       | Horizontal |
| 4   | 23510.55    | 51.14            | 42.43          | -8.71       | 83.54          | 41.11       | 100         | 249       | Horizontal |
| 5   | 25124.7     | 49.97            | 42.80          | -7.17       | 83.54          | 40.74       | 100         | 134       | Horizontal |
| 6   | 26431.575   | 49.79            | 42.61          | -7.18       | 83.54          | 40.93       | 100         | 38        | Horizontal |

**Suspected Data List**

| NO. | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 1   | 18571.625   | 53.54            | 41.47          | -12.07      | 83.54          | 42.07       | 100         | 131       | Vertical |
| 2   | 19511.3     | 54.34            | 42.93          | -11.41      | 83.54          | 40.61       | 100         | 109       | Vertical |
| 3   | 21118.65    | 52.97            | 42.99          | -9.98       | 83.54          | 40.55       | 100         | 299       | Vertical |
| 4   | 23455.725   | 51.20            | 42.59          | -8.61       | 83.54          | 40.95       | 100         | 18        | Vertical |
| 5   | 24560.3     | 51.10            | 43.40          | -7.70       | 83.54          | 40.14       | 100         | 299       | Vertical |
| 6   | 25641.925   | 49.64            | 42.11          | -7.53       | 83.54          | 41.43       | 100         | 177       | Vertical |

|                |                          |                           |                      |
|----------------|--------------------------|---------------------------|----------------------|
| EUT Name:      | Dual Relay Module T2     | Test Mode:                | Mode 1               |
| Model:         | DCM-K01                  | Sample No:                | E20230411918001-0001 |
| Power supply:  | AC 120V/60Hz             | Environmental Conditions: | 18.9℃/65%RH/101.0kPa |
| Test Engineer: | Zhang Zishan             | Test Date:                | 2023-04-25           |
| Channel        | Middle channel (2440MHz) | /                         | /                    |

| Suspected Data List |             |                  |                |             |                |             |             |           |            |
|---------------------|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| NO.                 | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1                   | 18997.9     | 54.22            | 42.42          | -11.80      | 83.54          | 41.12       | 100         | 337       | Horizontal |
| 2                   | 19851.725   | 53.98            | 42.83          | -11.15      | 83.54          | 40.71       | 100         | 15        | Horizontal |
| 3                   | 21501.15    | 53.07            | 43.21          | -9.86       | 83.54          | 40.33       | 100         | 15        | Horizontal |
| 4                   | 22637.175   | 51.86            | 42.90          | -8.96       | 83.54          | 40.64       | 100         | 176       | Horizontal |
| 5                   | 24815.3     | 50.76            | 43.28          | -7.48       | 83.54          | 40.26       | 100         | 15        | Horizontal |
| 6                   | 26177.425   | 50.07            | 42.43          | -7.64       | 83.54          | 41.11       | 100         | 84        | Horizontal |

| Suspected Data List |             |                  |                |             |                |             |             |           |          |
|---------------------|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| NO.                 | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1                   | 18895.05    | 54.06            | 42.19          | -11.87      | 83.54          | 41.35       | 100         | 23        | Vertical |
| 2                   | 19569.525   | 53.38            | 42.07          | -11.31      | 83.54          | 41.47       | 100         | 276       | Vertical |
| 3                   | 21578.925   | 54.04            | 44.36          | -9.68       | 83.54          | 39.18       | 100         | 206       | Vertical |
| 4                   | 23488.025   | 51.54            | 42.93          | -8.61       | 83.54          | 40.61       | 100         | 206       | Vertical |
| 5                   | 25179.525   | 50.31            | 43.30          | -7.01       | 83.54          | 40.24       | 100         | 185       | Vertical |
| 6                   | 26208.875   | 49.88            | 42.42          | -7.46       | 83.54          | 41.12       | 100         | 116       | Vertical |

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|                |                           |                           |                       |
|----------------|---------------------------|---------------------------|-----------------------|
| EUT Name:      | Dual Relay Module T2      | Test Mode:                | Mode 1                |
| Model:         | DCM-K01                   | Sample No:                | E20230411918001-0001  |
| Power supply:  | AC 120V/60Hz              | Environmental Conditions: | 18.9°C/65%RH/101.0kPa |
| Test Engineer: | Huang Lifang              | Test Date:                | 2023-04-25            |
| Channel        | Highest channel (2475MHz) | /                         | /                     |

| Suspected Data List |             |                  |                |             |                |             |             |           |            |
|---------------------|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|------------|
| NO.                 | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1                   | 19017.875   | 54.31            | 42.53          | -11.78      | 83.54          | 41.01       | 100         | 257       | Horizontal |
| 2                   | 20815.625   | 52.85            | 42.63          | -10.22      | 83.54          | 40.91       | 100         | 39        | Horizontal |
| 3                   | 21251.675   | 52.96            | 42.95          | -10.01      | 83.54          | 40.59       | 100         | 278       | Horizontal |
| 4                   | 22965.7     | 51.02            | 42.37          | -8.65       | 83.54          | 41.17       | 100         | 16        | Horizontal |
| 5                   | 24448.1     | 51.53            | 43.66          | -7.87       | 83.54          | 39.88       | 100         | 278       | Horizontal |
| 6                   | 25417.525   | 49.97            | 42.67          | -7.30       | 83.54          | 40.87       | 100         | 16        | Horizontal |

| Suspected Data List |             |                  |                |             |                |             |             |           |          |
|---------------------|-------------|------------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| NO.                 | Freq. [MHz] | Reading [dBμV/m] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1                   | 18989.825   | 54.06            | 42.26          | -11.80      | 83.54          | 41.28       | 100         | 206       | Vertical |
| 2                   | 20374.475   | 52.95            | 42.41          | -10.54      | 83.54          | 41.13       | 100         | 116       | Vertical |
| 3                   | 21477.35    | 52.68            | 42.91          | -9.77       | 83.54          | 40.63       | 100         | 231       | Vertical |
| 4                   | 22997.15    | 51.15            | 42.51          | -8.64       | 83.54          | 41.03       | 100         | 254       | Vertical |
| 5                   | 23825.05    | 51.96            | 43.49          | -8.47       | 83.54          | 40.05       | 100         | 69        | Vertical |
| 6                   | 25125.55    | 50.05            | 42.98          | -7.07       | 83.54          | 40.56       | 100         | 345       | Vertical |

**Remark:**

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- Above 18G test distance is 1m, so the Peak Limit=74+20\*log(3/1)=83.54 (dBμV/m), The limits are relaxed.

## 9. 6dB BANDWIDTH

### 9.1 LIMITS

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 9.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Set resolution bandwidth (RBW) = 100kHz. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize, record 6dB bandwidth value.
- 3) Repeat above procedures until all frequencies measured were complete.

### 9.3 TEST SETUP



### 9.4 TEST RESULTS

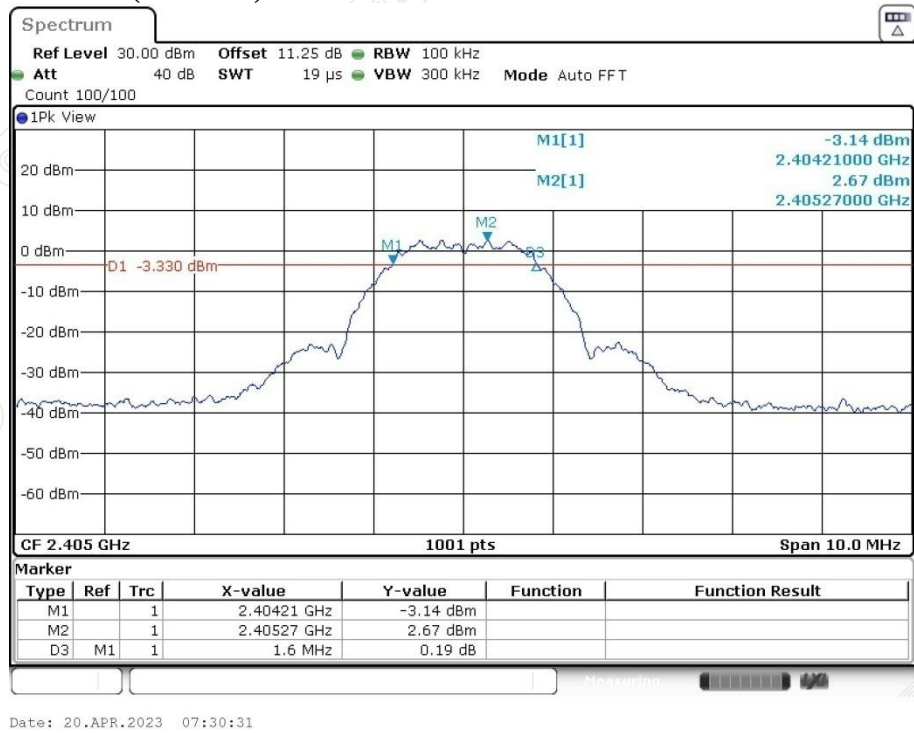
Environment: 24.6°C/65%RH/101.0kPa  
Tested By: Qin Tingting

Voltage: AC 120V/60Hz  
Date: 2023-04-20

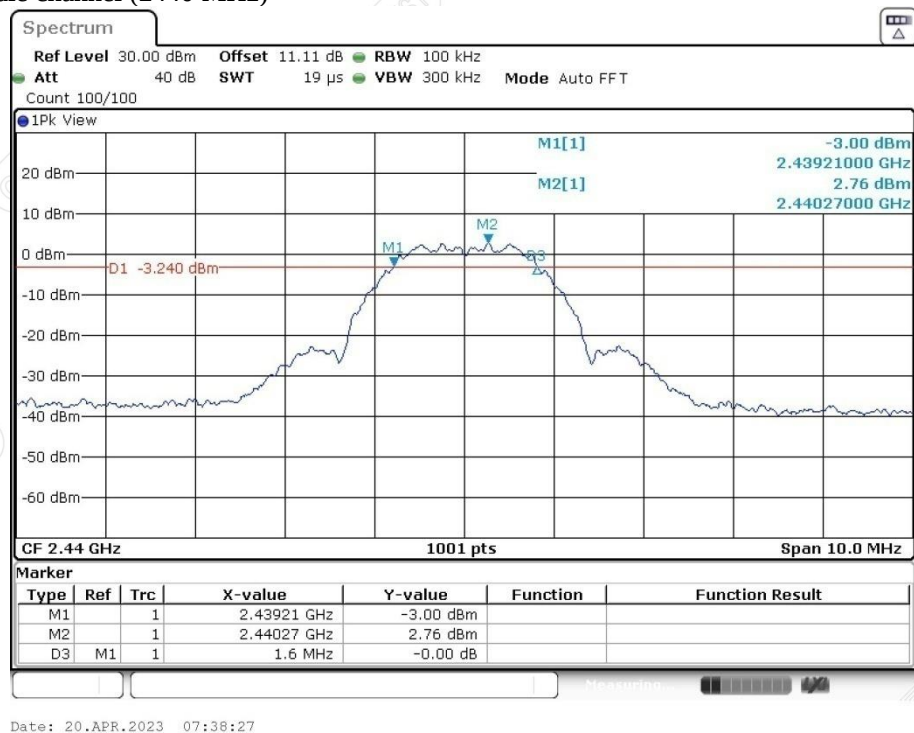
| Ch Name | Frequency (MHz) | Bandwidth [kHz] | Limit[kHz] | Verdict |
|---------|-----------------|-----------------|------------|---------|
| Lowest  | 2405            | 1600            | $\geq 500$ | PASS    |
| Middle  | 2440            | 1600            |            | PASS    |
| Highest | 2475            | 1600            |            | PASS    |

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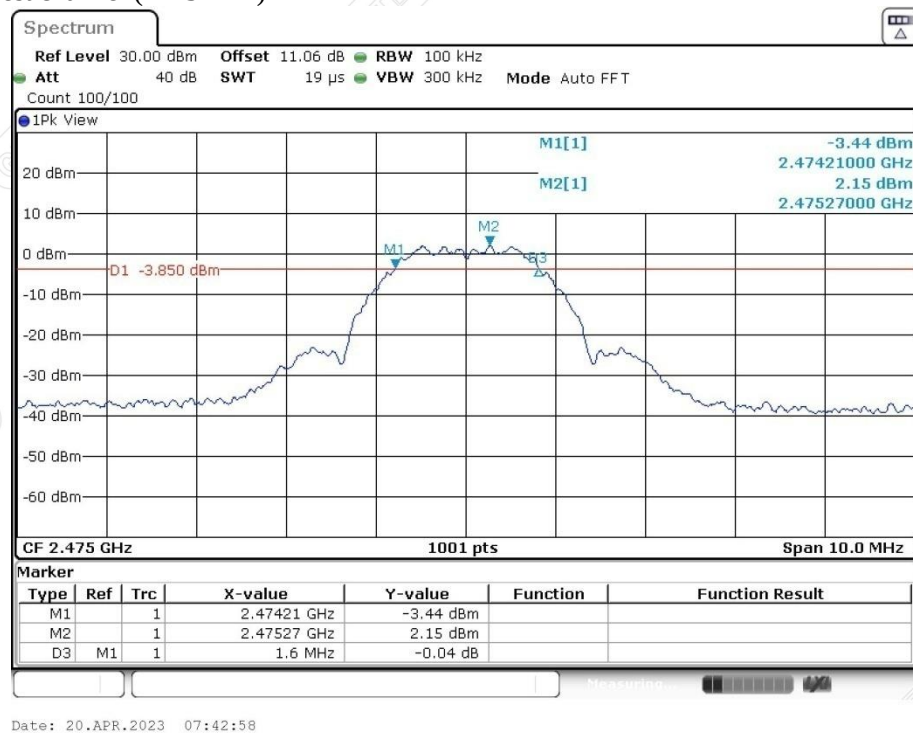
## Lowest channel (2405MHz)



## Middle channel (2440 MHz)



## Highest channel (2475MHz)



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## 10. MAXIMUM PEAK OUTPUT POWER

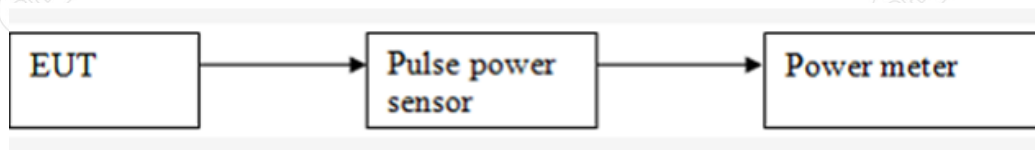
### 10.1 LIMITS

The maximum Peak output power measurement is 1W

### 10.2 TEST PROCEDURES

- 1) According to the test mode, the channel requirements set EUT to continuous transmission mode.
- 2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

### 10.3 TEST SETUP



### 10.4 TEST RESULTS

Environment: 24.6°C/65%RH/101.0kPa

Tested By: Qin Tingting

Voltage: AC 120V/60Hz

Date: 2023-04-20

| ChName  | Frequency (MHz) | Measured Channel Power (dBm) | Limit      | Peak/ Average | Result |
|---------|-----------------|------------------------------|------------|---------------|--------|
| Lowest  | 2405            | 6.68                         | 1W (30dBm) | Peak          | Pass   |
| Middle  | 2440            | 6.34                         |            |               | Pass   |
| Highest | 2475            | 6.01                         |            |               | Pass   |

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## 11. POWER SPECTRAL DENSITY

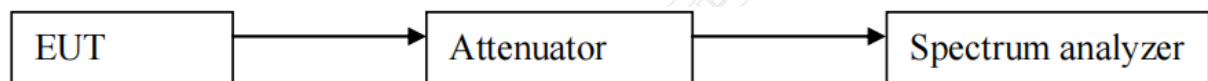
### 11.1 LIMITS

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 11.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3) The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:
  - a) Set analyzer center frequency to DTS channel center frequency.
  - b) Set the span to 1.5 times the DTS bandwidth.
  - c) Set the RBW to  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
  - d) Set the VBW  $\geq [3 \times \text{RBW}]$ .
  - e) Detector = peak
  - f) Sweep time = auto couple.
  - g) Trace mode = max hold.
  - h) Allow trace to fully stabilize.
  - i) Use the peak marker function to determine the maximum amplitude level within the RBW.
  - j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
- 4) Repeat above procedures until all frequencies measured were complete.

### 11.3 TEST SETUP



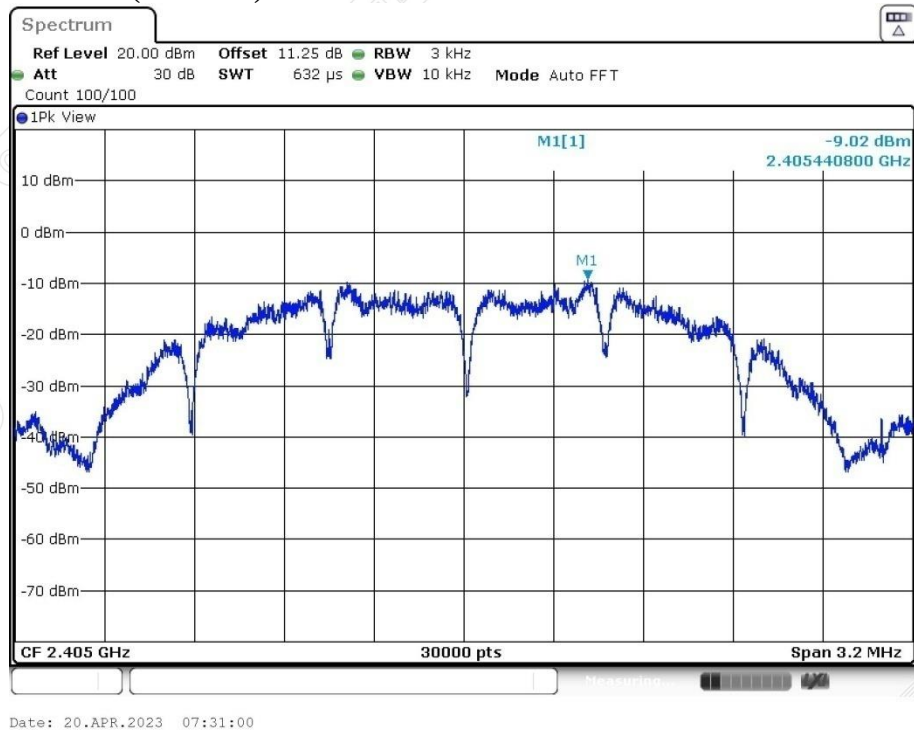
### 11.4 TEST RESULTS

Environment: 24.6°C/65%RH/101.0kPa  
 Tested By: Qin Tingting

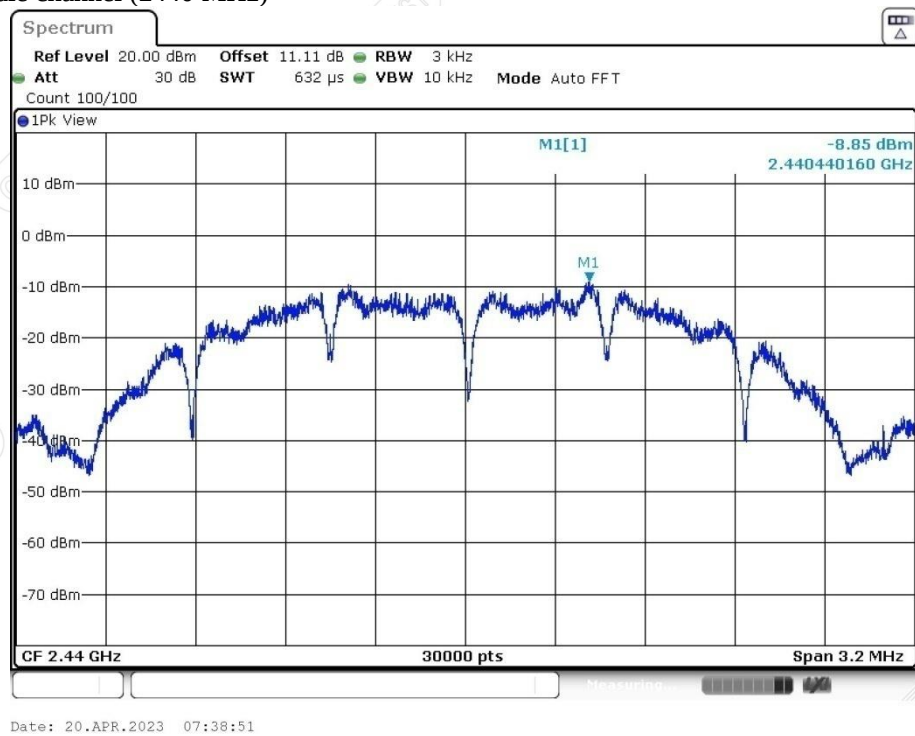
Voltage: AC 120V/60Hz  
 Date: 2023-04-20

| Ch Name | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|---------|-----------------|----------------|------------------|--------|
| Lowest  | 2405            | -9.02          | 8.00             | Pass   |
| Middle  | 2440            | -8.85          | 8.00             | Pass   |
| Highest | 2475            | -9.54          | 8.00             | Pass   |

## Lowest channel (2405MHz)



## Middle channel (2440 MHz)



## Highest channel (2475MHz)



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## 12. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

### 12.1 LIMITS

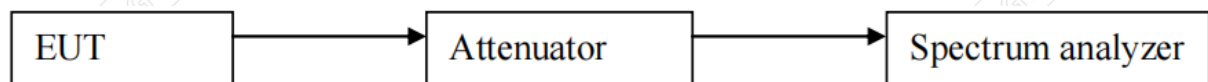
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 12.2 TEST PROCEDURES

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.

- 1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
- 2) Set the spectrum analyzer: RBW=100kHz; VBW=300kHz, Span=10MHz to 26.5GHz;Sweep=auto; Detector Function=Peak. Trace=Max, hold.
- 3) Measure and record the results in the test report.
- 4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 5) Measurements are made from 30MHz to 26.5GHz with the transmitter set to the lowest, middle, and highest channels.

### 12.3 TEST SETUP



### 12.4 TEST RESULTS

Environment: 24.6°C/65%RH/101.0kPa

Tested By: Qin Tingting

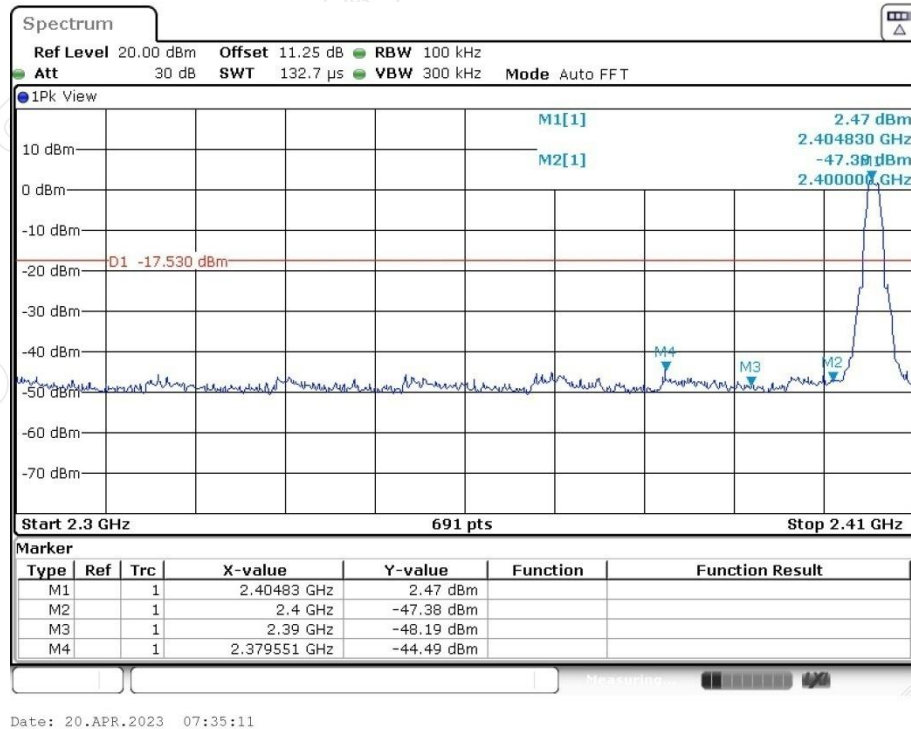
Voltage: AC 120V/60Hz

Date: 2023-04-20

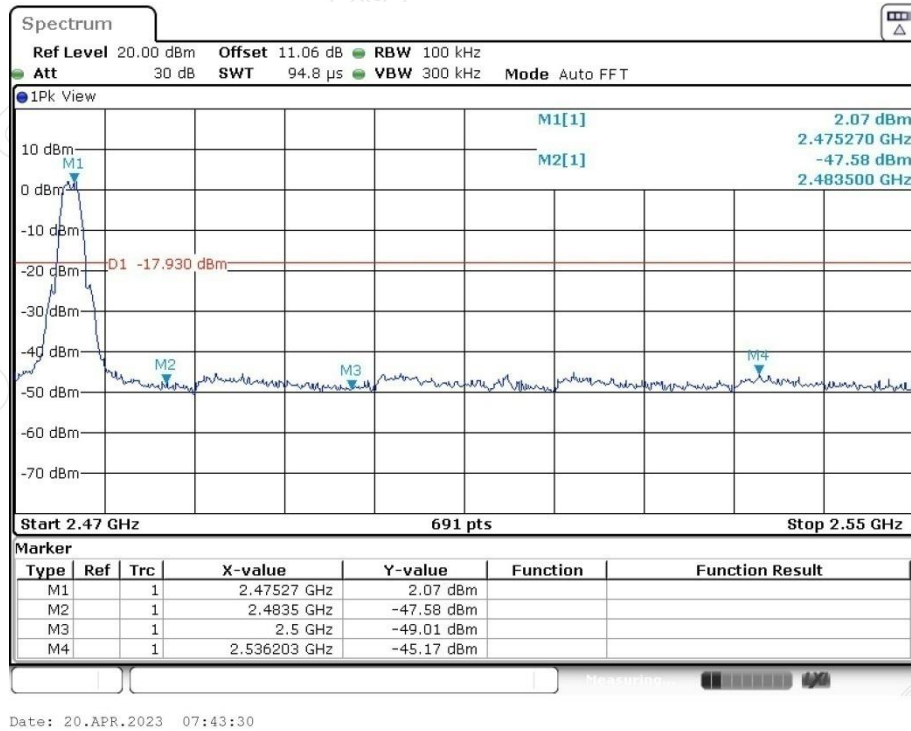
Band edge

| Test Mode | Antenna | Ch Name | Frequency [MHz] | Ref Level[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|---------|-----------------|----------------|-------------|------------|---------|
| Zigbee    | Ant1    | Lowest  | 2405            | 2.47           | -44.49      | ≤-17.38    | PASS    |
|           |         | Highest | 2475            | 2.07           | -45.17      | ≤-17.85    | PASS    |

Lowest channel (2405MHz)  
2.30GHz-2.41GHz



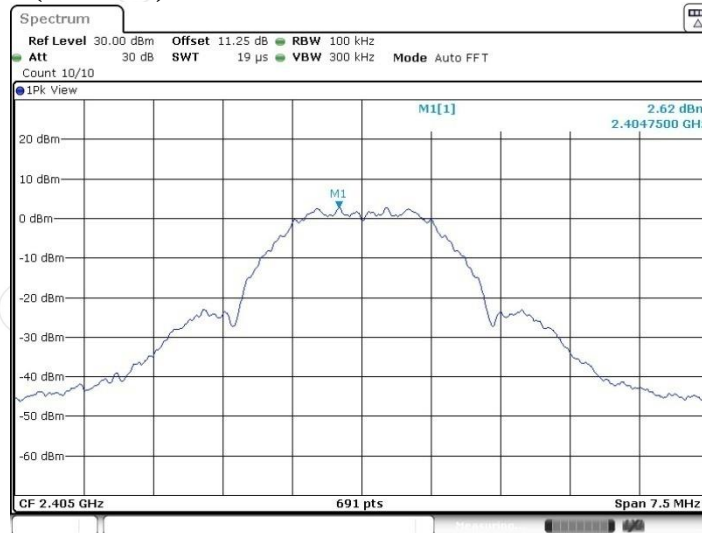
Highest channel (2475MHz)  
2.47GHz-2.55GHz



## Conducted Spurious Emission

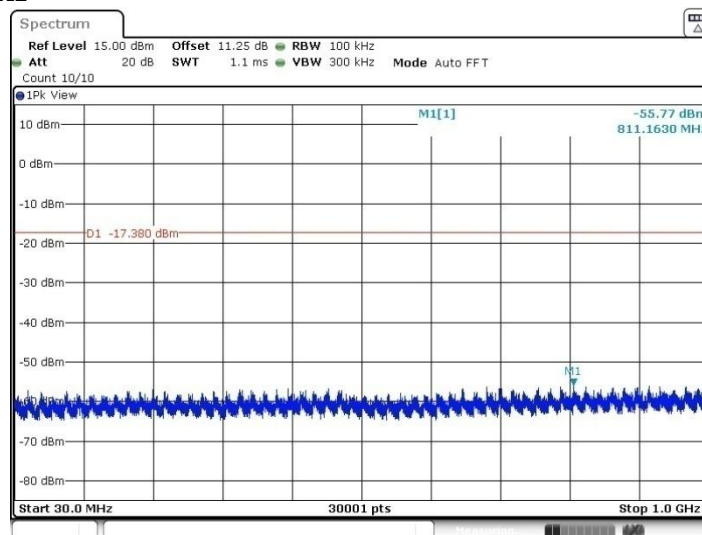
| Test Mode | Antenna | Frequency [MHz] | Freq Range [MHz] | Ref Level [dBm] | Result[dBm] | Limit[dBm]    | Verdict |
|-----------|---------|-----------------|------------------|-----------------|-------------|---------------|---------|
| Zigbee    | Ant1    | 2405            | Reference        | 2.62            | 2.62        | ---           | PASS    |
|           |         |                 | 30~1000          | 2.62            | -55.77      | $\leq -17.38$ | PASS    |
|           |         |                 | 1000~26500       | 2.62            | -41.92      | $\leq -17.38$ | PASS    |
|           |         | 2440            | Reference        | 2.75            | 2.75        | ---           | PASS    |
|           |         |                 | 30~1000          | 2.75            | -55.61      | $\leq -17.25$ | PASS    |
|           |         |                 | 1000~26500       | 2.75            | -41.93      | $\leq -17.25$ | PASS    |
|           |         | 2475            | Reference        | 2.15            | 2.15        | ---           | PASS    |
|           |         |                 | 30~1000          | 2.15            | -55.75      | $\leq -17.85$ | PASS    |
|           |         |                 | 1000~26500       | 2.15            | -41.93      | $\leq -17.85$ | PASS    |

## Lowest channel (2405MHz)



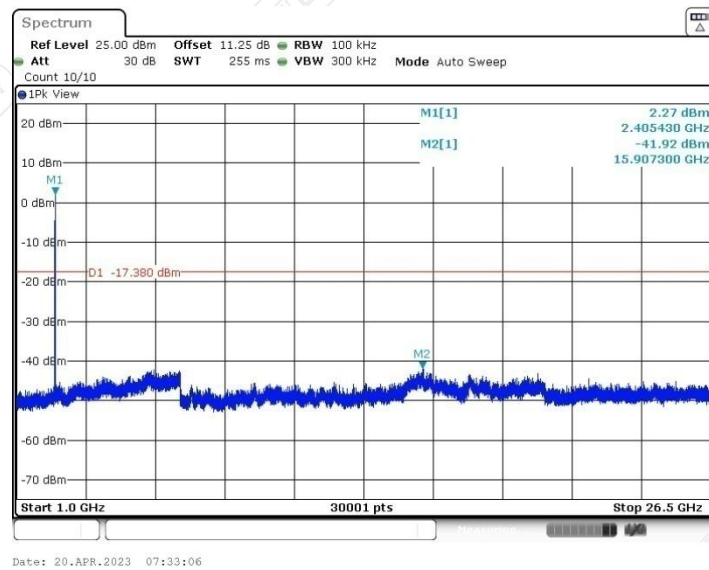
Date: 20.APR.2023 07:32:15

## 0.03GHz-1GHz



Date: 20.APR.2023 07:32:27

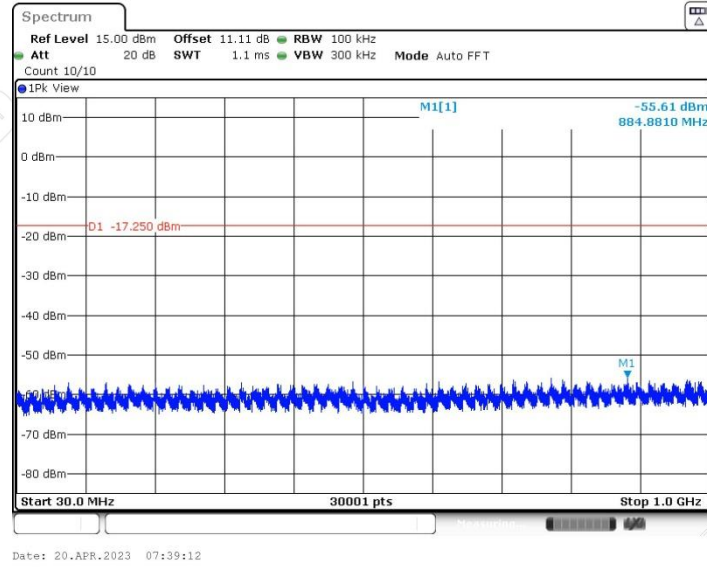
## 1GHz-26.5GHz



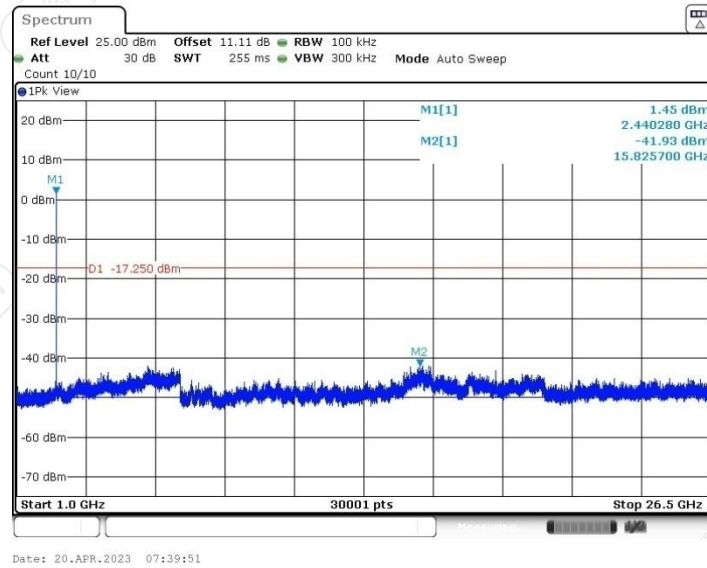
## Middle channel (2440MHz)



## 0.03GHz-1GHz



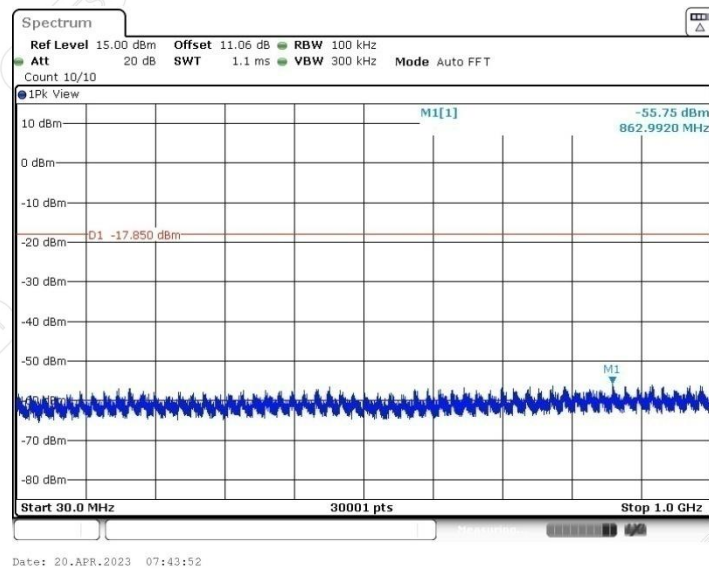
## 1GHz-26.5GHz



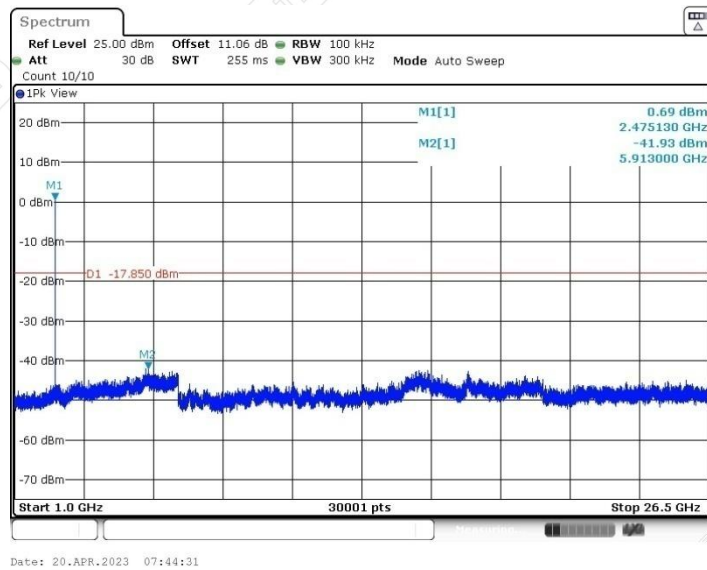
## Highest channel (2475MHz)



## 0.03GHz-1GHz



1GHz-26.5GHz



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### 13. RESTRICTED BANDS OF OPERATION

#### 13.1 LIMITS

Section 15.247(d) In addition, Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

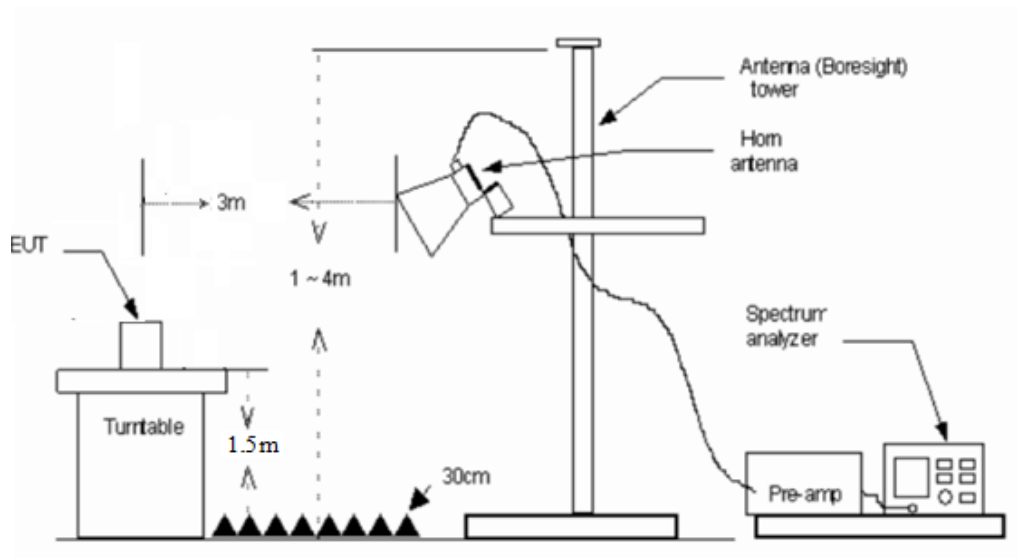
| MHz                 | MHz                   | MHz             | GHz           |
|---------------------|-----------------------|-----------------|---------------|
| 0.090 - 0.110       | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15    |
| 0.495 - 0.505       | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46   |
| 2.1735 - 2.1905     | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75   |
| 4.125 - 4.128       | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5   |
| 4.17725 - 4.17775   | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2     |
| 4.20725 - 4.20775   | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5     |
| 6.215 - 6.218       | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7   |
| 6.26775 - 6.26825   | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4  |
| 6.31175 - 6.31225   | 123 - 138             | 2200 - 2300     | 14.47 - 14.5  |
| 8.291 - 8.294       | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2  |
| 8.362 - 8.366       | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4   |
| 8.37625 - 8.38675   | 156.7 - 156.9         | 2655 - 2900     | 22.01 - 23.12 |
| 8.41425 - 8.41475   | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0   |
| 12.29 - 12.293      | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8   |
| 12.51975 - 12.52025 | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5  |
| 12.57675 - 12.57725 | 322 - 335.4           | 3600 - 4400     |               |
| 13.36 - 13.41       |                       |                 |               |

| Frequency (MHz) | Quasi-peak( $\mu$ V/m) | Measurement distance(m) | Quasi-peak(dB $\mu$ V/m)@distance 3m |
|-----------------|------------------------|-------------------------|--------------------------------------|
| 0.009-0.490     | 2400/F(kHz)            | 300                     | 128.5~93.8                           |
| 0.490-1.705     | 24000/F(kHz)           | 30                      | 73.8~63                              |
| 1.705-30.0      | 30                     | 30                      | 69.5                                 |
| 30 ~ 88         | 100                    | 3                       | 40                                   |
| 88~216          | 150                    | 3                       | 43.5                                 |
| 216 ~ 960       | 200                    | 3                       | 46                                   |
| Above 960       | 500                    | 3                       | 54                                   |

### 13.2 TEST PROCEDURES

- 1) The EUT is placed on a turntable, which is 1.5m above the ground plane.
- 2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4) Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - a) For Peak detector: Set RBW=1MHz, RBW=3MHz, Sweep=AUTO.
  - b) For Avg detector: Set RBW=1MHz, Sweep=AUTO, the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW  $\leq$  RBW/100 (i.e., 10kHz) but not less than 10 Hz.
- 5) Repeat the procedures until all the PEAK and AVERAGE versus polarization are measured.

### 13.3 TEST SETUP



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### 13.4 TEST RESULTS

Pre-scan all mode(Power supply:AC 120V/60Hz, DC 30V, DC 60V) and recorded the worst case results in this report (Power supply:AC 120V/60Hz)

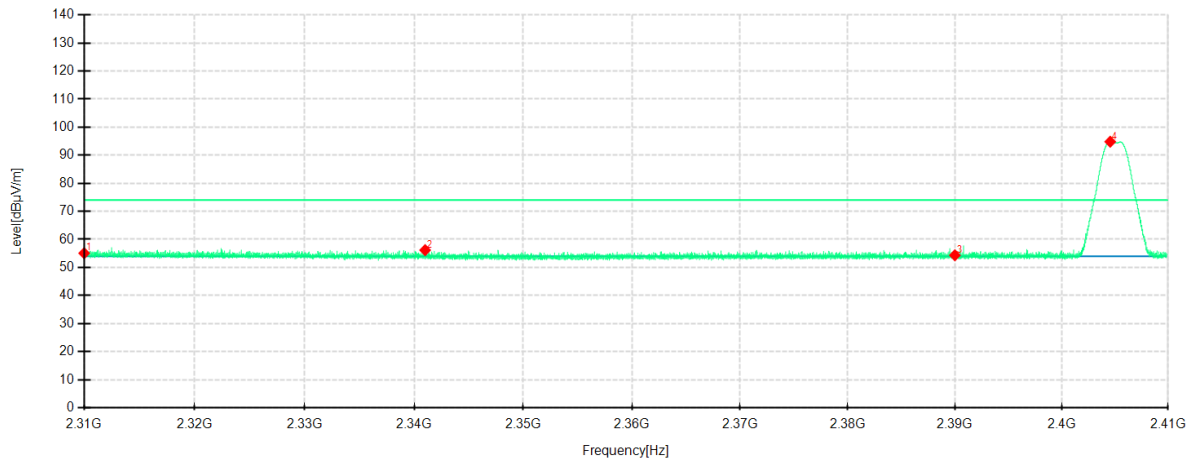
|                           |                      |               |                      |
|---------------------------|----------------------|---------------|----------------------|
| EUT Name:                 | Dual Relay Module T2 | Test Mode:    | Mode 1               |
| Model:                    | DCM-K01              | Sample No:    | E20230411918001-0001 |
| Test Engineer:            | Huang Lifang         | Test Voltage: | AC 120V/60Hz         |
| Environmental Conditions: | 18.9℃/65%RH/101.0kPa | Test Date:    | 2023-04-25           |

#### Lowest Channel

Frequency: 2405MHz

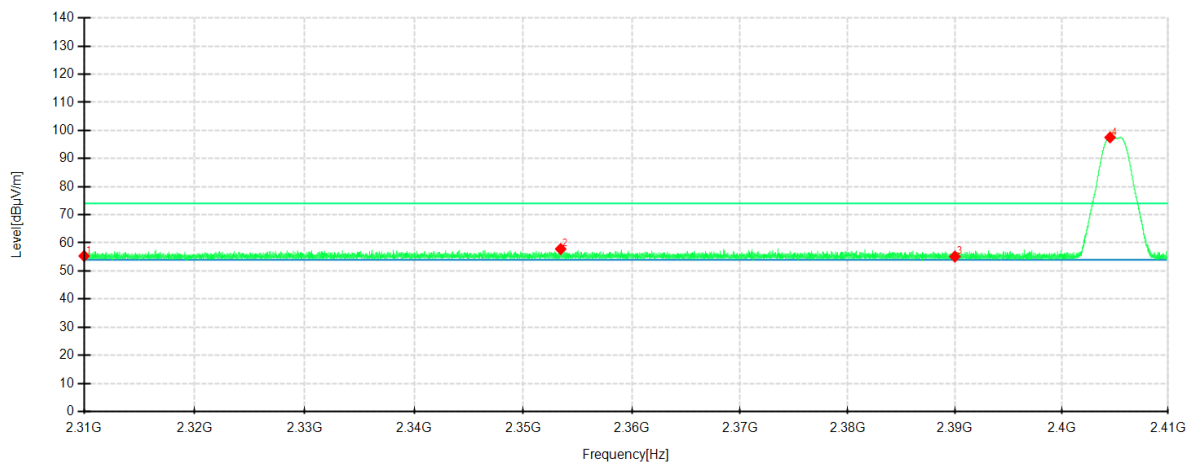
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



| No. | Frequency<br>MHz | Reading<br>dB $\mu$ V/m | Level<br>dB $\mu$ V/m | Factor<br>dB | Limit<br>dB $\mu$ V/m | Margin<br>dB | Height<br>cm | Angle<br>° | Pole       | Comment  |
|-----|------------------|-------------------------|-----------------------|--------------|-----------------------|--------------|--------------|------------|------------|----------|
| 1   | 2310             | 45.72                   | 55.07                 | 9.35         | 74.00                 | 18.93        | 100          | 182        | Horizontal | /        |
| 2   | 2341.0021        | 47.46                   | 56.17                 | 8.71         | 74.00                 | 17.83        | 100          | 195        | Horizontal | /        |
| 3   | 2390             | 45.41                   | 54.34                 | 8.93         | 74.00                 | 19.66        | 200          | 167        | Horizontal |          |
| 4   | 2404.5596        | 85.77                   | 94.82                 | 9.05         | 74.00                 | -20.82       | 100          | 150        | Horizontal | No limit |
| 1   | 2310             | 45.39                   | 55.32                 | 9.93         | 74.00                 | 18.68        | 100          | 238        | Vertical   | /        |
| 2   | 2353.4429        | 47.61                   | 57.82                 | 10.21        | 74.00                 | 16.18        | 200          | 289        | Vertical   | /        |
| 3   | 2390             | 45.05                   | 55.12                 | 10.07        | 74.00                 | 18.88        | 200          | 74         | Vertical   | /        |
| 4   | 2404.5463        | 87.57                   | 97.52                 | 9.95         | 74.00                 | -23.52       | 100          | 138        | Vertical   | No limit |

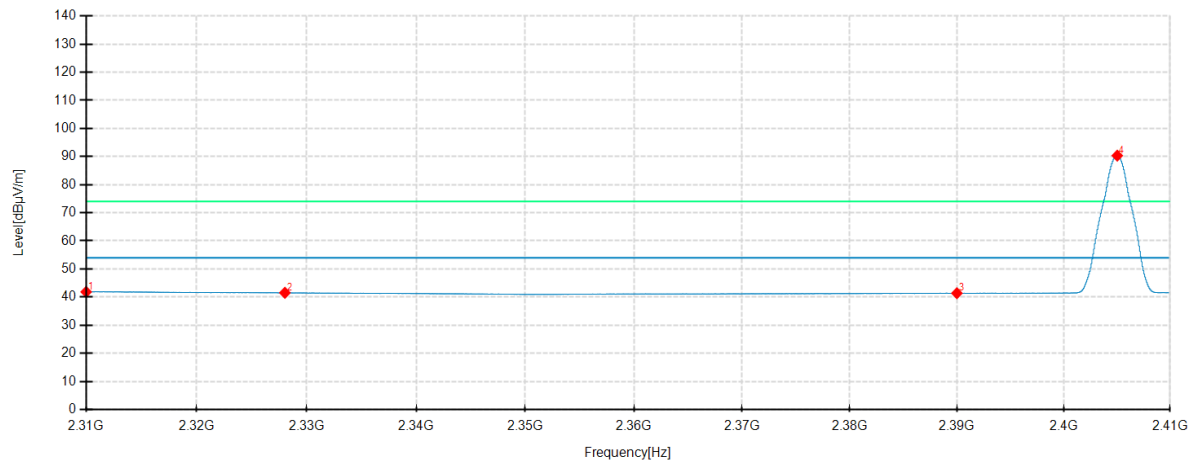
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**Lowest Channel**

Frequency: 2405MHz

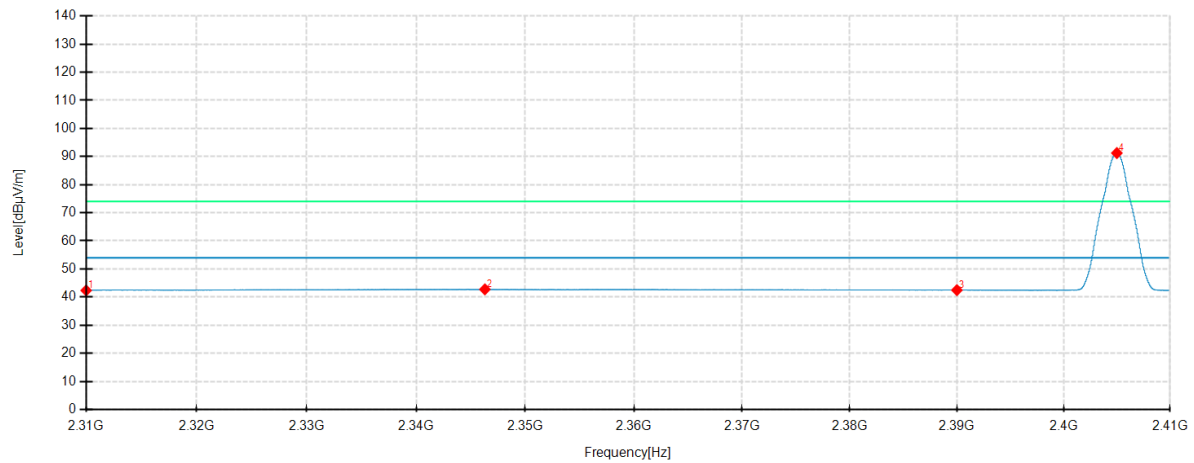
Detector mode: Average

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



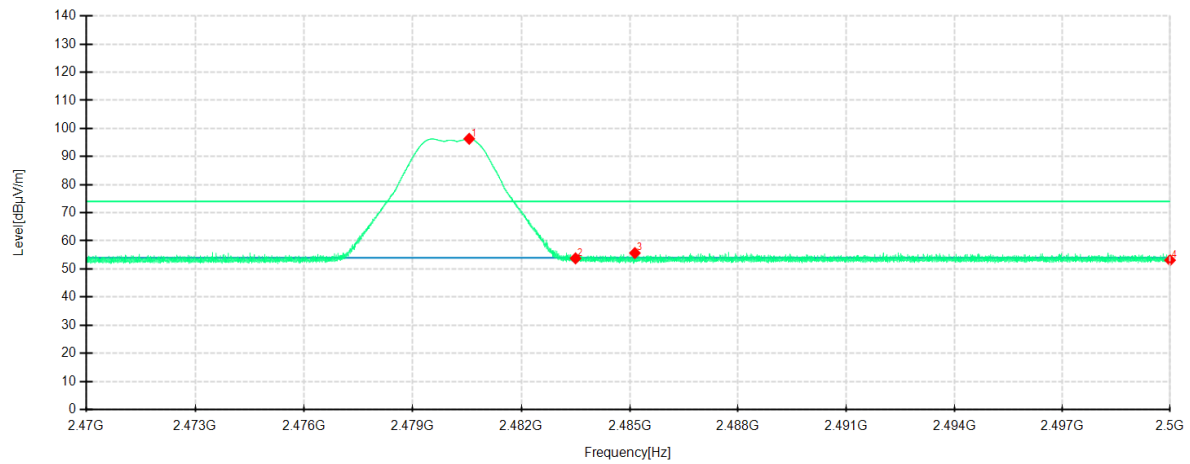
| No. | Frequency MHz | Reading dBμV/m | Level dBμV/m | Factor dB | Limit dBμV/m | Margin dB | Height cm | Angle ° | Pole       | Comment  |
|-----|---------------|----------------|--------------|-----------|--------------|-----------|-----------|---------|------------|----------|
| 1   | 2310          | 32.48          | 41.83        | 9.35      | 54.00        | 12.17     | 200       | 169     | Horizontal | /        |
| 2   | 2328.0212     | 32.56          | 41.53        | 8.97      | 54.00        | 12.47     | 100       | 225     | Horizontal | /        |
| 3   | 2390          | 32.45          | 41.38        | 8.93      | 54.00        | 12.62     | 100       | 148     | Horizontal | /        |
| 4   | 2405.033      | 81.29          | 90.34        | 9.05      | 54.00        | -36.34    | 100       | 181     | Horizontal | No limit |
| 1   | 2310          | 32.43          | 42.36        | 9.93      | 54.00        | 11.64     | 100       | 192     | Vertical   | /        |
| 2   | 2346.2958     | 32.54          | 42.74        | 10.20     | 54.00        | 11.26     | 200       | 343     | Vertical   | /        |
| 3   | 2390          | 32.40          | 42.47        | 10.07     | 54.00        | 11.53     | 100       | 148     | Vertical   | /        |
| 4   | 2404.993      | 81.31          | 91.25        | 9.94      | 54.00        | -37.25    | 100       | 181     | Vertical   | No limit |

**Highest Channel**

Frequency: 2475MHz

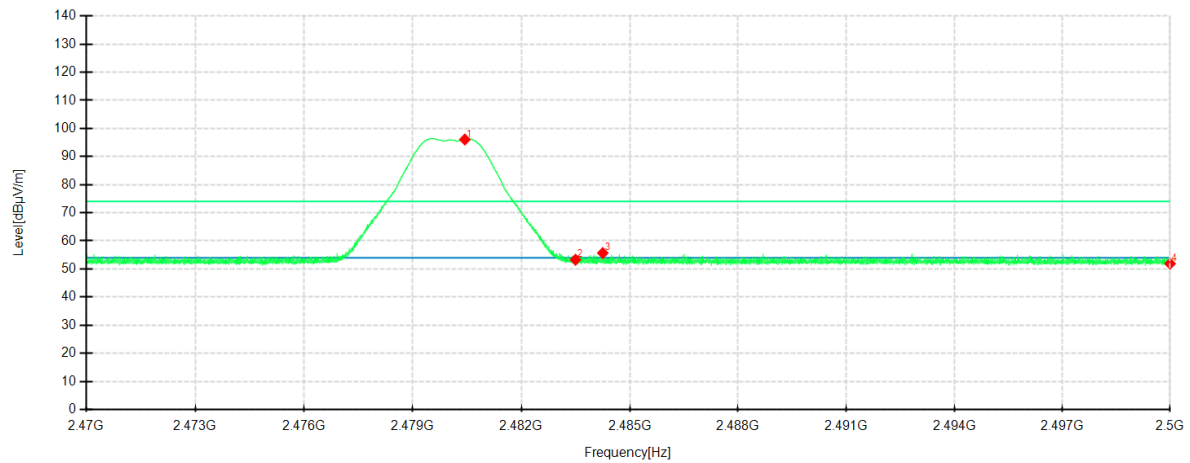
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



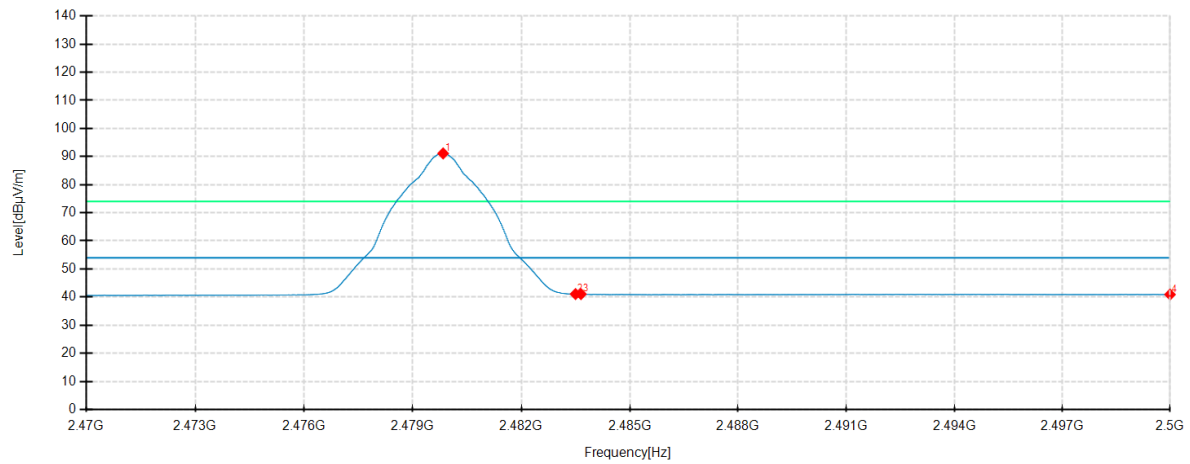
| No. | Frequency MHz | Reading dBμV/m | Level dBμV/m | Factor dB | Limit dBμV/m | Margin dB | Height cm | Angle ° | Pole       | Comment  |
|-----|---------------|----------------|--------------|-----------|--------------|-----------|-----------|---------|------------|----------|
| 1   | 2480.5607     | 86.46          | 96.32        | 9.86      | 74.00        | -22.32    | 100       | 246     | Horizontal | No limit |
| 2   | 2483.5        | 43.85          | 53.77        | 9.92      | 74.00        | 20.23     | 200       | 344     | Horizontal | /        |
| 3   | 2485.143      | 45.73          | 55.68        | 9.95      | 74.00        | 18.32     | 200       | 91      | Horizontal | /        |
| 4   | 2500          | 42.87          | 53.12        | 10.25     | 74.00        | 20.88     | 200       | 158     | Horizontal | /        |
| 1   | 2480.4407     | 86.80          | 96.07        | 9.27      | 74.00        | -22.07    | 200       | 220     | Vertical   | No limit |
| 2   | 2483.5        | 44.00          | 53.28        | 9.28      | 74.00        | 20.72     | 200       | 87      | Vertical   | /        |
| 3   | 2484.255      | 46.40          | 55.68        | 9.28      | 74.00        | 18.32     | 200       | 55      | Vertical   | /        |
| 4   | 2500          | 42.53          | 51.88        | 9.35      | 74.00        | 22.12     | 200       | 1       | Vertical   | /        |

**Highest Channel**

Frequency: 2475MHz

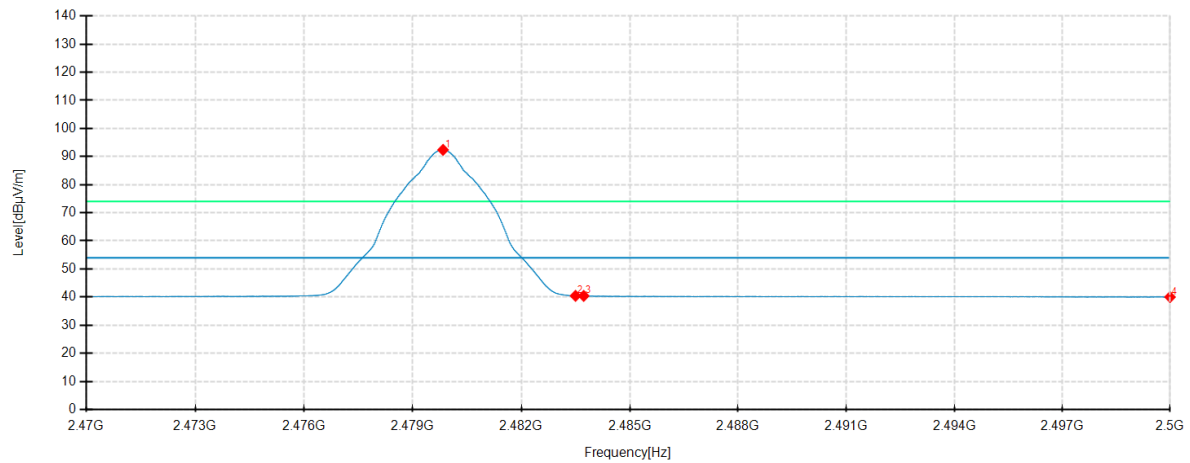
Detector mode: Average

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



| No. | Frequency MHz | Reading dBμV/m | Level dBμV/m | Factor dB | Limit dBμV/m | Margin dB | Height cm | Angle ° | Pole       | Comment  |
|-----|---------------|----------------|--------------|-----------|--------------|-----------|-----------|---------|------------|----------|
| 1   | 2479.8407     | 81.26          | 91.11        | 9.85      | 54.00        | -37.11    | 100       | 193     | Horizontal | No limit |
| 2   | 2483.5        | 31.16          | 41.08        | 9.92      | 54.00        | 12.92     | 100       | 205     | Horizontal | /        |
| 3   | 2483.6509     | 31.14          | 41.06        | 9.92      | 54.00        | 12.94     | 100       | 205     | Horizontal | /        |
| 4   | 2500          | 30.66          | 40.91        | 10.25     | 54.00        | 13.09     | 200       | 344     | Horizontal | /        |
| 1   | 2479.8387     | 83.11          | 92.38        | 9.27      | 54.00        | -38.38    | 100       | 196     | Vertical   | No limit |
| 2   | 2483.5        | 31.15          | 40.43        | 9.28      | 54.00        | 13.57     | 100       | 208     | Vertical   | /        |
| 3   | 2483.7269     | 31.13          | 40.41        | 9.28      | 54.00        | 13.59     | 100       | 208     | Vertical   | /        |
| 4   | 2500          | 30.66          | 40.01        | 9.35      | 54.00        | 13.99     | 100       | 342     | Vertical   | /        |

Remark: Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

## **APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM**

Please refer to the attached document E20240819312801-Test photo.

## **APPENDIX B. PHOTOGRAPH OF THE EUT**

Please refer to the attached document E20240819312801-EUT photo.

----- End of Report -----