



# Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

## TEST REPORT FCC Rules and Regulations Part PART 15.249

Report Reference No.: CTA25073100601

FCC ID: 2BEDV-M23

Compiled by

( position+printed name+signature.. File administrators Zoey Cao

Supervised by

( position+printed name+signature.. Project Engineer Ace Chai

Approved by

( position+printed name+signature.. RF Manager Eric Wang

Date of issue: Aug. 16, 2025

Zoey Cao  
Shenzhen CTA Testing Technology Co., Ltd.  
Ace Chai  
Approved  
Eric Wang

Testing Laboratory Name: Shenzhen CTA Testing Technology Co., Ltd.

Address: Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name: Shantou Ruiou Innovation Technology Co.LTD.

Address: Shantou Chenghai District Longdu town, Qianmei village residential garden No.36, Shantou, Guangdong, China

Standard: FCC Rules and Regulations PART 15.249

Shenzhen CTA Testing Technology Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen CTA Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen CTA Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description: Quadcopter

Trade Mark: N/A

Manufacturer: Shantou Ruiou Innovation Technology Co.LTD.

Model/Type reference: M23

Listed Models: Refer to page 2

Modulation: GFSK

Frequency: 2410-2470MHz

Ratings: DC 3.7V From battery and DC 5.0V From external circuit

Result: PASS

## TEST REPORT

Equipment under Test : Quadcopter

Model /Type : M23

Listed Models : M21, M22, M24, M25, M26, M27, M28, M29, M30, M31, M32, M33, M34, M35, M36, M37, M38, M39, M50, M51, M52, M53, M54, M55, M56, M57, M58, M59, M60, M61, M62

Model difference : The PCB board, circuit, structure and internal of these models are the same, Only model number and colour is different for these model.

Applicant : **Shantou Ruiou Innovation Technology Co.LTD.**

Address : Shantou Chenghai District Longdu town, Qianmei village residential garden No.36, Shantou, Guangdong, China

Manufacturer : **Shantou Ruiou Innovation Technology Co.LTD.**

Address : Shantou Chenghai District Longdu town, Qianmei village residential garden No.36, Shantou, Guangdong, China

|                     |             |
|---------------------|-------------|
| <b>Test Result:</b> | <b>PASS</b> |
|---------------------|-------------|

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Contents

|           |   |           |
|-----------|---|-----------|
| <u>1.</u> | <u>TEST STANDARDS .....</u>                         | <u>4</u>  |
| <u>2.</u> | <u>SUMMARY .....</u>                                | <u>5</u>  |
| 2.1.      | General Remarks                                     | 5         |
| 2.2.      | Product Description                                 | 5         |
| 2.3.      | Equipment Under Test                                | 5         |
| 2.4.      | Short description of the Equipment under Test (EUT) | 5         |
| 2.5.      | EUT configuration                                   | 5         |
| 2.6.      | EUT operation mode                                  | 6         |
| 2.7.      | Block Diagram of Test Setup                         | 6         |
| 2.8.      | Modifications                                       | 6         |
| <u>3.</u> | <u>TEST ENVIRONMENT .....</u>                       | <u>7</u>  |
| 3.1.      | Address of the test laboratory                      | 7         |
| 3.2.      | Test Facility                                       | 7         |
| 3.3.      | Environmental conditions                            | 7         |
| 3.4.      | Summary of measurement results                      | 8         |
| 3.5.      | Statement of the measurement uncertainty            | 8         |
| 3.6.      | Equipments Used during the Test                     | 8         |
| <u>4.</u> | <u>TEST CONDITIONS AND RESULTS .....</u>            | <u>10</u> |
| 4.1.      | AC Power Conducted Emission .....                   | 10        |
| 4.2.      | Radiated Emission and Band Edges .....              | 13        |
| 4.3.      | 20dB Bandwidth Measurement .....                    | 20        |
| 4.4.      | Antenna Requirement .....                           | 22        |
| <u>5.</u> | <u>TEST SETUP PHOTOS OF THE EUT .....</u>           | <u>23</u> |
| <u>6.</u> | <u>TEST PHOTOS OF THE EUT .....</u>                 | <u>23</u> |

## 1. TEST STANDARDS

The tests were performed according to following standards:

**FCC Rules Part 15.249:** Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

**ANSI C63.10:2013 :** American National Standard for Testing Unlicensed Wireless Devices

**ANSI C63.4: 2014:** American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz Range of 9 kHz to 40GHz

## 2. SUMMARY

### 2.1. General Remarks

|                                |   |               |
|--------------------------------|---|---------------|
| Date of receipt of test sample | : | Aug. 05, 2025 |
| Testing commenced on           | : | Aug. 05, 2025 |
| Testing concluded on           | : | Aug. 16, 2025 |

### 2.2. Product Description

|                     |  |
|---------------------|--|
| Name of EUT         | Quadcopter   |
| Model Number        | M23  |
| Power Rating        | DC 3.7V From battery and DC 5.0V From external circuit               |
| Hardware version:   | V1.0   |
| Software version:   | V1.0   |
| Sample ID:          | CTA250731006-1# (Engineer sample)<br>CTA250731006-2# (Normal sample) |
| Operation frequency | 2410-2470MHz   |
| Modulation          | GFSK   |
| Antenna Type        | Internal antenna   |
| Antenna Gain        | 0.67 dBi   |

### 2.3. Equipment Under Test

#### Power supply system utilised

|                      |   |   |                                   |
|----------------------|---|---|-----------------------------------|
| Power supply voltage | : | <input type="radio"/> 230V / 50 Hz                                | <input type="radio"/> 120V / 60Hz |
|                      |   | <input type="radio"/> 12 V DC                                     | <input type="radio"/> 24 V DC     |
|                      |   | <input checked="" type="radio"/> Other (specified in blank below) |                                   |

DC 3.7V From battery and DC 5.0V From external circuit

### 2.4. Short description of the Equipment under Test (EUT)

This is a Quadcopter.

For more details, refer to the user's manual of the EUT.

### 2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

|                       |  |  |   |
|-----------------------|--|--|---|
| <input type="radio"/> | Adapter information<br>(Auxiliary test supplied by test Lab) |  | Model: EP-TA20CBC<br>Input: AC 100-240V 50/60Hz<br>Output: DC 5V 2A |
|-----------------------|--|--|---|

## 2.6. EUT operation mode

The Applicant use Key to control the EUT for staying in continuous transmitting and receiving mode for testing .There is 3 channels provided to the EUT. Channel Low, Mid and High was selected to test.

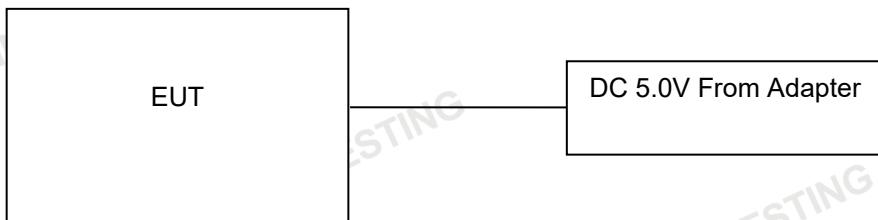
### Operation Frequency:

| Channel | Frequency (MHz) |
|---------|-----------------|
| 01      | 2410            |
| 02      | 2440            |
| 03      | 2470            |

Test frequency:

| Channel | Frequency (MHz) |
|---------|-----------------|
| Low     | 2410            |
| Mid     | 2440            |
| High    | 2470            |

## 2.7. Block Diagram of Test Setup



## 2.8. Modifications

No modifications were implemented to meet testing criteria.

### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

**Shenzhen CTA Testing Technology Co., Ltd.**

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

#### **3.2. Test Facility**

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

**FCC-Registration No.: 517856 Designation Number: CN1318**

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

**Industry Canada Registration Number. Is: 27890 CAB identifier: CN0127**

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

**A2LA-Lab Cert. No.: 6534.01**

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

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

#### **3.3. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 23 ° C       |
| Humidity:             | 48 %         |
| Atmospheric pressure: | 950-1050mbar |

AC Main Conducted testing:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 24 ° C       |
| Humidity:             | 45 %         |
| Atmospheric pressure: | 950-1050mbar |

Conducted testing:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 24 ° C       |
| Humidity:             | 45 %         |
| Atmospheric pressure: | 950-1050mbar |

### 3.4. Summary of measurement results

| FCC PART 15.249    |                               |      |
|--------------------|-------------------------------|------|
| FCC Part 15.249(a) | Field Strength of Fundamental | PASS |
| FCC Part 15.209    | Spurious Emission             | PASS |
| FCC Part 15.209    | Band edge                     | PASS |
| FCC Part 15.215(c) | 20dB bandwidth                | PASS |
| FCC Part 15.207    | Conducted Emission            | PASS |
| FCC Part 15.203    | Antenna Requirement           | PASS |

### 3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen CTA Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. :

| Test                                     | Range       | Measurement Uncertainty | Notes |
|--|-------------|-------------------------|-------|
| Radiated Emission                        | 9KHz~30MHz  | 3.02 dB                 | (1)   |
| Radiated Emission                        | 30~1000MHz  | 4.06 dB                 | (1)   |
| Radiated Emission                        | 1~18GHz     | 5.14 dB                 | (1)   |
| Radiated Emission                        | 18-40GHz    | 5.38 dB                 | (1)   |
| Conducted Disturbance                    | 0.15~30MHz  | 2.14 dB                 | (1)   |
| Output Peak power                        | 30MHz~18GHz | 0.55 dB                 | (1)   |
| Power spectral density                   | /           | 0.57 dB                 | (1)   |
| Spectrum bandwidth                       | /           | 1.1%                    | (1)   |
| Radiated spurious emission (30MHz-1GHz)  | 30~1000MHz  | 4.10 dB                 | (1)   |
| Radiated spurious emission (1GHz-18GHz)  | 1~18GHz     | 4.32 dB                 | (1)   |
| Radiated spurious emission (18GHz-40GHz) | 18-40GHz    | 5.54 dB                 | (1)   |
| Time                                     | /           | ±2%                     | (1)   |

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

### 3.6. Equipments Used during the Test

| Test Equipment          | Manufacturer | Model No. | Equipment No. | Calibration Date | Calibration Due Date |
|-------------------------|--------------|-----------|---------------|------------------|----------------------|
| LISN                    | R&S          | ENV216    | CTA-308       | 2025/08/04       | 2026/08/03           |
| LISN                    | R&S          | ENV216    | CTA-314       | 2025/07/30       | 2026/07/29           |
| EMI Test Receiver       | R&S          | ESPI      | CTA-307       | 2025/07/30       | 2026/07/29           |
| EMI Test Receiver       | R&S          | ESCI      | CTA-306       | 2025/07/30       | 2026/07/29           |
| Spectrum Analyzer       | Agilent      | N9020A    | CTA-301       | 2025/07/30       | 2026/07/29           |
| Vector Signal generator | Agilent      | N5182A    | CTA-305       | 2025/07/30       | 2026/07/29           |
| Analog Signal Generator | R&S          | E4421B    | CTA-304       | 2025/07/30       | 2026/07/29           |

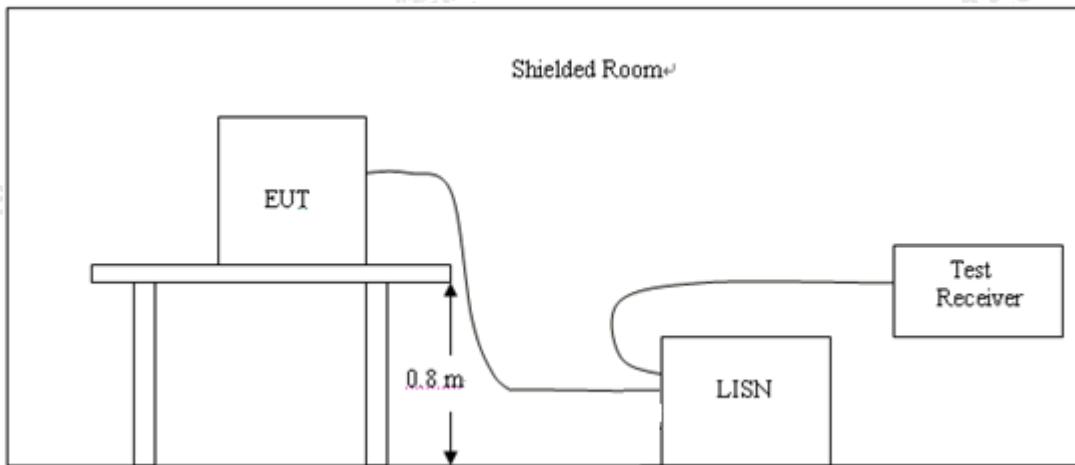
|   |             |               |         |            |            |
|---|-------------|---------------|---------|------------|------------|
| WIDEBAND RADIO<br>COMMUNICATION<br>TESTER | CMW500      | R&S           | CTA-302 | 2025/07/30 | 2026/07/29 |
| Temperature and<br>humidity meter         | Chigo       | ZG-7020       | CTA-326 | 2025/07/31 | 2026/07/30 |
| Ultra-Broadband<br>Antenna                | Schwarzbeck | VULB9163      | CTA-310 | 2023/10/17 | 2026/10/16 |
| Horn Antenna                              | Schwarzbeck | BBHA 9120D    | CTA-309 | 2023/10/13 | 2026/10/12 |
| Loop Antenna                              | Zhinan      | ZN30900C      | CTA-311 | 2023/10/17 | 2026/10/16 |
| Horn Antenna                              | Schwarzbeck | BBHA 9170     | CTA-346 | 2025/05/18 | 2028/05/17 |
| Amplifier                                 | Schwarzbeck | BBV9745       | CTA-312 | 2025/07/30 | 2026/07/29 |
| Amplifier                                 | Tonscend    | TAP-011840    | CTA-313 | 2025/07/30 | 2026/07/29 |
| High-Pass Filter                          | XingBo      | XBLBQ-GTA18   | CTA-402 | 2025/07/30 | 2026/07/29 |
| High-Pass Filter                          | XingBo      | XBLBQ-GTA27   | CTA-403 | 2025/07/30 | 2026/07/29 |
| Automatic control<br>unit                 | Tonscend    | JS0806-2      | CTA-404 | 2025/07/30 | 2026/07/29 |
| Power Sensor                              | Agilent     | U2021XA       | CTA-405 | 2025/07/30 | 2026/07/29 |
| Amplifier                                 | SKET        | LNPA 1840G-50 | CTA-345 | 2025/05/17 | 2026/05/16 |
| Spectrum analyzer                         | R&S         | FSV40-N       | CTA-344 | 2025/05/17 | 2026/05/16 |
| Power Meter                               | R&S         | NRVS          | CTA-354 | 2025/07/30 | 2026/07/29 |

| Test Equipment    | Manufacturer | Model No.   | Version<br>number | Calibration<br>Date | Calibration<br>Due Date |
|-------------------|--------------|-------------|-------------------|---------------------|-------------------------|
| EMI Test Software | Tonscend     | TS®JS32-RE  | 5.0.0.2           | N/A                 | N/A                     |
| EMI Test Software | Tonscend     | TS®JS32-CE  | 5.0.0.1           | N/A                 | N/A                     |
| RF Test Software  | Tonscend     | TS®JS1120-3 | 3.1.65            | N/A                 | N/A                     |
| RF Test Software  | Tonscend     | TS®JS1120   | 3.1.46            | N/A                 | N/A                     |

## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2, Support equipment, if needed, was placed as per ANSI C63.10.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

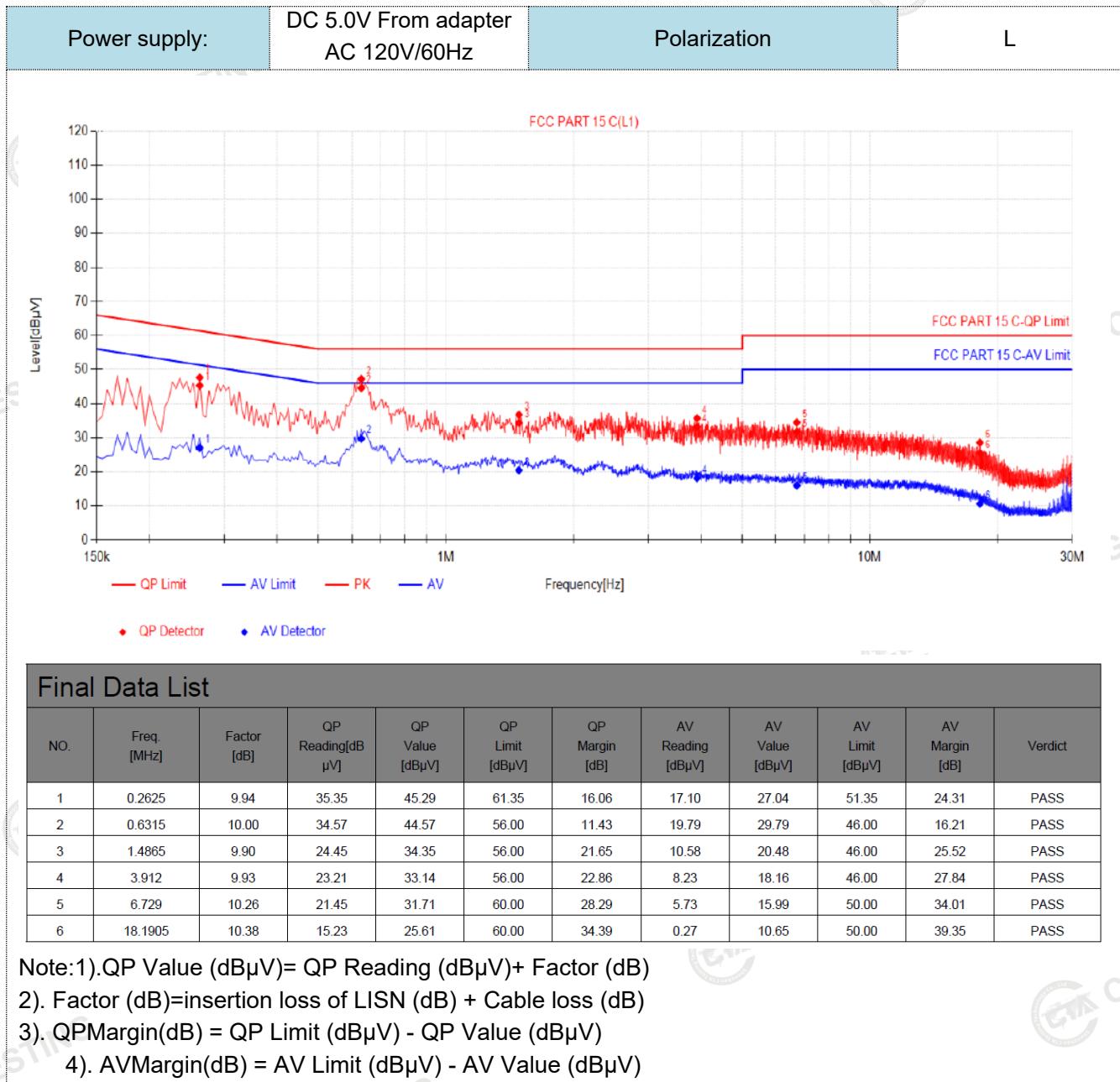
| Frequency range (MHz) | Limit (dBuV) |           |
|-----------------------|--------------|-----------|
|                       | Quasi-peak   | Average   |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |
| 0.5-5                 | 56           | 46        |
| 5-30                  | 60           | 50        |

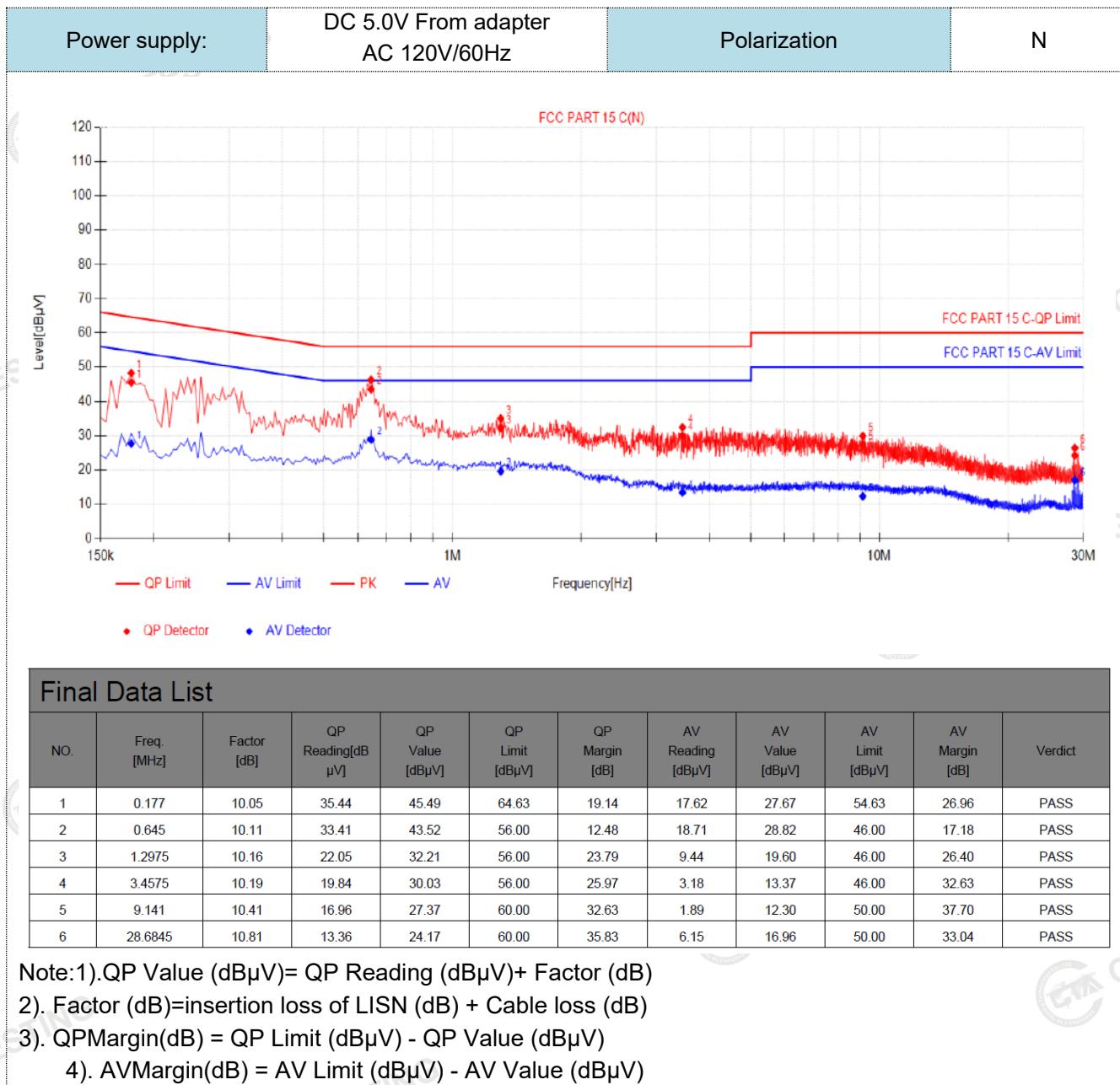
\* Decreases with the logarithm of the frequency.

#### TEST RESULTS

Remark:

1. All modes of GFSK were tested at Low, Middle, and High channel; only the worst result of GFSK CH19 was reported as below:
2. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

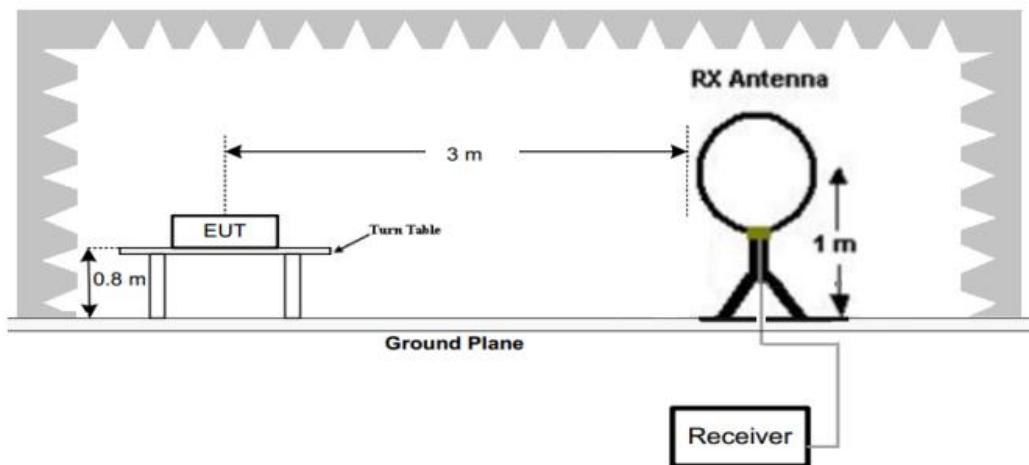




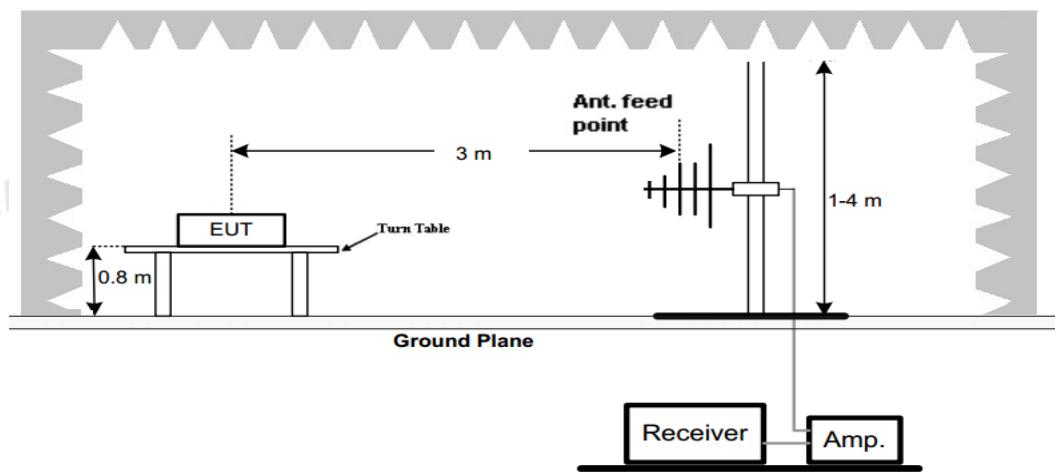
## 4.2. Radiated Emission and Band Edges

### TEST CONFIGURATION

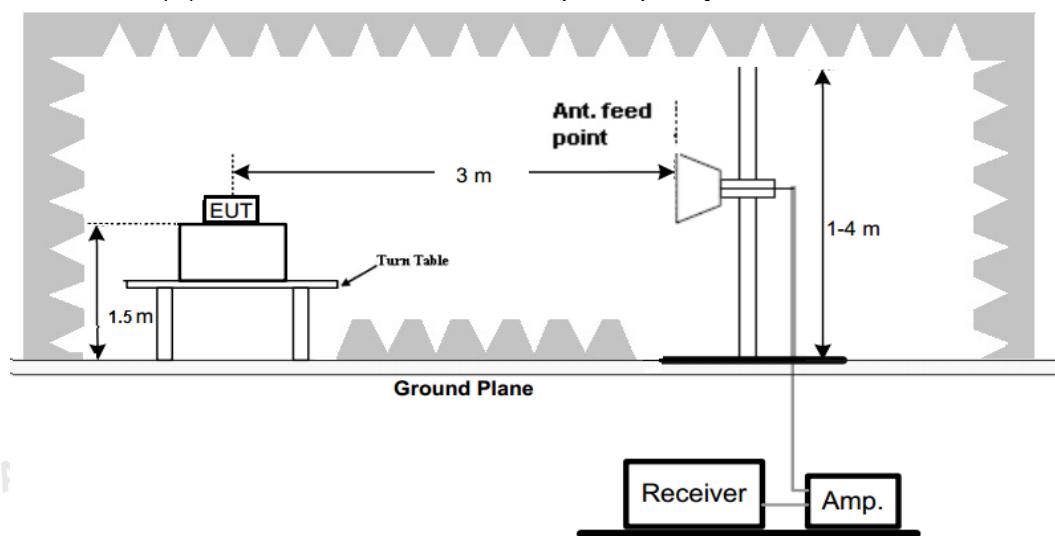
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz

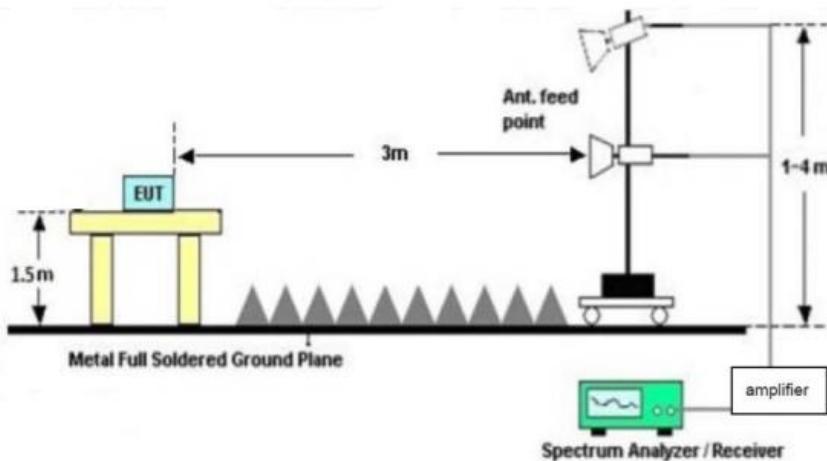


(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz





### TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 26MHz and maximum operation frequency was 1910MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type          | Test Distance |
|----------------------|----------------------------|---------------|
| 9KHz-30MHz           | Active Loop Antenna        | 3             |
| 30MHz-1GHz           | Ultra-Broadband Antenna    | 3             |
| 1GHz-18GHz           | Double Ridged Horn Antenna | 3             |
| 18GHz-25GHz          | Horn Antenna               | 1             |

7. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting  | Detector |
|----------------------|---|----------|
| 9KHz-150KHz          | RBW=200Hz/VBW=3KHz,Sweep time=Auto  | QP       |
| 150KHz-30MHz         | RBW=9KHz/VBW=100KHz,Sweep time=Auto   | QP       |
| 30MHz-1GHz           | RBW=120KHz/VBW=1000KHz,Sweep time=Auto  | QP       |
| 1GHz-40GHz           | Peak Value: RBW=1MHz/VBW=3MHz,<br>Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz,<br>Sweep time=Auto | Peak     |

### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|                           |  |
|---------------------------|--|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |  |

Transd=AF +CL-AG

### RADIATION LIMIT

According 15.249, the field strength of emissions from intentional radiators operated within 2400MHz-2483.5 MHz shall not exceed 94dB $\mu$ V/m (50mV/m):

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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)

Radiated emission limits

| Frequency (MHz) | Distance (Meters) | Radiated (dB $\mu$ V/m)                     | Radiated ( $\mu$ V/m) |
|-----------------|-------------------|---|-----------------------|
| 0.009-0.49      | 3                 | $20\log(2400/F(\text{KHz}))+40\log(300/3)$  | $2400/F(\text{KHz})$  |
| 0.49-1.705      | 3                 | $20\log(24000/F(\text{KHz}))+40\log(300/3)$ | $24000/F(\text{KHz})$ |
| 1.705-30        | 3                 | $20\log(30)+40\log(30/3)$                   | 30                    |
| 30-88           | 3                 | 40.0  | 100                   |
| 88-216          | 3                 | 43.5  | 150                   |
| 216-960         | 3                 | 46.0  | 200                   |
| Above 960       | 3                 | 54.0  | 500                   |

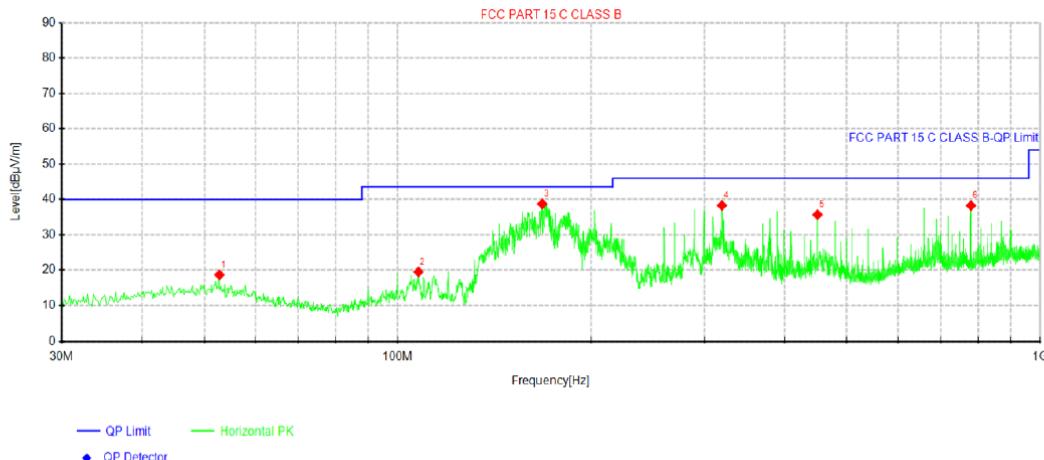
**TEST RESULTS**

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. GFSK were tested at Low, Middle, and High channel and recorded worst mode at the High channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

## For 30MHz-1GHz

## Horizontal



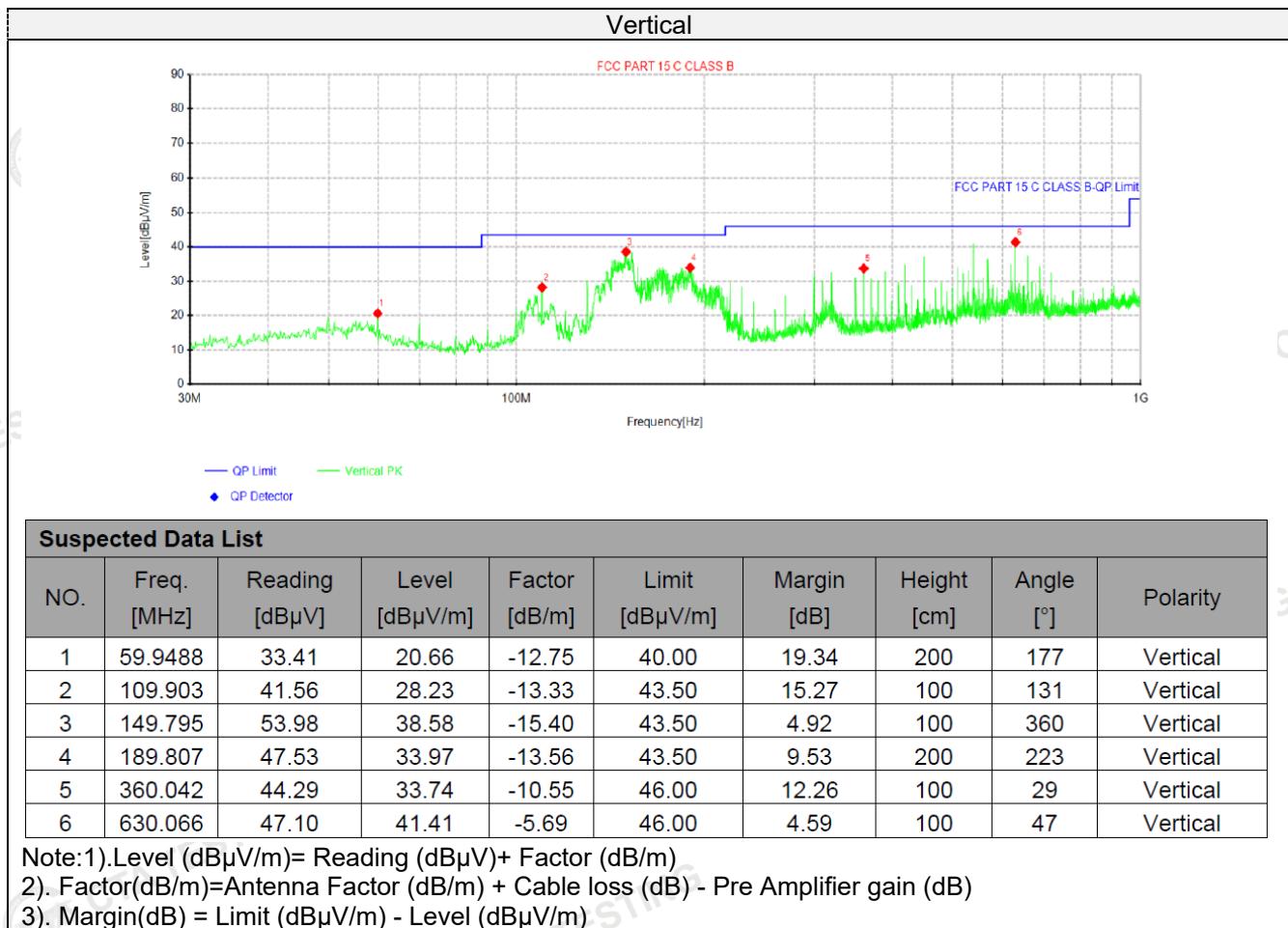
## Suspected Data List

| NO. | Freq. [MHz] | Reading [dB $\mu$ V] | Level [dB $\mu$ V/m] | Factor [dB/m] | Limit [dB $\mu$ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|----------------------|----------------------|---------------|----------------------|-------------|-------------|-----------|------------|
| 1   | 52.795      | 30.01                | 18.64                | -11.37        | 40.00                | 21.36       | 200         | 190       | Horizontal |
| 2   | 107.721     | 32.69                | 19.49                | -13.20        | 43.50                | 24.01       | 100         | 0         | Horizontal |
| 3   | 167.861     | 53.89                | 38.71                | -15.18        | 43.50                | 4.79        | 100         | 287       | Horizontal |
| 4   | 319.545     | 49.24                | 38.30                | -10.94        | 46.00                | 7.70        | 200         | 85        | Horizontal |
| 5   | 450.01      | 45.44                | 35.65                | -9.79         | 46.00                | 10.35       | 100         | 156       | Horizontal |
| 6   | 780.052     | 42.93                | 38.25                | -4.68         | 46.00                | 7.75        | 100         | 130       | Horizontal |

Note: 1).Level (dB $\mu$ V/m)= Reading (dB $\mu$ V)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dB $\mu$ V/m) - Level (dB $\mu$ V/m)



For 1GHz to 25GHz

## GFSK (above 1GHz)

| Frequency(MHz): |                         | 2410           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2410.00         | 88.72                   | PK             | 114.00      | 25.28            | 100.00                | 27.47             | 3.43               | 42.18                    |
| 2410.00         | 79.64                   | AV             | 94.00       | 14.36            | 90.92                 | 27.47             | 3.43               | 42.18                    |
| 4820.00         | 48.88                   | PK             | 74.00       | 25.12            | 53.16                 | 32.33             | 5.12               | 41.73                    |
| 4820.00         | 39.35                   | AV             | 54.00       | 14.65            | 43.63                 | 32.33             | 5.12               | 41.73                    |
| 7230.00         | 50.97                   | PK             | 74.00       | 23.03            | 51.50                 | 36.6              | 6.49               | 43.62                    |
| 7230.00         | 38.21                   | AV             | 54.00       | 15.79            | 38.74                 | 36.6              | 6.49               | 43.62                    |

| Frequency(MHz): |                         | 2410           |             | Polarity:        |                       | VERTICAL          |                    |                          |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2410.00         | 87.06                   | PK             | 114.00      | 26.94            | 98.34                 | 27.47             | 3.43               | 42.18                    |
| 2410.00         | 79.72                   | AV             | 94.00       | 14.28            | 91.00                 | 27.47             | 3.43               | 42.18                    |
| 4820.00         | 47.59                   | PK             | 74.00       | 26.41            | 51.87                 | 32.33             | 5.12               | 41.73                    |
| 4820.00         | 39.26                   | AV             | 54.00       | 14.74            | 43.54                 | 32.33             | 5.12               | 41.73                    |
| 7230.00         | 49.16                   | PK             | 74.00       | 24.84            | 49.69                 | 36.6              | 6.49               | 43.62                    |
| 7230.00         | 37.13                   | AV             | 54.00       | 16.87            | 37.66                 | 36.6              | 6.49               | 43.62                    |

| Frequency(MHz): |                         | 2440           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2440.00         | 88.22                   | PK             | 114.00      | 25.78            | 99.47                 | 27.52             | 3.45               | 42.22                    |
| 2440.00         | 80.34                   | AV             | 94.00       | 13.66            | 91.59                 | 27.52             | 3.45               | 42.22                    |
| 4880.00         | 49.62                   | PK             | 74.00       | 24.38            | 53.50                 | 32.6              | 5.34               | 41.82                    |
| 4880.00         | 39.52                   | AV             | 54.00       | 14.48            | 43.40                 | 32.6              | 5.34               | 41.82                    |
| 7320.00         | 49.55                   | PK             | 74.00       | 24.45            | 49.66                 | 36.8              | 6.81               | 43.72                    |
| 7320.00         | 36.69                   | AV             | 54.00       | 17.31            | 36.80                 | 36.8              | 6.81               | 43.72                    |

| Frequency(MHz): |                         | 2440           |             | Polarity:        |                       | VERTICAL          |                    |                          |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2440.00         | 86.58                   | PK             | 114.00      | 27.42            | 97.83                 | 27.52             | 3.45               | 42.22                    |
| 2440.00         | 78.90                   | AV             | 94.00       | 15.10            | 90.15                 | 27.52             | 3.45               | 42.22                    |
| 4880.00         | 47.46                   | PK             | 74.00       | 26.54            | 51.34                 | 32.6              | 5.34               | 41.82                    |
| 4880.00         | 37.82                   | AV             | 54.00       | 16.18            | 41.70                 | 32.6              | 5.34               | 41.82                    |
| 7320.00         | 48.52                   | PK             | 74.00       | 25.48            | 48.63                 | 36.8              | 6.81               | 43.72                    |
| 7320.00         | 36.18                   | AV             | 54.00       | 17.82            | 36.29                 | 36.8              | 6.81               | 43.72                    |

| Frequency(MHz): |                         | 2470           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |
| 2470.00         | 87.47                   | PK             | 114.00      | 26.53            | 97.61                 | 27.67             | 4.47               | 42.28                    |
| 2470.00         | 81.58                   | AV             | 94.00       | 12.42            | 91.72                 | 27.67             | 4.47               | 42.28                    |
| 4940.00         | 49.24                   | PK             | 74.00       | 24.76            | 52.34                 | 32.71             | 5.66               | 41.47                    |
| 4940.00         | 39.60                   | AV             | 54.00       | 14.40            | 42.70                 | 32.71             | 5.66               | 41.47                    |
| 7410.00         | 51.13                   | PK             | 74.00       | 22.87            | 50.70                 | 37.02             | 7.25               | 43.84                    |
| 7410.00         | 36.55                   | AV             | 54.00       | 17.45            | 36.12                 | 37.02             | 7.25               | 43.84                    |

| Frequency(MHz): |                         | 2470           |             | Polarity:        |                       | VERTICAL          |                    |                          |        |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|--------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |        |
| 2470.00         | 85.63                   | PK             | 114.00      | 28.37            | 95.77                 | 27.67             | 4.47               | 42.28                    | -10.14 |
| 2470.00         | 78.32                   | AV             | 94.00       | 15.68            | 88.46                 | 27.67             | 4.47               | 42.28                    | -10.14 |
| 4940.00         | 47.01                   | PK             | 74.00       | 26.99            | 50.11                 | 32.71             | 5.66               | 41.47                    | -3.1   |
| 4940.00         | 38.50                   | AV             | 54.00       | 15.50            | 41.60                 | 32.71             | 5.66               | 41.47                    | -3.1   |
| 7410.00         | 49.14                   | PK             | 74.00       | 24.86            | 48.71                 | 37.02             | 7.25               | 43.84                    | 0.43   |
| 7410.00         | 36.60                   | AV             | 54.00       | 17.40            | 36.17                 | 37.02             | 7.25               | 43.84                    | 0.43   |

## REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

**Results of Band Edges Test (Radiated)**

| Frequency(MHz): |                         | 2410           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |        |
|-----------------|-------------------------|----------------|-------------|------------------|-----------------------|-------------------|--------------------|--------------------------|--------|
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |        |
| 2390.00         | 62.83                   | PK             | 74.00       | 11.17            | 73.25                 | 27.42             | 4.31               | 42.15                    | -10.42 |
| 2390.00         | 44.10                   | AV             | 54.00       | 9.90             | 54.52                 | 27.42             | 4.31               | 42.15                    | -10.42 |
| 2400.00         | 62.56                   | PK             | 74.00       | 11.44            | 72.99                 | 27.43             | 4.31               | 42.17                    | -10.43 |
| 2400.00         | 48.52                   | AV             | 54.00       | 5.48             | 58.95                 | 27.43             | 4.31               | 42.17                    | -10.43 |
| Frequency(MHz): |                         | 2410           |             | Polarity:        |                       | VERTICAL          |                    |                          |        |
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |        |
| 2390.00         | 61.16                   | PK             | 74.00       | 12.84            | 71.58                 | 27.42             | 4.31               | 42.15                    | -10.42 |
| 2390.00         | 43.09                   | AV             | 54.00       | 10.91            | 53.51                 | 27.42             | 4.31               | 42.15                    | -10.42 |
| 2400.00         | 61.54                   | PK             | 74.00       | 12.46            | 71.97                 | 27.43             | 4.31               | 42.17                    | -10.43 |
| 2400.00         | 48.01                   | AV             | 54.00       | 5.99             | 58.44                 | 27.43             | 4.31               | 42.17                    | -10.43 |
| Frequency(MHz): |                         | 2470           |             | Polarity:        |                       | HORIZONTAL        |                    |                          |        |
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |        |
| 2483.50         | 62.97                   | PK             | 74.00       | 11.03            | 73.08                 | 27.7              | 4.47               | 42.28                    | -10.11 |
| 2483.50         | 43.31                   | AV             | 54.00       | 10.69            | 53.42                 | 27.7              | 4.47               | 42.28                    | -10.11 |
| Frequency(MHz): |                         | 2470           |             | Polarity:        |                       | VERTICAL          |                    |                          |        |
| Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBuV) | Antenna Factor (dB/m) | Cable Factor (dB) | Pre-amplifier (dB) | Correction Factor (dB/m) |        |
| 2483.50         | 60.02                   | PK             | 74.00       | 13.98            | 70.13                 | 27.7              | 4.47               | 42.28                    | -10.11 |
| 2483.50         | 40.63                   | AV             | 54.00       | 13.37            | 50.74                 | 27.7              | 4.47               | 42.28                    | -10.11 |

## Note:

- 1) Emission level (dBuV/m) = Meter Reading + antenna Factor + cable loss - preamp factor.
- 2) Margin value = Limits - Emission level.
- 3) -- Mean the PK detector measured value is below average limit.
- 4) The other emission levels were very low against the limit.
- 5) RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

### 4.3. 20dB Bandwidth Measurement

#### TEST CONFIGURATION



#### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30KHz RBW and 300KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

#### LIMIT

N/A

#### TEST RESULTS

| Modulation | Channel | 20dB bandwidth (MHz) | Result |
|------------|---------|----------------------|--------|
| GFSK       | Low     | 1.048                | PASS   |
|            | Mid     | 1.050                |        |
|            | High    | 1.079                |        |

Note: 1.The test results including the cable loss.

## GFSK



## Low



## Mid



## High

#### 4.4. Antenna Requirement

##### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

##### **Antenna Information**

The maximum gain of antenna was 0.67 dBi.

Remark: The antenna gain is provided by the customer, if the data provided by the customer is not accurate, Shenzhen CTA Testing Technology Co., Ltd. does not assume any responsibility.

## **5. Test Setup Photos of the EUT**

Please refer to separated files for Test Setup Photos of the EUT.

## **6. Test Photos of the EUT**

Please refer to separated files for External Photos & Internal Photos of the EUT.

.....**End of Report**.....