

## TEST REPORT

|                                                                                                                                                                                                                    |                                                                                                                                 |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Report Number</b> ..... :                                                                                                                                                                                       | 90229-22-72-22-PP001                                                                                                            |                  |
| <b>Date of issue</b> ..... :                                                                                                                                                                                       | 2022.4.8                                                                                                                        |                  |
| <b>Tested by (+signature)</b> ..... :                                                                                                                                                                              | Duke Chen                                                                                                                       | <i>Duke Chen</i> |
| <b>Approved by (+signature)</b> ..... :                                                                                                                                                                            | Jason Gao                                                                                                                       | <i>Jason gao</i> |
| <b>Testing Laboratory name</b> ..... :                                                                                                                                                                             | SLG-CPC Testlaboratory Co., Ltd.                                                                                                |                  |
| <b>Address</b> ..... :                                                                                                                                                                                             | No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117                                            |                  |
| <b>Applicant's name</b> ..... :                                                                                                                                                                                    | SHENZHEN GEILI TECHNOLOGY CO.,LTD                                                                                               |                  |
| <b>Address</b> ..... :                                                                                                                                                                                             | 503, Building C1, Zhonghao yuandong industrial area, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen,China |                  |
| <b>Manufacturer's name</b> .....                                                                                                                                                                                   | SHENZHEN GEILI TECHNOLOGY CO.,LTD                                                                                               |                  |
| <b>Address</b> ..... :                                                                                                                                                                                             | 503, Building C1, Zhonghao yuandong industrial area, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen,China |                  |
| <b>Factory's name</b> .....                                                                                                                                                                                        | SHENZHEN GEILI TECHNOLOGY CO.,LTD                                                                                               |                  |
| <b>Address</b> ..... :                                                                                                                                                                                             | 503, Building C1, Zhonghao yuandong industrial area, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen,China |                  |
| <b>Standard(s)</b> ..... :                                                                                                                                                                                         | FCC 47 CFR Part 15, Subpart C                                                                                                   |                  |
| <b>Test item description</b> ..... :                                                                                                                                                                               | Remote Control                                                                                                                  |                  |
| <b>Trade Mark</b> ..... :                                                                                                                                                                                          | N/A                                                                                                                             |                  |
| <b>Model/Type reference</b> ..... :                                                                                                                                                                                | MZWX-F3-1;MZWX-F3-2;MZWX-F3-3;MZWX-F3-4;MZWX-F3-5;MZWX-F3-6;MZWX-F3-7                                                           |                  |
| <b>FCC ID</b> ..... :                                                                                                                                                                                              | 2A4KFGLKJ-2                                                                                                                     |                  |
| <b>Date of receipt of test item</b> ..... :                                                                                                                                                                        | 2022.03.23                                                                                                                      |                  |
| <b>Date (s) of performance of test:</b>                                                                                                                                                                            | 2022.03.24-04.07                                                                                                                |                  |
| <b>Summary of Test Results</b> ..... :                                                                                                                                                                             | <b>Pass</b>                                                                                                                     |                  |
| The Summary of Test Results based on a technical opinion belongs to the standard(s).                                                                                                                               |                                                                                                                                 |                  |
| <b>General disclaimer:</b><br>This report shall not be reproduced except in full, without the written approval of SLG-CPC Testlaboratory Co., Ltd. The test results in the report only apply to the tested sample. |                                                                                                                                 |                  |

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## 1 EUT TECHNICAL DESCRIPTION

| Characteristics               | Description                                                                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product:                      | Remote Control                                                                                                                                                                                            |
| Model Number:                 | MZWX-F3-1;                                                                                                                                                                                                |
| Model Differences:            | MZWX-F3-1;MZWX-F3-2;MZWX-F3-3;MZWX-F3-4;MZWX-F3-5;MZWX-F3-6;MZWX-F3-7; models numbers are said to be identical in same technical construction including circuit diagram,Only the appearance is different. |
| Modulation:                   | OOK                                                                                                                                                                                                       |
| Operating Frequency Range(s): | 433.92MHz                                                                                                                                                                                                 |
| Number of Channels:           | 1                                                                                                                                                                                                         |
| Antenna Type :                | Integral Antenna                                                                                                                                                                                          |
| Antenna Gain:                 | 1.0 dBi                                                                                                                                                                                                   |
| Power supply:                 | <input checked="" type="checkbox"/> DC 9V form Battery                                                                                                                                                    |
|                               | <input type="checkbox"/> Adapter supply:                                                                                                                                                                  |
| Product SW/HW version:        | N/A                                                                                                                                                                                                       |
| Radio SW/HW version:          | N/A                                                                                                                                                                                                       |
| Temperature Range:            | -10°C ~ +50°C                                                                                                                                                                                             |

**Note:** for more details, please refer to the User's manual of the EUT.

## 2 SUMMARY OF TEST RESULT

| FCC Part Clause             | Test Parameter          | Verdict | Remark |
|-----------------------------|-------------------------|---------|--------|
| 15.231(c)                   | 20dB Emission Bandwidth | PASS    |        |
| 15.209 & 15.231(b)          | Radiated Emissions      | PASS    |        |
| 15.203                      | Antenna Requirement     | PASS    |        |
| 15.207                      | Conducted Emission      | PASS    |        |
| 15.231(a)                   | Transmission Time       | PASS    |        |
| NOTE1: N/A (Not Applicable) |                         |         |        |

### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID:2A4KFGLKJ-2 filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules

### 3 TEST METHODOLOGY

#### 3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:  
 FCC 47 CFR Part 15, Subpart C, Section 15.231

#### 3.2 MEASUREMENT EQUIPMENT USED

| Equipment                           | Model           | Manufacturer | S/N              | Cal. Due   |
|-------------------------------------|-----------------|--------------|------------------|------------|
| <b>RF Connected Test</b>            |                 |              |                  |            |
| Vector Signal Generater             | Rohde & Schwarz | SMBV100B(6G) | 101166           | 2022/07/30 |
| Analog Signal Generator             | Rohde & Schwarz | SMB100A(40G) | 181333           | 2022/07/30 |
| Signal Analyzer                     | Rohde & Schwarz | FSV40        | 101527           | 2022/05/24 |
| Power Analyzer                      | Rohde & Schwarz | OSP-B157W8   | N/A              | 2022/09/23 |
| Wideband Radio Communication Tester | R&S             | CMW270       | 101985           | 2022/07/30 |
| Temperature&Humidity test chamber   | ESPEC           | VC 4018      | /                | 2022/04/02 |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500       | 166898           | 2022/09/07 |
| <b>Radiated Emission Test</b>       |                 |              |                  |            |
| EMI Test Receiver                   | KEYSIGHT        | N9010A       | MY56070465       | 2022/12/10 |
| EMI Test Receiver                   | Rohde & Schwarz | FSV40        | 101511           | 2022/05/24 |
| Bilog Antenna                       | Schwarzbeck     | VULB 9163    | 01335            | 2023/04/28 |
| Power Amplifier                     | EMEC            | EM330        | 060676           | 2022/12/10 |
| Cable                               | Tuyue           | F4309        | L-400-NmNm-12000 | 2022/12/10 |
| Signal Analyzer                     | Rohde & Schwarz | FSV40        | 101511           | 2022/05/24 |
| Horn Antenna                        | Schwarzbeck     | BBHA9170     | /                | 2022/10/09 |
| Power Amplifier                     | Rohde & Schwarz | SCU-18F      | 180118           | 2022/05/17 |
| Active Loop Antenna                 | ETS LINDGREN    | 6512         | 41623            | 2022/04/26 |
| Test Software                       | Farad           | EZ-EMC       | Ver.CPC-3A1      | /          |

### 3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

The following test modes were performed for test:433.92MHz

## 4 FACILITIES AND ACCREDITATIONS

### 4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117 63.4 and CISPR Publication 22.

### 4.2 LABORATORY ACCREDITATIONS AND LISTINGS

#### Site Description

EMC Lab. : **Accredited by A2LA**  
The Certificate Number is 6325.01.

Name of Firm : SLG-CPC Testlaboratory Co., Ltd.  
Site Location : No. 11, Wu Song Road, Dongcheng District, Dongguan,  
Guangdong Province, China 523117

## 5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                      | Uncertainty            |
|--------------------------------|------------------------|
| Radio Frequency                | $\pm 1 \times 10^{-5}$ |
| Maximum Peak Output Power Test | $\pm 1.0\%$            |
| Conducted Emissions Test       | $\pm 3.08\text{dB}$    |
| Radiated Emission Test         | $\pm 4.60\text{dB}$    |
| Power Density                  | $\pm 0.9\%$            |
| Occupied Bandwidth Test        | $\pm 2.3\%$            |
| Band Edge Test                 | $\pm 1.2\%$            |
| Antenna Port Emission          | $\pm 3\text{dB}$       |
| Temperature                    | $\pm 3.2\%$            |
| Humidity                       | $\pm 2.5\%$            |

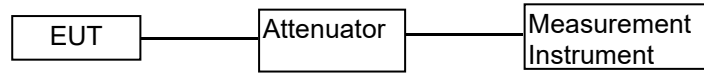
Measurement Uncertainty for a level of Confidence of 95%



## 6 SETUP OF EQUIPMENT UNDER TEST

### 6.1 RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

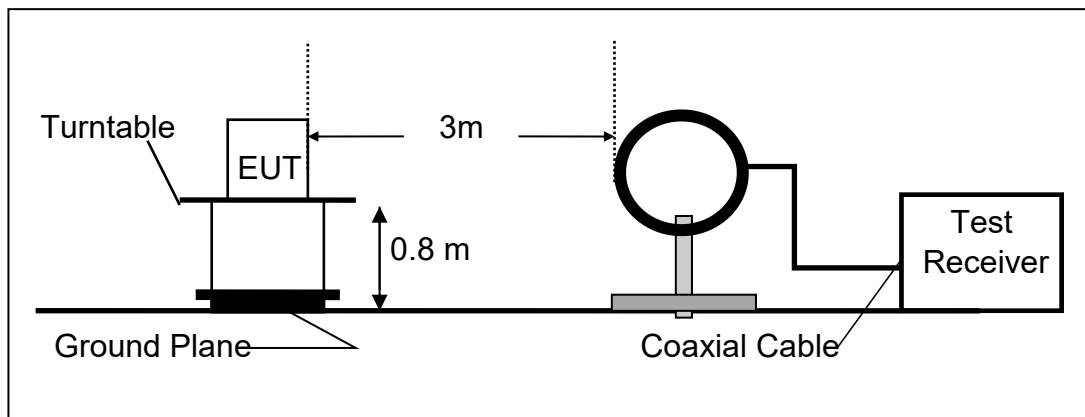
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

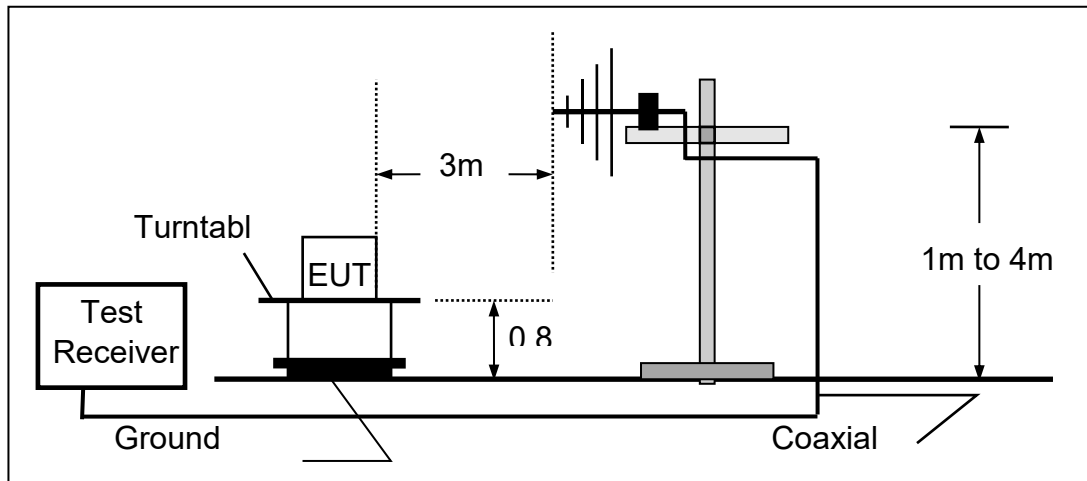
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

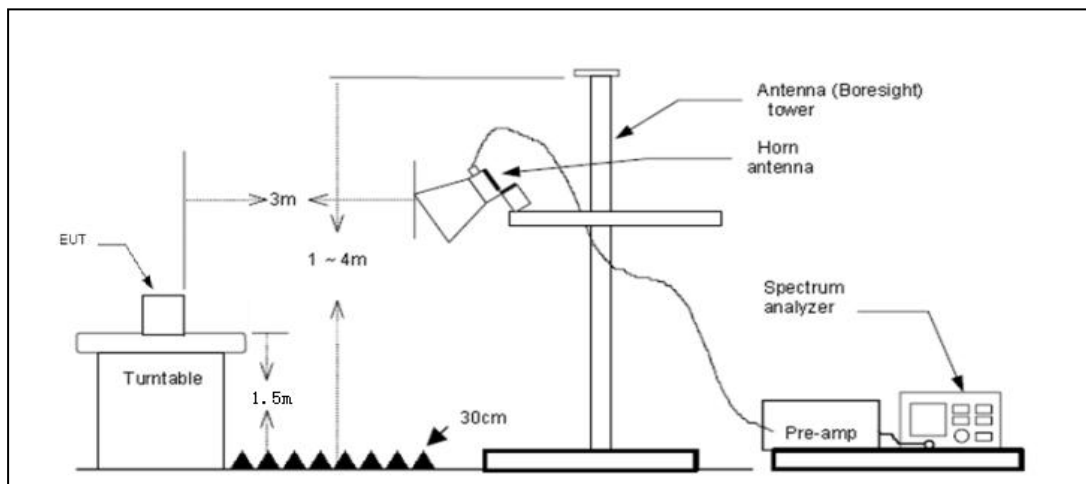
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



## (b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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

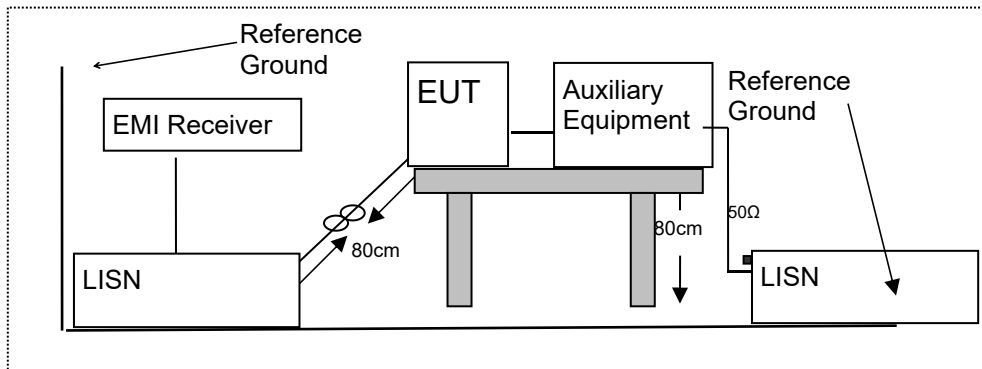


### 6.3 CONDUCTED EMISSION TEST SETUP

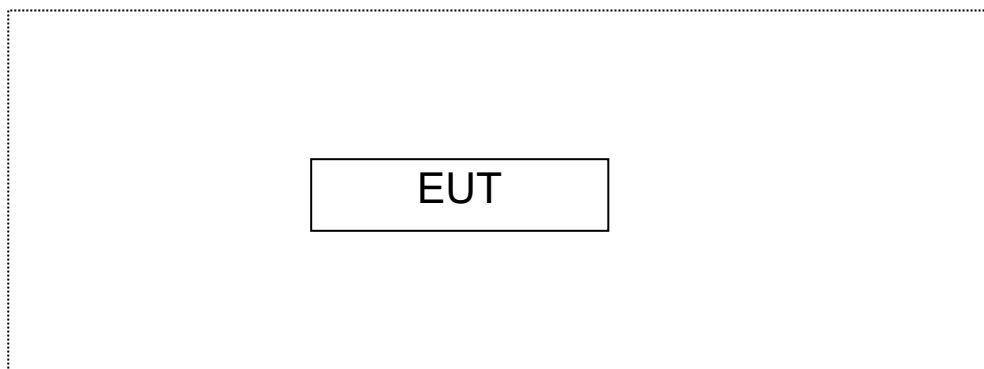
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8 m.

According to the requirements in ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



#### 6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



#### 6.5 SUPPORT EQUIPMENT

| EUT Cable List and Details |            |                     |                        |
|----------------------------|------------|---------------------|------------------------|
| Cable Description          | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| /                          | /          | /                   | /                      |

| Auxiliary Cable List and Details |            |                     |                        |
|----------------------------------|------------|---------------------|------------------------|
| Cable Description                | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| /                                | /          | /                   | /                      |

| Auxiliary Equipment List and Details |              |       |               |
|--------------------------------------|--------------|-------|---------------|
| Description                          | Manufacturer | Model | Serial Number |
| /                                    | /            | /     | /             |

#### Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 7 TEST REQUIREMENTS

### 7.1 20dB EMISSION BANDWIDTH

#### 7.1.1 Applicable Standard

According to FCC part 15.231(c)

#### 7.1.2 Conformance Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### 7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

#### 7.1.4 Test Procedure

The EUT was operating in transmit mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

#### Test Results

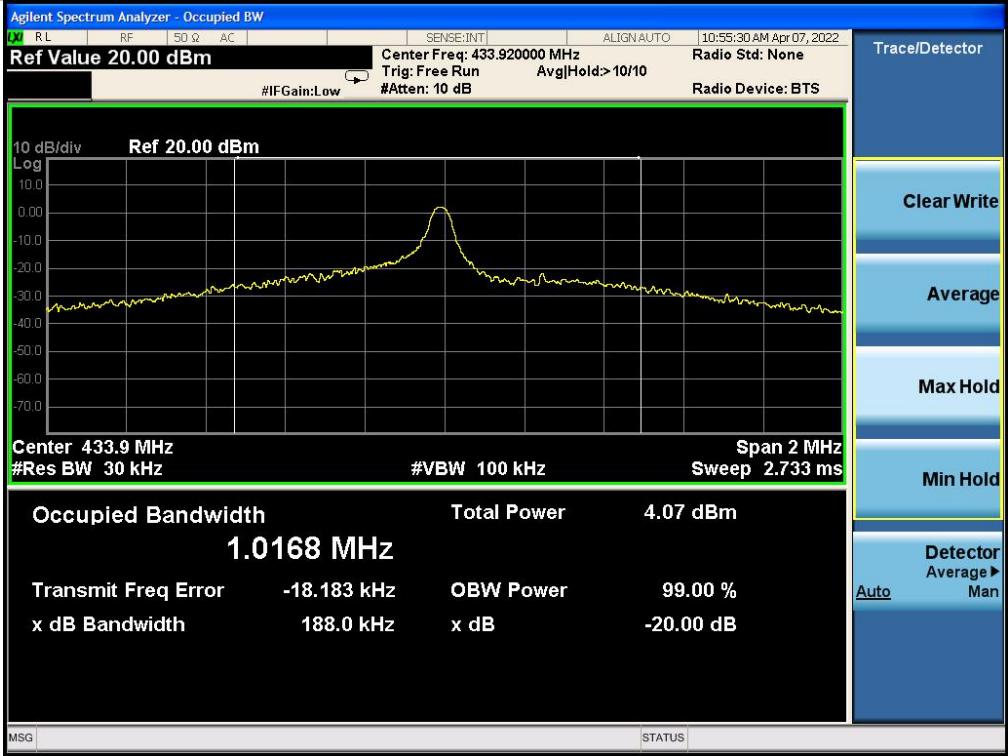
|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Modulation Mode                                                        | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (kHz) | Limit (kHz) | Verdict |
|------------------------------------------------------------------------|----------------|-------------------------|-----------------------------|-------------|---------|
| OOK                                                                    | 1              | 433.92                  | 188.0                       | ≤1084.8     | PASS    |
| Note: Limit=0.5% of the center frequency=433.92MHz * 0.25% = 1084.8KHz |                |                         |                             |             |         |

Test Model

Occupied Bandwidth  
Channel 0: 433.92MHz

OOK Modulation



## 7.2 TRANSMISSION CEASE TIME

### 7.2.1 Applicable Standard

According to FCC part 15.231(a)

### 7.2.2 Conformance Limit

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

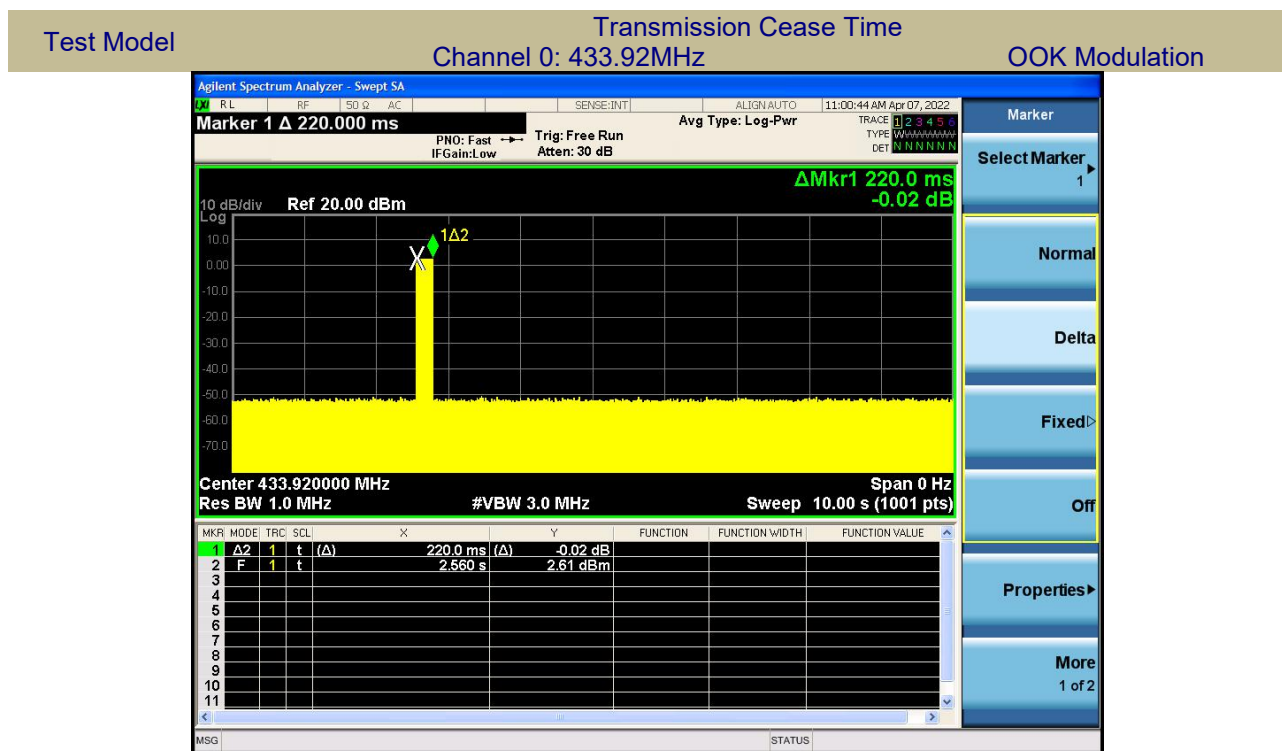
### 7.2.4 Test Procedures

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the transmission duration was measured and recorded.

### 7.2.5 Test Results

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

| Frequency MHz | Transmission Cease Time | Limit | Result |
|---------------|-------------------------|-------|--------|
| 433.92        | 0.22s                   | 5s    | Pass   |







### 7.3 RADIATED SPURIOUS EMISSION

#### 7.3.1 Applicable Standard

According to FCC Part 15.231(b) and 15.209

#### 7.3.2 Conformance Limit

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

According to FCC Part 15.231 the field strength Limited

| Frequencies<br>(MHz) | Field strength of fundamental @3m |                     |
|----------------------|-----------------------------------|---------------------|
|                      | (Microvolts /meter)               | (Microvolts /meter) |
| 40.66-40.70          | 2250                              | 225                 |
| 70-130               | 1250                              | 125                 |
| 130-174              | 1250 to 3750**                    | 125 to 375**        |
| 174-260              | 3750                              | 375                 |
| <b>260-470</b>       | <b>3750 to 12500*</b>             | <b>375 to 1250*</b> |
| Above 470            | 12500                             | 1250                |

\* Linear interpolation

| FCC Part15 (15.231) , Subpart C |                                   |                                         |
|---------------------------------|-----------------------------------|-----------------------------------------|
| Fundamental Frequency           | Field Strength<br>Of Fundamental  | Field Strength of Spurious<br>Emissions |
| 433.92MHz                       | AV:80.82 dBuV/m<br>at 3m distance | AV:54 dBuV/m at 3m<br>distance          |
|                                 | PK:100.82dBuV/m<br>at 3m distance | PK:74 dBuV/m at 3m<br>distance          |

According to FCC Part15.205, Restricted bands

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.15    |
| 10.495-0.505      | 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   | 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         | 2690-2900     | 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     | (2)         |
| 13.36-13.41       |                     |               |             |

According to FCC Part15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

| Restricted Frequency(MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance |
|---------------------------|-----------------------|-------------------------|----------------------|
| 0.009~0.490               | 2400/F(KHz)           | 300                     | See the remark       |
| 0.490~1.705               | 24000/F(KHz)          | 30                      |                      |
| 1.705~30.0                | 30                    | 30                      |                      |
| 30-88                     | 100                   | 40                      | 3                    |
| 88-216                    | 150                   | 43.5                    | 3                    |
| 216-960                   | 200                   | 46                      | 3                    |
| Above 960                 | 500                   | 54                      | 3                    |

Remark :1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)( dB);

Limit line=Specific limits(dBuV) + distance extrapolation factor.

for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10\*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

### 7.3.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

### 7.3.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for  $f < 1$  GHz (30MHz to 1GHz), 200Hz for  $f < 150$  KHz (9KHz to 150KHz), 9KHz for  $f < 30$  MHz (150KHz to 30MHz), 1MHz for  $f < 5$  GHz

VBW  $\geq$  RBW Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

- Calculation of Average factor

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100ms or the repetition cycle period, whichever is a shorter time frame, the duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

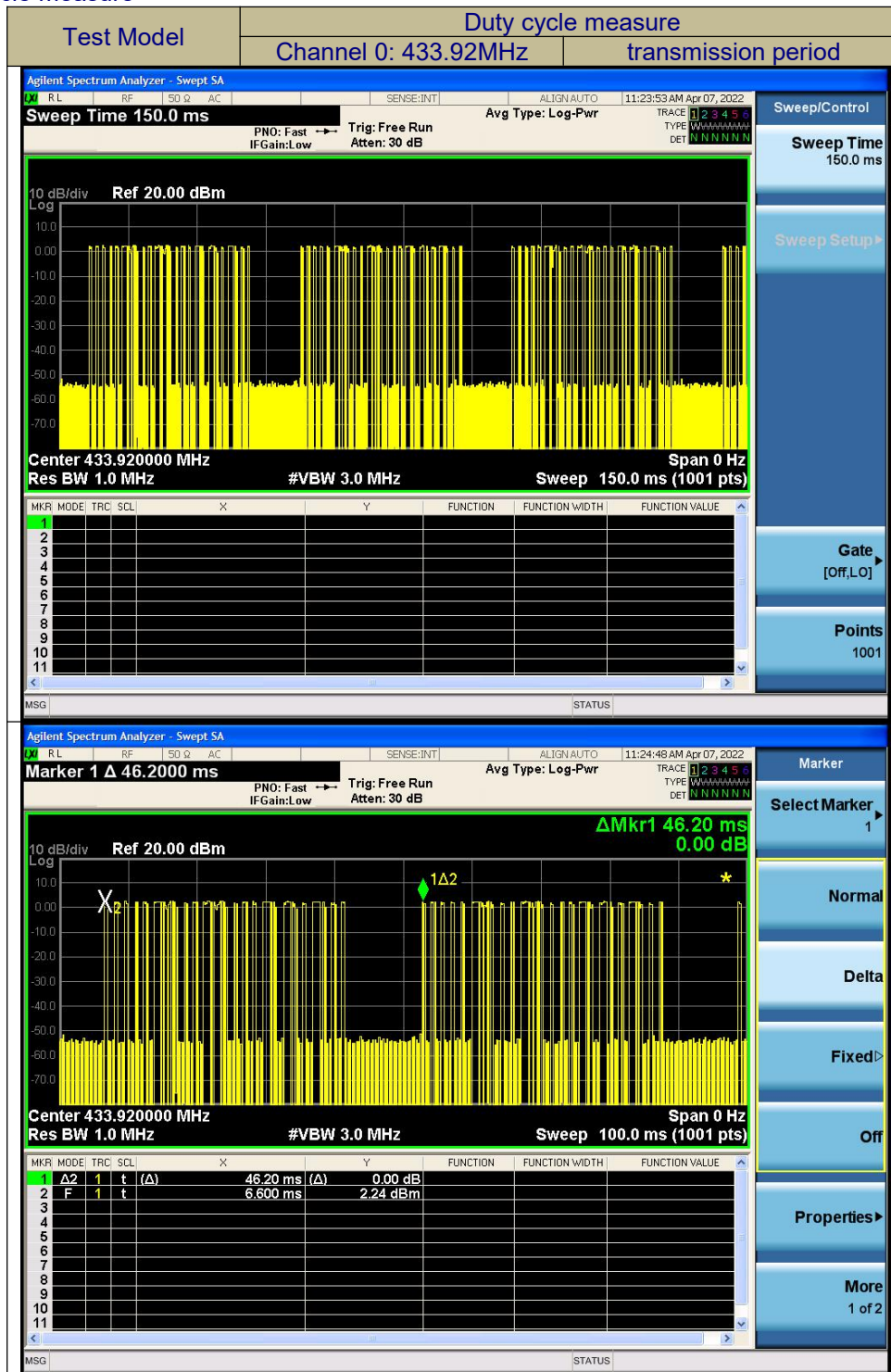
Averaging factor in dB =  $20\log(\text{duty cycle})$

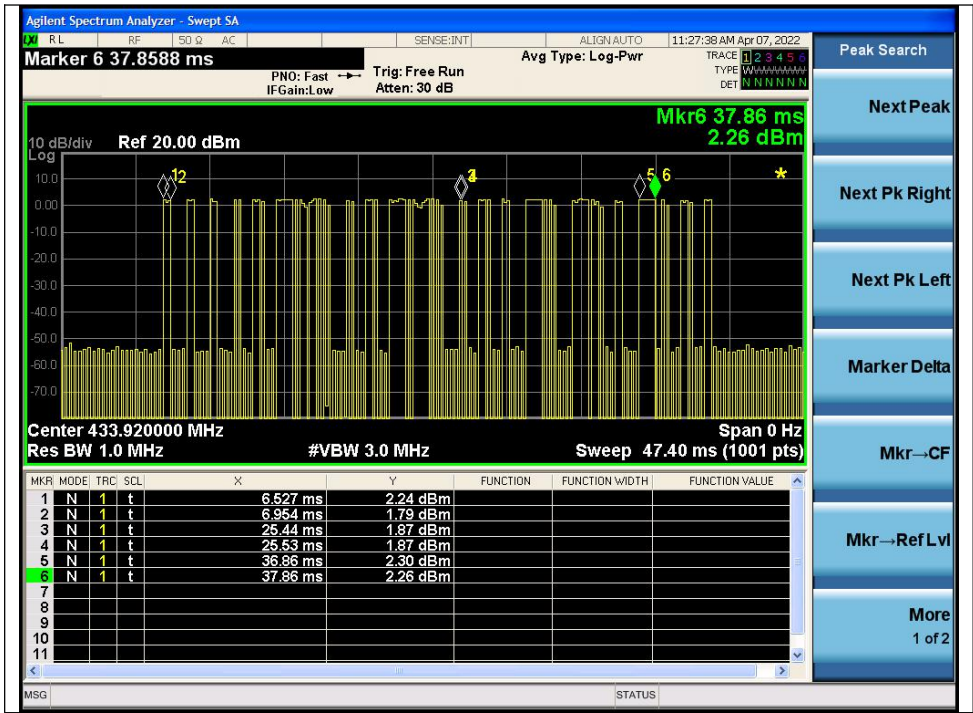
Repeat above procedures until all frequency measured was complete.

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 54%       |
| ATM Pressure:      | 1011 mbar |

## 7.3.5 Test Results

## ■ Duty cycle measure





|                               |                                                                                                                      |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Duty Cycle:                   | $(0.427 \times 13 + 0.09 \times 24 + 1.000 \times 6) \text{ms} / 46.20 = 17.54 \text{ms} / 46.20 \text{ms} = 0.2968$ |
| Duty Cycle Correction Factor: | $20 \lg(0.2968) = -10.55$                                                                                            |

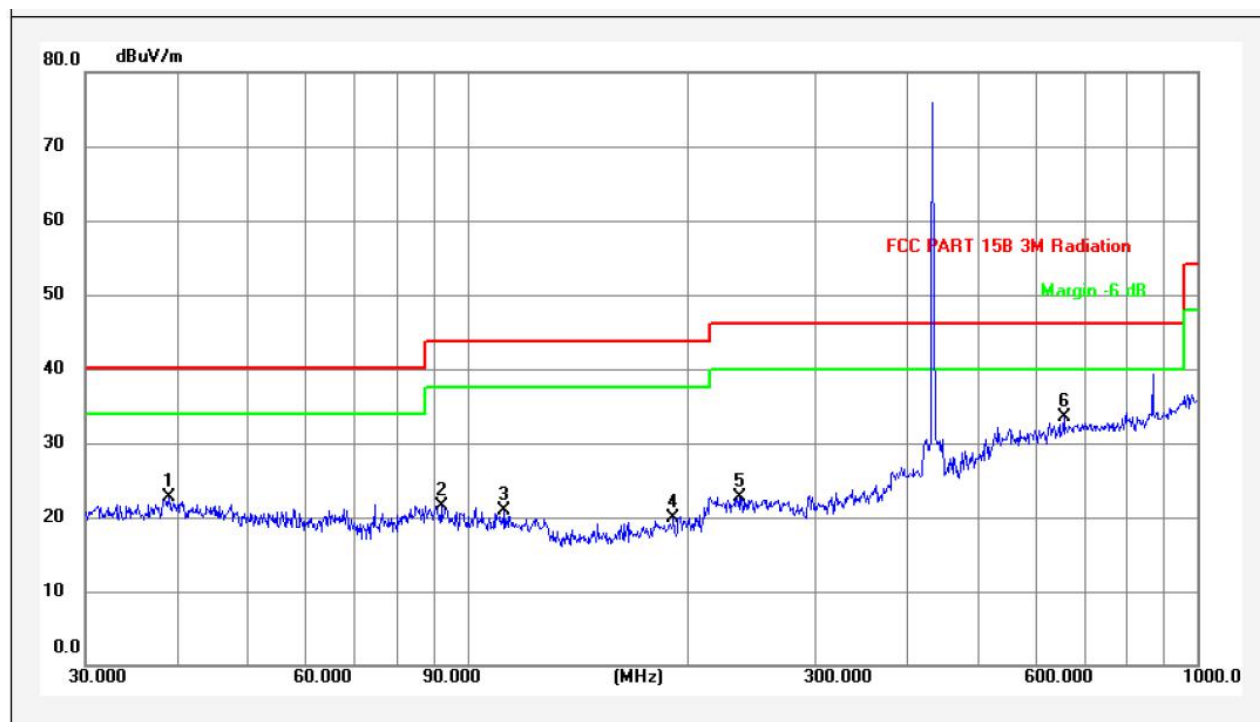
■ Spurious Emission below 30MHz (9KHz to30MHz)

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission<br>Level(dBuV/m) |    | Limit 3m(dBuV/m) |    | Over(dB) |    |
|----------------|-----------------|---------------------------|----|------------------|----|----------|----|
|                |                 | PK                        | AV | PK               | AV | PK       | AV |
| --             | --              | --                        | -- | --               | -- | --       | -- |

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.  
Distance extrapolation factor =40log(Specific distance/ test distance)( dB);  
Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Radiated spurious emission (30MHz ~ 1GHz, worst emissions found)

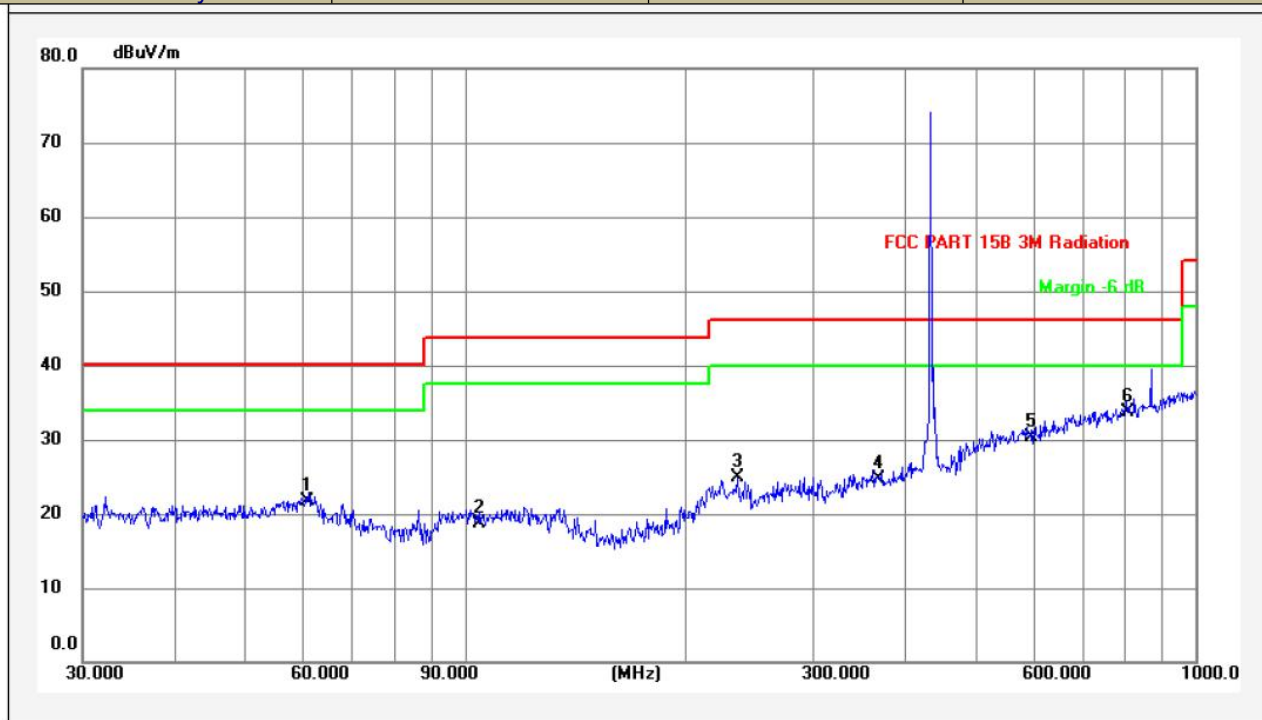
|                    |         |               |          |
|--------------------|---------|---------------|----------|
| Test Mode:         | TX Mode | Test Voltage: | DC 9V    |
| Temperature:       | 20℃     | Phase:        | Vertical |
| Relative Humidity: | 54%     | Pressure:     | 101.0KPa |



| No. | Frequency (MHz) | Factor (dBuV/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector | MK. | Remark |
|-----|-----------------|-----------------|----------------|----------------|----------------|-----------|----------|-----|--------|
| 1   | 39.0242         | 12.30           | 10.32          | 22.62          | 40.00          | -17.38    | QP       |     |        |
| 2   | 92.1386         | 11.79           | 9.77           | 21.56          | 43.50          | -21.94    | QP       |     |        |
| 3   | 112.5241        | 12.08           | 8.84           | 20.92          | 43.50          | -22.58    | QP       |     |        |
| 4   | 191.7450        | 10.61           | 9.23           | 19.84          | 43.50          | -23.66    | QP       |     |        |
| 5   | 236.6447        | 12.84           | 9.80           | 22.64          | 46.00          | -23.36    | QP       |     |        |
| 6   | 656.5300        | 22.18           | 11.34          | 33.52          | 46.00          | -12.48    | QP       | *   |        |



|                    |         |               |            |
|--------------------|---------|---------------|------------|
| Test Mode:         | TX Mode | Test Voltage: | DC 9V      |
| Temperature:       | 20℃     | Phase:        | Horizontal |
| Relative Humidity: | 54%     | Pressure:     | 101.0KPa   |



| No. | Frequency (MHz) | Factor (dBuV/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector | MK. | Remark |
|-----|-----------------|-----------------|----------------|----------------|----------------|-----------|----------|-----|--------|
| 1   | 60.9174         | 12.54           | 9.14           | 21.68          | 40.00          | -18.32    | QP       |     |        |
| 2   | 104.9031        | 12.74           | 6.05           | 18.79          | 43.50          | -24.71    | QP       |     |        |
| 3   | 235.8163        | 12.80           | 12.08          | 24.88          | 46.00          | -21.12    | QP       |     |        |
| 4   | 368.1116        | 15.85           | 8.92           | 24.77          | 46.00          | -21.23    | QP       |     |        |
| 5   | 597.2233        | 21.52           | 8.82           | 30.34          | 46.00          | -15.66    | QP       |     |        |
| 6   | 807.4289        | 24.61           | 9.16           | 33.77          | 46.00          | -12.23    | QP       | *   |        |



- For Fundamental radiation, Harmonic radiation.

Operation Mode: TX Mode

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission<br>Level(dBuV/m) |       | Limit 3m(dBuV/m) |       | Over(dB) |        |
|----------------|-----------------|---------------------------|-------|------------------|-------|----------|--------|
|                |                 | PK                        | AV    | PK               | AV    | PK       | AV     |
| 433.92         | H               | 74.10                     | 63.55 | 100.82           | 80.82 | -26.72   | -17.27 |
| 433.92         | V               | 75.94                     | 65.39 | 100.82           | 80.82 | -24.88   | -15.43 |
| 867.84         | H               | 55.58                     | 45.03 | 80.82            | 60.82 | -25.24   | -15.79 |
| 867.84         | V               | 50.73                     | 40.18 | 80.82            | 60.82 | -30.09   | -20.64 |

■ Test Result and Data (Above 1GHz)

Operation Mode: TX Mode

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level(dBuV/m) |            |       | Limit 3m(dBuV/m) |    | Margin(dB) |        |
|----------------|-----------------|------------------------|------------|-------|------------------|----|------------|--------|
|                |                 | PK                     | Factor(dB) | AV    | PK               | AV | PK         | AV     |
| 1400           | V               | 40.10                  | -10.55     | 29.55 | 74               | 54 | -33.90     | -24.45 |
| 2750           | V               | 45.88                  | -10.55     | 35.33 | 74               | 54 | -28.12     | -18.67 |
| 3035           | V               | 44.92                  | -10.55     | 34.37 | 74               | 54 | -29.08     | -19.63 |
| 4155           | V               | 43.92                  | -10.55     | 33.37 | 74               | 54 | -30.08     | -20.63 |
| 5180           | V               | 46.05                  | -10.55     | 35.5  | 74               | 54 | -27.95     | -18.5  |
| 5810           | V               | 47.87                  | -10.55     | 37.32 | 74               | 54 | -26.13     | -16.68 |
| --             |                 |                        |            |       |                  |    |            |        |
| 1410           | H               | 40.10                  | -10.55     | 29.55 | 74               | 54 | -34.06     | -24.45 |
| 2640           | H               | 45.88                  | -10.55     | 35.33 | 74               | 54 | -30.66     | -18.67 |
| 3215           | H               | 44.92                  | -10.55     | 34.37 | 74               | 54 | -30.08     | -19.63 |
| 4125           | H               | 43.92                  | -10.55     | 33.37 | 74               | 54 | -30.93     | -20.63 |
| 5065           | H               | 46.05                  | -10.55     | 35.5  | 74               | 54 | -29.50     | -18.5  |
| 5890           | H               | 47.87                  | -10.55     | 37.32 | 74               | 54 | -24.61     | -16.68 |

## 7.4 CONDUCTED EMISSION TEST

### 7.4.1 Applicable Standard

According to FCC Part 15.207(a)

### 7.4.2 Conformance Limit

| Conducted Emission Limit                                                                                                                                                  |            |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|
| Frequency(MHz)                                                                                                                                                            | Quasi-peak | Average |
| 0.15-0.5                                                                                                                                                                  | 66-56      | 56-46   |
| 0.5-5.0                                                                                                                                                                   | 56         | 46      |
| 5.0-30.0                                                                                                                                                                  | 60         | 50      |
| Note: 1. The lower limit shall apply at the transition frequencies<br>2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz. |            |         |

### 7.4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

### 7.4.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.  
Maximum procedure was performed on the highest emissions to ensure EUT compliance.  
Repeat above procedures until all frequency measured were complete.

### 7.4.5 Test Results

EUT power supply by battery, so the test not applicable.

## 7.5 Antenna Application

### 7.5.1 Antenna Requirement

| Standard            | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC CRF Part 15.203 | An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. |

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.

### 7.5.2 Result

PASS.

The EUT has 1 antenna: a Helical Antenna for OOK model, the gain is 1.0 dBi;

Note: ☒ Antenna use a permanently attached antenna which is not replaceable.  
☐ Not using a standard antenna jack or electrical connector for antenna replacement  
☐ The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

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