



Certificate # 2861.01

**GRGTEST**

# TEST REPORT

Verified code: 527592

|                                                                                                                                                                                |                                                                                                                     |                                                                                                                             |                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Report No.:</b>                                                                                                                                                             | <b>E202003301041-5</b>                                                                                              | <b>Application No.:</b>                                                                                                     | <b>E202003301041</b> |
| <b>Client:</b>                                                                                                                                                                 | Shenzhen Malide Technology Co., Ltd.                                                                                |                                                                                                                             |                      |
| <b>Address:</b>                                                                                                                                                                | Room 201, No.26A, Xin'E Industrial Zone, E'GongLing, Pinghu Street, Longgang District, Shenzhen, Guangdong Province |                                                                                                                             |                      |
| <b>Sample Description:</b>                                                                                                                                                     | External TPMS                                                                                                       |                                                                                                                             |                      |
| <b>Model:</b>                                                                                                                                                                  | MLD-B03                                                                                                             |                                                                                                                             |                      |
| <b>Test Location:</b>                                                                                                                                                          | Guangzhou GRG Metrology & Test Co., Ltd.                                                                            |                                                                                                                             |                      |
| <b>Test Specification:</b>                                                                                                                                                     | CFR 47 FCC Part 15 Subpart C 10-1-2019 Edition<br>ANSI C63.10:2013                                                  |                                                                                                                             |                      |
| <b>Issue Date:</b>                                                                                                                                                             | 2020/06/19                                                                                                          |                                                                                                                             |                      |
| <b>Test Result:</b>                                                                                                                                                            | PASS                                                                                                                |                                                                                                                             |                      |
| <b>Prepared By:</b><br>Test Engineer<br><br>Wu Haoming                                                                                                                         | <b>Reviewed By:</b><br>Technical Manager<br><br>Wu Chengrong                                                        | <b>Approved By:</b><br>Manager<br><br> |                      |
| <b>Other Aspects:</b>                                                                                                                                                          |                                                                                                                     |                                                                                                                             |                      |
| Note: /                                                                                                                                                                        |                                                                                                                     |                                                                                                                             |                      |
| Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;                                                                                                  |                                                                                                                     |                                                                                                                             |                      |
| The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT. |                                                                                                                     |                                                                                                                             |                      |



## **DIRECTIONS OF TEST**

1. This company carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.
2. 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.
3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.

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## 1. TEST RESULT SUMMARY

| Section B of FCC Part 15.231   |                               |                           |                   |
|--------------------------------|-------------------------------|---------------------------|-------------------|
| Standard                       | Item                          | Limit / Severity          | Result            |
| Part 15, Subpart C<br>(15.231) | Conducted Emissions           | §15.203                   | N/A <sup>1)</sup> |
|                                | Transmission Time             | §15.231<br>§15.231(a) (3) | PASS              |
|                                | 20DB Bandwidth                | §15.231 (c)               | PASS              |
|                                | Radiated Spurious<br>Emission | §15.231(b)                | PASS              |

Note. 1: N/A=Not Applicable, the EUT was powered by 1\*3.0V dc type “CR1632” battery..

## 2. GENERAL DESCRIPTION OF EUT

### 2.1. APPLICANT

Name: Shenzhen Malide Technology Co., Ltd.  
Address: Room 201, No.26A, Xin'E Industrial Zone, E'GongLing, Pinghu Street,  
Longgang District, Shenzhen, Guangdong Province

### 2.2. MANUFACTURER

Name: Shenzhen Malide Technology Co., Ltd.  
Address: Room 201, No.26A, Xin'E Industrial Zone, E'GongLing, Pinghu Street,  
Longgang District, Shenzhen, Guangdong Province

### 2.3. FACTORY

Name : Shenzhen Malide Technology Co., Ltd.  
Address : Room 201, No.26A, Xin'E Industrial Zone, E'GongLing, Pinghu Street,  
Longgang District, Shenzhen, Guangdong Province

### 2.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: External TPMS  
Model No.: MLD-B03  
Adding Model N/A  
Trade Name: Malide  
FCC ID: 2AV7VMLD-B03  
Power supply DC 3V powered by 1\*DC 3V type "CR1632" battery  
Frequency 433.92MHz  
Range  
Max Antenna Integrated Antenna, -3.25dBi  
gain:  
Sample submitting way : ☒ Provided by customer ☐ Sampling  
Type of Modulation: FSK  
Temperature Range: -40 ℃ ~ +85 ℃  
Hardware Version: V2.0  
Software Version: V3.0  
Note: N/A

### 3. LABORATORY AND ACCREDITATIONS

#### 3.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add : Address: No.1301 Guanguang Road Xinlan Community, Guanlan Street,  
Longhua District Shenzhen, 518110, People's Republic of China

P.C. : 518000

Tel : 0755-61180008

Fax : 0755-61180008

#### 3.2. ACCREDITATIONS

|      |                            |
|------|----------------------------|
| A2LA | Certificate Number 2861.01 |
|------|----------------------------|

#### 3.3. MEASUREMENT UNCERTAINTY

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

| Measurement       |            | Frequency     | Uncertainty |
|-------------------|------------|---------------|-------------|
| Radiated Emission | Horizontal | 30MHz~1000MHz | 4.3dB       |
|                   |            | 1GHz~18GHz    | 5.6dB       |
|                   | Vertical   | 30MHz~1000MHz | 4.3dB       |
|                   |            | 1GHz~18GHz    | 5.6dB       |

This uncertainty represents an expanded uncertainty factor of  $k=2$ .

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

| Name of Equipment                                         | Manufacturer  | Model       | Serial Number     | Calibration Due |
|-----------------------------------------------------------|---------------|-------------|-------------------|-----------------|
| Radiated Spurious Emission& Restricted bands of operation |               |             |                   |                 |
| EMI TEST Receiver                                         | ROHDE&SCHWARZ | ESU26       | EMC26-G260        | 2020-07-16      |
| EXA signal analyzer                                       | Agilent       | N9010A      | MY52221469        | 2021-05-16      |
| Bilog Antenna                                             | Schwarzbeck   | VULB9160    | VULB9160-340<br>1 | 2020-11-27      |
| Horn Antenna                                              | Schwarzbeck   | BBHA9120    | D286              | 2020-11-27      |
| Amplifier                                                 | tonscend      | TAP9E6343   | AP20E806065       | /               |
| Amplifier                                                 | tonscend      | TAP01018048 | AP20E806075       | /               |
| Test SW                                                   | tonscend      | Js1120-2    |                   |                 |
| 20 dB Bandwidth & Transmission Time & Duty cycle          |               |             |                   |                 |
| EXA signal analyzer                                       | Agilent       | N9010A      | MY52221469        | 2021-05-16      |

## 5. RADIATED SPURIOUS EMISSIONS

### 5.1. LIMITS

§15.231(b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emission (microvolts/meter) |
|-----------------------------|--------------------------------------------------|--------------------------------------------------------|
| 40.66-40.70                 | 2,250                                            | 225                                                    |
| 70-130                      | 1,250                                            | 125                                                    |
| 130-174                     | <sup>1</sup> 1,250 to 3,750                      | <sup>1</sup> 125 to 375                                |
| 174-260                     | 3,750                                            | 375                                                    |
| 260-470                     | <sup>1</sup> 3,750 to 12,500                     | <sup>1</sup> 375 to 1,250                              |
| Above 470                   | 12,500                                           | 1,250                                                  |

1. \*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  at 3 meters =  $41.6667(F) - 7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

§15.231(b)(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

| Frequency (MHz) | Quasi-peak( $\mu\text{V/m}$ ) | Measurement distance(m) | Quasi-peak( $\text{dB}\mu\text{V/m}$ )@distance 3m |
|-----------------|-------------------------------|-------------------------|----------------------------------------------------|
| 0.009-0.490     | $2400/F(\text{kHz})$          | 300                     | 53.8~88.5                                          |
| 0.490-1.705     | $24000/F(\text{kHz})$         | 30                      | 43~53.8                                            |
| 1.705-30.0      | 30                            | 30                      | 49.5                                               |
| 30 ~ 88         | 100                           | 3                       | 40                                                 |
| 88~216          | 150                           | 3                       | 43.5                                               |
| 216 ~ 960       | 200                           | 3                       | 46                                                 |
| Above 960       | 500                           | 3                       | 54                                                 |

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

### 5.2. TEST PROCEDURES

- 1) The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) Height of receiving antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

- 4) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6) If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported.  
Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

### 5.3. TEST SETUP

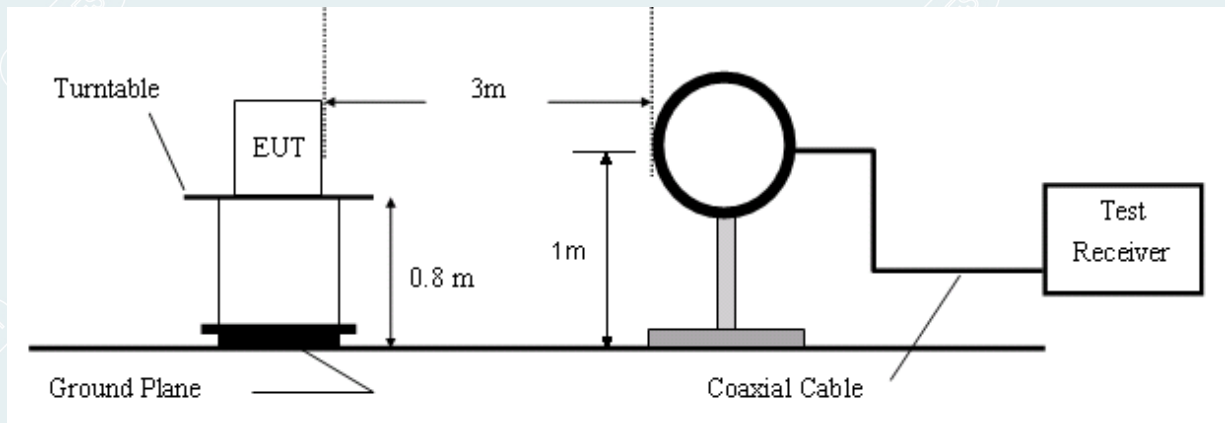


Figure 1. 9KHz to 30MHz radiated emissions test configuration

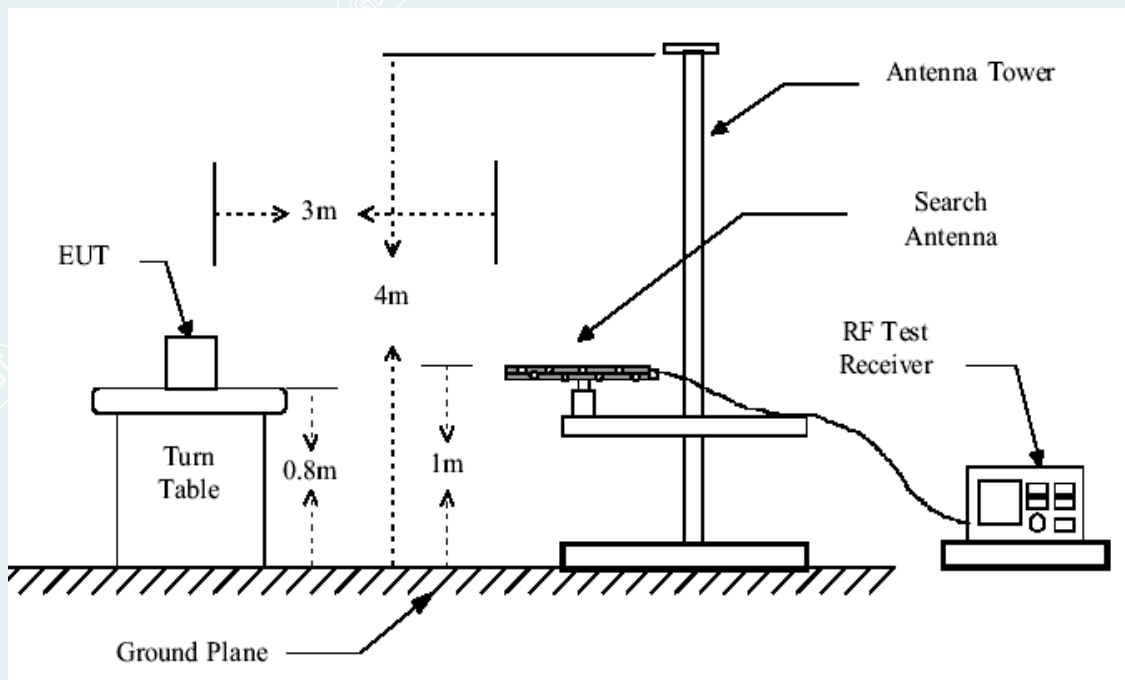


Figure 2. 30MHz to 1GHz radiated emissions test configuration

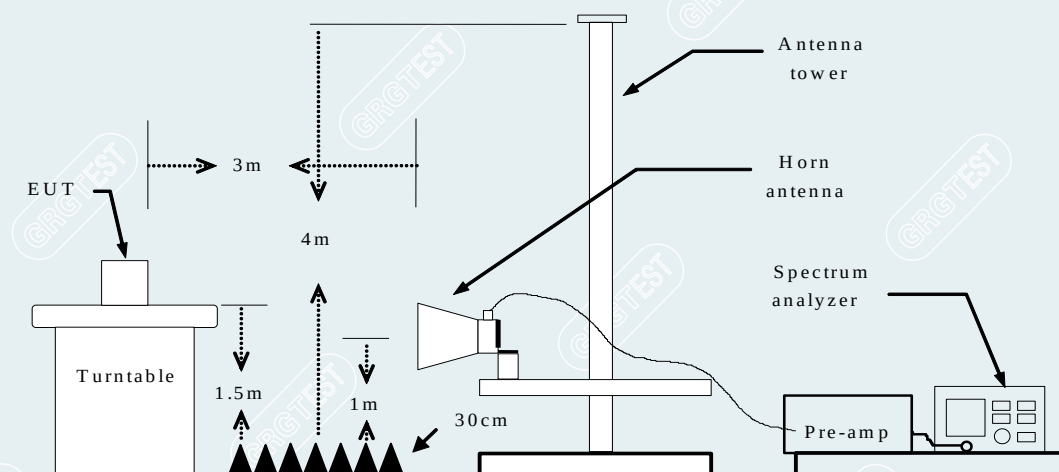


Figure 3. Above 1GHz radiated emissions test configuration

## 5.4. DATA SAMPLE

### Below 1GHz

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Pole (V/H) | Remark |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------------------|--------|
| XXX.XXXX        | 37.47          | -16.41                   | 21.06           | 40.00          | -18.94      | V                  | QP     |

### Above 1GHz

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Pole (V/H) | Remark |
|-----------------|----------------|--------------------------|-----------------|----------------|-------------|--------------------|--------|
| XXXX.XXXX       | 55.54          | 4.56                     | 60.10           | 74.00          | -13.90      | V                  | Peak   |
| XXXX.XXXX       | 29.66          | 4.56                     | 34.22           | 54.00          | -19.78      | V                  | AVG    |

Frequency (MHz)

= Emission frequency in MHz

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m)

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

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Result (dBuV/m) – Limit (dBuV/m)

Q.P.

= Quasi-peak Reading

Peak

= Peak Reading

AVG

= Average Reading

## 5.5. TEST RESULTS

### Fundamental:

| Frequency | Reading  | Correct      | Result   | Limit    | Margin | Antenna Pole(V/H) | Remark |
|-----------|----------|--------------|----------|----------|--------|-------------------|--------|
| (MHz)     | (dBuV/m) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB)   |                   |        |
| 433.9200  | 78.31    | -22.29       | 56.02    | 100.83   | -44.81 | V                 | peak   |
| 433.9200  | 89.41    | -22.60       | 66.81    | 100.83   | -34.02 | H                 | peak   |

| Frequency | PK Result | Duty Cycle Correction | Result   | Limit    | Margin | Antenna Pole(V/H) | Remark |
|-----------|-----------|-----------------------|----------|----------|--------|-------------------|--------|
| (MHz)     | (dBuV/m)  | Factor(dB)            | (dBuV/m) | (dBuV/m) | (dB)   |                   |        |
| 433.9200  | 56.02     | -11.70                | 44.30    | 80.83    | -36.53 | V                 | AVG    |
| 433.9200  | 66.81     | -11.70                | 55.11    | 80.83    | -25.72 | H                 | AVG    |

### Remark:

1.  $AVG = Peak + 20\log(Duty\ Cycle)$
2. Duty Cycle Correction Factor:  $20\log(0.26) = -11.7$
3. Duty Cycle = On time/Total time =  $26/100 = 0.26\%$

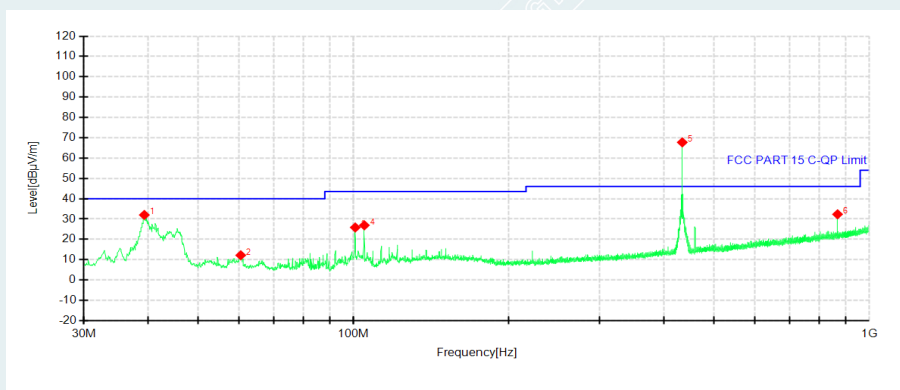
## Radiated Spurious Emission

### For 9 kHz to 30MHz

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

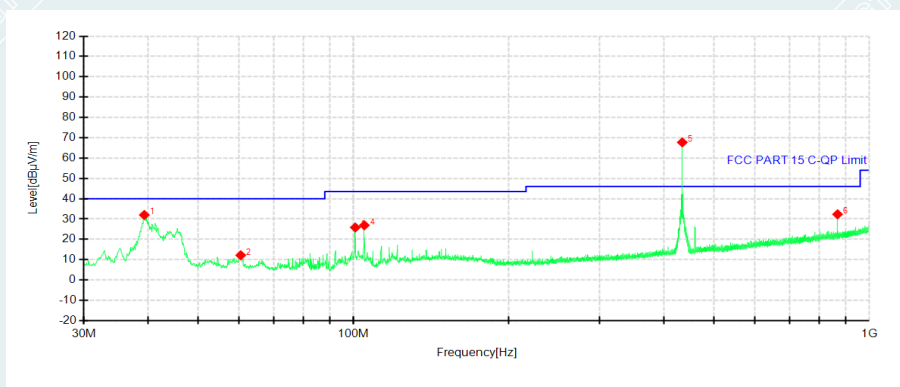
30MHz – 1GHz

Vertical



| Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 39.7970     | 32.96          | -29.62      | 40.00          | 7.04        | 100         | 68        | Vertical |
| 100.8100    | 25.90          | -31.67      | 43.50          | 17.60       | 200         | 23        | Vertical |
| 104.9810    | 26.63          | -31.02      | 43.50          | 16.87       | 200         | 6         | Vertical |
| 113.4200    | 17.39          | -29.98      | 43.50          | 26.11       | 200         | 241       | Vertical |
| 867.8860    | 31.75          | -14.17      | 46.00          | 14.25       | 200         | 285       | Vertical |

Horizontal



| Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-------------|----------------|-------------|----------------|-------------|-------------|-----------|----------|
| 39.3120     | 32.01          | -29.64      | 40.00          | 7.99        | 100         | 110       | Vertical |
| 60.4580     | 12.18          | -30.65      | 40.00          | 27.82       | 200         | 128       | Vertical |
| 100.8100    | 25.85          | -31.67      | 43.50          | 17.65       | 200         | 17        | Vertical |
| 104.9810    | 26.91          | -31.02      | 43.50          | 16.59       | 200         | 6         | Vertical |
| 867.8860    | 32.34          | -14.17      | 46.00          | 13.66       | 100         | 305       | Vertical |

**Emission above 1GHz:**

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

**Mode: TX****Test channel (433.92 MHz)**

| No. | Frequency<br>(MHz) | Result PK<br>(dBuV/m) | Correct<br>Factor(dB/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Height<br>[cm] | Angle<br>[°] | Pole       |
|-----|--------------------|-----------------------|-------------------------|-------------------|----------------|----------------|--------------|------------|
| 1   | 1301.2500          | 44.43                 | -25.25                  | 74.00             | 29.57          | 150            | 197          | Vertical   |
| 2   | 1761.2500          | 51.26                 | -23.36                  | 74.00             | 22.74          | 150            | 19           | Vertical   |
| 3   | 2288.7500          | 43.07                 | -22.59                  | 74.00             | 30.93          | 150            | 178          | Vertical   |
| 4   | 3151.2500          | 45.67                 | -19.45                  | 74.00             | 28.33          | 150            | 88           | Vertical   |
| 6   | 4292.5000          | 48.48                 | -16.42                  | 74.00             | 25.52          | 150            | 94           | Vertical   |
| 7   | 5306.2500          | 51.49                 | -12.62                  | 74.00             | 22.51          | 150            | 232          | Vertical   |
| 8   | 1301.2500          | 40.46                 | -25.25                  | 74.00             | 33.54          | 150            | 115          | Horizontal |
| 9   | 1763.7500          | 47.68                 | -23.33                  | 74.00             | 26.32          | 150            | 146          | Horizontal |
| 10  | 2621.2500          | 49.74                 | -21.12                  | 74.00             | 24.26          | 150            | 302          | Horizontal |
| 11  | 3670.0000          | 46.55                 | -18.50                  | 74.00             | 27.45          | 150            | 34           | Horizontal |
| 13  | 4467.5000          | 49.48                 | -15.25                  | 74.00             | 24.52          | 150            | 215          | Horizontal |
| 14  | 5295.0000          | 52.21                 | -12.62                  | 74.00             | 21.79          | 150            | 15           | Horizontal |

## 6. 20DB BANDWIDTH

### 6.1. LIMITS

§15.231 (c) 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.

### 6.2. TEST PROCEDURES

- 1) Set resolution bandwidth (RBW) = 2kHz. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize, record 20dB bandwidth value.
- 2) Repeat above procedures until all frequencies measured were complete.

### 6.3. TEST SETUP

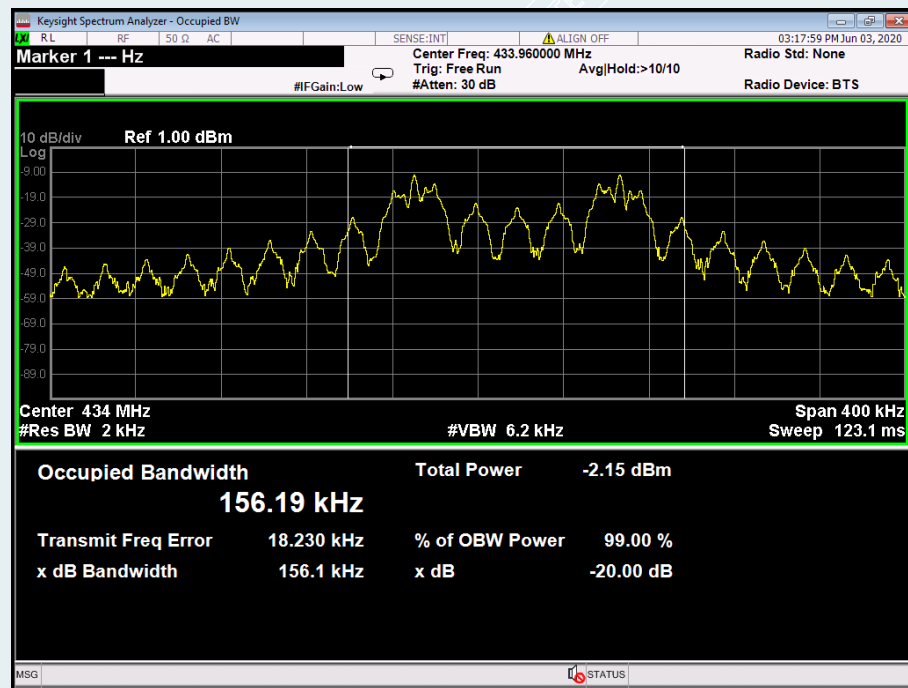


### 6.4. TEST RESULTS

Test mode:

| Channel | Frequency(MHz) | Bandwidth (kHz) | Limit (kHz) | Test Result |
|---------|----------------|-----------------|-------------|-------------|
|         | 433.92         | 156.10          | 1084.8      | PASS        |

#### Test Plot



## 7. TRANSMISSION TIME

### 7.1. LIMITS

§15.231 (e) (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

§15.231 (e) devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

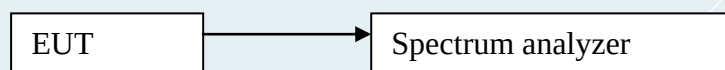
§15.231 (a) for this periodic operation:

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

### 7.2. TEST PROCEDURES

- 1) The spectrum analyzer resolution bandwidth that is  $\leq$ EBW. So we test the Maximum Conducted Output Power — Integrated band power method.
- 2) Set Set the analyzer span = 0Hz. RBW = 100kHz. Set VBW  $\geq$  3 x RBW. Detector = Peak. Sweep = Adjust according to actual conditions.
- 3) Allow the trace to stabilize, record value.

### 7.3. TEST SETUP



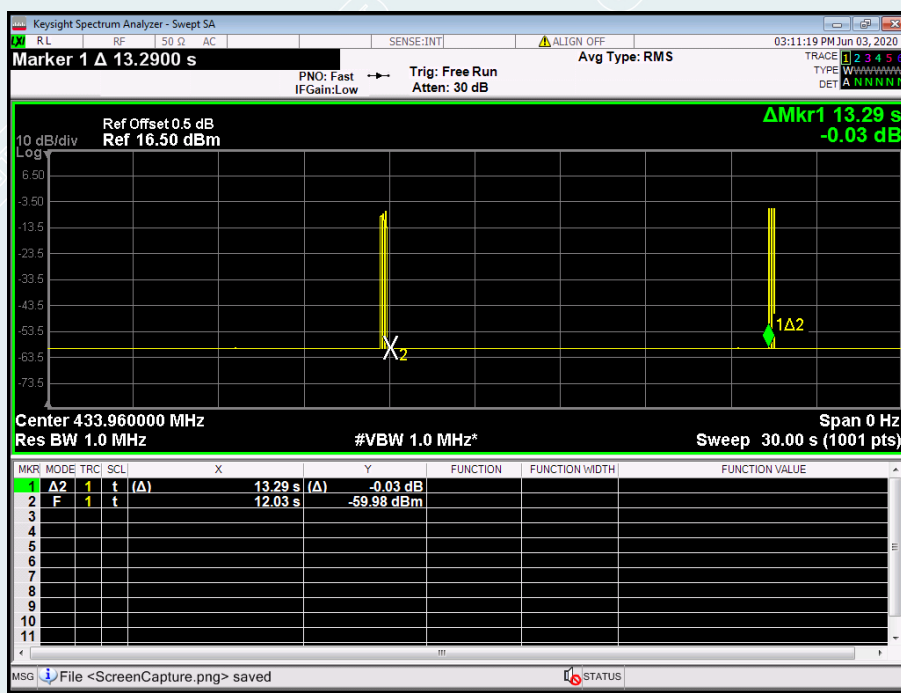
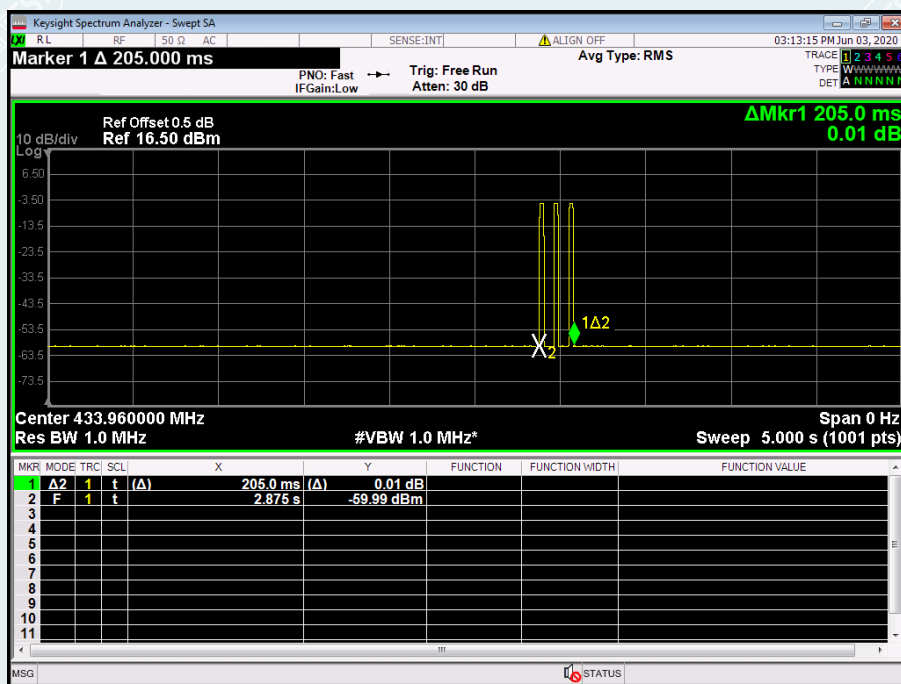
### 7.4. TEST RESULTS

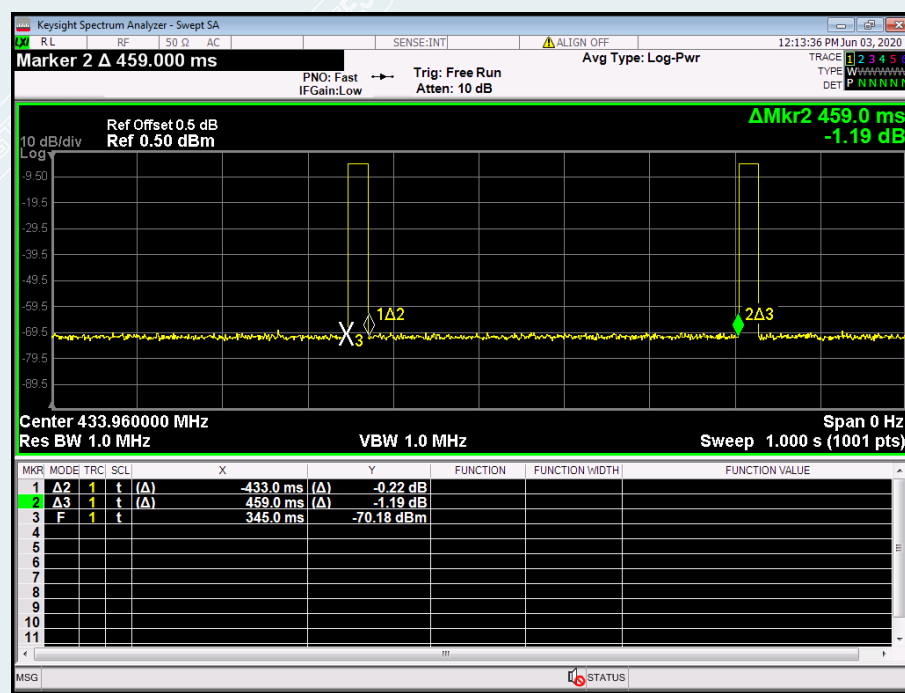
#### Test Data

| Frequency (MHz) | Transmission Time (s) | Limit (s) | Result |
|-----------------|-----------------------|-----------|--------|
| 433.92          | 0.205                 | 1         | Pass   |

| Frequency (MHz) | Silent period (s) | Limit (s) | Result |
|-----------------|-------------------|-----------|--------|
| 433.92          | 12.03             | >10       | Pass   |

## Test Plot



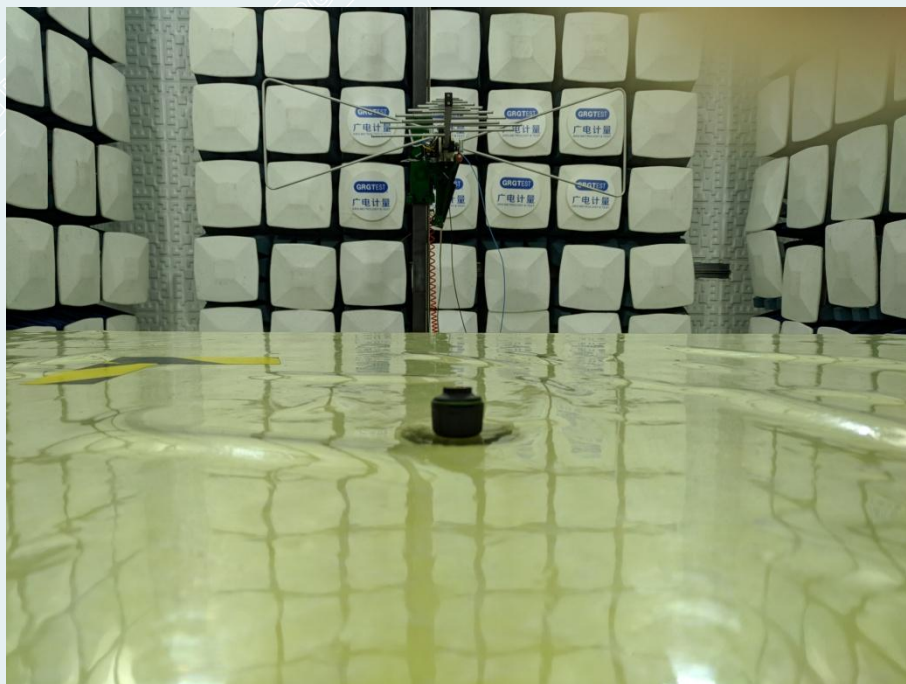
**Duty Cycle:**

Remark:

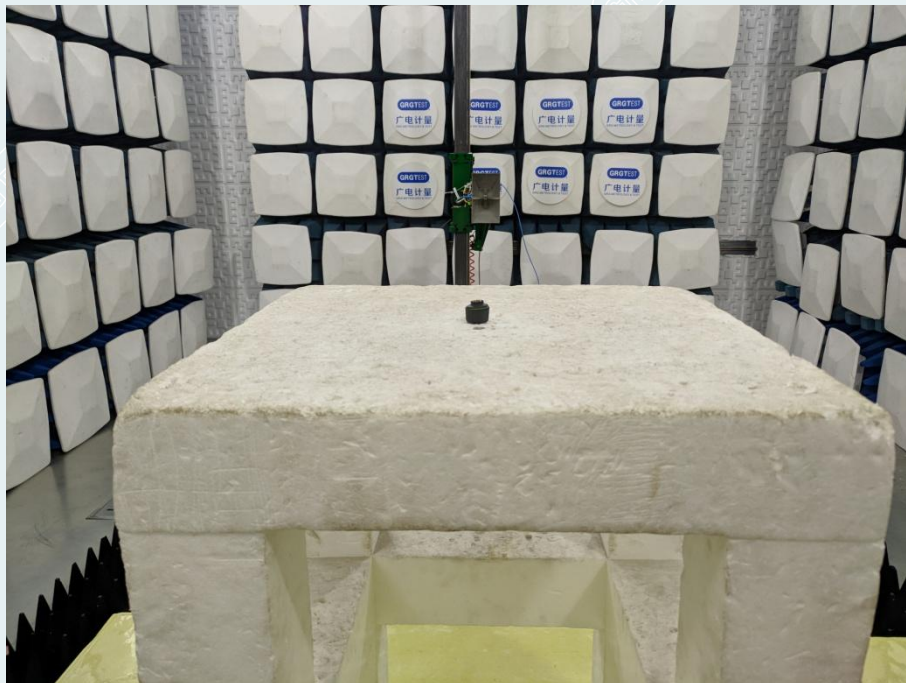
1. On time: 26ms
2. Duty Cycle = On time/Total time (100ms) = 26ms/100ms = 26%

## APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT

RSE (Below 1GHz)



RSE (Above 1GHz)



-----This is the last page of the report. -----