

# TEST REPORT

**Applicant:** EIS GmbH

**Address of Applicant:** Am Lenkwerk 3, 33609 Bielefeld Germany

**Manufacturer:** Ninghai County Jimeite Electronics Co., Ltd

**Address of Manufacturer:** No.18, 8th Jinshan Road, Ninghai County, Ningbo City, China, 315600

## Equipment Under Test (EUT)

**Product Name:** Remote Control

**Model No.:** J02008-03-06

**Trade Mark:** N/A

**FCC ID:** 2AVEP-J02008

**IC:** 27159-J02008

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.231

RSS-Gen Issue 5

RSS-210 Issue 10

**Date of sample receipt:** Mar. 25, 2021

**Date of Test:** Mar. 25, 2021 - Apr. 09, 2021

**Date of report issued:** Apr. 09, 2021

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

A handwritten signature of Robinson Lo is written over a circular blue official stamp. The stamp contains the text "GTS", "GLOBAL TECHNOLOGY SERVICES", "TESTING", and "LTD." around a central circle.

Robinson Lo

**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | Apr. 09, 2021 | Original    |
|             |               |             |
|             |               |             |
|             |               |             |
|             |               |             |

Prepared By:



Date:

Apr. 09, 2021

Project Engineer

Check By:



Date:

Apr. 09, 2021

Reviewer

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## 4 Test Summary

| Test Item  | Section in CFR 47   | Result |
|--|---|--------|
| Antenna requirement                                  | 15.203& RSS-Gen Section 6.8   | Pass   |
| AC Power Line Conducted Emission                     | 15.207& RSS-Gen Clause 8.8  | N/A    |
| Fundamental & Radiated Spurious Emission Measurement | 15.209,15.231b& RSS-210 Clause A.1.2(Table A1)& RSS-Gen Clause 8.9&8.10 | Pass   |
| Occupied Bandwidth                                   | 15.231c& RSS-210 A.1.3 & RSS-Gen Clause 6.7                             | Pass   |
| Dwell time   | 15.231a& RSS-210 Clause A.1.4(b)  | Pass   |

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013.

### 4.1 Measurement Uncertainty

| Test Item                        | Frequency Range | Measurement Uncertainty | Notes |
|----------------------------------|-----------------|-------------------------|-------|
| Radiated Emission                | 30MHz-200MHz    | 3.8039dB                | (1)   |
| Radiated Emission                | 200MHz-1GHz     | 3.9679dB                | (1)   |
| Radiated Emission                | 1GHz-18GHz      | 4.29dB                  | (1)   |
| Radiated Emission                | 18GHz-40GHz     | 3.30dB                  | (1)   |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | 3.44dB                  | N/A   |

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 General Description of EUT

|                      |                            |
|----------------------|----------------------------|
| Product Name:        | Remote Control             |
| Model No.:           | J02008-03-06               |
| Hardware Version:    | HV04                       |
| Software Version:    | SV01                       |
| Test sample(s) ID:   | GTSL202104000039-1         |
| Sample(s) Status     | Engineered sample          |
| Operation Frequency: | 433.92MHz                  |
| Channel numbers:     | 1                          |
| Modulation type:     | ASK                        |
| Antenna Type:        | PCB antenna                |
| Antenna gain:        | 0dBi(declare by applicant) |
| Power supply:        | DC 3V from battery         |

### 5.2 Test mode

|   |   |
|---|---|
| Transmitting mode                                       | Keep the EUT in continuously transmitting mode. |
| <i>Remark: (1) New battery is used during the test.</i> |   |

#### Pre-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis                   | X     | Y     | Z     |
|------------------------|-------|-------|-------|
| Field Strength(dBuV/m) | 75.38 | 74.59 | 75.21 |

#### Final Test Mode:

According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”:

X axis (see the test setup photo)

### 5.3 Description of Support Units

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| /            | /           | /     | /             |

### 5.4 Deviation from Standards

None.

### 5.5 Abnormalities from Standard Conditions

None

## 5.6 Test Facility

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

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0d by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

## 5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd. (CN0091)

No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

## 5.8 Additional Instructions

|                   |   |
|-------------------|---|
| Test Software     | Special test command provided by manufacturer |
| Power level setup | Default                                       |

## 6 Test Instruments list

| Radiated Emission: |                                     |                             |                             |               |                     |                         |
|--------------------|-------------------------------------|-----------------------------|-----------------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment                      | Manufacturer                | Model No.                   | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | 3m Semi- Anechoic Chamber           | ZhongYu Electron            | 9.2(L)*6.2(W)* 6.4(H)       | GTS250        | July. 02 2020       | July. 01 2025           |
| 2                  | Control Room                        | ZhongYu Electron            | 6.2(L)*2.5(W)* 2.4(H)       | GTS251        | N/A                 | N/A                     |
| 3                  | EMI Test Receiver                   | Rohde & Schwarz             | ESU26                       | GTS203        | June. 25 2020       | June. 24 2021           |
| 4                  | BiConiLog Antenna                   | SCHWARZBECK MESS-ELEKTRONIK | VULB9163                    | GTS214        | June. 25 2020       | June. 24 2021           |
| 5                  | Double -ridged waveguide horn       | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D                 | GTS208        | June. 25 2020       | June. 24 2021           |
| 6                  | Horn Antenna                        | ETS-LINDGREN                | 3160                        | GTS217        | June. 25 2020       | June. 24 2021           |
| 7                  | EMI Test Software                   | AUDIX                       | E3                          | N/A           | N/A                 | N/A                     |
| 8                  | Coaxial Cable                       | GTS                         | N/A                         | GTS213        | June. 25 2020       | June. 24 2021           |
| 9                  | Coaxial Cable                       | GTS                         | N/A                         | GTS211        | June. 25 2020       | June. 24 2021           |
| 10                 | Coaxial cable                       | GTS                         | N/A                         | GTS210        | June. 25 2020       | June. 24 2021           |
| 11                 | Coaxial Cable                       | GTS                         | N/A                         | GTS212        | June. 25 2020       | June. 24 2021           |
| 12                 | Amplifier(100kHz-3GHz)              | HP                          | 8347A                       | GTS204        | June. 25 2020       | June. 24 2021           |
| 13                 | Amplifier(2GHz-20GHz)               | HP                          | 84722A                      | GTS206        | June. 25 2020       | June. 24 2021           |
| 14                 | Amplifier (18-26GHz)                | Rohde & Schwarz             | AFS33-18002<br>650-30-8P-44 | GTS218        | June. 25 2020       | June. 24 2021           |
| 15                 | Band filter                         | Amindeon                    | 82346                       | GTS219        | June. 25 2020       | June. 24 2021           |
| 16                 | Power Meter                         | Anritsu                     | ML2495A                     | GTS540        | June. 25 2020       | June. 24 2021           |
| 17                 | Power Sensor                        | Anritsu                     | MA2411B                     | GTS541        | June. 25 2020       | June. 24 2021           |
| 18                 | Wideband Radio Communication Tester | Rohde & Schwarz             | CMW500                      | GTS575        | June. 25 2020       | June. 24 2021           |
| 19                 | Splitter                            | Agilent                     | 11636B                      | GTS237        | June. 25 2020       | June. 24 2021           |
| 20                 | Loop Antenna                        | ZHINAN                      | ZN30900A                    | GTS534        | June. 25 2020       | June. 24 2021           |
| 21                 | Breitband hornantenne               | SCHWARZBECK                 | BBHA 9170                   | GTS579        | Oct. 18 2020        | Oct. 17 2021            |
| 22                 | Amplifier                           | TDK                         | PA-02-02                    | GTS574        | Oct. 18 2020        | Oct. 17 2021            |
| 23                 | Amplifier                           | TDK                         | PA-02-03                    | GTS576        | Oct. 18 2020        | Oct. 17 2021            |
| 24                 | PSA Series Spectrum Analyzer        | Rohde & Schwarz             | FSP                         | GTS578        | June. 25 2020       | June. 24 2021           |

| Conducted Emission |                          |                         |                      |               |                     |                         |
|--------------------|--------------------------|-------------------------|----------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment           | Manufacturer            | Model No.            | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | Shielding Room           | ZhongYu Electron        | 7.3(L)x3.1(W)x2.9(H) | GTS252        | May.15 2019         | May.14 2022             |
| 2                  | EMI Test Receiver        | R&S                     | ESCI 7               | GTS552        | June. 25 2020       | June. 24 2021           |
| 3                  | Coaxial Switch           | ANRITSU CORP            | MP59B                | GTS225        | June. 25 2020       | June. 24 2021           |
| 4                  | Artificial Mains Network | SCHWARZBECK MESS        | NSLK8127             | GTS226        | June. 25 2020       | June. 24 2021           |
| 5                  | Coaxial Cable            | GTS                     | N/A                  | GTS227        | N/A                 | N/A                     |
| 6                  | EMI Test Software        | AUDIX                   | E3                   | N/A           | N/A                 | N/A                     |
| 7                  | Thermo meter             | KTJ                     | TA328                | GTS233        | June. 25 2020       | June. 24 2021           |
| 8                  | Absorbing clamp          | Elektronik-Feinmechanik | MDS21                | GTS229        | June. 25 2020       | June. 24 2021           |
| 9                  | ISN                      | SCHWARZBECK             | NTFM 8158            | GTD565        | June. 25 2020       | June. 24 2021           |

| RF Conducted Test: |  |              |                  |            |                     |                         |
|--------------------|--|--------------|------------------|------------|---------------------|-------------------------|
| Item               | Test Equipment                                 | Manufacturer | Model No.        | Serial No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | MXA Signal Analyzer                            | Agilent      | N9020A           | GTS566     | June. 25 2020       | June. 24 2021           |
| 2                  | EMI Test Receiver                              | R&S          | ESCI 7           | GTS552     | June. 25 2020       | June. 24 2021           |
| 3                  | Spectrum Analyzer                              | Agilent      | E4440A           | GTS533     | June. 25 2020       | June. 24 2021           |
| 4                  | MXG vector Signal Generator                    | Agilent      | N5182A           | GTS567     | June. 25 2020       | June. 24 2021           |
| 5                  | ESG Analog Signal Generator                    | Agilent      | E4428C           | GTS568     | June. 25 2020       | June. 24 2021           |
| 6                  | USB RF Power Sensor                            | DARE         | RPR3006W         | GTS569     | June. 25 2020       | June. 24 2021           |
| 7                  | RF Switch Box                                  | Shongyi      | RFSW3003328      | GTS571     | June. 25 2020       | June. 24 2021           |
| 8                  | Programmable Constant Temp & Humi Test Chamber | WEWON        | WHTH-150L-40-880 | GTS572     | June. 25 2020       | June. 24 2021           |

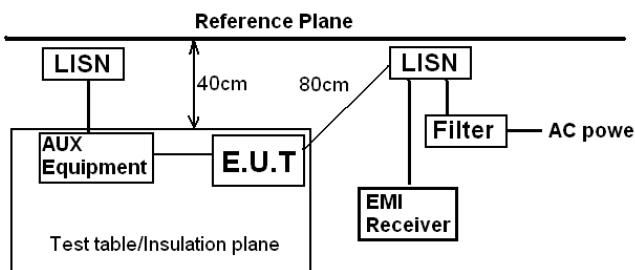
| General used equipment: |                                 |              |           |               |                     |                         |
|-------------------------|---------------------------------|--------------|-----------|---------------|---------------------|-------------------------|
| Item                    | Test Equipment                  | Manufacturer | Model No. | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                       | Humidity/ Temperature Indicator | KTJ          | TA328     | GTS243        | June. 25 2020       | June. 24 2021           |
| 2                       | Barometer                       | ChangChun    | DYM3      | GTS255        | June. 25 2020       | June. 24 2021           |

## 7 Test results and Measurement Data

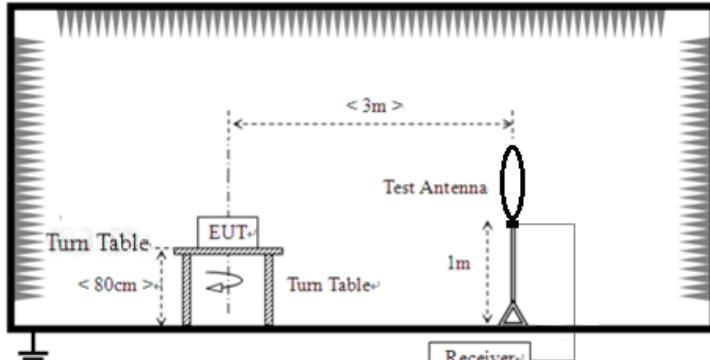
### 7.1 Antenna requirement

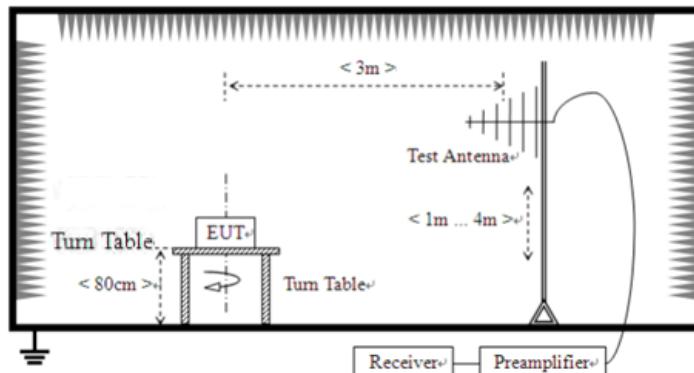
|  |                             |
|--|-----------------------------|
| Standard requirement:  | FCC Part15 C Section 15.203 |
| <b>15.203 requirement:</b><br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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. |                             |
| <b>15.231 requirement:</b><br>For intentional device, according to 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.  |                             |
| <b>EUT Antenna:</b>  |                             |
| <i>The antenna is PCB antenna, the best case gain of the antenna is 0dBi, reference to the appendix II for details</i>   |                             |

## 7.2 Conducted Emissions

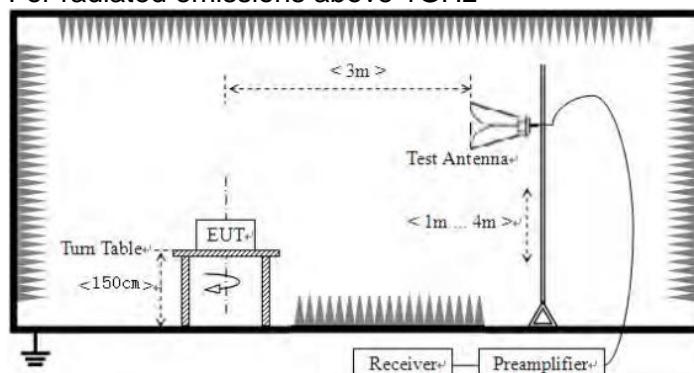
| Test Requirement:     | FCC Part15 C Section 15.207   |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
|-----------------------|---|-----------|---------|-----------------------|--------------|----------|------------|---------|----------|-----------|-----------|-------|----|----|------|----|----|
| Test Method:          | ANSI C63.10:2013  |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test Frequency Range: | 150KHz to 30MHz   |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Class / Severity:     | Class B   |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Receiver setup:       | RBW=9KHz, VBW=30KHz, Sweep time=auto  |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Limit:                | <table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>   |           |         | 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 |
| 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        |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
|                       | <p>* Decreases with the logarithm of the frequency.</p>   |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test setup:           |  <p>Reference Plane</p> <p>LISN</p> <p>40cm</p> <p>80cm</p> <p>AUX Equipment</p> <p>E.U.T</p> <p>Test table/Insulation plane</p> <p>Filter</p> <p>AC power</p> <p>EMI Receiver</p> <p>Remark:<br/>E.U.T: Equipment Under Test<br/>LISN: Line Impedance Stabilization Network<br/>Test table height=0.8m</p>  |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test procedure:       | <ol style="list-style-type: none"> <li>1. The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol> |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test Instruments:     | Refer to section 6.0 for details  |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test mode:            | Refer to section 5.2 for details  |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test environment:     | Temp.:  | 25 °C     | Humid.: | 52%                   | Press.:      | 1012mbar |            |         |          |           |           |       |    |    |      |    |    |
| Test voltage:         | /   |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |
| Test results:         | N/A   |           |         |                       |              |          |            |         |          |           |           |       |    |    |      |    |    |

## 7.3 Radiated Emission Method

| Test Requirement:                                    | FCC Part15 C Section 15.209  |  |   |        |                  |  |  |  |
|--|--|--|---|--------|------------------|--|--|--|
| Test Method:   | ANSI C63.10:2013   |  |   |        |                  |  |  |  |
| Test Frequency Range:                                | 9kHz to 25GHz  |  |   |        |                  |  |  |  |
| Test site:   | Measurement Distance: 3m   |  |   |        |                  |  |  |  |
| Receiver setup:                                      | Frequency  | Detector   | RBW   | VBW    | Remark           |  |  |  |
|  | 9kHz-150kHz  | Quasi-peak                                       | 200Hz   | 300Hz  | Quasi-peak Value |  |  |  |
|  | 150kHz-30MHz   | Quasi-peak                                       | 9kHz  | 10kHz  | Quasi-peak Value |  |  |  |
|  | 30MHz-1GHz   | Quasi-peak                                       | 120KHz  | 300KHz | Quasi-peak Value |  |  |  |
|  | Above 1GHz   | Peak   | 1MHz  | 3MHz   | Peak Value       |  |  |  |
|  |  | Peak   | 1MHz  | 10Hz   | Average Value    |  |  |  |
| Limit:<br>(Field strength of the fundamental signal) | Fundamental Frequency (MHz)  | Field Strength of Fundamental (microvolts/meter) | Field Strength of Spurious Emissions (microvolts/meter) |        |                  |  |  |  |
|  | 40.66 - 40.70  | 2,250  | 225   |        |                  |  |  |  |
|  | 70 - 130   | 1,250  | 125   |        |                  |  |  |  |
|  | 130 - 174  | 1,250 to 3,750 **                                | 125 to 375 **   |        |                  |  |  |  |
|  | 174 - 260  | 3,750  | 375   |        |                  |  |  |  |
|  | 260 - 470  | 3,750 to 12,500 **                               | 375 to 1,250 **   |        |                  |  |  |  |
|  | Above 470  | 12,500   | 1,250   |        |                  |  |  |  |
|  | ** linear interpolations   |  |   |        |                  |  |  |  |
| Limit:<br>(Spurious Emissions)                       | Frequency  | Limit (uV/m)                                     | Remark  |        |                  |  |  |  |
|  | 0.009MHz-0.490MHz  | 2400/F(kHz) @300m                                | Quasi-peak Value  |        |                  |  |  |  |
|  | 0.490MHz-1.705MHz  | 24000/F(kHz) @30m                                | Quasi-peak Value  |        |                  |  |  |  |
|  | 1.705MHz-30.0MHz   | 30 @30m  | Quasi-peak Value  |        |                  |  |  |  |
|  | 30MHz-88MHz  | 100 @3m  | Quasi-peak Value  |        |                  |  |  |  |
|  | 88MHz-216MHz   | 150 @3m  | Quasi-peak Value  |        |                  |  |  |  |
|  | 216MHz-960MHz  | 200 @3m  | Quasi-peak Value  |        |                  |  |  |  |
|  | 960MHz-1GHz  | 500 @3m  | Quasi-peak Value  |        |                  |  |  |  |
|  | Above 1GHz   | 500 @3m  | Average Value   |        |                  |  |  |  |
|  |  | 5000 @3m   | Peak Value  |        |                  |  |  |  |
| Test setup:  | For radiated emissions from 9kHz to 30MHz  |  |   |        |                  |  |  |  |
|  |  |  |   |        |                  |  |  |  |
|  | For radiated emissions from 30MHz to 1GHz  |  |   |        |                  |  |  |  |



For radiated emissions above 1GHz



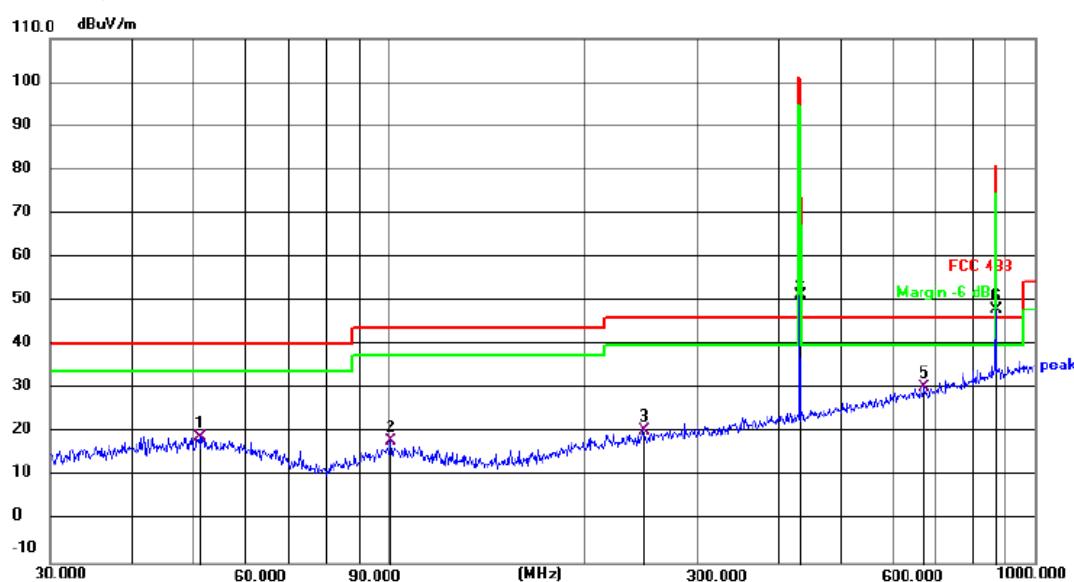
#### Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. 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. The antenna height 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. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
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 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

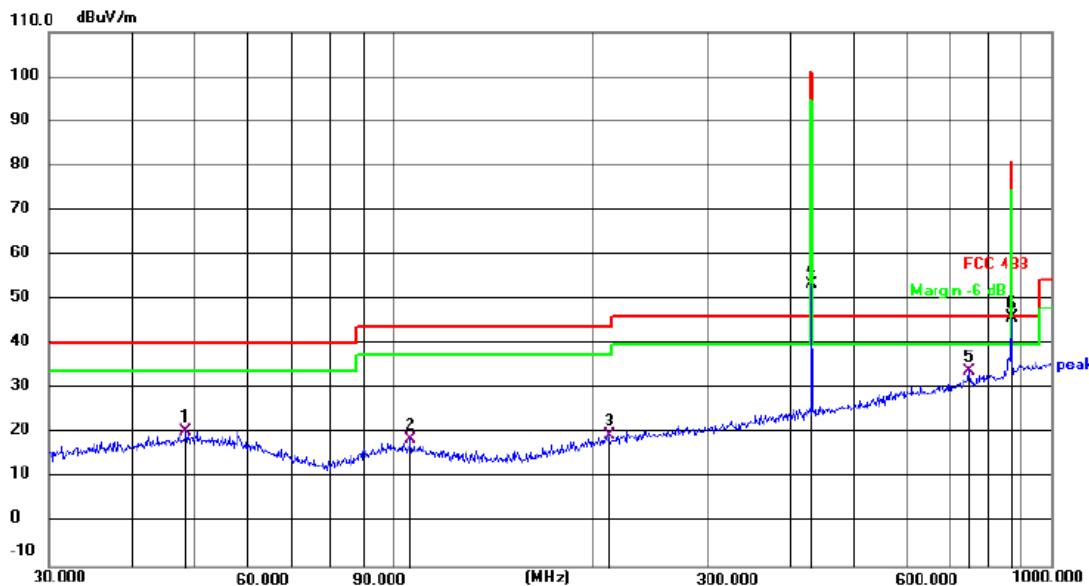
|                   |                                  |       |         |     |         |          |
|-------------------|----------------------------------|-------|---------|-----|---------|----------|
| Test Instruments: | Refer to section 6.0 for details |       |         |     |         |          |
| Test mode:        | Refer to section 5.2 for details |       |         |     |         |          |
| Test environment: | Temp.:                           | 25 °C | Humid.: | 52% | Press.: | 1012mbar |
| Test voltage:     | DC 3V                            |       |         |     |         |          |
| Test results:     | Pass                             |       |         |     |         |          |

**Measurement data:**
**7.3.1 Spurious emissions**
**■ Below 30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

**■ Below 1GHz**
**Horizontal:**


| No. | Mk. | Freq.    | Reading | Correct | Measure- | Limit  | Margin | Comment  |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|
|     |     |          | Level   | Factor  | ment     |        |        |          |
|     |     | MHz      | dBuV    | dB      | dBuV/m   | dB/m   | dB     | Detector |
| 1   |     | 51.1209  | 32.91   | -14.01  | 18.90    | 40.00  | 21.10  | QP       |
| 2   |     | 100.9339 | 33.91   | -15.96  | 17.95    | 43.50  | 25.55  | QP       |
| 3   |     | 247.6819 | 34.20   | -13.78  | 20.42    | 46.00  | 25.58  | QP       |
| 4   | *   | 433.9200 | 60.59   | -9.12   | 51.47    | 100.80 | 49.33  | peak     |
| 5   |     | 672.8444 | 34.60   | -4.11   | 30.49    | 46.00  | 15.51  | QP       |
| 6   | X   | 867.8400 | 46.90   | -0.79   | 47.69    | 80.80  | 33.11  | peak     |

**Vertical:**


| No. | Mk. | Freq.    | Reading | Correct | Measure- | Limit  | Margin | Detector | Comment |
|-----|-----|----------|---------|---------|----------|--------|--------|----------|---------|
|     |     |          | Level   | Factor  | ment     |        |        |          |         |
|     |     | MHz      | dBuV    | dB      | dBuV/m   | dB/m   | dB     |          |         |
| 1   |     | 48.5015  | 34.54   | -14.05  | 20.49    | 40.00  | 19.51  | QP       |         |
| 2   |     | 106.3850 | 35.06   | -16.50  | 18.56    | 43.50  | 24.94  | QP       |         |
| 3   |     | 212.2693 | 34.79   | -15.10  | 19.69    | 43.50  | 23.81  | QP       |         |
| 4   | *   | 433.9200 | 62.62   | -9.12   | 53.50    | 100.80 | 47.30  | peak     |         |
| 5   |     | 750.1082 | 36.64   | -2.74   | 33.90    | 46.00  | 12.10  | QP       |         |
| 6   | !   | 867.8400 | 46.73   | -0.79   | 45.94    | 80.80  | 34.86  | peak     |         |

For average Emission

| Frequency<br>MHz | Peak<br>Measurement<br>Level<br>dBuV/m | Duty<br>cycle<br>factor | Average<br>Level<br>dBuV/m | Limit<br>AV | Margin | Polarization |
|------------------|--|-------------------------|----------------------------|-------------|--------|--------------|
| 433.92           | 53.50                                  | -5.85                   | 47.65                      | 80.80       | -33.15 | Vertical     |
| 867.84           | 45.94                                  | -5.85                   | 40.09                      | 60.80       | -20.71 | Vertical     |

Notes: 1. Average emission Level = Peak Level + Duty cycle factor  
2. Duty cycle level please see clause 7.5.

| Frequency<br>MHz | Peak<br>Measurement<br>Level<br>dBuV/m | Duty<br>cycle<br>factor | Average<br>Level<br>dBuV/m | Limit<br>AV | Margin | Polarization |
|------------------|--|-------------------------|----------------------------|-------------|--------|--------------|
| 433.92           | 51.47                                  | -5.85                   | 45.62                      | 80.80       | -35.18 | Horizontal   |
| 867.84           | 47.69                                  | -5.85                   | 41.84                      | 60.80       | -18.96 | Horizontal   |

Notes: 1. Average emission Level = Peak Level + Duty cycle factor  
2. Duty cycle level please see clause 7.5.

■ Above 1GHz

| Frequency<br>MHz | Peak<br>Level<br>dBuV/m | Duty<br>cycle<br>factor | Average<br>Level<br>dBuV/m | Limit |       | Margin dB |        | Polarization |
|------------------|-------------------------|-------------------------|----------------------------|-------|-------|-----------|--------|--------------|
|                  |                         |                         |                            | PK    | AV    | PK        | AV     |              |
| 1301.42          | 51.47                   | -5.85                   | 45.62                      | 80.80 | 60.80 | -29.33    | -15.18 | Vertical     |
| 1735.56          | 49.52                   | -5.85                   | 43.67                      | 80.80 | 60.80 | -31.28    | -17.13 | Vertical     |
| 2169.15          | 47.24                   | -5.85                   | 41.39                      | 80.80 | 60.80 | -33.56    | -19.41 | Vertical     |
| 2603.33          | 49.37                   | -5.85                   | 43.52                      | 80.80 | 60.80 | -31.43    | -17.28 | Vertical     |
| 3037.18          | 48.25                   | -5.85                   | 42.40                      | 80.80 | 60.80 | -32.55    | -18.40 | Vertical     |
| 3471.29          | 46.39                   | -5.85                   | 40.54                      | 80.80 | 60.80 | -34.41    | -20.26 | Vertical     |
| 1301.63          | 49.51                   | -5.85                   | 43.66                      | 80.80 | 60.80 | -31.29    | -17.14 | Horizontal   |
| 1735.47          | 47.23                   | -5.85                   | 41.38                      | 80.80 | 60.80 | -33.57    | -19.42 | Horizontal   |
| 2169.68          | 49.04                   | -5.85                   | 43.19                      | 80.80 | 60.80 | -31.76    | -17.61 | Horizontal   |
| 2603.47          | 48.37                   | -5.85                   | 42.52                      | 80.80 | 60.80 | -32.43    | -18.28 | Horizontal   |
| 3037.36          | 46.31                   | -5.85                   | 40.46                      | 80.80 | 60.80 | -34.49    | -20.34 | Horizontal   |
| 3471.43          | 46.27                   | -5.85                   | 40.42                      | 80.80 | 60.80 | -34.53    | -20.38 | Horizontal   |

Notes: 1. Average emission Level = Peak Level + Duty cycle factor

2. Duty cycle level please see clause 7.5.

3. Pulse Desensitization Correction Factor

Pulse Width (PW) = 10.7ms

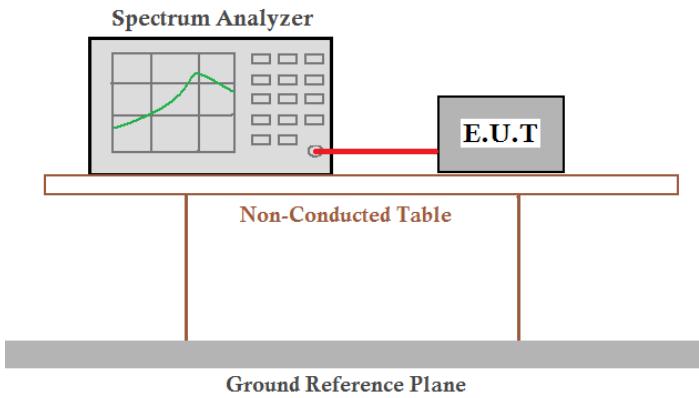
2/PW = 2/10.7ms = 0.19kHz

RBW (100 kHz) > 2/PW (0.028kHz)

Therefore PDCF is not needed

4. Other harmonics emissions are lower than 20dB below the allowable limit.

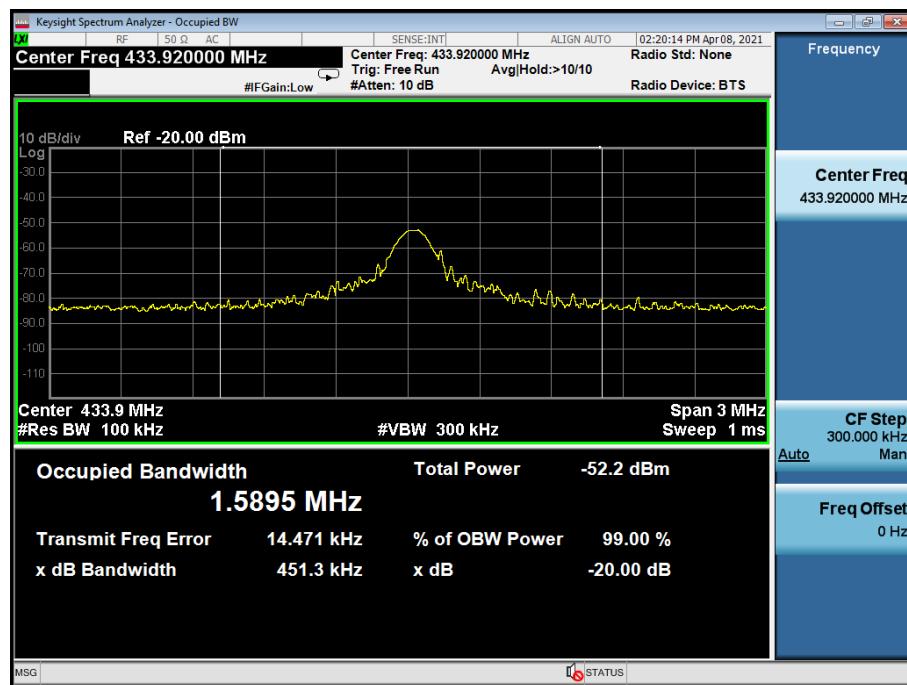
## 7.4 20dB Occupy Bandwidth

|                   |  |
|-------------------|--|
| Test Requirement: | FCC Part15 C Section 15.231  |
| Test Method:      | ANSI C63.10:2013   |
| Limit:            | <p>According to FCC 15.231(c) requirement:</p> <p>The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.</p> <p>B.W (20dBc) Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1.0843MHz</p> |
| Test setup:       |   |
| Test Instruments: | Refer to section 6.0 for details   |
| Test mode:        | Refer to section 5.2 for details   |
| Test results:     | Pass   |

### Measurement Data

| Test channel | 99% bandwidth(MHz) | 20dB bandwidth(kHz) | Limit(kHz) | Result |
|--------------|--------------------|---------------------|------------|--------|
| Lowest       | 1.5895             | 451.3               | 1084.3     | Pass   |

Test plot as follows:



Lowest channel

## 7.5 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 100 ms 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 =  $20\log(\text{duty cycle})$

The duration of one cycle = 58.08ms

The duty cycle is simply the on-time divided the duration of one cycle

$$\text{Duty Cycle} = (3.440\text{ms} * 1 + 1.040\text{ms} * 25) / 58.08$$

$$= 29.44\text{ms} / 58.08\text{ms}$$

$$= 0.51$$

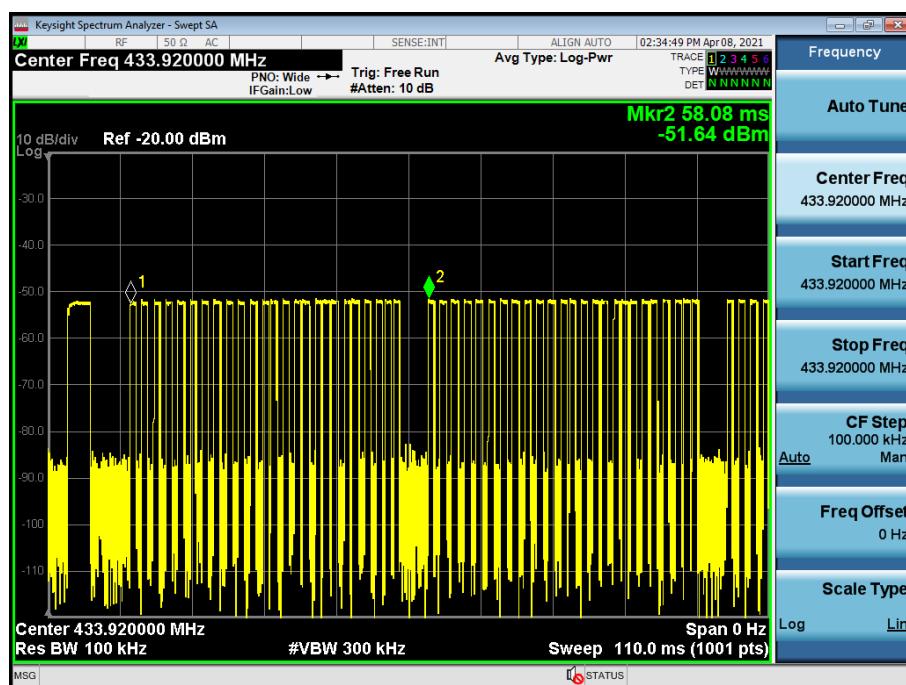
Therefore, the averaging factor is found by  $20\log 0.51 = -5.85\text{dB}$

Test plot as follows:

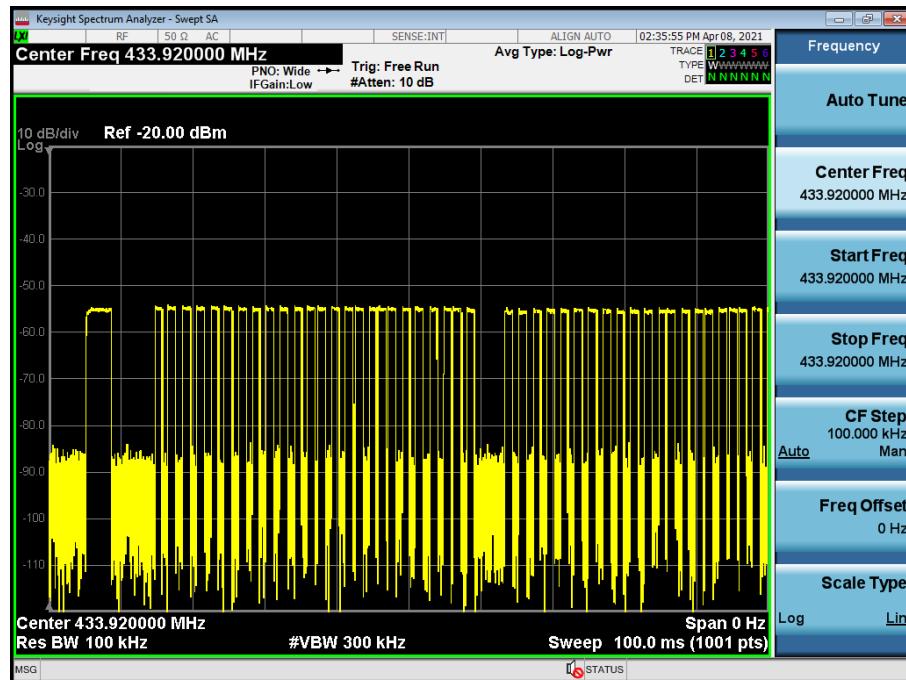
Note: During the 100ms, the amount of pulse and on-time of pulse are the same for every pulse train.

## Measurement Data

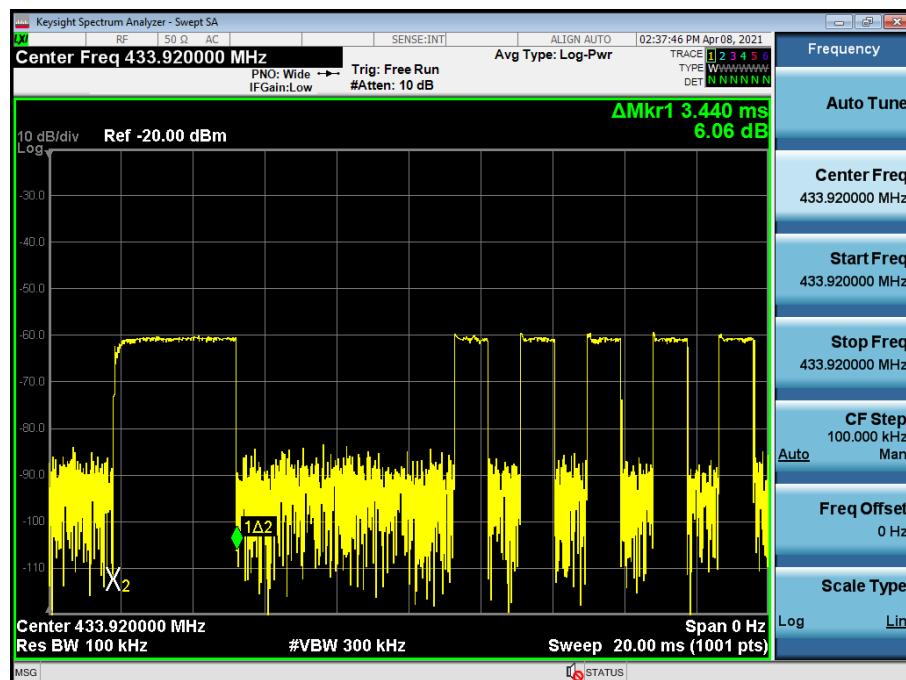
Cycle



## Pulse



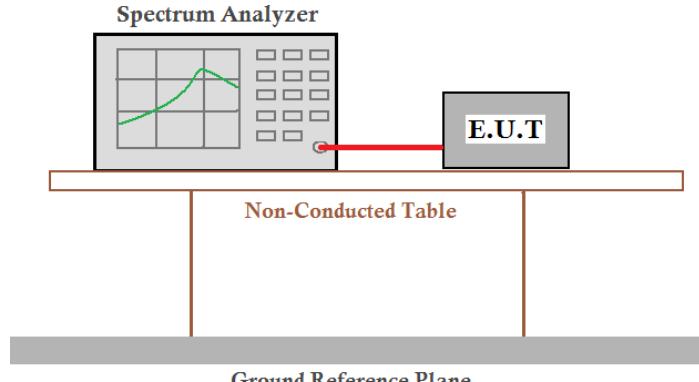
## On-time



On-time



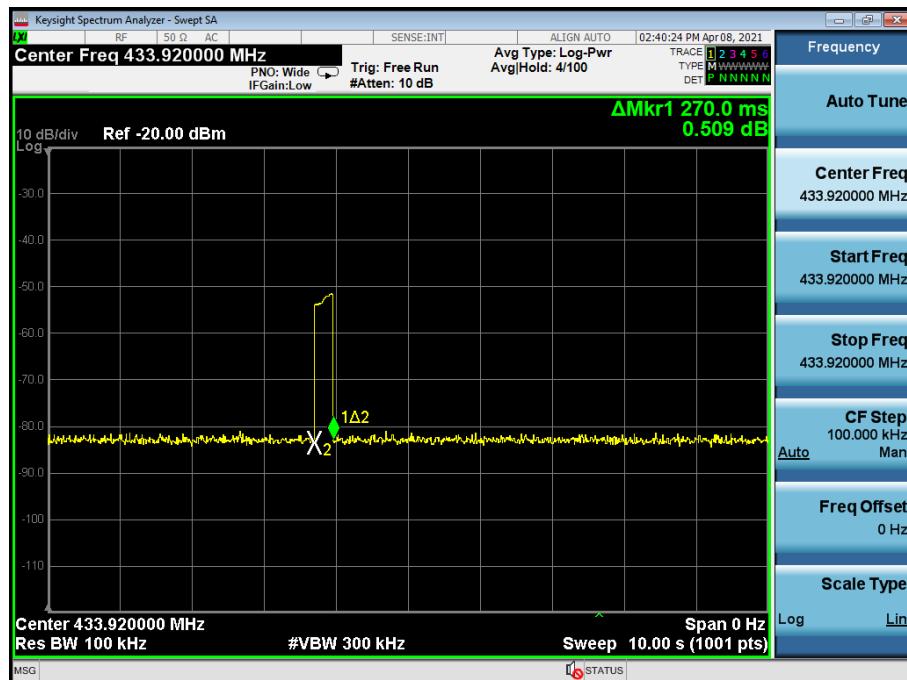
## 7.6 DWELL TIME

|                   |  |
|-------------------|--|
| Test Requirement: | FCC Part15 C Section 15.231  |
| Test Method:      | ANSI C63.10:2013   |
| Limit:            | According to FCC 15.231(a) requirement:<br>A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.  |
| Test setup:       |    |
| Test Instruments: | Refer to section 6.0 for details   |
| Test mode:        | <p>Test Procedure</p> <ol style="list-style-type: none"> <li>Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.</li> <li>Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.</li> <li>Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.</li> <li>Repeat above procedures until all measured frequencies were complete.</li> </ol> |
| Test results:     | Pass   |

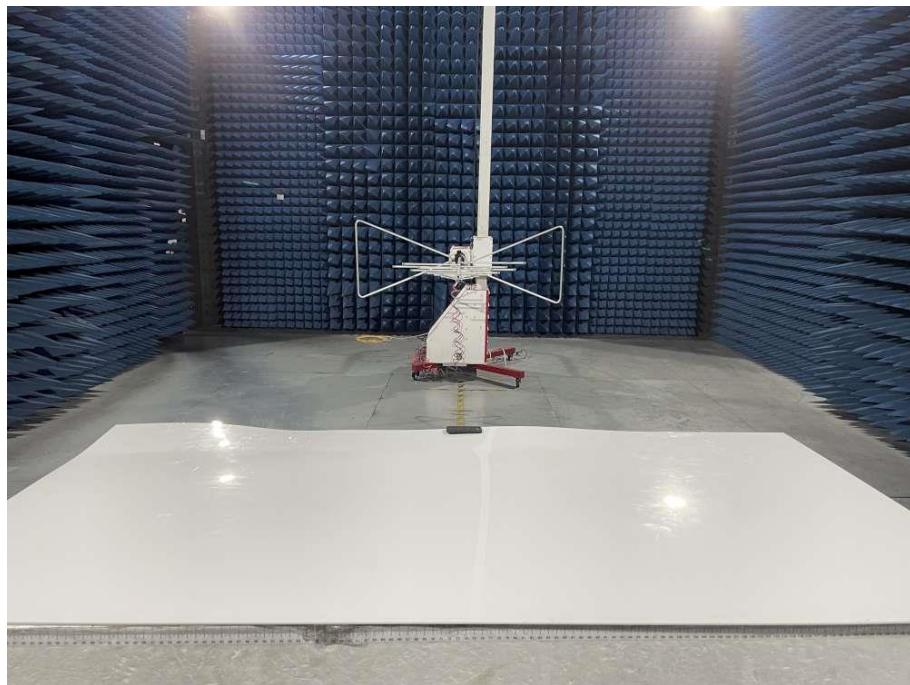
### Measurement Data

| Dwell time (second) | Limit (second) | Result |
|---------------------|----------------|--------|
| 0.27s               | <5s            | Pass   |

Test plot as follows:

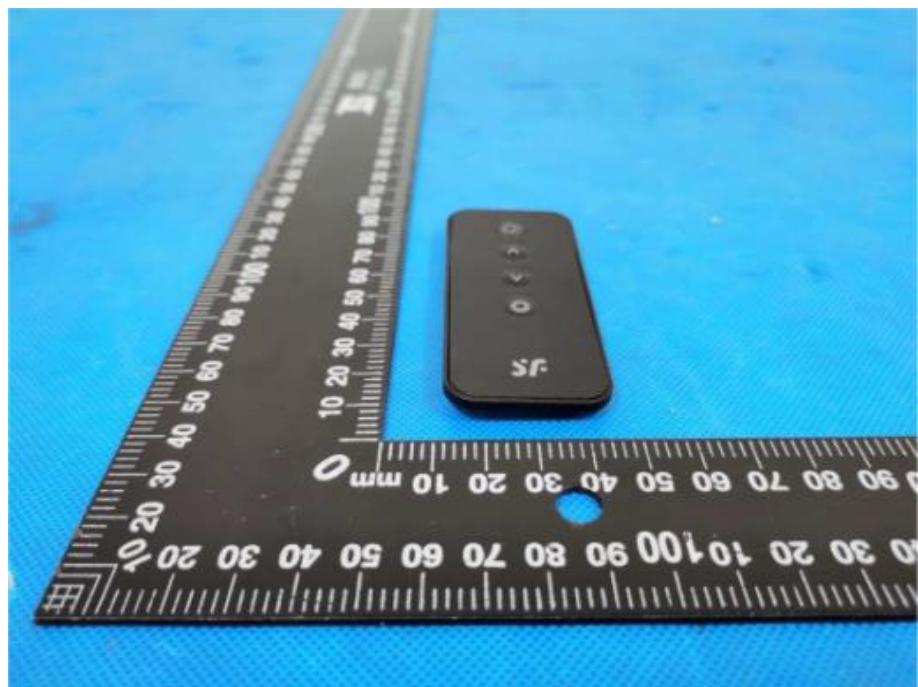
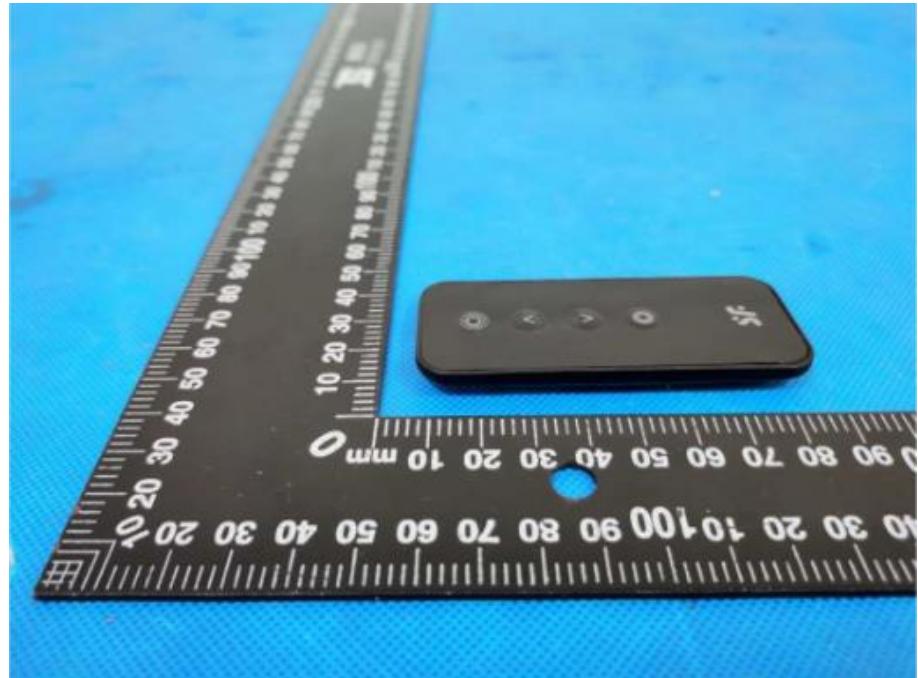


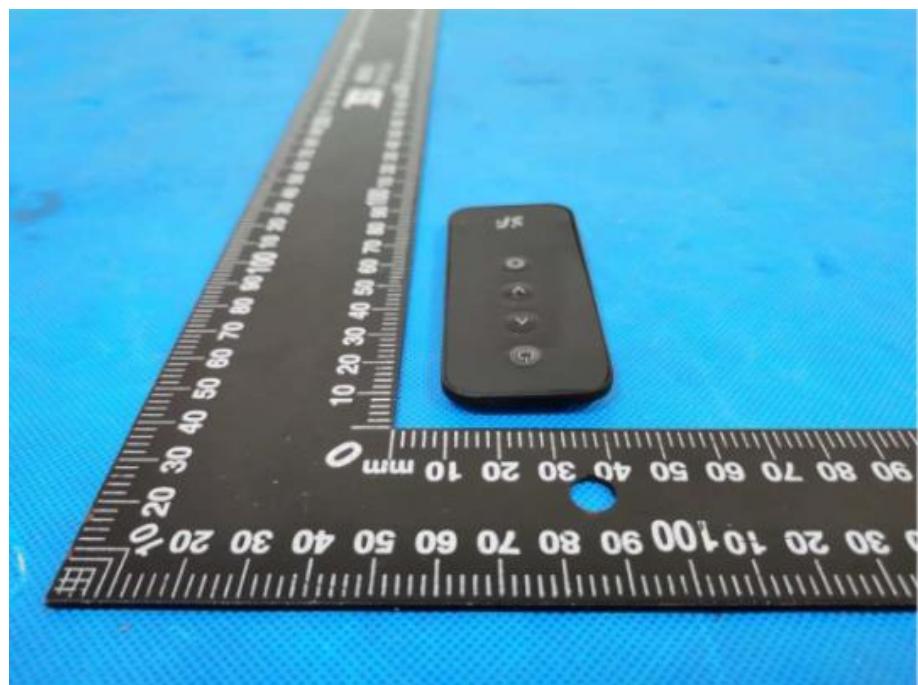
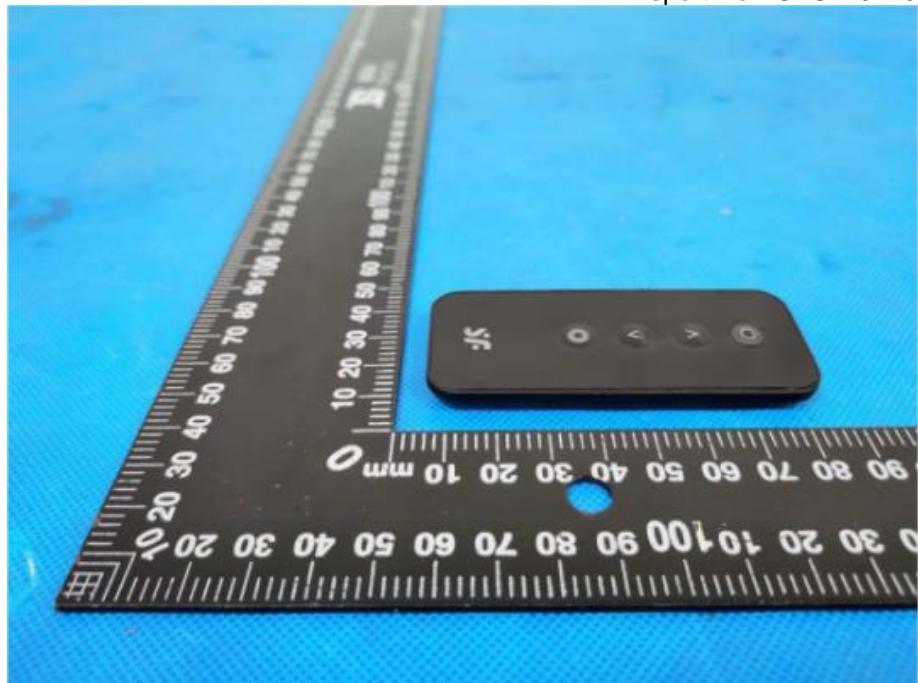
## 8 Test Setup Photo

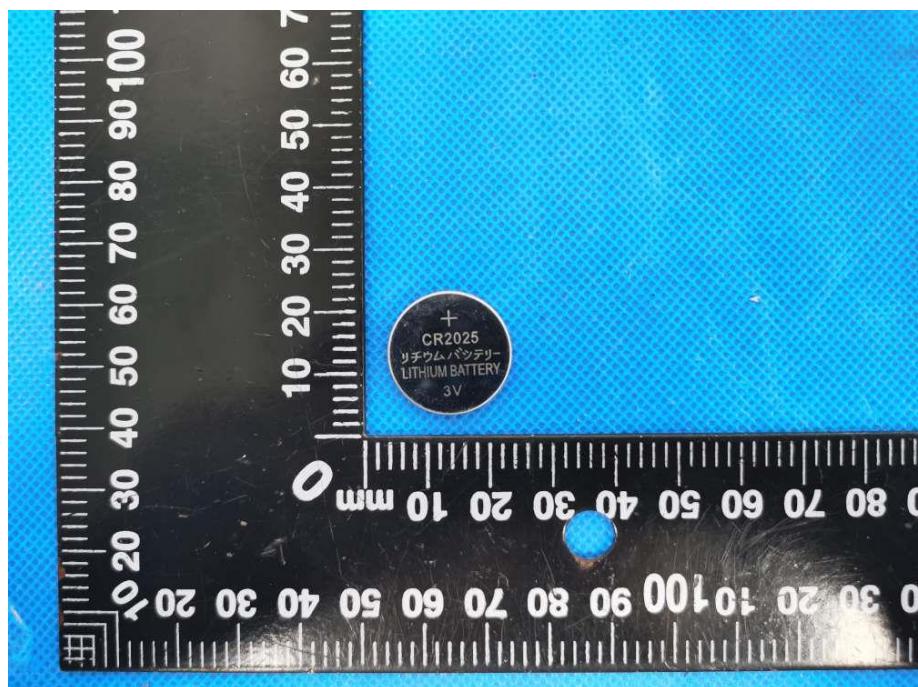
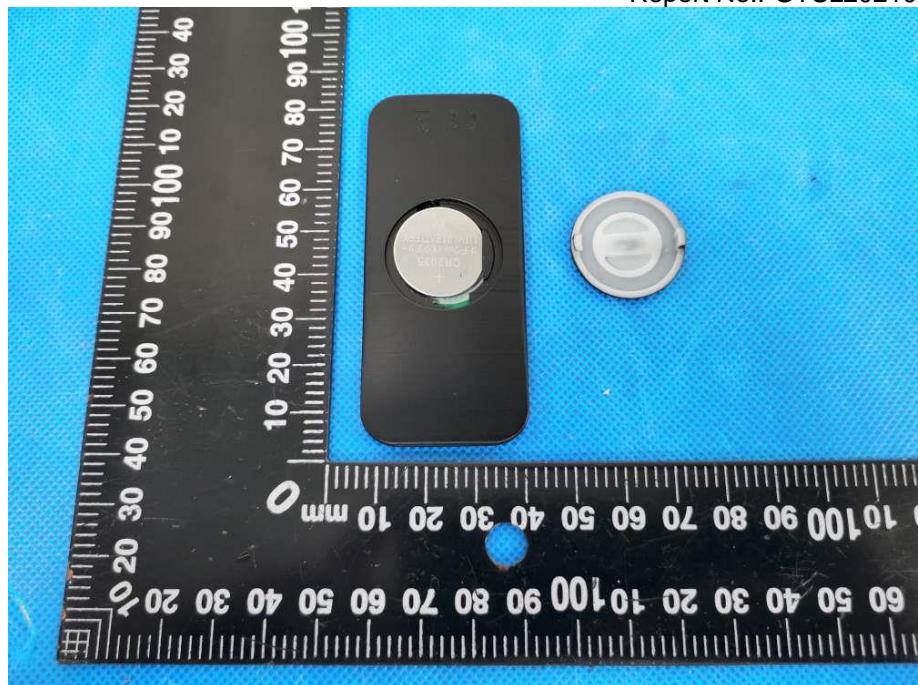


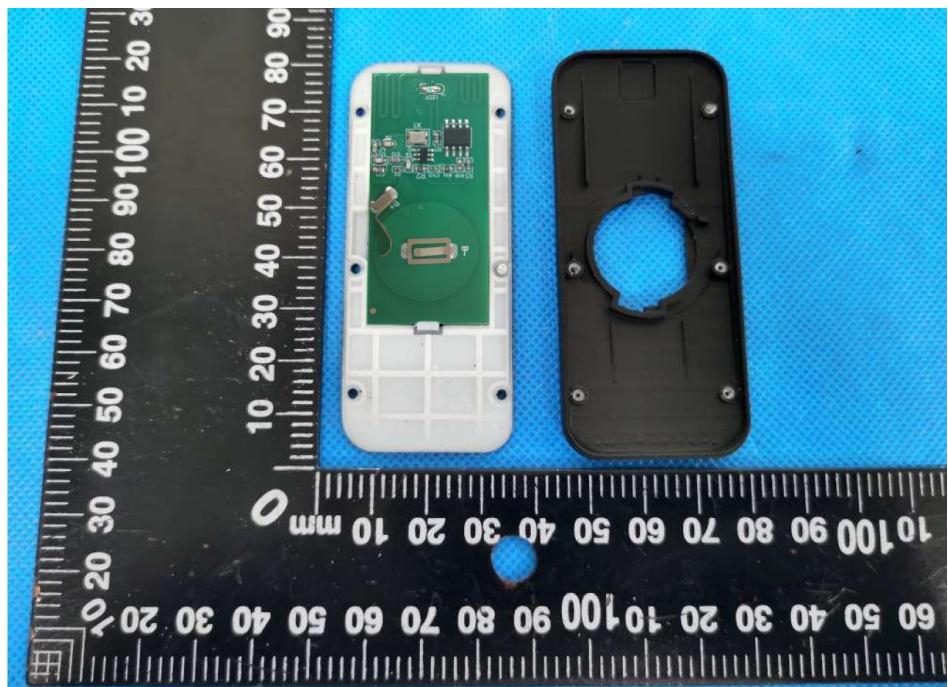
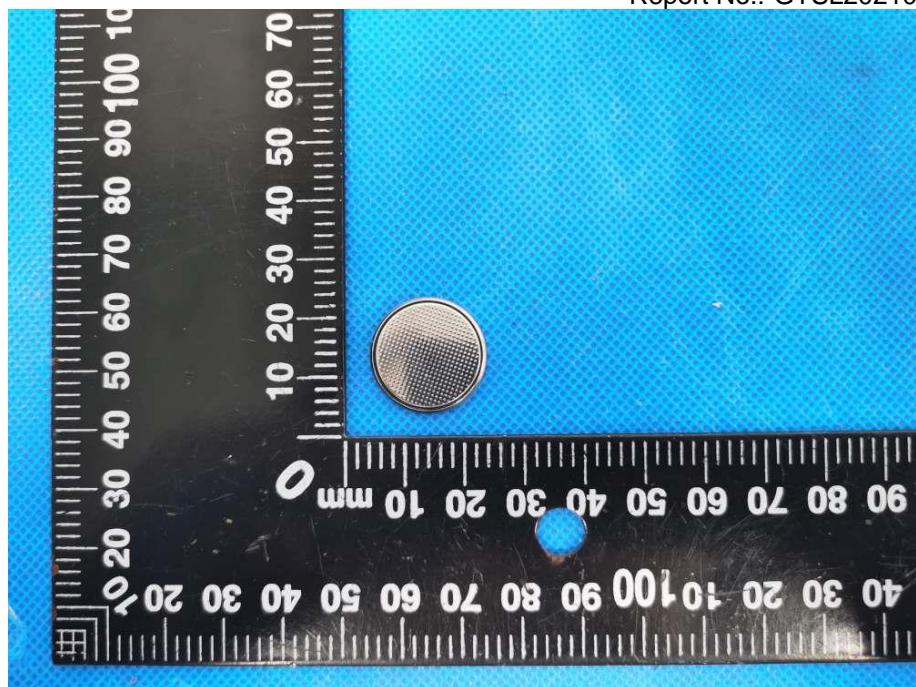
## 9 EUT Constructional Details

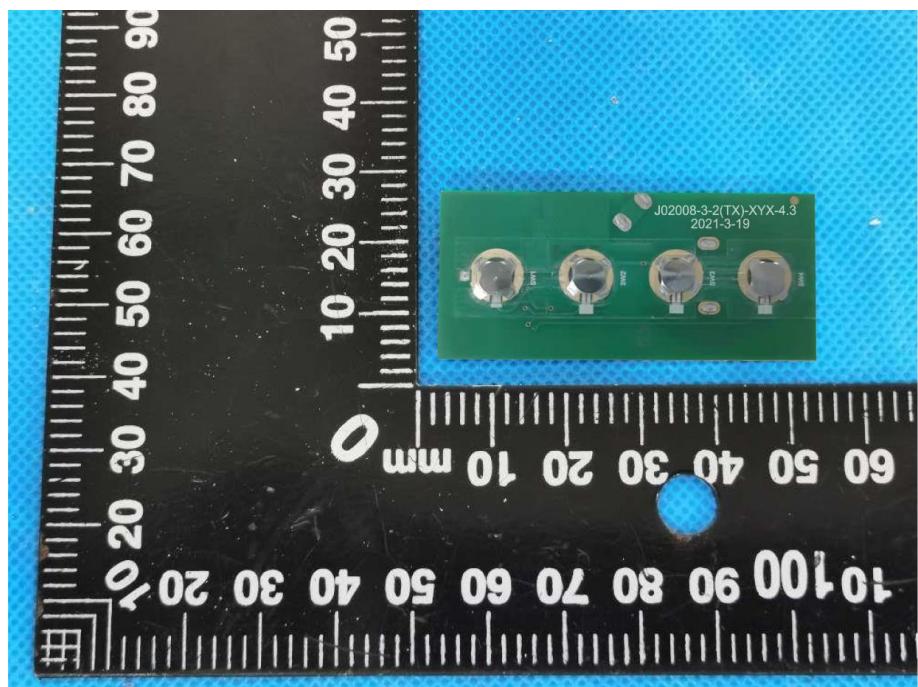
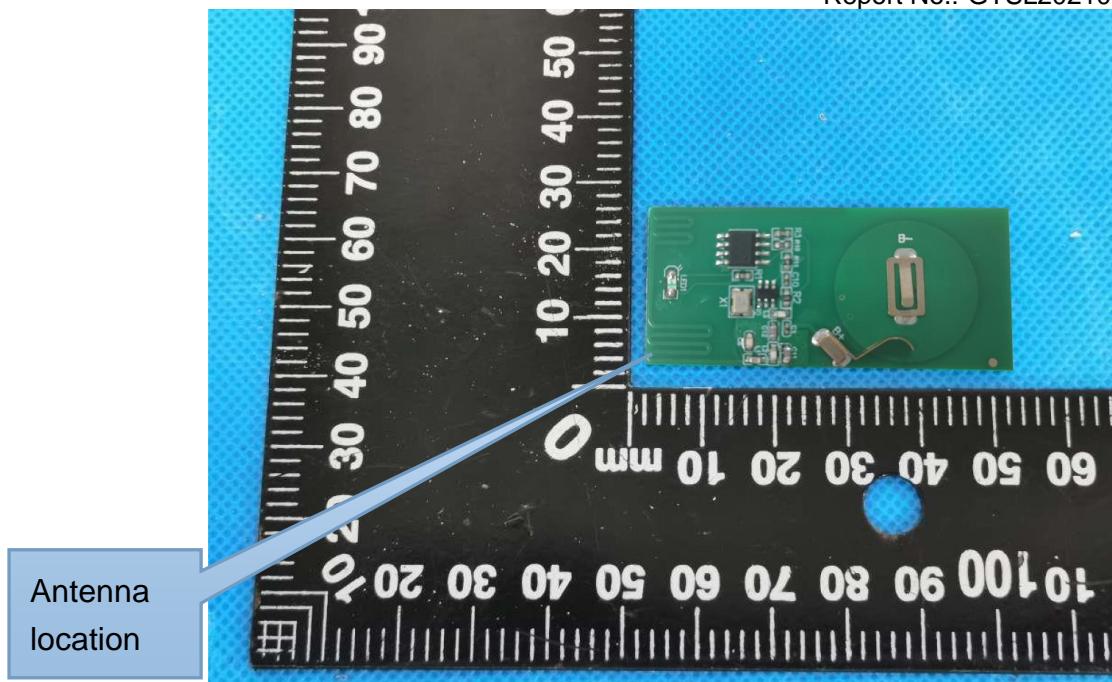












-----End-----