

# FCC TEST REPORT

For

SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.

Wireless Remote Controller

Model No.: HK-S-63, HK-S-33, HK-S-16,  
HK-S-25, HK-S-67

Prepared For : SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.  
Address : A5 Building, The 3rd Industrial Zone Yanchuan, Songgang Town,  
Shenzhen City, 518105, China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited  
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Report Number : R0217030089W1  
Date of Test : Mar. 24~Apr. 20, 2017  
Date of Report : Apr. 20, 2017

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## TEST REPORT

Applicant : SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.  
Manufacturer : SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.  
Product Name : Wireless Remote Controller  
Model No. : HK-S-63, HK-S-33, HK-S-16, HK-S-25, HK-S-67  
Trade Mark : N/A  
Rating(s) : DC 4.5V by "AAA" Battery\*3

**Test Standard(s) : FCC Part15 Subpart C, Paragraph 15.249**

**Test Method(s) : ANSI C63.10: 2013**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Mar. 24~Apr. 20, 2017

Prepared by :



*Winkey Wang*

(Tested Engineer / Winkey Wang)

Reviewer :

*Amy Ding*

(Project Manager / Amy Ding)

Approved & Authorized Signer :

*Tom Chen*

(Manager / Tom Chen)

## 1. General Information

### 1.1. Client Information

|              |   |                                                                                            |
|--------------|---|--------------------------------------------------------------------------------------------|
| Applicant    | : | SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.                                                 |
| Address      | : | A5 Building, The 3rd Industrial Zone Yanchuan, Songgang Town, Shenzhen City, 518105, China |
| Manufacturer | : | SHENZHEN GOODHEALTH MOTOR MANUF. CO., LTD.                                                 |
| Address      | : | A5 Building, The 3rd Industrial Zone Yanchuan, Songgang Town, Shenzhen City, 518105, China |

### 1.2. Description of Device (EUT)

|                                                                                                                                                                                                    |          |                                                                                                                                                            |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Product Name                                                                                                                                                                                       | :        | Wireless Remote Controller                                                                                                                                 |              |
| Model No.                                                                                                                                                                                          | :        | HK-S-63, HK-S-33, HK-S-16, HK-S-25, HK-S-67<br>(Note: All samples are the same except the model number and colour, so we prepare “HK-S-63” for test only.) |              |
| Trade Mark                                                                                                                                                                                         | :        | N/A                                                                                                                                                        |              |
| Test Power Supply                                                                                                                                                                                  | :        | DC 4.5V by “AAA” Battery*3                                                                                                                                 |              |
| Product Description                                                                                                                                                                                | :        | Operation Frequency 1:                                                                                                                                     | 2434MHz      |
|                                                                                                                                                                                                    |          | Number of Channel:                                                                                                                                         | 1 Channels   |
|                                                                                                                                                                                                    |          | Modulation Type:                                                                                                                                           | FSK          |
|                                                                                                                                                                                                    |          | Antenna Type:                                                                                                                                              | PCB Antenna  |
|                                                                                                                                                                                                    |          | Antenna Gain(Peak):                                                                                                                                        | 1.5 dBi      |
|                                                                                                                                                                                                    |          |                                                                                                                                                            |              |
|                                                                                                                                                                                                    |          | Operation Frequency 2:                                                                                                                                     | 8MHz         |
|                                                                                                                                                                                                    |          | Number of Channel:                                                                                                                                         | 1 Channels   |
|                                                                                                                                                                                                    |          | Modulation Type:                                                                                                                                           | FSK          |
|                                                                                                                                                                                                    |          | Antenna Type:                                                                                                                                              | loop Antenna |
| Antenna Gain(Peak):                                                                                                                                                                                | -0.5 dBi |                                                                                                                                                            |              |
| <b>Remark:</b> 1)For a more detailed features description, please refer to the manufacturer’s specifications or the User’s Manual.<br>2) This test report test for Operation Frequency 1 : 2434MHz |          |                                                                                                                                                            |              |

### 1.3. Auxiliary Equipment Used During Test

|     |  |
|-----|--|
| N/A |  |
|-----|--|

#### 1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|--------------|-------------|
| Mode 1       | TX Mode     |

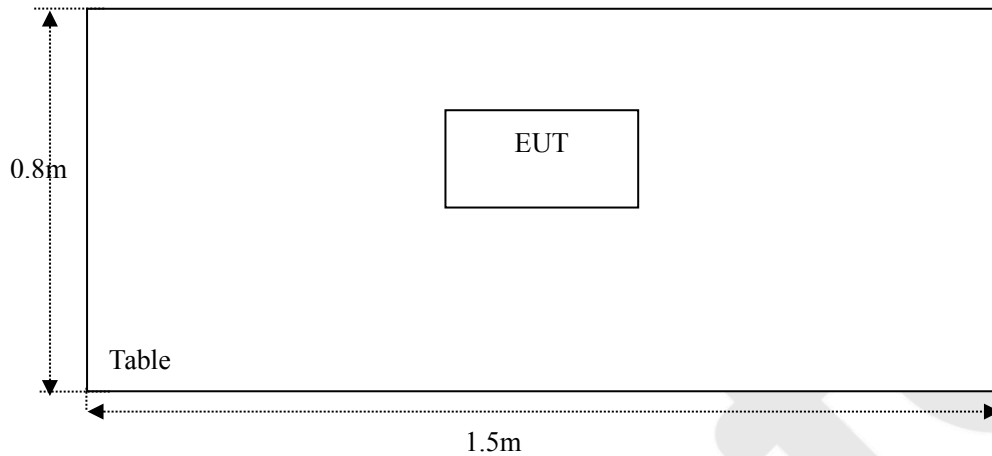
| For Radiated Emission |             |
|-----------------------|-------------|
| Final Test Mode       | Description |
| Mode 1                | TX Mode     |

#### 1.5. List of Channels

| Channel | Frequency |
|---------|-----------|
| 01      | 2434 MHz  |

## 1.6. Description of Test Setup

RE



## 1.7. Test Equipment List

| Item | Equipment                      | Manufacturer            | Model No.     | Serial No.    | Last Cal.     | Cal. Interval |
|------|--------------------------------|-------------------------|---------------|---------------|---------------|---------------|
| 1.   | Two-Line V-network             | Rohde & Schwarz         | ENV216        | 100055        | Jul. 19, 2016 | 1 Year        |
| 2.   | EMI Test Receiver              | Rohde & Schwarz         | ESCI          | 100627        | Jun. 17, 2016 | 1 Year        |
| 3.   | RF Switching Unit              | Compliance Direction    | RSU-M2        | 38303         | Jun. 17, 2016 | 1 Year        |
| 4.   | Spectrum Analysis              | Agilent                 | E4407B        | US39390582    | Jul. 12, 2016 | 1 Year        |
| 5.   | Preamplifier                   | Instruments corporation | EMC011830     | 980100        | Jun. 17, 2016 | 1 Year        |
| 6.   | EMI Test Receiver              | Rohde & Schwarz         | ESPI          | 101604        | Jun. 17, 2016 | 1 Year        |
| 7.   | Double Ridged Horn Antenna     | Instruments corporation | GTH-0118      | 351600        | May 06, 2016  | 1 Year        |
| 8.   | Bilog Broadband Antenna        | Schwarzbeck             | VULB9163      | VULB 9163-289 | May 06, 2016  | 1 Year        |
| 9.   | Loop Antenna                   | Schwarzbeck             | FMZB1519      | 012           | May 11, 2016  | 1 Year        |
| 10.  | Pre-amplifier                  | SONOMA                  | 310N          | 186860        | Jun. 17, 2016 | 1 Year        |
| 11.  | EMI Test Software EZ-EMC       | SHURPLE                 | N/A           | N/A           | N/A           | N/A           |
| 12.  | Power Sensor                   | Agilent                 | KFSW150502    | 15I00041SN045 | Jun. 17, 2016 | 1 Year        |
| 13.  | MXA Spectrum Analysis          | Agilent                 | N9020A        | MY51170037    | Jun. 17, 2016 | 1 Year        |
| 14.  | MXG RF Vector Signal Generator | Agilent                 | N5182A        | MY48180656    | Jun. 17, 2016 | 1 Year        |
| 15.  | Signal Generator               | Agilent                 | E4421B        | MY41000743    | Jun. 17, 2016 | 1 Year        |
| 16.  | DC Power supply                | IV                      | IV-8080       | YQSB0096      | Jun. 17, 2016 | 1 Year        |
| 17.  | TEMP&HUMI PROGRAMMABLE CHAMBER | Bell Group              | BE-THK-150 M8 | SE-0137       | Jun. 17, 2016 | 1 Year        |

## 1.8. Measurement Uncertainty

|                        |   |                          |
|------------------------|---|--------------------------|
| Radiation Uncertainty  | : | Ur = 4.1 dB (Horizontal) |
|                        |   | Ur = 4.3 dB (Vertical)   |
|                        |   |                          |
| Conduction Uncertainty | : | Uc = 3.4dB               |

## 1.9. Description of Test Facility

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

### **FCC-Registration No.: 752021**

Shenzhen Anbotek Compliance Laboratory Limited, 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 our files. Registration 752021, July 06, 2016.

### **IC-Registration No.: 8058A-1**

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, June 13, 2016.

### **Test Location**

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

## 2. Summary of Test Results

| Standard Section                                            | Test Item           | Result |
|-------------------------------------------------------------|---------------------|--------|
| 15.203                                                      | Antenna Requirement | PASS   |
| 15.207                                                      | Conducted Emission  | N/A    |
| 15.249                                                      | Spurious Emission   | PASS   |
| 15.215(c)                                                   | 20dB Bandwidth      | PASS   |
| 15.249(c)                                                   | Band Edge           | PASS   |
| <b>Remark:</b> “N/A” is an abbreviation for Not Applicable. |                     |        |

### 3. Radiation Spurious Emission and Band Edge

#### 3.1. Test Standard and Limit

| Test Standard | FCC Part15 C Section 15.209 and 15.205 |                                  |                |            |                          |
|---------------|----------------------------------------|----------------------------------|----------------|------------|--------------------------|
| Test Limit    | Frequency (MHz)                        | Field strength (microvolt/meter) | Limit (dBuV/m) | Remark     | Measurement distance (m) |
|               | 0.009MHz~0.490MHz                      | 2400/F(kHz)                      | -              | -          | 300                      |
|               | 0.490MHz-1.705MHz                      | 24000/F(kHz)                     | -              | -          | 30                       |
|               | 1.705MHz-30MHz                         | 30                               | -              | -          | 30                       |
|               | 30MHz~88MHz                            | 100                              | 40.0           | Quasi-peak | 3                        |
|               | 88MHz~216MHz                           | 150                              | 43.5           | Quasi-peak | 3                        |
|               | 216MHz~960MHz                          | 200                              | 46.0           | Quasi-peak | 3                        |
|               | 960MHz~1000MHz                         | 500                              | 54.0           | Quasi-peak | 3                        |
|               | Above 1000MHz                          | 500                              | 54.0           | Average    | 3                        |
|               |                                        | -                                | 74.0           | Peak       | 3                        |

**Remark:**

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

| Test Standard | FCC Part15 C Section 15.249 |                                                    |                                                |                |         |                          |
|---------------|-----------------------------|----------------------------------------------------|------------------------------------------------|----------------|---------|--------------------------|
| Test Limit    | Frequency (MHz)             | Field Strength of fundamental ((millivolts /meter) | Field Strength of Harmonics (microvolts/meter) | Limit (dBuV/m) | Remark  | Measurement distance (m) |
|               | 2400~2483.5                 | 50                                                 | -                                              | 114.0          | Peak    | 3                        |
|               | 2400~2483.5                 | 50                                                 | -                                              | 94.0           | Average | 3                        |
|               | 2400~2483.5                 | -                                                  | 500                                            | 74.0           | Peak    | 3                        |
|               | 2400~2483.5                 | -                                                  | 500                                            | 54.0           | Average | 3                        |

**Remark:**

(1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

### 3.2. Test Setup

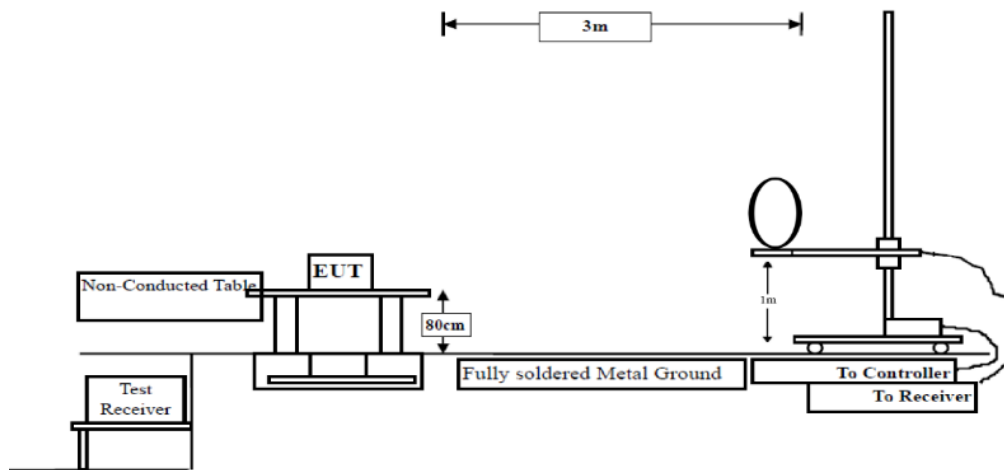


Figure 1. Below 30MHz

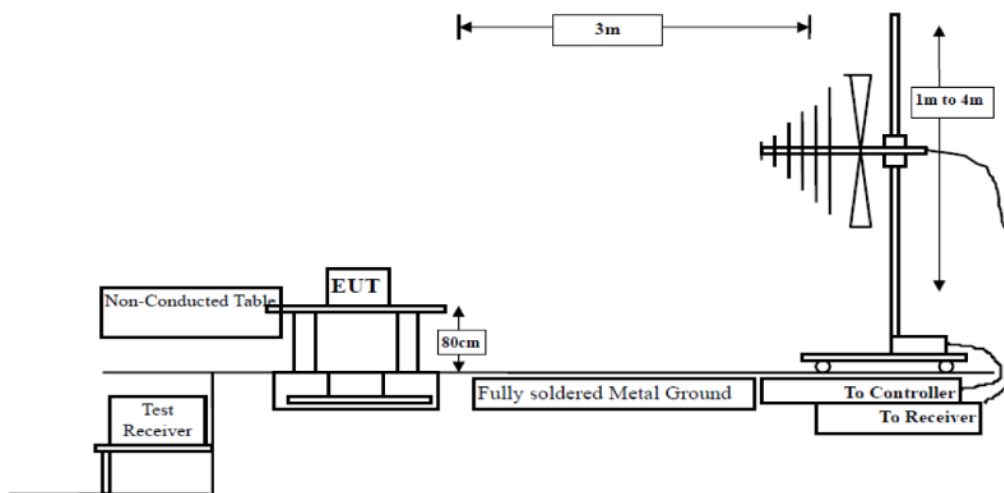


Figure 2. 30MHz to 1GHz

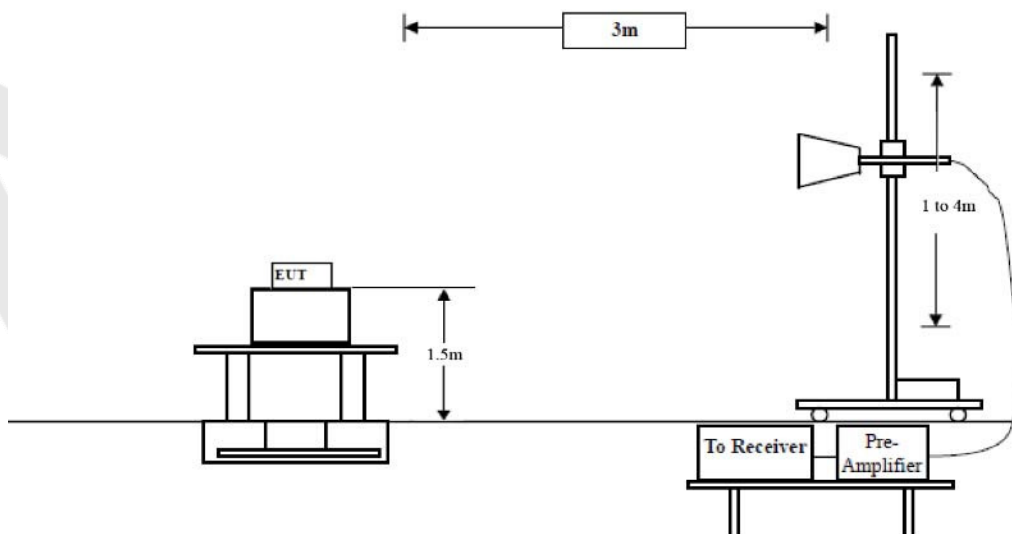


Figure 3. Above 1 GHz

### 3.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9\*6\*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:

RBW =1MHz, VBW =10Hz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

### 3.4. Test Data

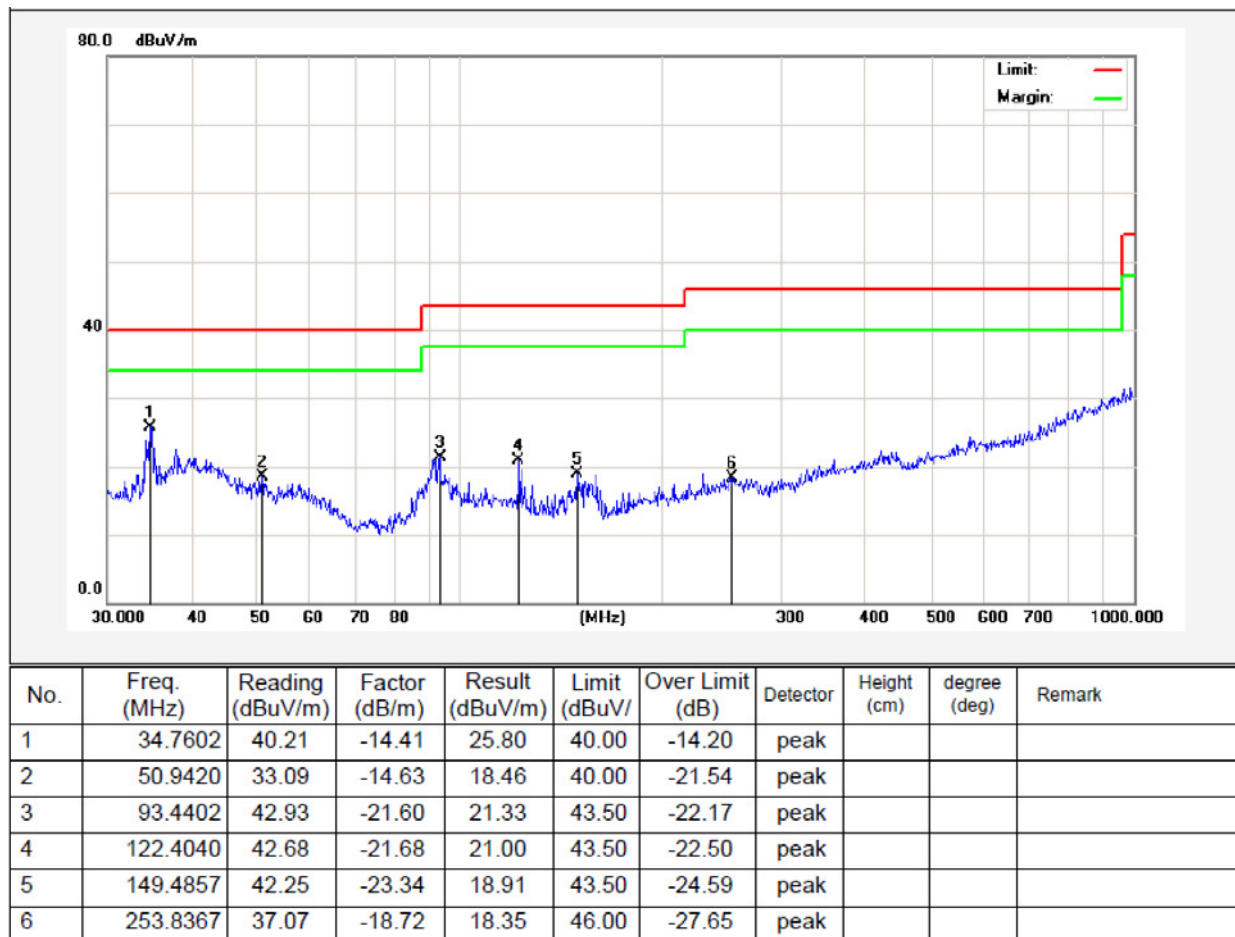
#### PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz and above 18000MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

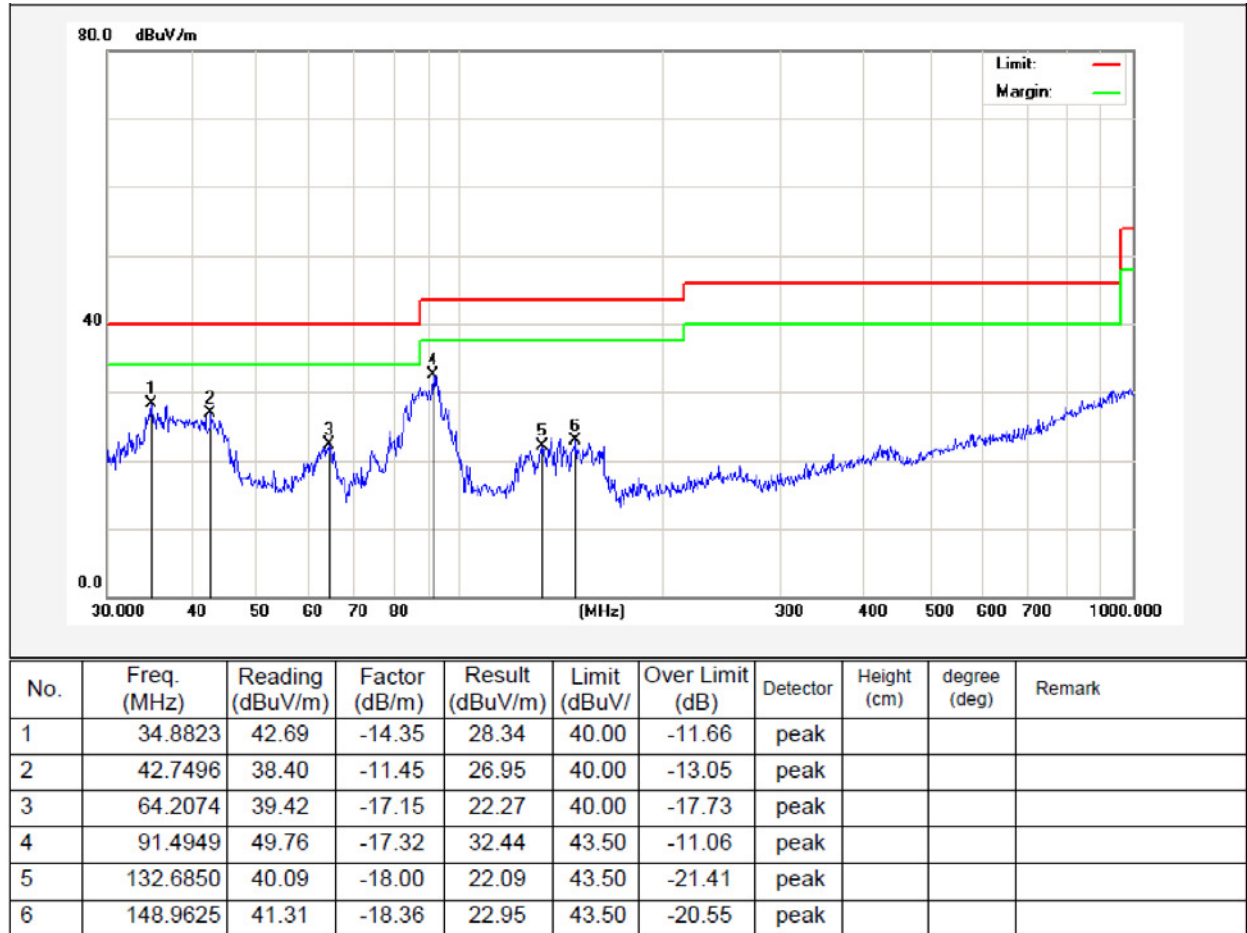
**Test Results (30~1000MHz)**

Job No.: 0217030089W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH  
Standard: FCC PART 15C Power Source: DC 4.5V  
Test Mode: TX mode Polarization: Horizontal



**Test Results (30~1000MHz)**

Job No.: 0217030089W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH  
Standard: FCC PART 15C Power Source: DC 4.5V  
Test Mode: TX mode Polarization: Vertical



# Test Results (Above 1000MHz)

| Horizontal<br>CH Low (2434MHz) |         |               |               |           |        |        |               |        |
|--------------------------------|---------|---------------|---------------|-----------|--------|--------|---------------|--------|
| Frequency                      | Reading | Ant<br>Factor | Cable<br>Loss | Amplifier | Level  | Limit  | Over<br>Limit | Remark |
| MHz                            | dB      | (dBuV/m)      | (dB)          | (dB)      | dBμV/m | dBμV/m | dB            |        |
| 2434.00                        | 87.25   | 31.21         | 2.17          | 35.30     | 85.33  | 114.0  | -28.67        | Peak   |
| 2434.00                        | 79.45   | 31.21         | 2.17          | 35.30     | 77.53  | 94.0   | -16.47        | AV     |
| 4868.00                        | 35.30   | 34.25         | 6.75          | 34.27     | 51.51  | 74.00  | -22.49        | Peak   |
| 4868.00                        | 32.23   | 34.25         | 6.75          | 34.27     | 38.96  | 54.00  | -15.04        | AV     |
| 7302.00                        | 42.51   | 38.26         | 7.91          | 34.66     | 54.02  | 74.00  | -19.98        | Peak   |
| 7302.00                        | 28.76   | 38.26         | 7.91          | 34.66     | 40.27  | 54.00  | -13.73        | AV     |
| 9736.00                        | ---     | ---           | ---           | ---       | ---    | ---    | ---           | ---    |
| 9736.00                        | ---     | ---           | ---           | ---       | ---    | ---    | ---           | ---    |
| 12170.00                       | ---     | ---           | ---           | ---       | ---    | ---    | ---           | ---    |
| 12170.00                       | ---     | ---           | ---           | ---       | ---    | ---    | ---           | ---    |
| ---                            | ---     | ---           | ---           | ---       | ---    | ---    | ---           | ---    |

| Vertical<br>CH Low (2434MHz) |               |               |                  |               |        |        |               |        |
|------------------------------|---------------|---------------|------------------|---------------|--------|--------|---------------|--------|
| Frequency                    | Cable<br>Loss | Ant<br>Factor | Preamp<br>Factor | Read<br>Level | Level  | Limit  | Over<br>Limit | Remark |
| MHz                          | dB            | dB/m          | dB               | dBμV          | dBμV/m | dBμV/m | dB            |        |
| 2434.00                      | 89.58         | 31.21         | 2.17             | 35.30         | 87.66  | 114.0  | -26.34        | Peak   |
| 2434.00                      | 81.24         | 31.21         | 2.17             | 35.30         | 79.32  | 94.0   | -14.68        | AV     |
| 4868.00                      | 47.27         | 34.25         | 6.75             | 34.27         | 54.00  | 74.0   | -28.02        | Peak   |
| 4868.00                      | 33.79         | 34.25         | 6.75             | 34.27         | 40.52  | 54.0   | -16.88        | AV     |
| 7302.00                      | 43.67         | 38.26         | 7.91             | 34.66         | 55.18  | 74.0   | -29.76        | Peak   |
| 7302.00                      | 29.77         | 38.26         | 7.91             | 34.66         | 41.28  | 54.0   | -15.27        | AV     |
| 9736.00                      | ---           | ---           | ---              | ---           | ---    | ---    | ---           | ---    |
| 9736.00                      | ---           | ---           | ---              | ---           | ---    | ---    | ---           | ---    |
| 12170.00                     | ---           | ---           | ---              | ---           | ---    | ---    | ---           | ---    |
| 12170.00                     | ---           | ---           | ---              | ---           | ---    | ---    | ---           | ---    |
| ---                          | ---           | ---           | ---              | ---           | ---    | ---    | ---           | ---    |

**NOTE:** “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The results of different modulations are the same.

### Radiated Band Edge:

| Test Mode:      |                   |                       |                 |                    | Test channel: Lowest |                |                 |      |      |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------------|----------------|-----------------|------|------|
| Peak Value      |                   |                       |                 |                    |                      |                |                 |      |      |
| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m)       | Limit (dBuV/m) | Over Limit (dB) | Pol. | Det. |
| 2400.00         | 54.33             | 29.16                 | 3.43            | 34.01              | 52.91                | 74.00          | -21.09          | H    | PK   |
| 2400.00         | 42.92             | 29.16                 | 3.43            | 34.01              | 41.50                | 54.00          | -12.50          | H    | AV   |
| 2483.50         | 50.59             | 29.28                 | 3.53            | 34.03              | 49.37                | 74.00          | -24.63          | H    | PK   |
| 2483.50         | 38.24             | 29.28                 | 3.53            | 34.03              | 37.02                | 54.00          | -16.98          | H    | AV   |
| 2400.00         | 55.51             | 29.16                 | 3.43            | 34.01              | 54.09                | 74.00          | -19.91          | V    | PK   |
| 2400.00         | 43.51             | 29.16                 | 3.43            | 34.01              | 42.09                | 54.00          | -11.91          | V    | AV   |
| 2483.50         | 52.24             | 29.28                 | 3.53            | 34.03              | 51.02                | 74.00          | -22.98          | V    | PK   |
| 2483.50         | 37.24             | 29.28                 | 3.53            | 34.03              | 36.02                | 54.00          | -17.98          | V    | AV   |

Remark:

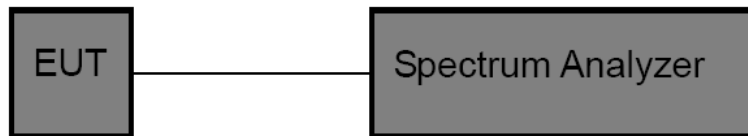
1. Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

## 4. 20dB Bandwidth Test

### 4.1. Test Standard and Limit

|               |                             |
|---------------|-----------------------------|
| Test Standard | FCC Part15 C Section 15.249 |
|---------------|-----------------------------|

### 4.2. Test Setup



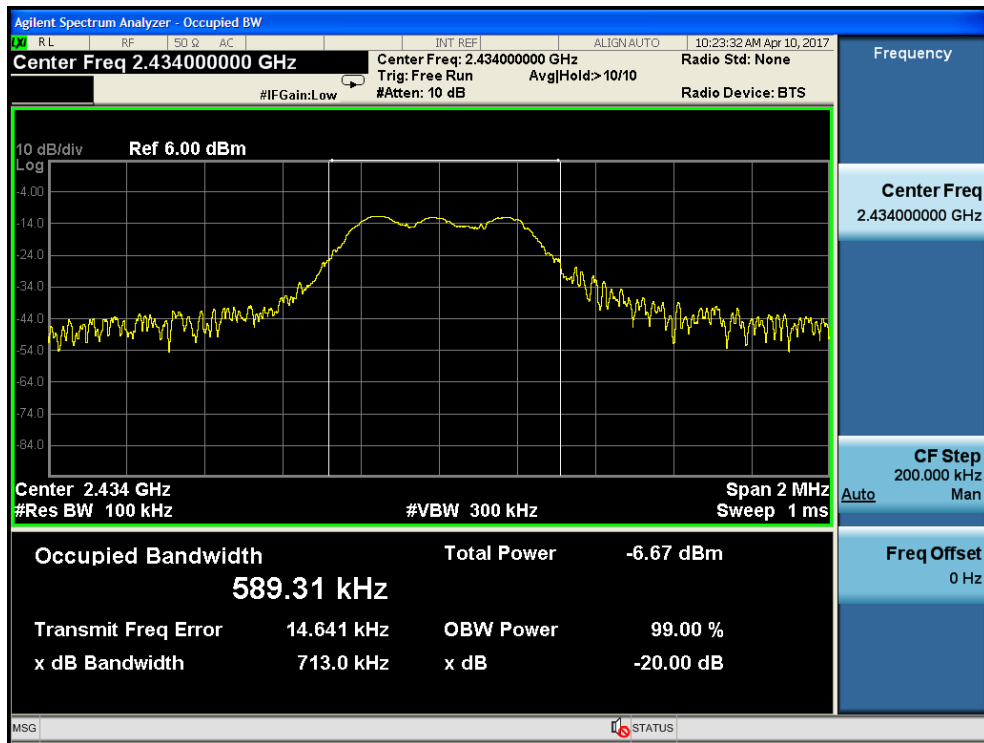
### 4.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:  
 RBW = 10kHz, VBW  $\geq$  3\*RBW = 30kHz,  
 Detector= CISPR quasi-peak  
 Trace mode= Max hold.  
 Sweep- auto couple.
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

### 4.4. Test Data

|              |                  |             |           |
|--------------|------------------|-------------|-----------|
| Test Item    | : 20dB Bandwidth | Test Mode   | : TX Mode |
| Test Voltage | : DC 4.5V        | Temperature | : 24°C    |
| Test Result  | : PASS           | Humidity    | : 55%RH   |

| Frequency (MHz) | Bandwidth (kHz) | Result |
|-----------------|-----------------|--------|
| 2434MHZ         | 713             | PASS   |



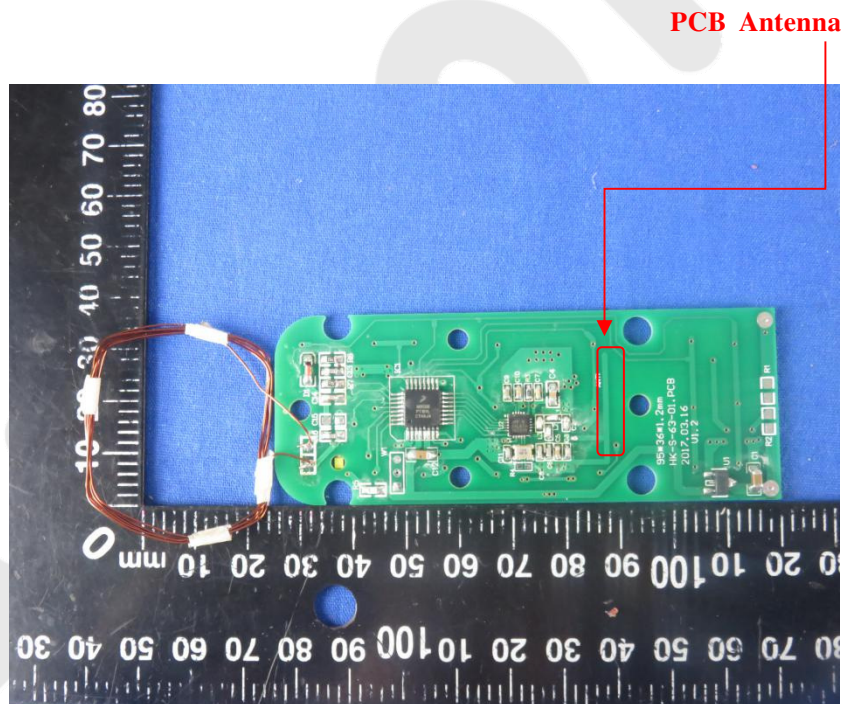
## 5. Antenna Requirement

### 5.1. Test Standard and Requirement

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Standard | FCC Part15 Section 15.203                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Requirement   | <p>1) 15.203 requirement:</p> <p>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.</p> |

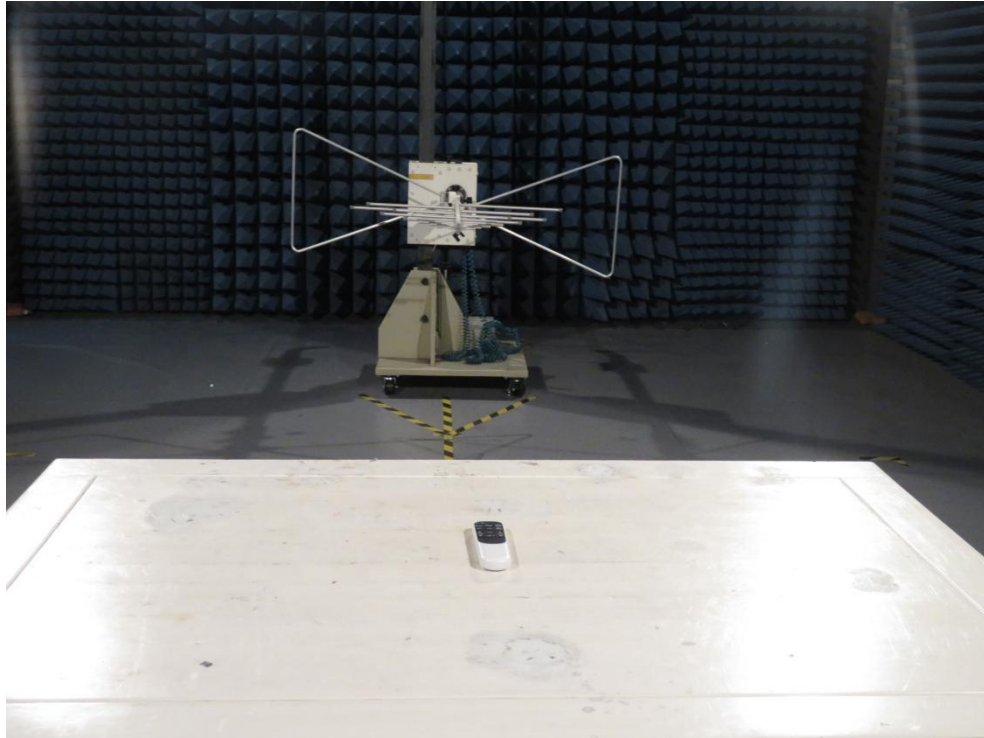
### 5.2. Antenna Connected Construction

The antenna is a PCB antenna which permanently attached, and the best case gain of the antenna is 1.5dBi. It complies with the standard requirement.



## APPENDIX I -- TEST SETUP PHOTOGRAPH

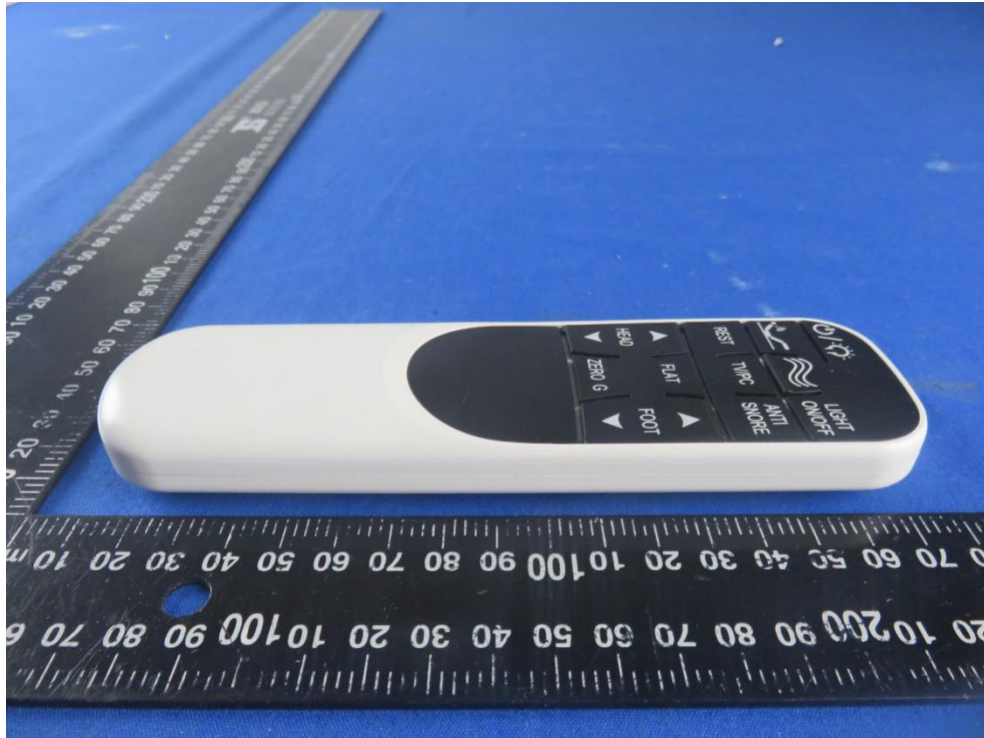
Photo of Radiation Emission Test



## APPENDIX II -- EXTERNAL PHOTOGRAPH







## APPENDIX III -- INTERNAL PHOTOGRAPH

