# FCC TEST REPORT

## FCC PART 15 SUBPART C 15.231

**Test report**

**On Behalf of**

**YELLOW KEY SUPPLY**

**For**

**car remote**

**Model No.: YKS-002-1060, YKS-002-1061**

**FCC ID: 2ARON-YKS002**

**Prepared for :** **YELLOW KEY SUPPLY**
**136-50. 71RD FLUSHING NY. 11367 united state**

**Prepared By :** **Shenzhen HUAK Testing Technology Co., Ltd.**
**1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**

**Date of Test:** **Oct. 25, 2018 ~Dec. 20, 2018**
**Date of Report:** **Dec. 20, 2018**
**Report Number:** **HK1810081204-E**

# TEST RESULT CERTIFICATION

**Applicant's name** ..... : YELLOW KEY SUPPLY

Address..... : 136-50. 71RD FLUSHING NY. 11367 united state

**Manufacture's Name** ..... : SHENZHEN MAISHI TECHNOLOGY CO.,LTD

Address..... : Room 1608A Gao Sheng Buliding Sha Jing street Bao An District SHENZHEN GUANGDONG CHINA

**Product description**

Trade Mark: N/A

Product name..... : car remote

Model and/or type reference .. : YKS-002-1060, YKS-002-1061

**Standards** ..... : FCC Rules and Regulations Part 15 Subpart C Section 15.231
ANSI C63.10: 2013

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**Date of Test** .....:

Date (s) of performance of tests.....: Oct. 25, 2018 ~Dec. 20, 2018

Date of Issue.....: Dec. 20, 2018

Test Result.....: **Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

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# 1. TEST SUMMARY

## 1.1 TEST PROCEDURES AND RESULTS

| FCC RULES | DESCRIPTION OF TEST | RESULT |
|---|---|---|
| §15.203 | Antenna Requirement | Compliant |
| §15.231(a)(1) | Manually operated transmitter | Compliant |
| §15.231(b) | Average Factor | N/A |
| §15.231(b) & §15.209 | Field Strength of Fundamental and Spurious Emission | Compliant |
| §15.231(c) | Bandwidth | Compliant |

## 1.2 TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address : 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

Designation Number: : CN1229

Test Firm Registration Number : 616276

## 1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

| | | |
|---|---|---|
| Conducted Emission Expanded Uncertainty | = | 2.23dB, k=2 |
| Radiated emission expanded uncertainty(9kHz-30MHz) | = | 3.08dB, k=2 |
| Radiated emission expanded uncertainty(30MHz-1000MHz) | = | 4.42dB, k=2 |
| Radiated emission expanded uncertainty(Above 1GHz) | = | 4.06dB, k=2 |

# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **Operation Frequency** | 315MHz |
| **Modulation** | FSK |
| **Number of channels** | 1 |
| **Hardware Version** | V1.0 |
| **Software Version** | V1.0 |
| **Antenna Designation** | PCB antenna |
| **Antenna Gain** | 0dBi |
| **Power Supply** | DC 3V by Button Battery |

## 2.2 OPERATION OF EUT DURING TESTING

| NO. | TEST MODE DESCRIPTION |
|---|---|
| 1 | Transmitting mode |

Note:
1. All the test modes can be supply by new battery, and only the data of the worst case recorded in the test report.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

## 2.3 DESCRIPTION OF TEST SETUP

Operation of EUT during Radiation and Above1GHz Radiation testing:

EUT

## 2.4 MEASUREMENT INSTRUMENTS LIST

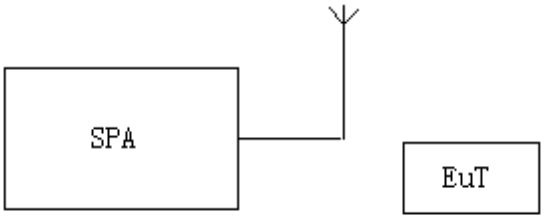
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | L.I.S.N. Artificial Mains Network | R&S | ENV216 | HKE-002 | Dec. 28, 2017 | 1 Year |
| 2. | Receiver | R&S | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 3. | RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Dec. 28, 2017 | 1 Year |
| 4. | Spectrum analyzer | R&S | FSP40 | HKE-025 | Dec. 28, 2017 | 1 Year |
| 5. | Spectrum analyzer | Agilent | N9020A | HKE-048 | Dec. 28, 2017 | 1 Year |
| 6. | Preamplifier | Schwarzbeck | BBV 9743 | HKE-006 | Dec. 28, 2017 | 1 Year |
| 7. | EMI Test Receiver | Rohde & Schwarz | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 8. | Bilog Broadband Antenna | Schwarzbeck | VULB9163 | HKE-012 | Dec. 28, 2017 | 1 Year |
| 9. | Loop Antenna | Schwarzbeck | FMZB 1519 B | HKE-014 | Dec. 28, 2017 | 1 Year |
| 10. | Horn Antenna | Schewarzbeck | 9120D | HKE-013 | Dec. 28, 2017 | 1 Year |
| 11. | Pre-amplifier | EMCI | EMC051845 SE | HKE-015 | Dec. 28, 2017 | 1 Year |
| 12. | Pre-amplifier | Agilent | 83051A | HKE-016 | Dec. 28, 2017 | 1 Year |
| 13. | EMI Test Software EZ-EMC | Tonscend | JS1120-B Version | HKE-083 | Dec. 28, 2017 | N/A |
| 14. | Shielded room | Shiel Hong | 4*3*3 | HKE-039 | Dec. 28, 2017 | 3 Year |

# 3. PROVISION FOR MOMENTARY OPERATION

## 3.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
   Centre frequency = Operation Frequency
   RBW=1MHz, VBW=3MHz
   Span: 0Hz
   Sweep time: 10.00s
2. Set the EUT to transmit by manually operated. Use the “View” function of SPA to find the transmission time of being released.
3. Record the data and Reported.

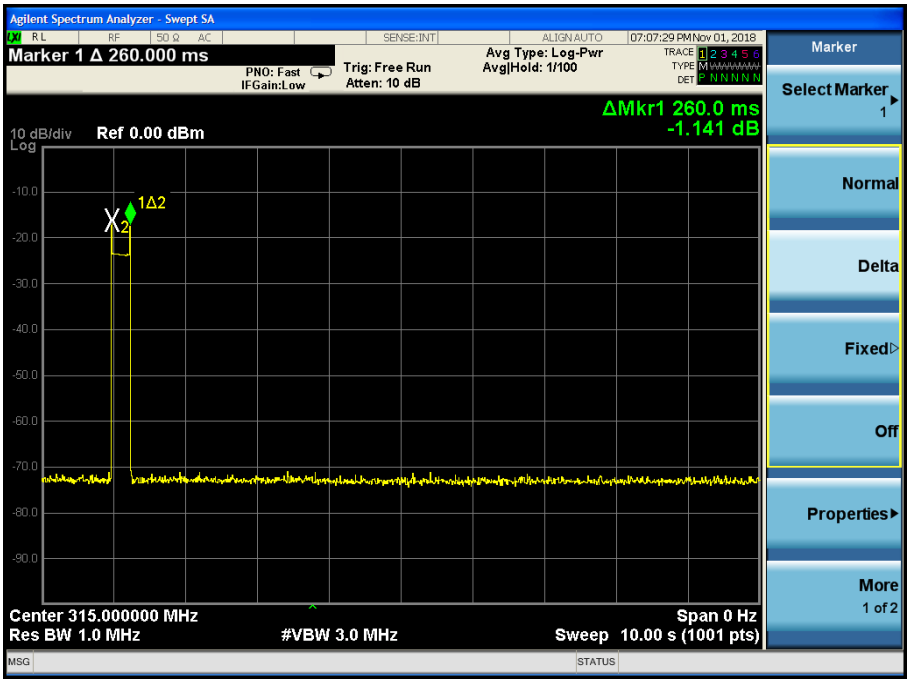
## 3.2 TEST SETUP




## 3.3 TEST RESULT

Test Mode: EUT @ 315MHz for RF Transmitter

| The time of stopping transmission(s) | Limit (s) |
|---|---|
| 0.260 | 5.00 |



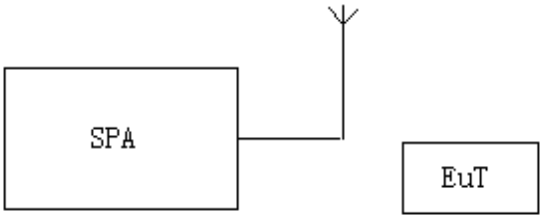

**RESULT: PASS**

# 4. DUTY CYCLE CORRECTION FACTOR

## 4.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
   Centre frequency = Operation Frequency
   RBW=1MHz; VBW=3MHz
   Span: 0Hz
   Sweep time: more than two pulse trains or more than each type of pulse occupancy time
2. Set the EUT to transmit by manually operated. Use the “Delta mark” function of SPA to find the period time between two pulse trains and each type of pulse occupancy time.
3. Record the plots and Reported.

## 4.2 TEST SETUP




## 4.3 TEST RESULT

Note: The level of the peak emission are less than the average limit, so the average factor need not to be tested.

# 5. RADIATED EMISSION

## 5.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

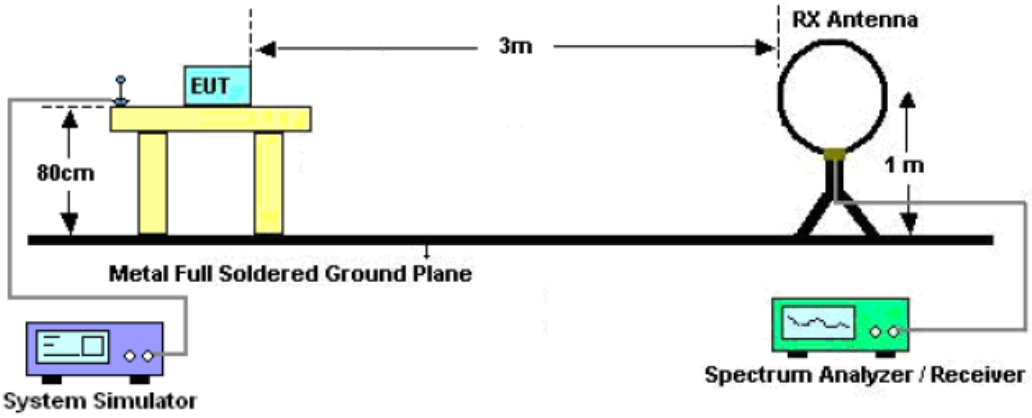
The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Start ~Stop Frequency | 9KHz~150KHz/RBW 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RBW 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RBW 120KHz for QP |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/1MHz for Peak, 1MHz/10Hz for Average |

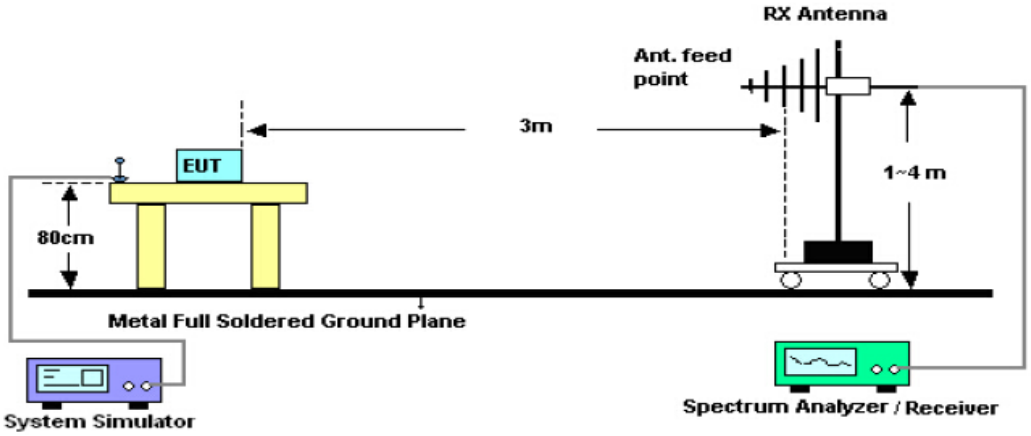
| Receiver Parameter | Setting |
|---|---|
| Start ~Stop Frequency | 9KHz~150KHz/RBW 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RBW 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RBW 120KHz for QP |

## 5.2. TEST SETUP

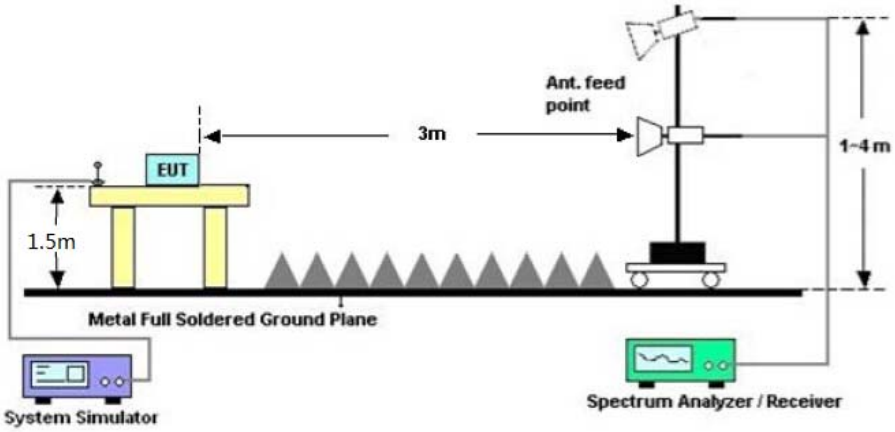
Radiated Emission Test-Setup Frequency Below 30MHz




RADIATED EMISSION TEST SETUP 30MHz-1000MHz




RADIATED EMISSION TEST SETUP ABOVE 1000MHz



## 5.3. TEST RESULT

According to the data below, the FCC Part 15.205, 15.209 and 15.231 standards, and had the worst margin of:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The level of the peak emission are less than the average limit, so the average value is not reflected in the report.

*Horizontal*

| No. | Frequency | Reading | Corr. | Duty cycle | Result | Limit | Margin | Deg. | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | Factor (dB) | Factor (dB) | dBuV/m | dBuV/m | dB | (°) | (cm) | |
| 1 | 315.00 | 47.65 | 12.33 | N/A | 59.98 | 95.63 | -35.65 | 169 | 100 | peak |
| 2 | 630.00 | 19.52 | 15.82 | N/A | 35.34 | 55.63 | -20.29 | 168 | 100 | QP |

*Above 1GHz*

| No. | Frequency | Reading | Corr. | Duty cycle | Result | Limit | Margin | Deg. | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | Factor (dB) | Factor (dB) | dBuV/m | dBuV/m | dB | (°) | (cm) | |
| 1 | 1260.00 | 18.86 | 25.83 | N/A | 44.69 | 74 | -29.31 | 41 | 100 | Peak |
| 2 | 1575.00 | 16.79 | 27.25 | N/A | 44.04 | 74 | -29.96 | 204 | 100 | Peak |

*Vertical*

| No. | Frequency | Reading | Corr. | Duty cycle | Result | Limit | Margin | Deg. | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | Factor (dB) | Factor (dB) | dBuV/m | dBuV/m | dB | (°) | (cm) | |
| 1 | 315.00 | 46.88 | 12.23 | N/A | 59.11 | 95.63 | -36.52 | 103 | 300 | peak |
| 2 | 630.00 | 17.74 | 16.26 | N/A | 34.00 | 55.63 | -21.63 | 125 | 200 | QP |

*Above 1GHz*

| No. | Frequency | Reading | Corr. | Duty cycle | Result | Limit | Margin | Deg. | Height | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | Factor (dB) | Factor (dB) | dBuV/m | dBuV/m | dB | (°) | (cm) | |
| 1 | 1260.00 | 18.54 | 25.83 | N/A | 44.37 | 74 | -29.63 | 166 | 100 | Peak |
| 2 | 1575.00 | 19.36 | 27.25 | N/A | 46.61 | 74 | -27.39 | 245 | 100 | Peak |

*Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the the operating frequency 315MHz.*

*Frequency Range (9 kHz-30MHz)*

| Frequency (MHz) | Level@3m (dBμV/m | | Limit@3m (dBμV/m) | |
|---|---|---|---|---|
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |

*Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor*

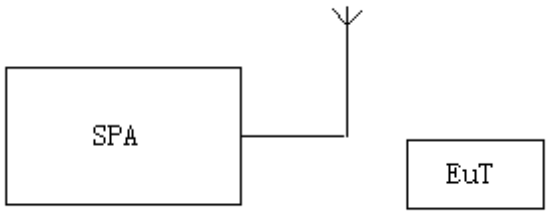
*2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.*

# 6. BANDWIDTH

## 6.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
   Centre frequency = Operation Frequency
   RBW=10 KHz
   VBW=30 KHz
   Span: 500 KHz
   Sweep time: Auto
2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
3. Record the plots and Reported.

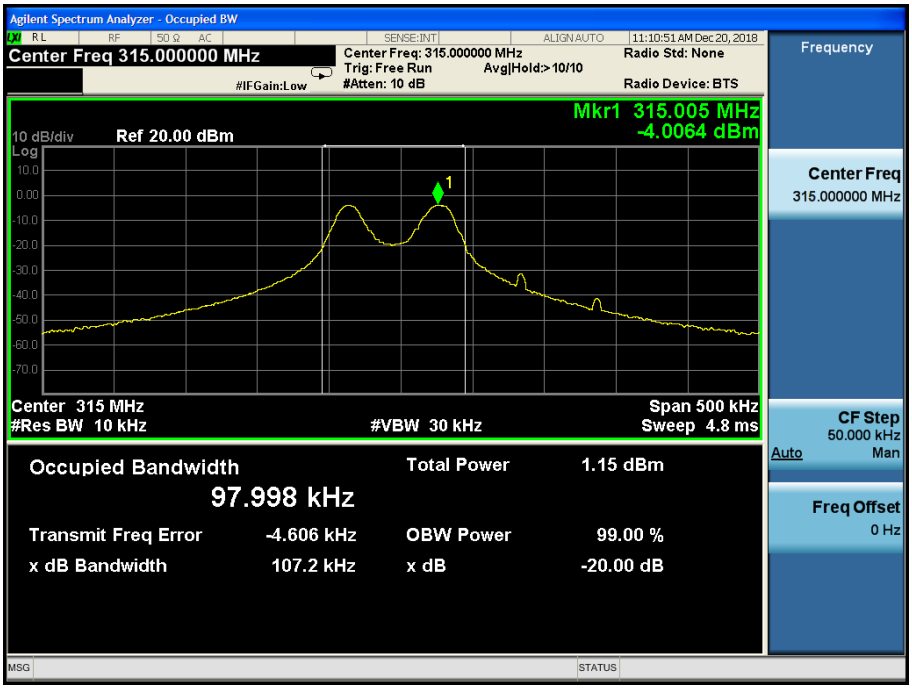
## 6.2. TEST SETUP



## 6.3. TEST RESULT

Test Mode: EUT @ 315MHz for RF Transmitter

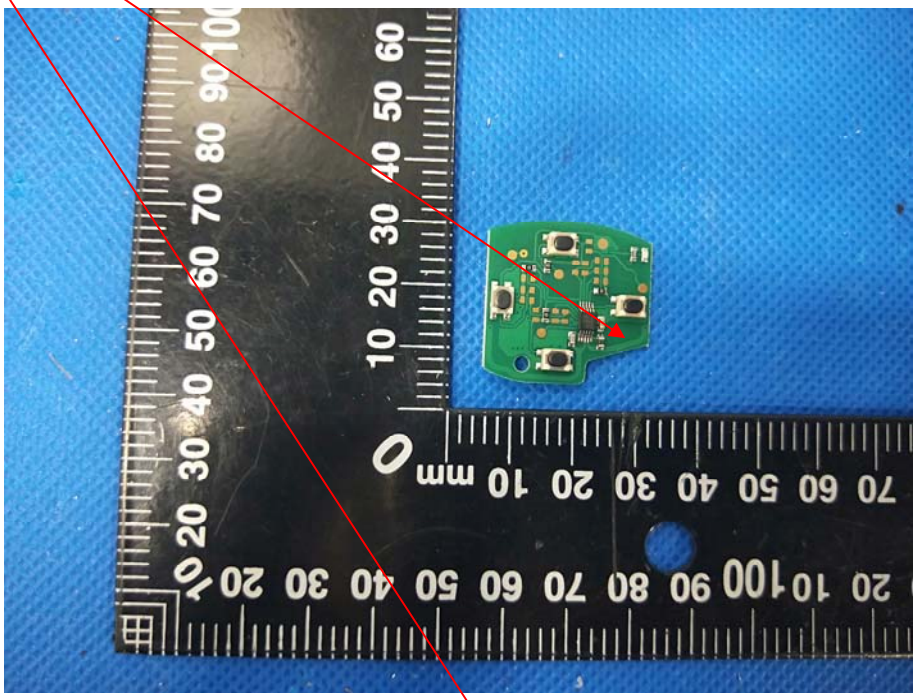
| -20dB bandwidth | LIMIT | RESULT |
|---|---|---|
| 107.2kHz | 787.5KHz | Pass |
| Note: Limit= Operation Frequency ×0.25% | | |

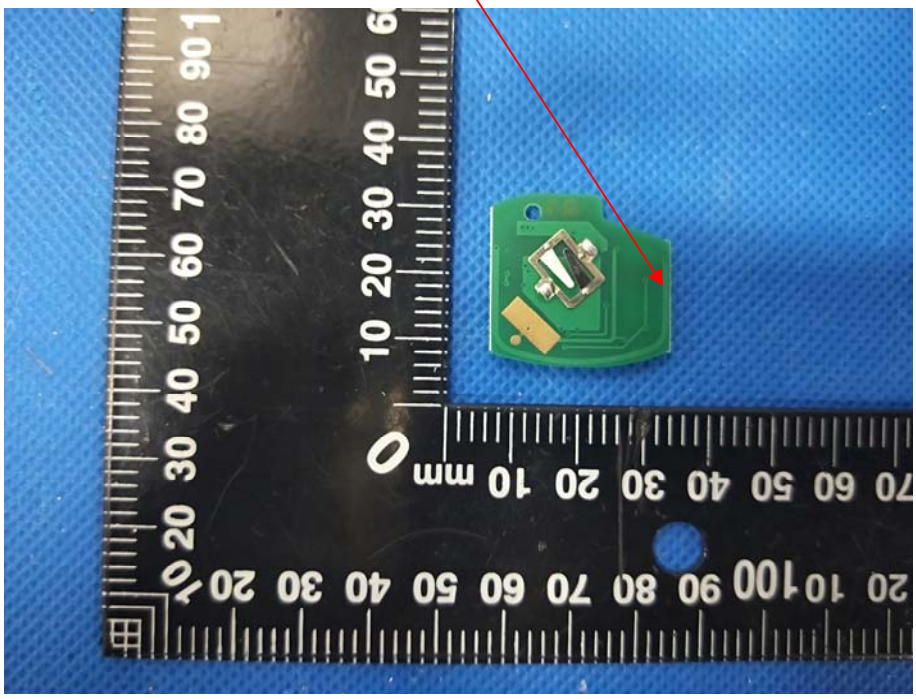


# 7. Antenna Connected Construction

The RF antenna is a PCB Antenna which permanently attached, and the best case gain of the Antenna is 0 dBi. It complies with the standard requirement.

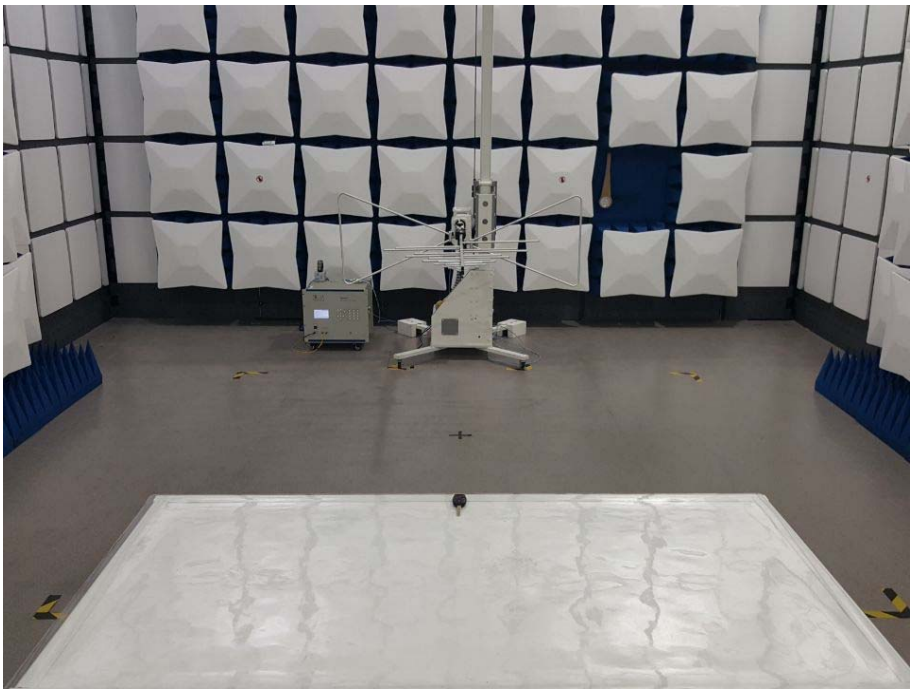
ANTENNA :

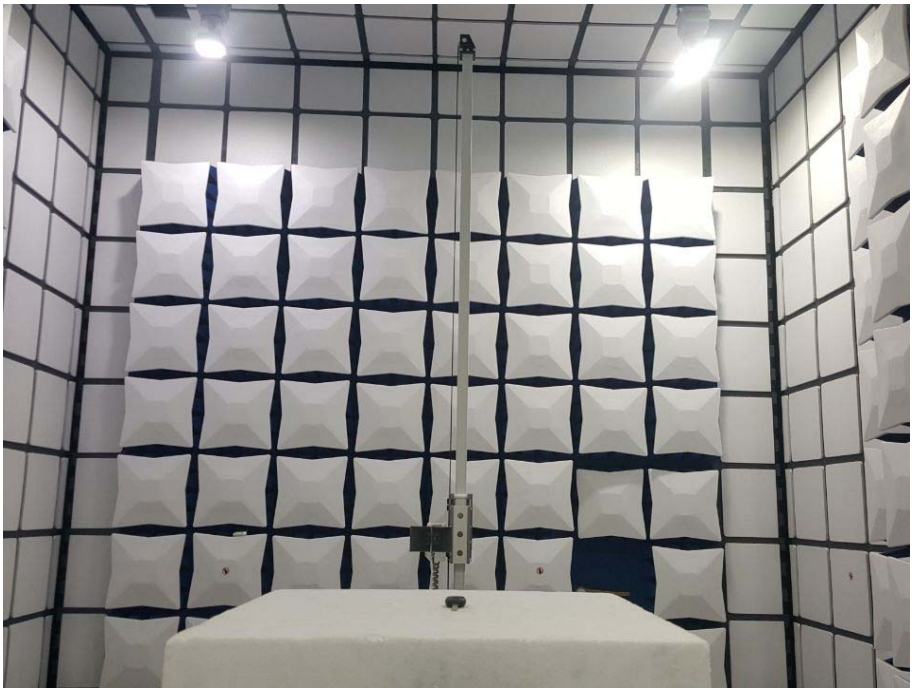




# 8. PHOTOGRAPH OF TEST

**Radiated Emission**

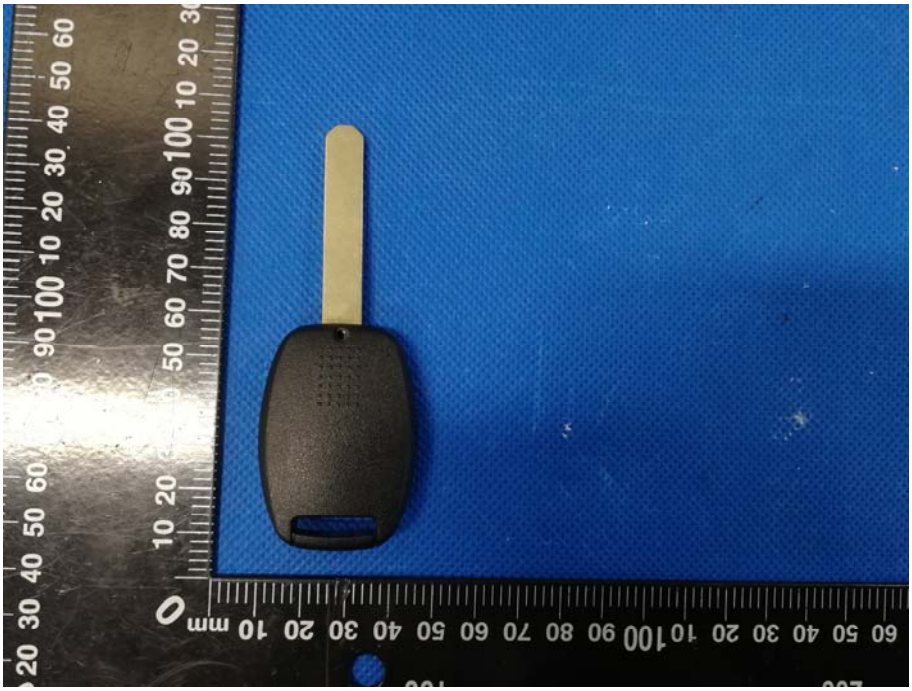




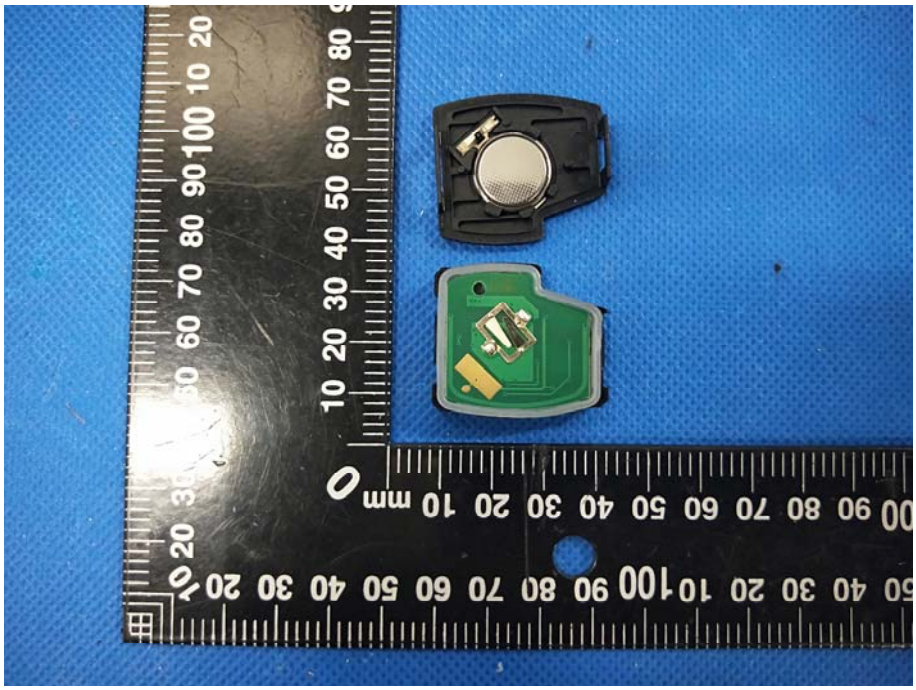
# 8. PHOTOGRAPH OF EUT

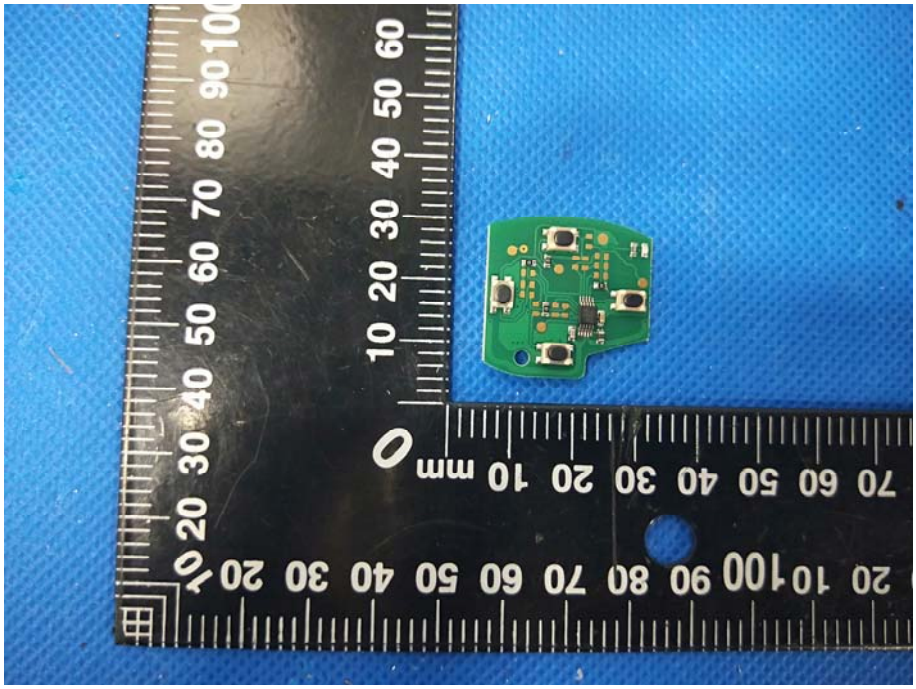
YKS-002-1060

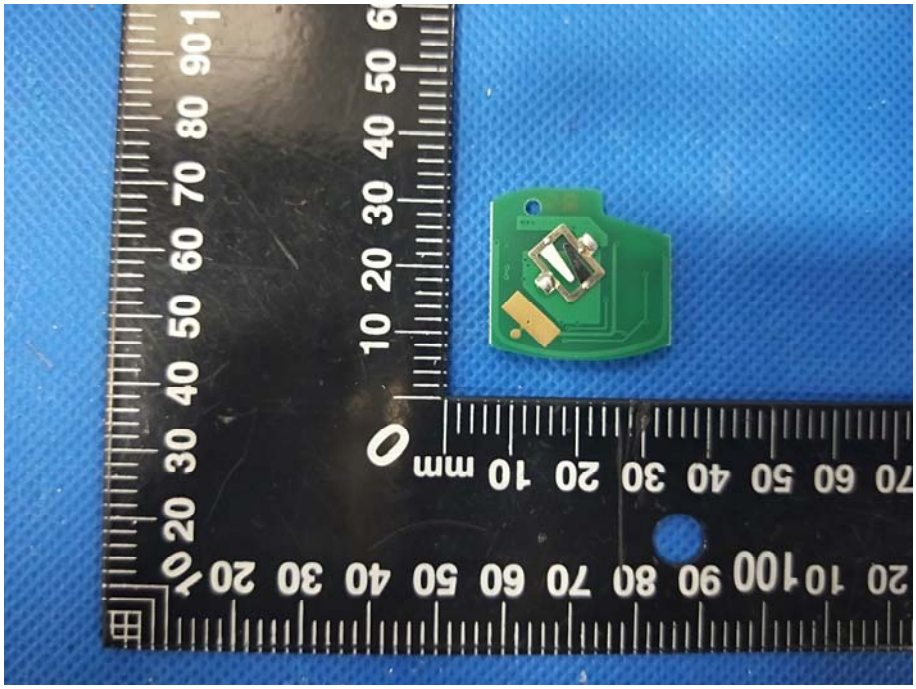
YKS-002-1061



G8D-384H-A
CMII ID: 2002DJ0321
OMRON Corporation CHINA







LITHIUM BATTERY
CR1632