**Report No.:** DDT-R17Q0518-6E1

**Issued Date:** Jun. 04, 2017

# FCC CERTIFICATION TEST REPORT

## FOR

| | | |
|---|---|---|
| **Applicant** | : | iSmart Alarm, Inc. |
| **Address** | : | 1290 Kifer Road Suite 306, Sunnyvale, CA 94086, US |
| **Equipment under Test** | : | Keypad |
| **Model No.** | : | KP3 |
| **FCC ID** | : | SENKP3 |
| **Manufacturer** | : | iSmart Alarm, Inc. |
| **Address** | : | 1290 Kifer Road Suite 306, Sunnyvale, CA 94086, US |


**Issued By: Dongguan Dongdian Testing Service Co., Ltd.**

**Add:** No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

**Tel:** +86-0769-89201699 http://www.dgddt.com


REPORT

# TABLE OF CONTENTS


| | | |
|---|---|---|
| | Test report declares | 3 |
| 1. | Summary of test results | 4 |
| 2. | General test information | 5 |
| 2.1. | Description of EUT | 5 |
| 2.2. | Accessories of EUT | 5 |
| 2.3. | Assistant equipment used for test | 5 |
| 2.4. | Block diagram of EUT configuration for test | 5 |
| 2.5. | Test environment conditions | 6 |
| 2.6. | Test laboratory | 6 |
| 2.7. | Measurement uncertainty | 6 |
| 3. | Equipment used during test | 7 |
| 4. | 20dB Bandwidth | 8 |
| 4.1. | Block diagram of test setup | 8 |
| 4.2. | Limits | 8 |
| 4.3. | Test Procedure | 8 |
| 4.4. | Test Result | 9 |
| 4.5. | Original test data | 9 |
| 5. | Radiated emission | 10 |
| 5.1. | Block diagram of test setup | 10 |
| 5.2. | Limit | 11 |
| 5.3. | Test Procedure | 12 |
| 5.4. | Test result | 13 |
| 6. | Power Line Conducted Emission | 18 |
| 6.1. | Block diagram of test setup | 18 |
| 6.2. | Power Line Conducted Emission Limits(Class B) | 18 |
| 6.3. | Test Procedure | 19 |
| 6.4. | Test Result | 19 |
| 7. | Antenna Requirements | 19 |
| 7.1. | Limit | 19 |
| 7.2. | Result | 19 |
| 8. | Test setup photograph | 20 |
| 9. | Photos of the EUT | 21 |

# TEST REPORT DECLARE

| | | |
|---|---|---|
| **Applicant** | : | iSmart Alarm, Inc. |
| **Address** | : | 1290 Kifer Road Suite 306, Sunnyvale, CA 94086, US |
| **Equipment under Test** | : | Keypad |
| **Model No.** | : | KP3 |
| **FCC ID** | : | SENKP3 |
| **Manufacturer** | : | iSmart Alarm, Inc. |
| **Address** | : | 1290 Kifer Road Suite 306, Sunnyvale, CA 94086, US |

**Test Standard Used:** FCC Rules and Regulations Part 15 Subpart C

**Test procedure used:** ANSI C63.10:2013, ANSI C63.4:2014.

**We Declare:**

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.**

| | | | |
|---|---|---|---|
| **Report No.:** | DDT-R17Q0518-6E1 | | |
| **Date of Receipt:** | May 18, 2017 | **Date of Test:** | May 18, 2017 ~ Jun. 04, 2017 |

***Prepared By:*** ***Approved By:***

***Damon Hu/Engineer*** ***Kevin Feng/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

# 1. Summary of test results

| EMISSION | | |
|---|---|---|
| **Description of Test Item** | **Standard** | **Results** |
| Power Line Conducted Emission Test | FCC Part 15C:15.207<br>ANSI C63.10:2013 | **N/A** |
| Radiated Emission Test | FCC Part 15C: 15.209<br>FCC Part 15C: 15.249<br>ANSI C63.10:2013<br>ANSI C63.4:2014 | **PASS** |
| 20dB Bandwidth Test | FCC Part 15: 15.215<br>ANSI C63.10:2013 | **PASS** |
| N/A is an abbreviation for Not Applicable. | | |

# 2. General test information

## 2.1. Description of EUT

| | | |
|---|---|---|
| EUT* Name | : | Keypad |
| Model Number | : | KP3 |
| EUT function description | : | Please reference user manual of this device |
| Power supply | : | DC 4.5V from battery |
| Operation frequency | : | 908MHz |
| Modulation | : | GFSK |
| Antenna Type | : | Integrated coil antenna, Maximum Gain: 0.5dBi |
| Sample Type | : | Series production |

Note: EUT is the ab. of equipment under test.

## 2.2. Accessories of EUT

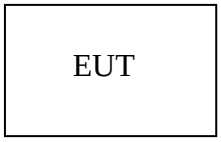
| Description of Accessories | Manufacturer | Model number | Other |
|---|---|---|---|
| / | / | / | / |

## 2.3. Assistant equipment used for test

| Description of Assistant equipment | Manufacturer | Model number | Other |
|---|---|---|---|
| / | / | / | / |

## 2.4. Block diagram of EUT configuration for test

TX Mode:




| Tested mode, channel, and data rate information | | |
|---|---|---|
| Mode | Channel | Frequency (MHz) |
| Tx Mode | / | 908 |

## 2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature range: | 21-25℃ |
| Humidity range: | 40-75% |
| Pressure range: | 86-106kPa |

## 2.6. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808 Tel: +86-0769-89201699 http://www.dgddt.com

FCC Registration Number: 270092; Industry Canada site registration number: 10288A-1

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

## 2.7. Measurement uncertainty

| Test Item | Uncertainty |
|---|---|
| Bandwidth | 1.1% |
| Peak Output Power(Conducted)( Spectrum analyzer) | 0.86dB(10 MHz ≤ f < 3.6GHz); |
| | 1.38dB(3.6GHz≤ f < 8GHz) |
| Peak Output Power(Conducted)(Power Sensor) | 0.74dB |
| Dwell Time | 0.6% |
| Conducted spurious emissions | 0.86dB(10 MHz ≤ f < 3.6GHz); |
| | 1.40dB(3.6GHz≤ f < 8GHz) |
| | 1.66dB(8GHz≤ f < 22GHz) |
| Uncertainty for radio frequency (RBW<20KHz) | $3\times10^{-8}$ |
| Temperature | 0.4℃ |
| Humidity | 2% |
| Uncertainty for Radiation Emission test (30MHz-1GHz) | 4.70 dB (Antenna Polarize: V) |
| | 4.84 dB (Antenna Polarize: H) |
| Uncertainty for Radiation Emission test (1GHz-18GHz) | 4.10dB(1-6GHz) |
| | 4.40dB (6GHz-18Gz) |
| Uncertainty for Power line conduction emission test | 3.32dB (150KHz-30MHz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | |

# 3. Equipment used during test

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|
| **RF Connected Test** | | | | | |
| Spectrum analyzer | R&S | FSU26 | 1166.1660.26 | Oct. 16, 2016 | 1 Year |
| Vector Signal Generator | Agilent | E8267D | MY52098743 | Oct. 20, 2016 | 1 Year |
| Vector Signal Generator | Agilent | N5182A | MY48180737 | Jul. 05, 2016 | 1 Year |
| Power Sensor | Agilent | U2021XA | MY55150010 | Apr. 18, 2017 | 1 Year |
| Power Sensor | Agilent | U2021XA | MY55150011 | Apr. 19, 2017 | 1 Year |
| DC Power Source | MATRIS | MPS-3005L-3 | D813058W | Oct. 24, 2016 | 1 Year |
| Attenuator | Mini-Circuits | BW-S10W2 | 101109 | Aug. 18, 2016 | 1 Year |
| RF Cable | Micable | C10-01-01-1 | 100309 | Aug. 18, 2016 | 1 Year |
| Test Software | JS Tonscend | JS1120-2 | Ver.2.5 | N/A | N/A |
| USB Data acquisition | Agilent | U2531A | TW55043503 | N/A | N/A |
| Auto control Unit | JS Tonscend | JS0806-2 | 158060010 | N/A | N/A |
| **Radiated Emission Test** | | | | | |
| EMI Test Receiver | R&S | ESU8 | 100316 | Oct. 16, 2016 | 1 Year |
| Spectrum analyzer | R&S | FSU26 | 1166.1660.26 | Oct. 16, 2016 | 1 Year |
| Trilog Broadband Antenna | Schwarzbeck | VULB9163 | 9163-462 | Oct. 27, 2016 | 1 Year |
| Active Loop antenna | Schwarzbeck | FMZB-1519 | 1519-038 | Oct. 16, 2016 | 1 Year |
| Double Ridged Horn Antenna | R&S | HF907 | 100276 | Oct. 12, 2016 | 1 Year |
| Pre-amplifier | A.H. | PAM-0118 | 360 | Oct. 16, 2016 | 1 Year |
| RF Cable | HUBSER | CP-X2 | W11.03 | Oct. 16, 2016 | 1 Year |
| RF Cable | HUBSER | CP-X1 | W12.02 | Oct. 16, 2016 | 1 Year |
| MI Cable | HUBSER | C10-01-01-1M | 1091629 | Oct. 16, 2016 | 1 Year |
| Test software | Audix | E3 | V 6.11111b | N/A | N/A |
| **Power Line Conducted Emissions Test** | | | | | |
| Test Receiver | R&S | ESU8 | 100316 | Oct. 16, 2016 | 1 Year |
| LISN 1 | R&S | ENV216 | 101109 | Oct. 16, 2016 | 1 Year |
| LISN 2 | R&S | ESH2-Z5 | 100309 | Oct. 16, 2016 | 1 Year |
| Pulse Limiter | R&S | ESH3-Z2 | 101242 | Oct. 16, 2016 | 1 Year |
| CE Cable 1 | HUBSER | ESU8/RF2 | W10.01 | Oct. 16, 2016 | 1 Year |
| Test software | Audix | E3 | V 6.11111b | N/A | N/A |

# 4. 20dB Bandwidth

## 4.1. Block diagram of test setup

## 4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

## 4.3. Test Procedure

(1) The EUT's RF signal was coupled to spectrum analyzer by a antenna connected to spectrum analyzer.

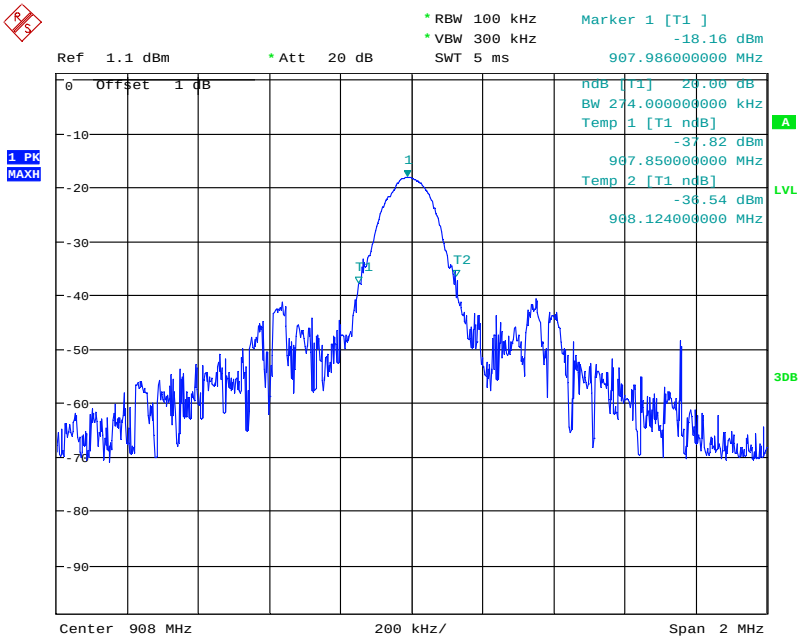
(2) Configure EUT work in Tx mode as stated in clause 2.3.

(3) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

## 4.4. Test Result

| EUT: Keypad M/N: KP3 | | | | | |
|---|---|---|---|---|---|
| Mode | Freq. (MHz) | Result (MHz) | Limit (MHz) | Margin (MHz) | Conclusion |
| Tx Mode | 908 | 0.274 | / | / | PASS |
| Test Date : Jun. 02, 2017 | | | | Test Engineer : Leo Liu | |

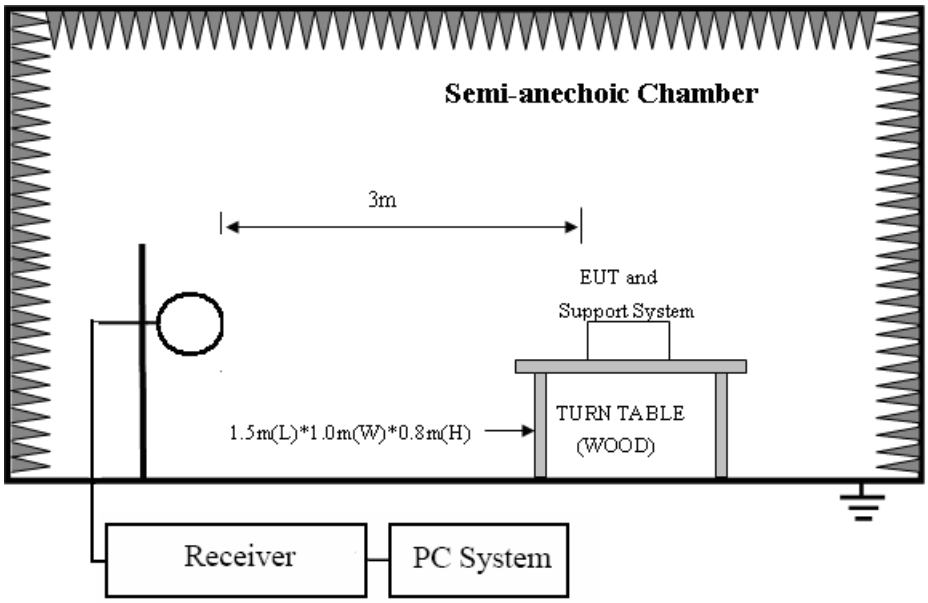
## 4.5. Original test data



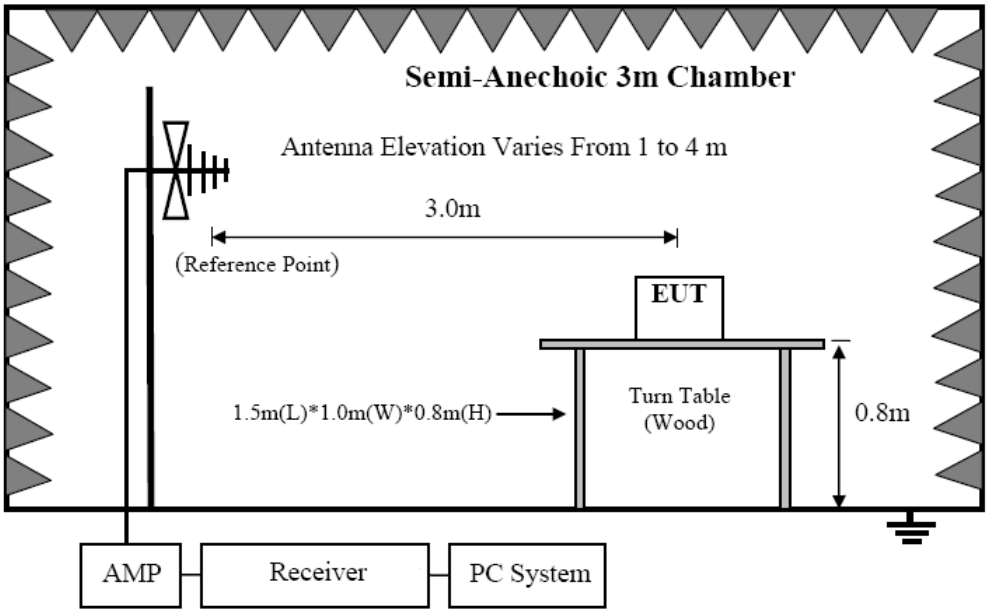
# 5. Radiated emission

## 5.1. Block diagram of test setup

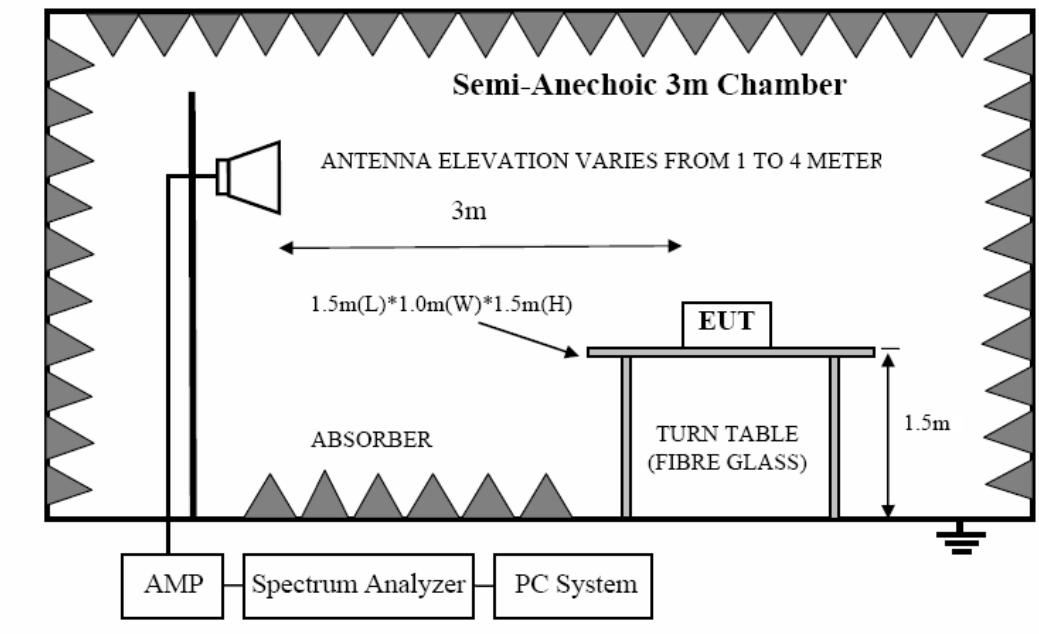
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz




In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz




In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz




Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

## 5.2. Limit

3.3.1 FCC 15.209 limit

| FREQUENCY MHz | DISTANCE Meters | FIELD STRENGTHS LIMIT | |
|---|---|---|---|
| | | μV/m | dB(μV)/m |
| 0.009 ~ 0.490 | 300 | 2400/F(KHz) | 67.6-20log(F) |
| 0.490 ~ 1.705 | 30 | 24000/F(KHz) | 87.6-20log(F) |
| 1.705 ~ 30.0 | 30 | 30 | 29.54 |
| 30 ~ 88 | 3 | 100 | 40.0 |
| 88 ~ 216 | 3 | 150 | 43.5 |
| 216 ~ 960 | 3 | 200 | 46.0 |
| 960 ~ 1000 | 3 | 500 | 54.0 |
| Above 1000 | 3 | 74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) | |

Remark：(1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(5) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$Limit_{3m}$(dBuV/m)= $Limit_{30m}$(dBuV/m) + 40Log(30m/3m)

3.3.2 FCC 15.249 limit

| FREQUENCY MHz | DISTANCE Meters | Limit |
|---|---|---|
| Field Strength of Fundamental emission for 902MHz-928MHz | 3 | 94.0 dB(μV)/m (QP) |
| Field Strength of Harmonics | 3 | 54.0 dB(μV)/m (QP) |

Note: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

## 5.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.4 and 8.2

(3) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

| Test frequency range | Test antenna used |
|---|---|
| 9KHz-30MHz | Active Loop antenna |
| 30MHz-1GHz | Trilog Broadband Antenna |
| 1GHz-18GHz | Double Ridged Horn Antenna(1GHz-18GHz) |
| 18GHz-40GHz | Horn Antenna(18GHz-40GHz) |

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 25GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it’s fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage.

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(6) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz,110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(7) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

| Frequency band | RBW |
|---|---|
| 9KHz-150KHz | 200Hz |
| 150KHz-30MHz | 9KHz |
| 30MHz-1GHz | 120KHz |

(8) For emissions above 1GHz, and the RBW is set at 1MHz, VBW is set at 3MHz, peak detector for PK, RMS detector for AV. Read the Level in spectrum analyzer and record.

(9) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

## 5.4. Test result

## PASS. (See below detailed test result)

All the emissions except fundamental emission from 9 KHz to 10GHz were comply with 4.3.1 limit.

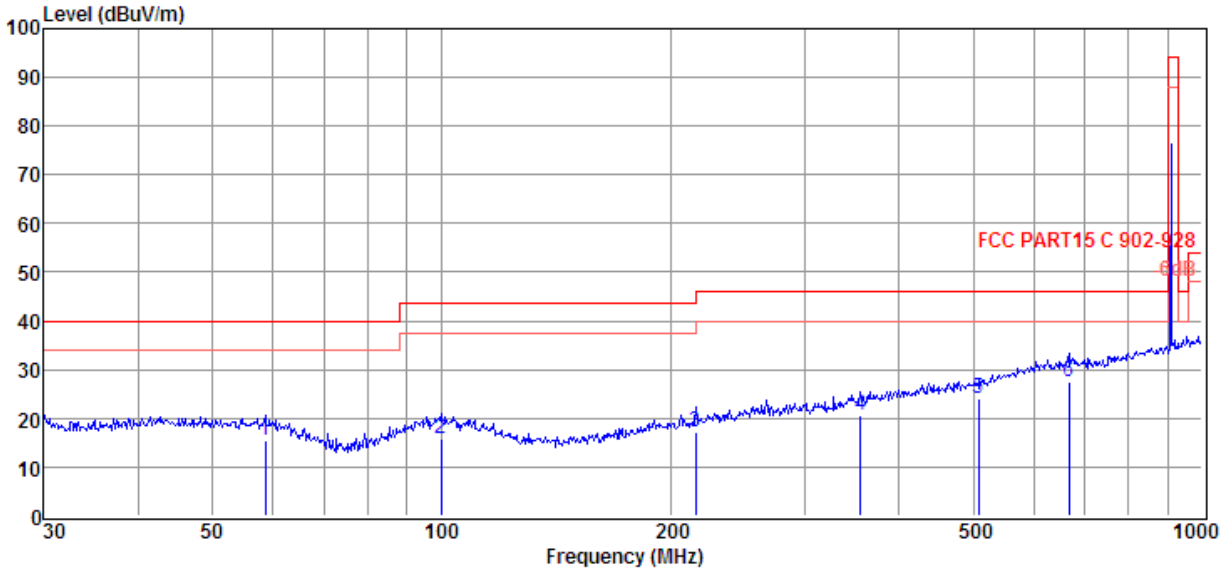
Note1: According exploratory test no any obvious emission were detected from 9kHz to 30MHz, so the final test was performed with frequency range from 30MHz to 10GHz and recorded in below.

Note2: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2017 RE1# Report Data\17Q0518-6\RE.EM6 | |
| **Test Date** | : 2017-06-04 | **Tested By** | : Aaron |
| **EUT** | : Keypad | **Model Number** | : KP3 |
| **Power Supply** | : DC 4.5V from battery | **Test Mode** | : TX mode |
| **Condition** | : Temp:24.5'C,Humi:55%, Press:100.1kPa | **Antenna/Distance** | : 2016 VULB9163 1#/3m/VERTICAL |
| **Memo** | : | | |

Data: 3



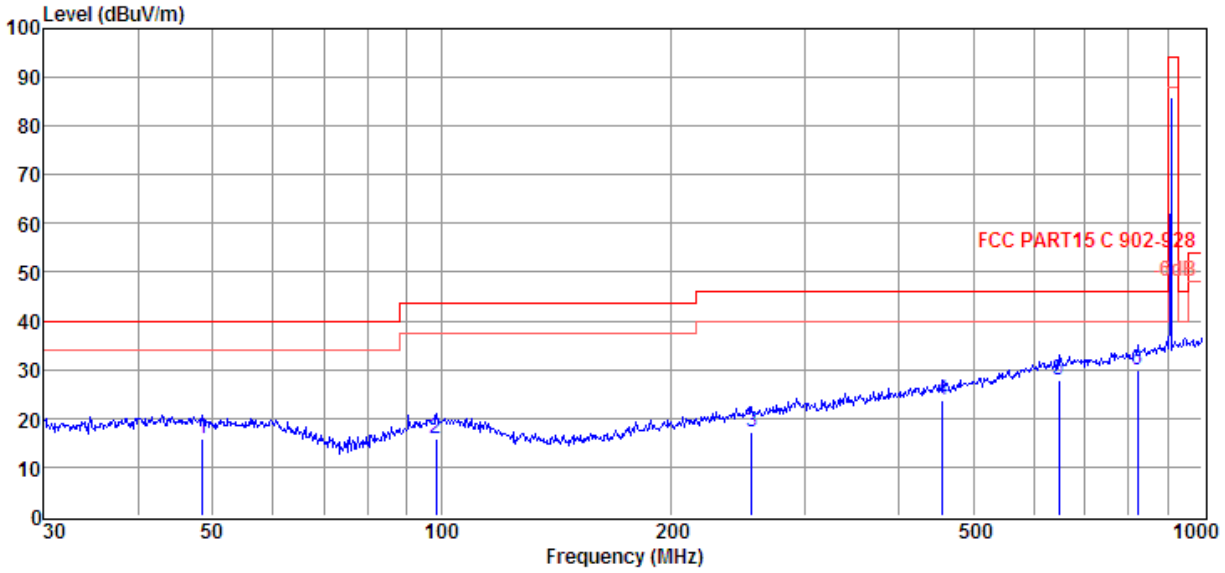

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 58.61 | -0.16 | 11.70 | 3.97 | 15.51 | 40.00 | -24.49 | QP | VERTICAL |
| 2 | 99.88 | -0.34 | 11.99 | 4.30 | 15.95 | 43.50 | -27.55 | QP | VERTICAL |
| 3 | 216.02 | 1.13 | 11.06 | 4.98 | 17.17 | 46.00 | -28.83 | QP | VERTICAL |
| 4 | 355.43 | 0.09 | 14.86 | 5.61 | 20.56 | 46.00 | -25.44 | QP | VERTICAL |
| 5 | 508.26 | 0.24 | 17.50 | 6.20 | 23.94 | 46.00 | -22.06 | QP | VERTICAL |
| 6 | 668.14 | 0.89 | 19.76 | 6.73 | 27.38 | 46.00 | -18.62 | QP | VERTICAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2017 RE1# Report Data\17Q0518-6\RE.EM6 | |
| **Test Date** | : 2017-06-04 | **Tested By** | : Aaron |
| **EUT** | : Keypad | **Model Number** | : KP3 |
| **Power Supply** | : DC 4.5V from battery | **Test Mode** | : TX mode |
| **Condition** | : Temp:24.5'C,Humi:55%, Press:100.1kPa | **Antenna/Distance** | : 2016 VULB9163 1#/3m/HORIZONTAL |
| **Memo** | : | | |

Data: 4



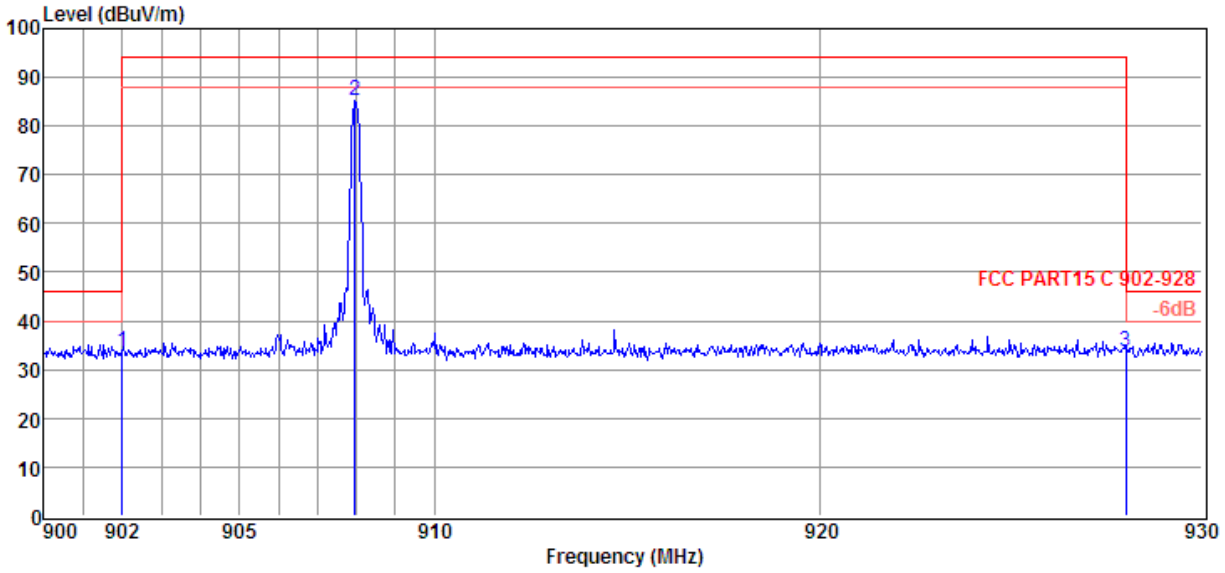

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 48.50 | -0.37 | 12.22 | 3.87 | 15.72 | 40.00 | -24.28 | QP | HORIZONTAL |
| 2 | 98.49 | -0.26 | 11.88 | 4.28 | 15.90 | 43.50 | -27.60 | QP | HORIZONTAL |
| 3 | 255.62 | -0.29 | 12.31 | 5.17 | 17.19 | 46.00 | -28.81 | QP | HORIZONTAL |
| 4 | 455.91 | 1.36 | 16.30 | 6.01 | 23.67 | 46.00 | -22.33 | QP | HORIZONTAL |
| 5 | 647.39 | 1.73 | 19.45 | 6.66 | 27.84 | 46.00 | -18.16 | QP | HORIZONTAL |
| 6 | 821.71 | 1.45 | 21.42 | 7.19 | 30.06 | 46.00 | -15.94 | QP | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2017 RE1# Report Data\17Q0518-6\RE.EM6 | |
| **Test Date** | : 2017-06-04 | **Tested By** | : Aaron |
| **EUT** | : Keypad | **Model Number** | : KP3 |
| **Power Supply** | : DC 4.5V from battery | **Test Mode** | : TX mode |
| **Condition** | : Temp:24.5'C,Humi:55%, Press:100.1kPa | **Antenna/Distance** | : 2016 VULB9163 1#/3m/HORIZONTAL |
| **Memo** | : | | |

Data: 5



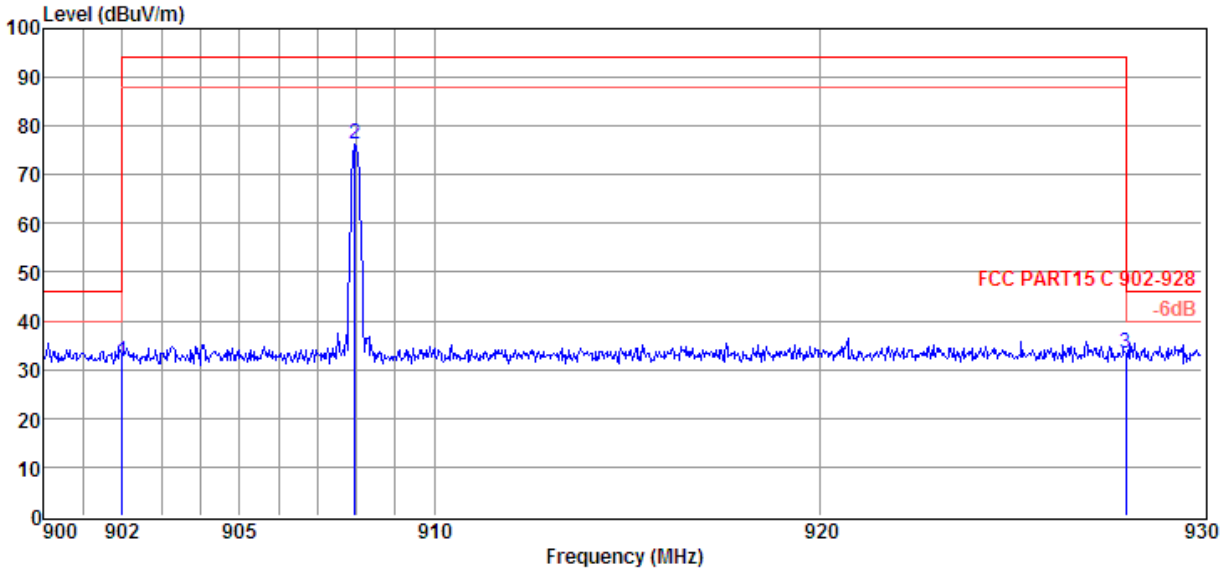

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 902.00 | 3.79 | 22.34 | 7.43 | 33.56 | 46.00 | -12.44 | Peak | HORIZONTAL |
| 2 | 907.97 | 55.20 | 22.46 | 7.44 | 85.10 | 94.00 | -8.90 | Peak | HORIZONTAL |
| 3 | 928.00 | 3.48 | 22.70 | 7.49 | 33.67 | 46.00 | -12.33 | Peak | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2017 RE1# Report Data\17Q0518-6\RE.EM6 | |
| **Test Date** | : 2017-06-04 | **Tested By** | : Aaron |
| **EUT** | : Keypad | **Model Number** | : KP3 |
| **Power Supply** | : DC 4.5V from battery | **Test Mode** | : TX mode |
| **Condition** | : Temp:24.5'C,Humi:55%, Press:100.1kPa | **Antenna/Distance** | : 2016 VULB9163 1#/3m/VERTICAL |
| **Memo** | : | | |

Data: 6




| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 902.00 | 1.92 | 22.34 | 7.43 | 31.69 | 46.00 | -14.31 | Peak | VERTICAL |
| 2 | 907.97 | 46.31 | 22.46 | 7.44 | 76.21 | 94.00 | -17.79 | Peak | VERTICAL |
| 3 | 928.00 | 3.23 | 22.70 | 7.49 | 33.42 | 46.00 | -12.58 | Peak | VERTICAL |

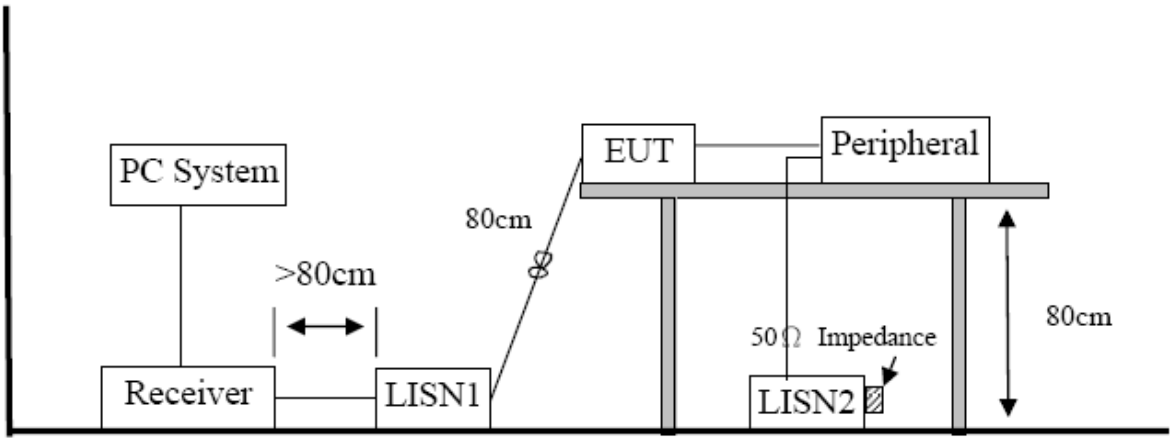
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

**Radiated Emission above 1GHz**

| Freq. (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 2782.00 | 36.14 | 31.08 | 30.09 | 6.50 | 43.63 | 74.00 | -30.37 | Peak | VERTICAL |
| 4537.00 | 37.07 | 33.79 | 29.23 | 8.18 | 49.81 | 74.00 | -24.19 | Peak | VERTICAL |
| 5455.00 | 35.85 | 34.61 | 29.28 | 9.14 | 50.32 | 74.00 | -23.68 | Peak | VERTICAL |
| 7138.00 | 34.58 | 36.31 | 30.45 | 10.56 | 51.00 | 74.00 | -23.00 | Peak | VERTICAL |
| 7993.00 | 35.77 | 36.70 | 31.13 | 11.13 | 52.47 | 74.00 | -21.53 | Peak | VERTICAL |
| 9163.00 | 35.10 | 37.13 | 32.39 | 12.01 | 51.85 | 74.00 | -22.15 | Peak | VERTICAL |
| 2602.00 | 37.61 | 30.53 | 29.92 | 6.28 | 44.50 | 74.00 | -29.50 | Peak | HORIZONTAL |
| 4267.00 | 35.04 | 33.62 | 29.10 | 7.90 | 47.46 | 74.00 | -26.54 | Peak | HORIZONTAL |
| 5815.00 | 33.39 | 34.89 | 29.21 | 9.50 | 48.57 | 74.00 | -25.43 | Peak | HORIZONTAL |
| 7120.00 | 34.41 | 36.30 | 30.44 | 10.55 | 50.82 | 74.00 | -23.18 | Peak | HORIZONTAL |
| 7678.00 | 34.61 | 36.64 | 30.96 | 10.95 | 51.24 | 74.00 | -22.76 | Peak | HORIZONTAL |
| 7993.00 | 35.22 | 36.70 | 31.13 | 11.13 | 51.92 | 74.00 | -22.08 | Peak | HORIZONTAL |

# 6. Power Line Conducted Emission

## 6.1. Block diagram of test setup




## 6.2. Power Line Conducted Emission Limits(Class B)

| Frequency | Quasi-Peak Level dB(μV) | Average Level dB(μV) |
|---|---|---|
| 150kHz ~ 500kHz | 66 ~ 56* | 56 ~ 46* |
| 500kHz ~ 5MHz | 56 | 46 |
| 5MHz ~ 30MHz | 60 | 50 |

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

### 6.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4:2014.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

### 6.4. Test Result

Test result: Not Applicable.

## 7. Antenna Requirements

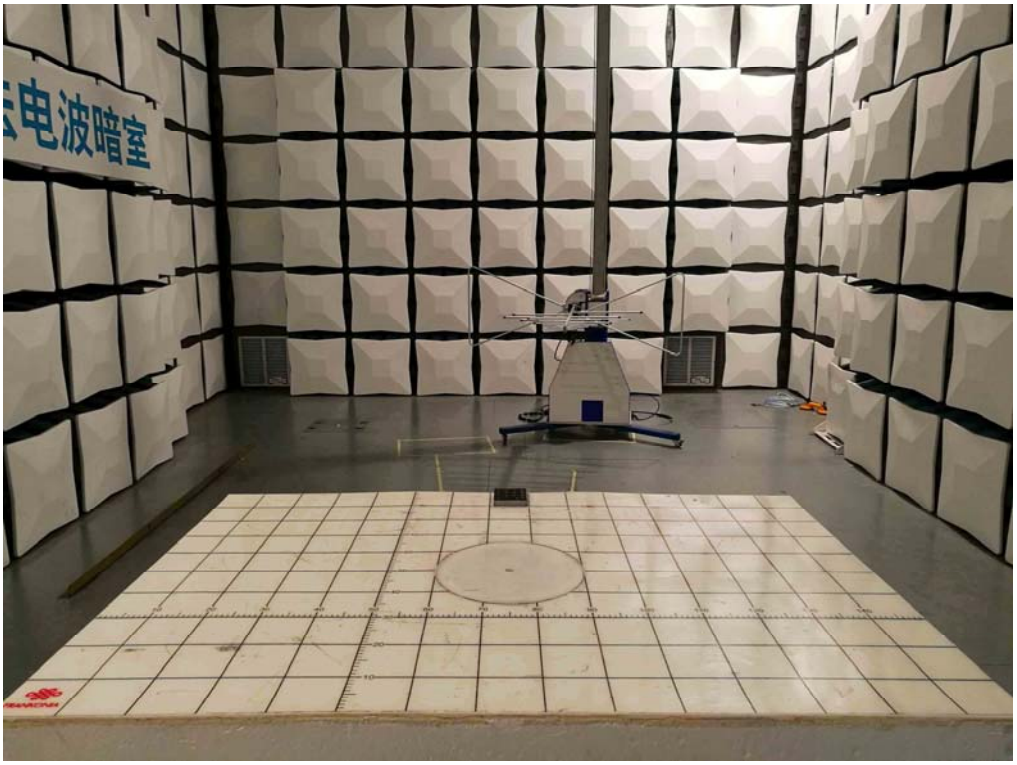
### 7.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

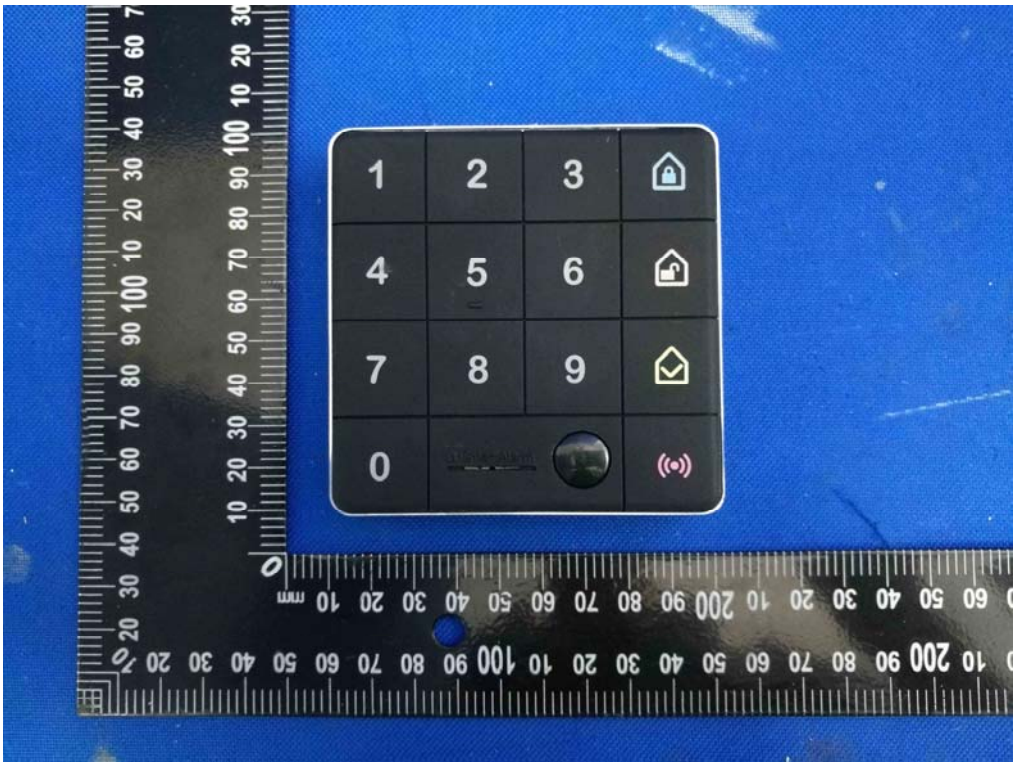
### 7.2. Result

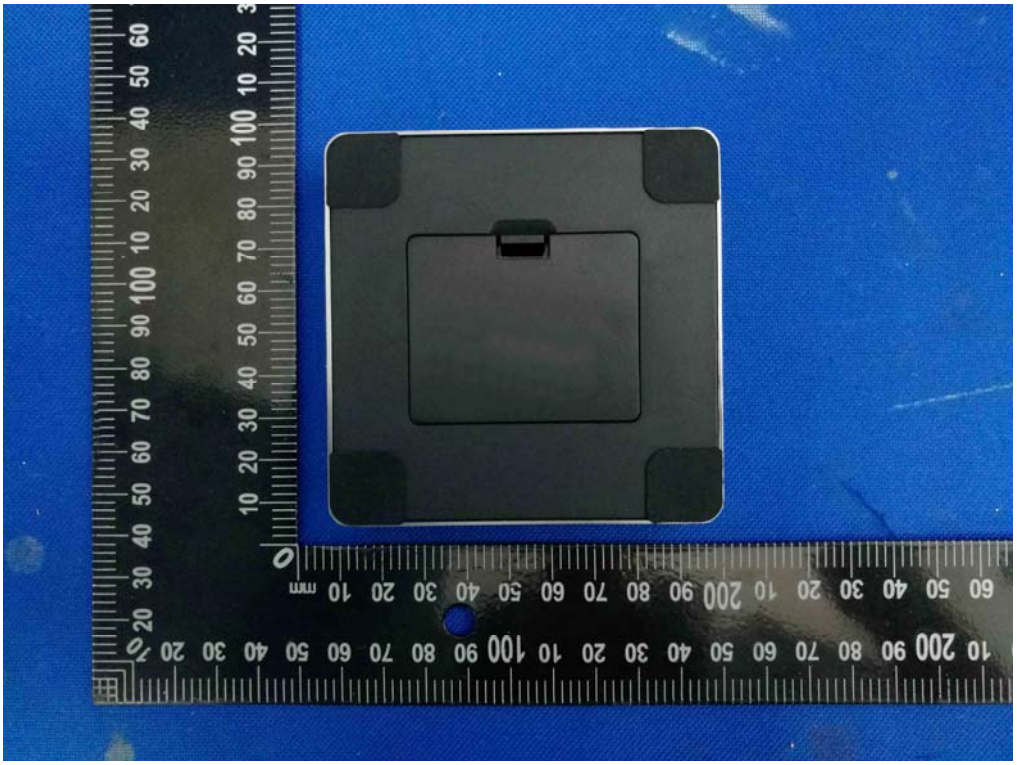
The antennas used for this product are integral coil Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0.5dBi.

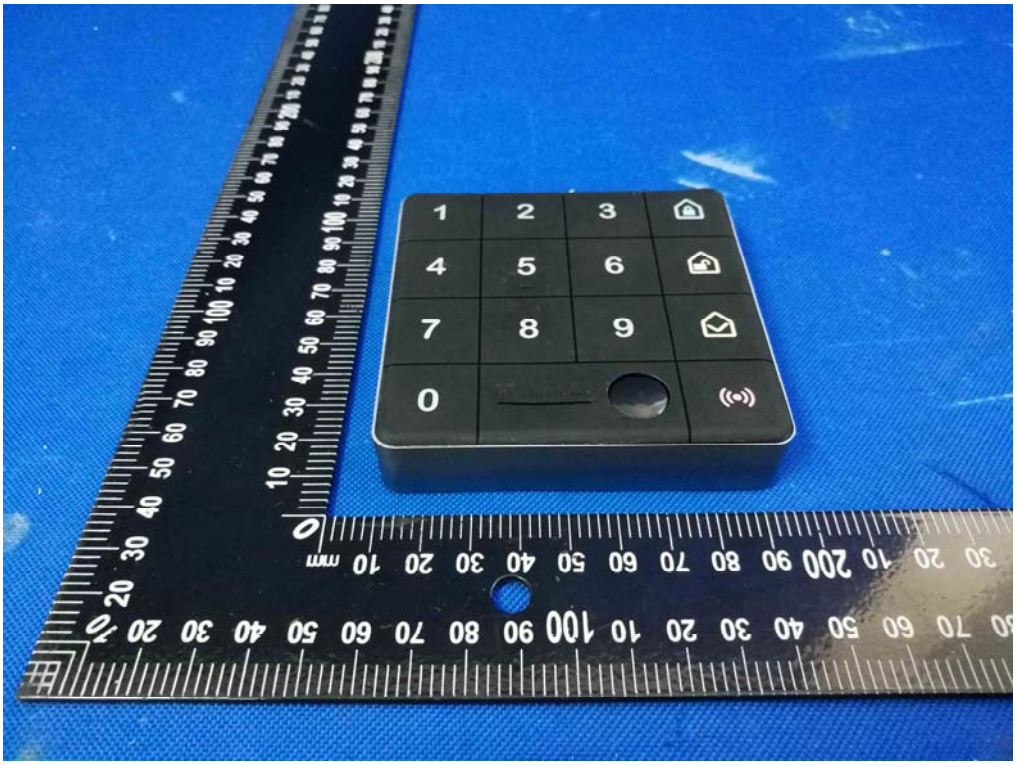
# 8. Test setup photograph

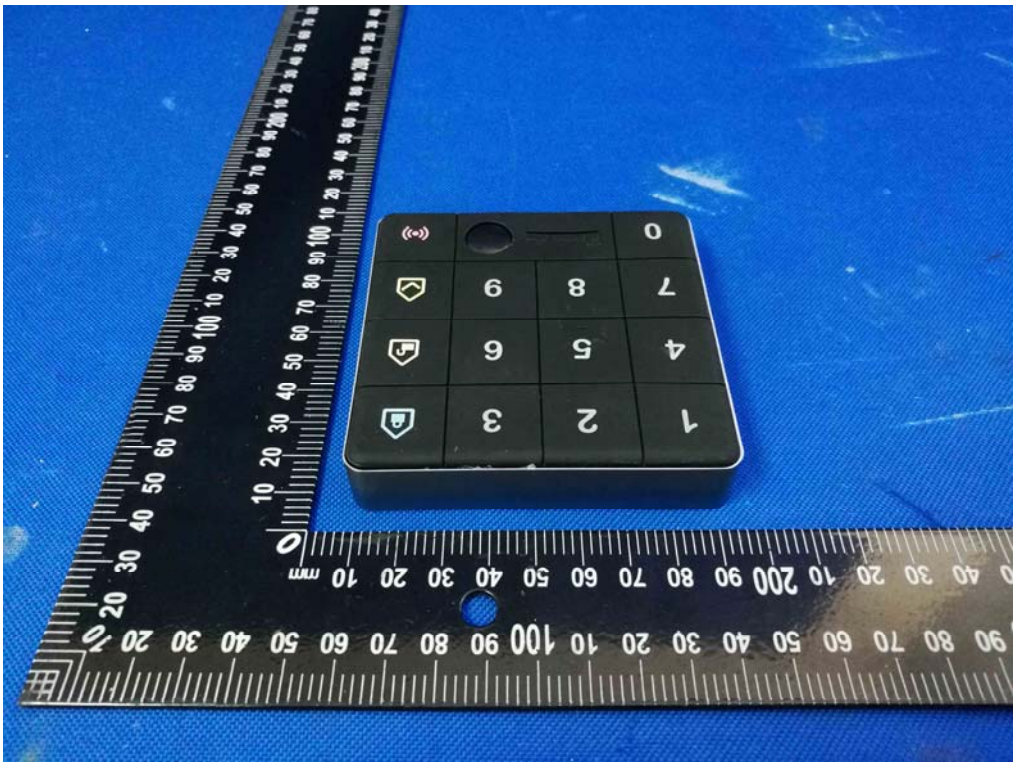


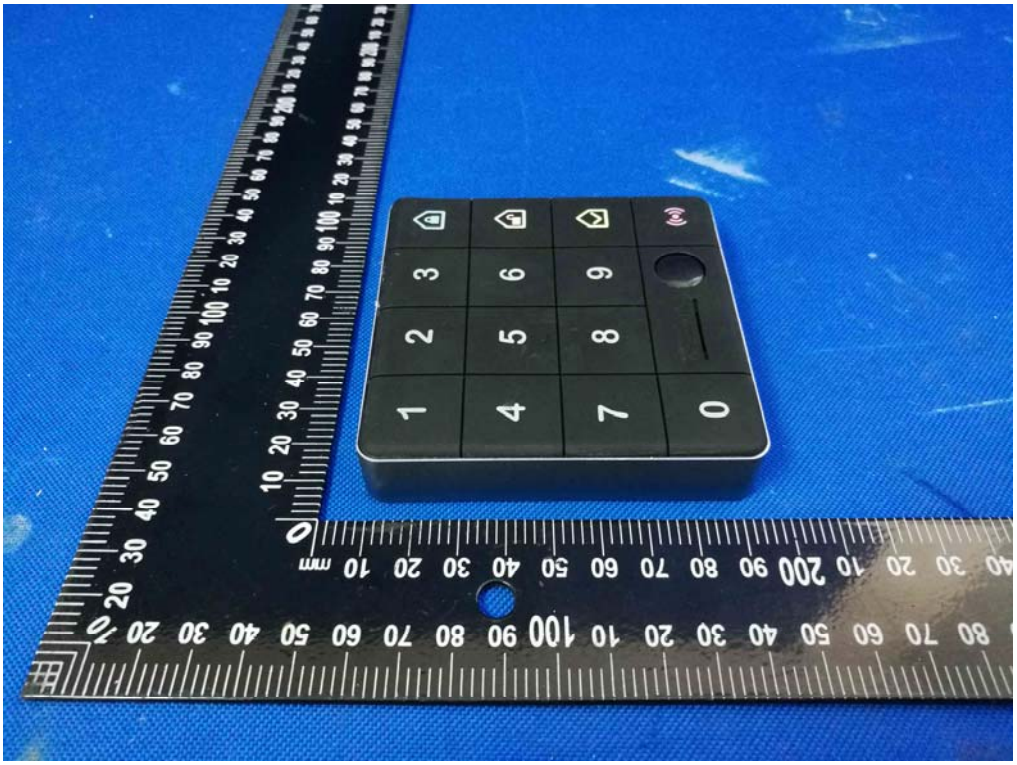
# 9. Photos of the EUT

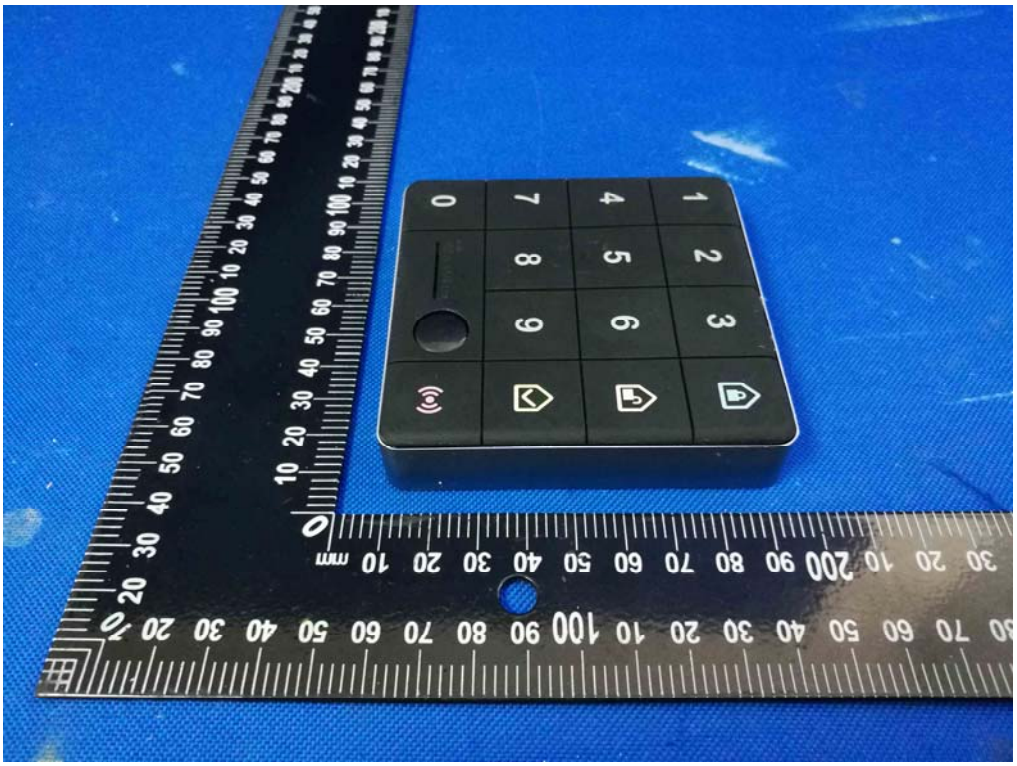


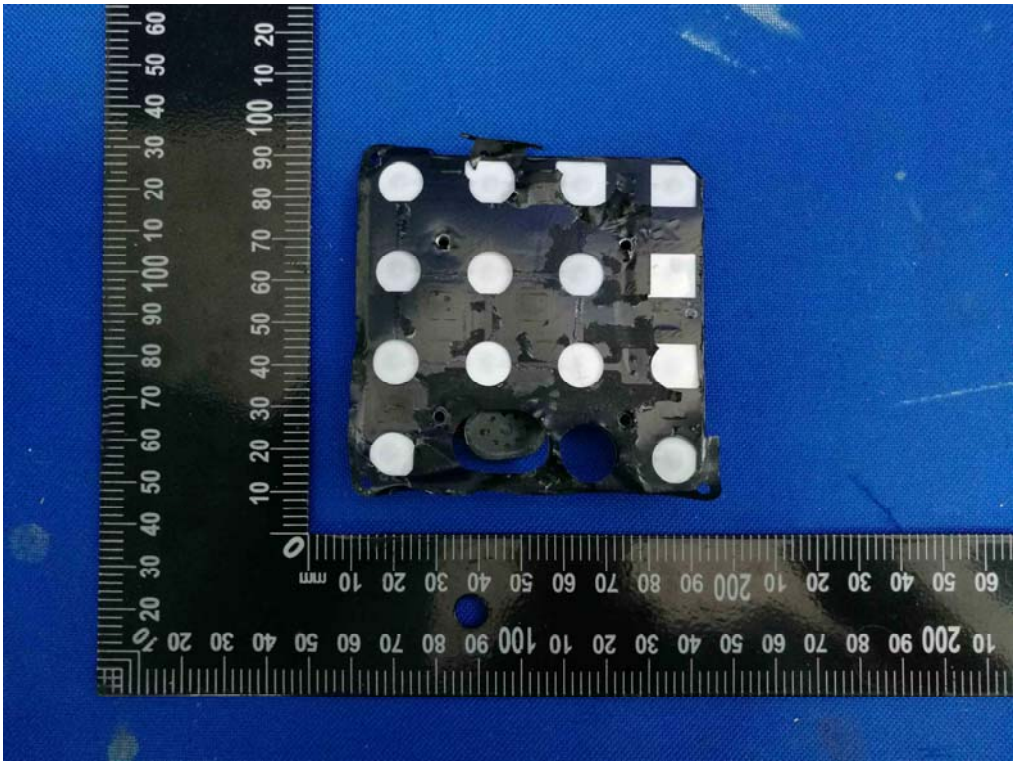



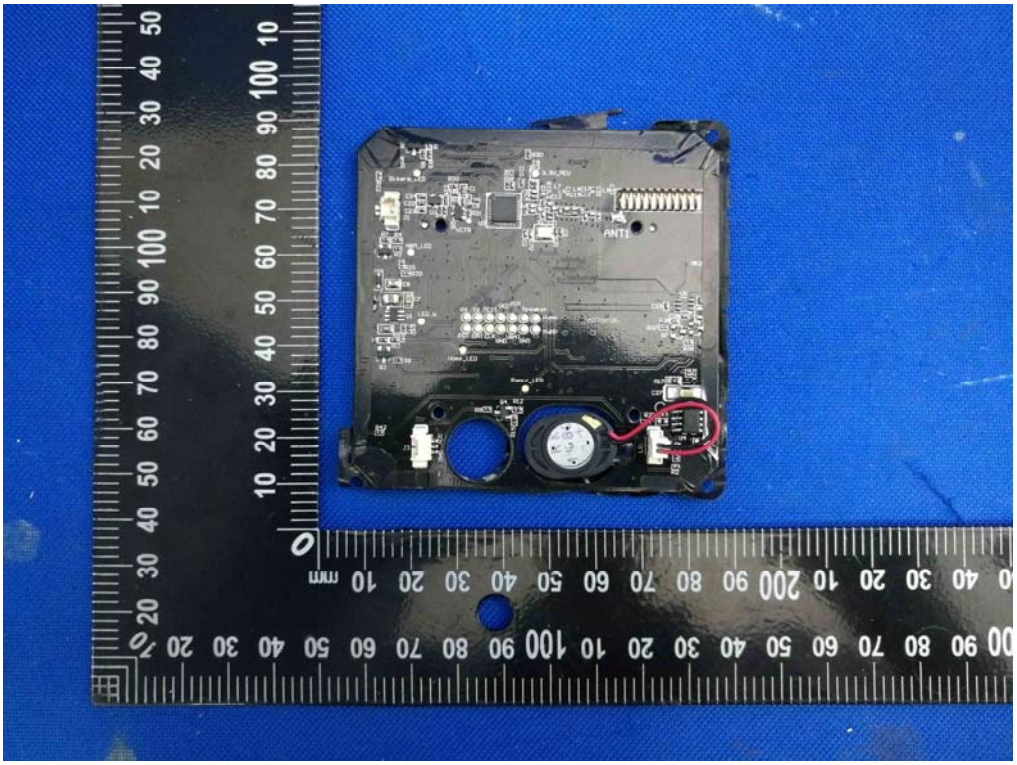

1 2 3
4 5 6
7 8 9
0

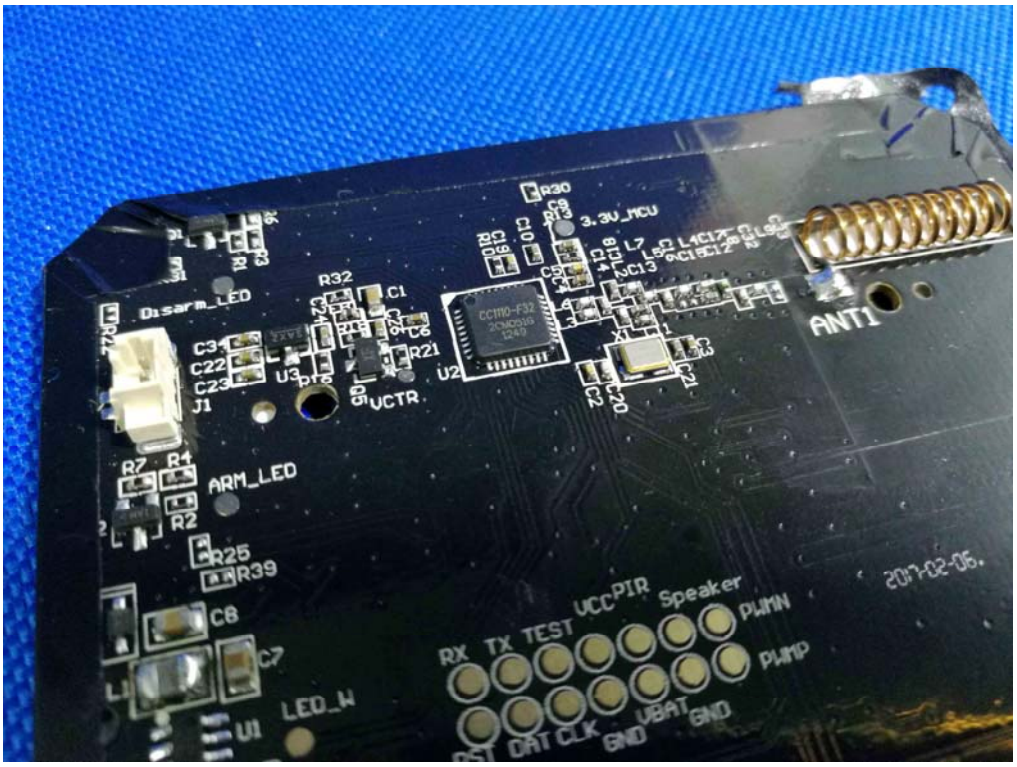

0
7 8 9
4 5 6
1 2 3

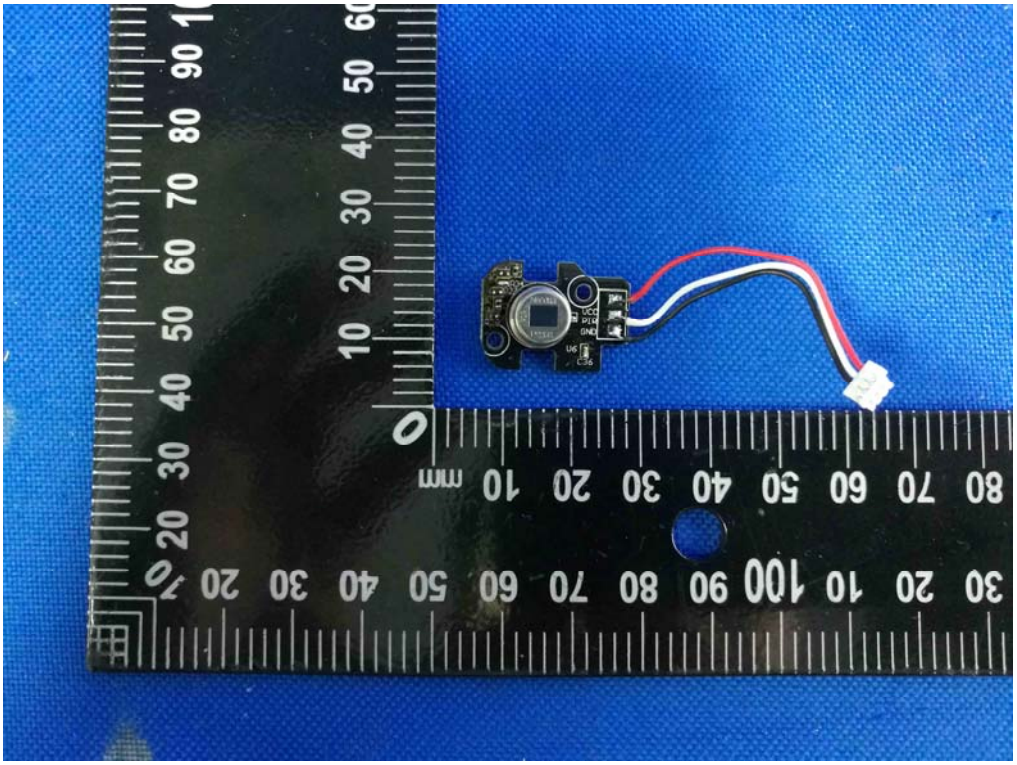

1 2 3
4 5 6
7 8 9
0

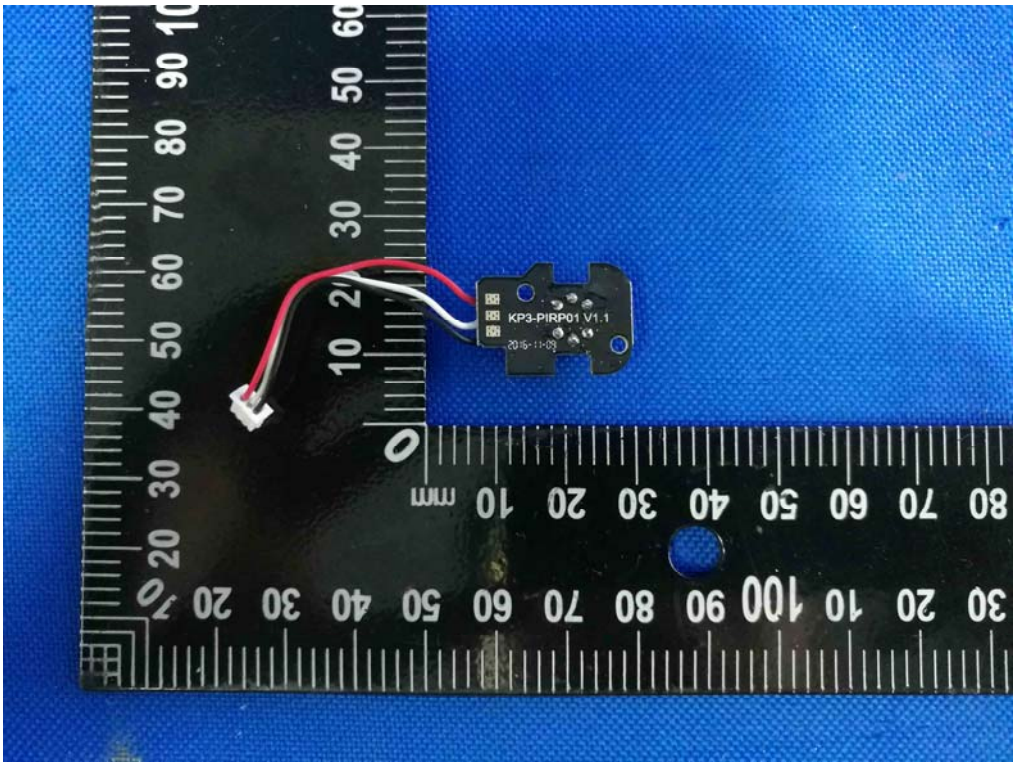

1 2 3
4 5 6
7 8 9
0






Disarm_LED
ARM_LED
LED_W
VCTR
3.3V_MCU
ANT1
RX TX TEST VCC PIR Speaker PWMN
PWMP
DAT CLK GND VBAT GND
2017-02-06.






**END OF REPORT**