



# TEST REPORT

**FCC ID: 2AB3E-IUL8    IC: 10541A-IUL8**

Applicant : ION AUDIO,LLC  
 Address : 200 Scenic View Drive, Cumberland, RI 02864, U.S.A

**Equipment under Test (EUT):**

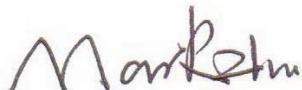
|           |   |             |
|-----------|---|-------------|
| Name      | : | Smart Badge |
| Model     | : | iUL8        |
| Trademark | : | ION         |

**Standards:** FCC PART 15, SUBPART C : 2015 (Section 15.247)  
 ANSI C63.4:2014 and ANSI C63.10:2013

**Report No** : T1851503 08  
**Date of Test** : October 16- October 28, 2015  
**Date of Issue** : November 03, 2015

**Test Result** : PASS

In the configuration tested, the EUT complied with the standards specified above  
 Authorized Signature

  
 (Mark Zhu)  
 Manager

The manufacturer should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Alpha Product Testing Co., Ltd. Or test done by Shenzhen Alpha Product Testing Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Alpha Product Testing Co., Ltd. Approvals in writing.

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## TEST REPORT VERIFICATION

Applicant : ION AUDIO,LLC  
Manufacturer : ION AUDIO,LLC  
EUT Description : Smart Badge

(A) Model No. : iUL8  
(B) Trademark : ION  
(C) Ratings Supply : DC 3.7V from Battery or DC 5V from USB port  
(D) Test Voltage : DC 3.7V from Battery or DC 5V from USB port

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C 2015, ANSI C63.4-2014

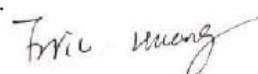
The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:

Eric Huang  
Test Engineer



Approved by (name + signature).....:

Simple Guan  
Project Manager



Date of issue.....:

November 03, 2015

# 1 General Information

## 1.1 Description of Device (EUT)

Trade Name : ION

EUT : Smart Badge

Model No. : iUL8

DIFF : N/A

Radio Technology : Bluetooth 4.0

Antenna Type : Integrated Antenna, Maximum Gain is 0dBi for Bluetooth 4.0

Operation frequency : 2402MHz -2480MHz

Channel No. : 40 Channels

Modulation : GFSK

Power Supply : DC 3.7V from battery or DC 5V from USB port

Applicant : ION AUDIO,LLC

Address : 200 Scenic View Drive, Cumberland, RI 02864, U.S.A

manufacture : ION AUDIO, LLC

Address : 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.

## 1.2 Description of Test Facility

Shenzhen Alpha Product Testing Co., Ltd  
 Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road,  
 Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission  
 Registration Number: 203110

July 18, 2014 Certificated by IC  
 Registration Number: 12135A

## 2 EMC Equipment List

| Equipment              | Manufacture  | Model No.                   | Serial No.            | Last cal.  | Cal Interval |
|------------------------|--------------|-----------------------------|-----------------------|------------|--------------|
| 3m Semi-Anechoic       | ETS-LINDGREN | N/A                         | SEL0017               | 2015.01.19 | 1 Year       |
| Spectrum analyzer      | Agilent      | E4407B                      | MY46185649            | 2015.01.19 | 1 Year       |
| Receiver               | R&S          | ESCI                        | 1166.5950K03-1<br>011 | 2015.01.19 | 1 Year       |
| Receiver               | R&S          | ESCI                        | 101202                | 2015.01.19 | 1 Year       |
| Bilog Antenna          | Schwarzbeck  | VULB 9168                   | VULB9168-438          | 2015.01.21 | 1 Year       |
| Horn Antenna           | EMCO         | 3115                        | 640201028-06          | 2015.01.21 | 1 Year       |
| Active Loop Antenna    | Beijing Daze | ZN30900A                    | SEL0097               | 2015.01.21 | 1 Year       |
| Cable                  | Resenberger  | N/A                         | No.1                  | 2015.01.19 | 1 Year       |
| Cable                  | SCHWARZBECK  | N/A                         | No.2                  | 2015.01.19 | 1 Year       |
| Cable                  | SCHWARZBECK  | N/A                         | No.3                  | 2015.01.19 | 1 Year       |
| Pre-amplifier          | Schwarzbeck  | BBV9743                     | 9743-019              | 2015.01.19 | 1 Year       |
| Pre-amplifier          | R&S          | AFS33-18002650<br>-30-8P-44 | SEL0080               | 2015.01.19 | 1 Year       |
| Base station           | Agilent      | E5515C                      | GB44300243            | 2015.01.19 | 1 Year       |
| Temperature controller | Terchy       | MHQ                         | 120                   | 2015.01.19 | 1 Year       |

|                  |               |          |            |            |        |
|------------------|---------------|----------|------------|------------|--------|
| Power divider    | Anritsu       | K240C    | 020346     | 2015.01.19 | 1 Year |
| Signal Generator | HP            | 83732B   | VS3449051  | 2015.01.19 | 1 Year |
| Power Meter      | Anritsu       | ML2487A  | 6K00001491 | 2015.01.19 | 1 Year |
| Power sensor     | Anritsu       | ML2491A  | 32516      | 2015.01.19 | 1 Year |
| L.I.S.N.#1       | Schwarzbeck   | NSLK8126 | 8126466    | 2015.01.19 | 1 Year |
| L.I.S.N.#2       | ROHDE&SCHWARZ | ENV216   | 101043     | 2015.01.19 | 1 Year |

### 3 Test Procedure

**POWER LINE CONDUCTED INTERFERENCE:** The test procedure used was ANSI Standard ANSI C63.4:2014 using a 50  $\mu$  H LISN. Both Lines were observed. The bandwidth of the receiver was 10kHz with an appropriate sweep speed. The ambient temperature of the EUT was 25°C with a humidity of 58%.

**RADIATION INTERFERENCE:** The test procedure used was ANSI Standard ANSI C63.4:2014 using a ANRITSU spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100kHz and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3MHz above 1 GHz. The ambient temperature of the EUT was 25°C with a humidity of 58%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer and cable loss. The antenna correction factors and cable loss are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF + CABLE = FS

33.20 dBuV + 10.36 dB + 0.9 dB = 44.46 dBuV/m @ 3m

**ANSI STANDARD ANSI C63.4:2014 10.1.7 MEASUREMENT PROCEDURES:** The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSI Standard ANSI C63.4:2014 10.1.7 with the EUT 40 cm from the vertical ground wall.

## 4 Summary of Measurement

### 4.1 Summary of test result

| Test Item           | Test Requirement | Standards Paragraph | Result     |
|---------------------|------------------|---------------------|------------|
| Spurious Emission   | FCC PART 15:2015 | Section 15.247      | Compliance |
| Conduction Emission | FCC PART 15:2015 | Section 15.207      | Compliance |
| Bandwidth Test      | FCC PART 15:2015 | Section 15.247      | Compliance |
| Peak Power          | FCC PART 15:2015 | Section 15.247      | Compliance |
| Power Density       | FCC PART 15:2015 | Section 15.247      | Compliance |
| Band Edge           | FCC PART 15:2015 | Section 15.247      | Compliance |
| Antenna Requirement | FCC PART 15:2015 | Section 15.203      | Compliance |

Note: The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.

### 4.2 Test connection



#### 4.3 Assistant equipment used for test

|                          |   |          |
|--------------------------|---|----------|
| Description              | : | Notebook |
| Manufacturer             | : | ACER     |
| Model No.                | : | ZQT      |
| Remark: FCC DOC approved |   |          |

#### 4.4 Test mode

| Dutycycle :100%<br>Keeping TX |                               |              |                    |
|-------------------------------|-------------------------------|--------------|--------------------|
| Mode                          | data rate<br>(Mbps)(see Note) | Channel      | Frequency<br>(MHz) |
| GFSK                          | 1                             | Low :CH1     | 2402               |
|                               | 1                             | Middle: CH19 | 2440               |
|                               | 1                             | High: CH39   | 2480               |

Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test.

## 4.5 Test Conditions

|                   |           |
|-------------------|-----------|
| Temperature range | 21-25 °C  |
| Humidity range    | 40-75%    |
| Pressure range    | 86-106kPa |

## 4.6 Measurement Uncertainty (95% confidence levels, k=2)

| Item  | MU                 | Remark      |
|---|--------------------|-------------|
| Uncertainty for Power point Conducted Emissions Test                  | 2.42dB             |             |
| Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)   | 2.13 dB            | Polarize: V |
|   | 2.57dB             | Polarize: H |
| Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz) | 3.54dB             | Polarize: V |
|   | 4.1dB              | Polarize: H |
| Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz) | 2.08dB             | Polarize: H |
|   | 2.56dB             | Polarize: V |
| Uncertainty for radio frequency                                       | $1 \times 10^{-9}$ |             |
| Uncertainty for conducted RF Power                                    | 0.65dB             |             |
| Uncertainty for temperature   | 0.2 °C             |             |
| Uncertainty for humidity  | 1%                 |             |
| Uncertainty for DC and low frequency voltages                         | 0.06%              |             |

## 5 Spurious Emission

### 5.1 Radiation Emission

#### 5.1.1 Radiation Emission Limits(15.209)

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009~0.490          | 2400/F(KHz)                          | 300                              |
| 0.490~1.705          | 24000/F(KHz)                         | 30                               |
| 1.705~30.0           | 30                                   | 30                               |
| 30~88                | 100                                  | 3                                |
| 88~216               | 150                                  | 3                                |
| 216~960              | 200                                  | 3                                |
| Above 960            | 500                                  | 3                                |

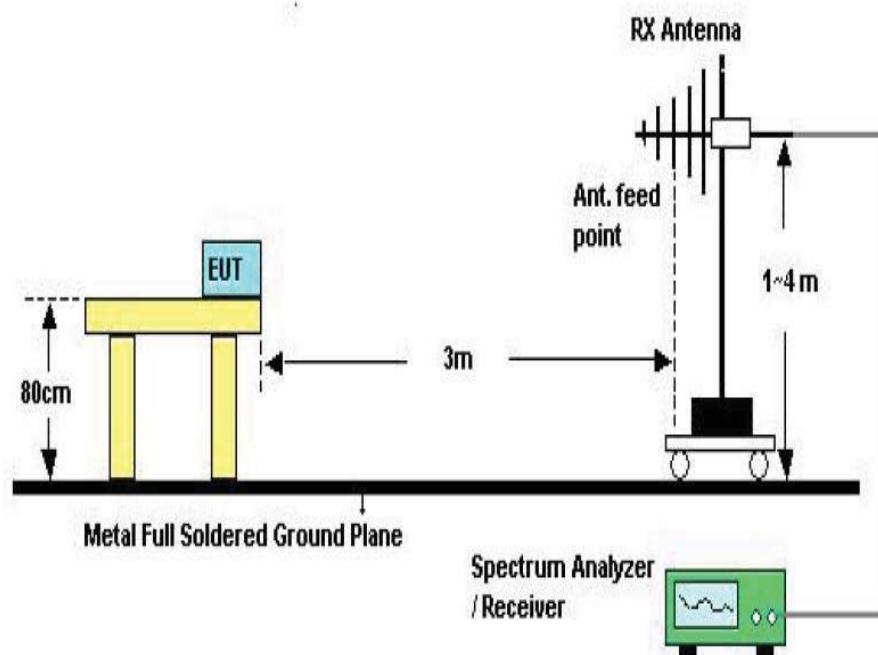
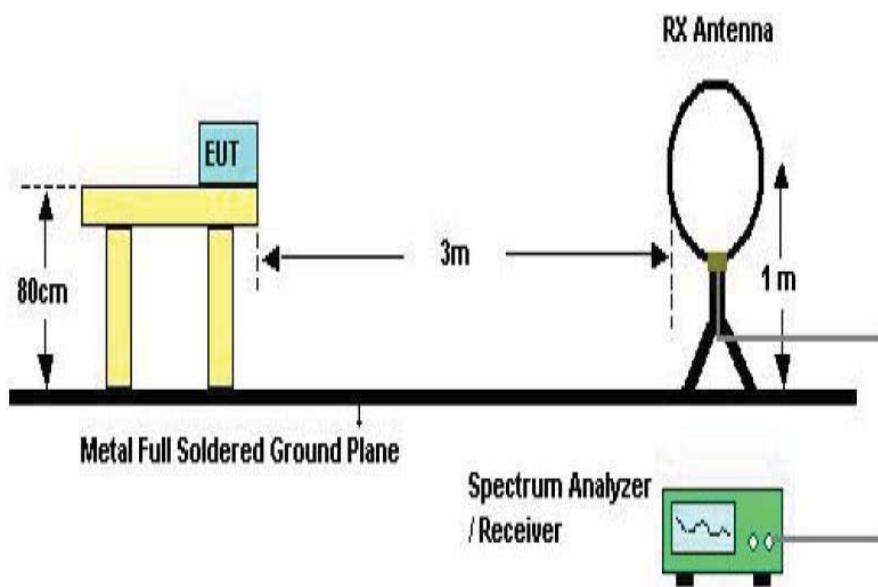
Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

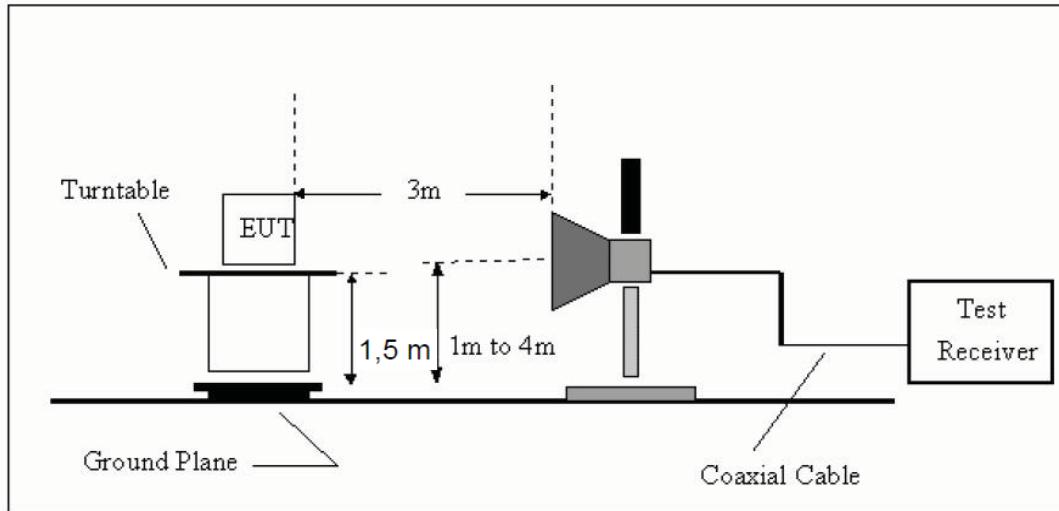
**NOTE:**

- The tighter limit applies at the band edges.
- Emission Level(dB uV/m)=20log Emission Level(uV/m)

#### 5.1.2 Test Setup

See the next page





Above 1GHz Test Setup

### 5.1.3 Test Procedure

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz. The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above 1GHz testing. The table was rotated 360 degrees to determine the position of the highest radiation
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Qusia Peak Detector mode premeasured
- If Peak value comply with QP limit Below 1GHz. The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
- For the actual test configuration, please see the test setup photo.

### 5.1.4 Test Equipment Setting For emission test Result

|              |            |            |
|--------------|------------|------------|
| 9KHz~150KHz  | RBW 200Hz  | VBW1KHz    |
| 150KHz~30MHz | RBW 9KHz   | VBW 30KHz  |
| 30MHz~1GHz   | RBW 120KHz | VBW 300KHz |

Above 1GHz

RBW 1MHz

VBW 3MHz

#### 5.1.5 Test Condition

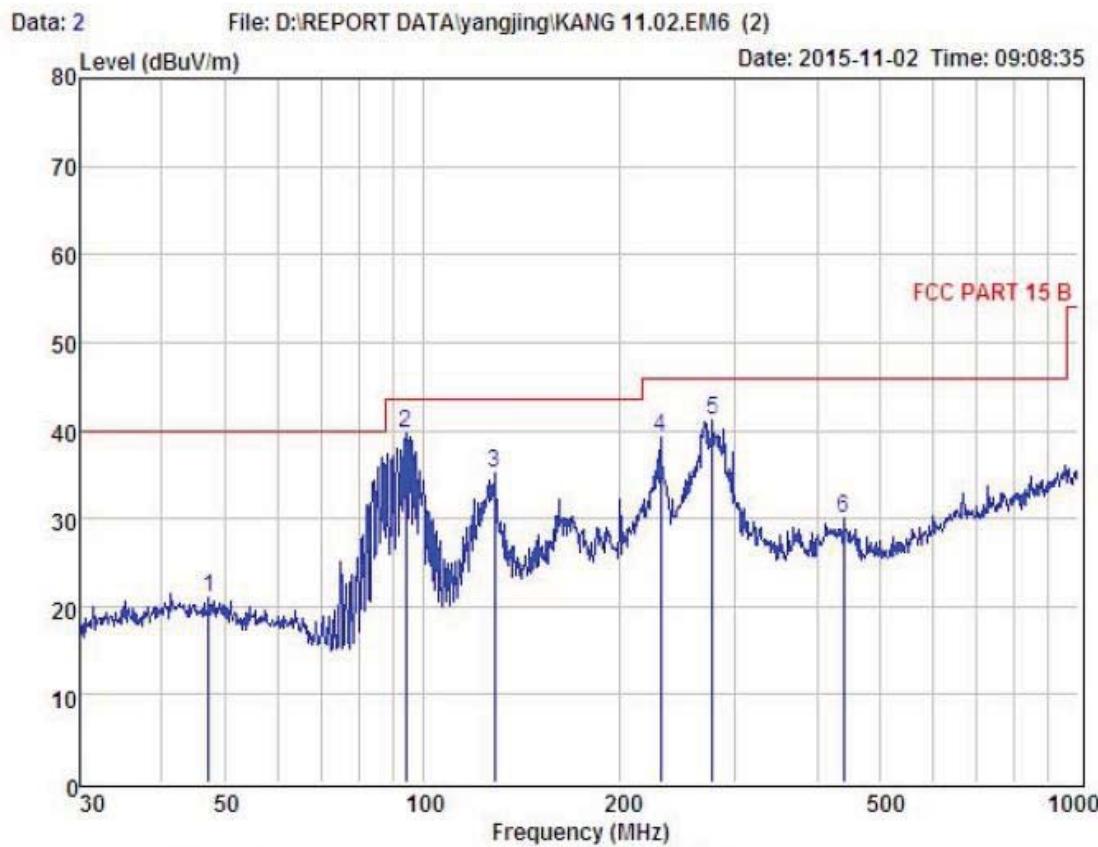
Continual Transmitting in maximum power.

#### 5.1.6 Test Result

We have scanned the 9KHz from 25GHz to the EUT.  
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

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



Condition : FCC PART 15 B 3m POL: HORIZONTAL

EUT :

Model No :

Test Mode :

Power : DC 5V from PC with AC 120V/60Hz

Test Engineer :

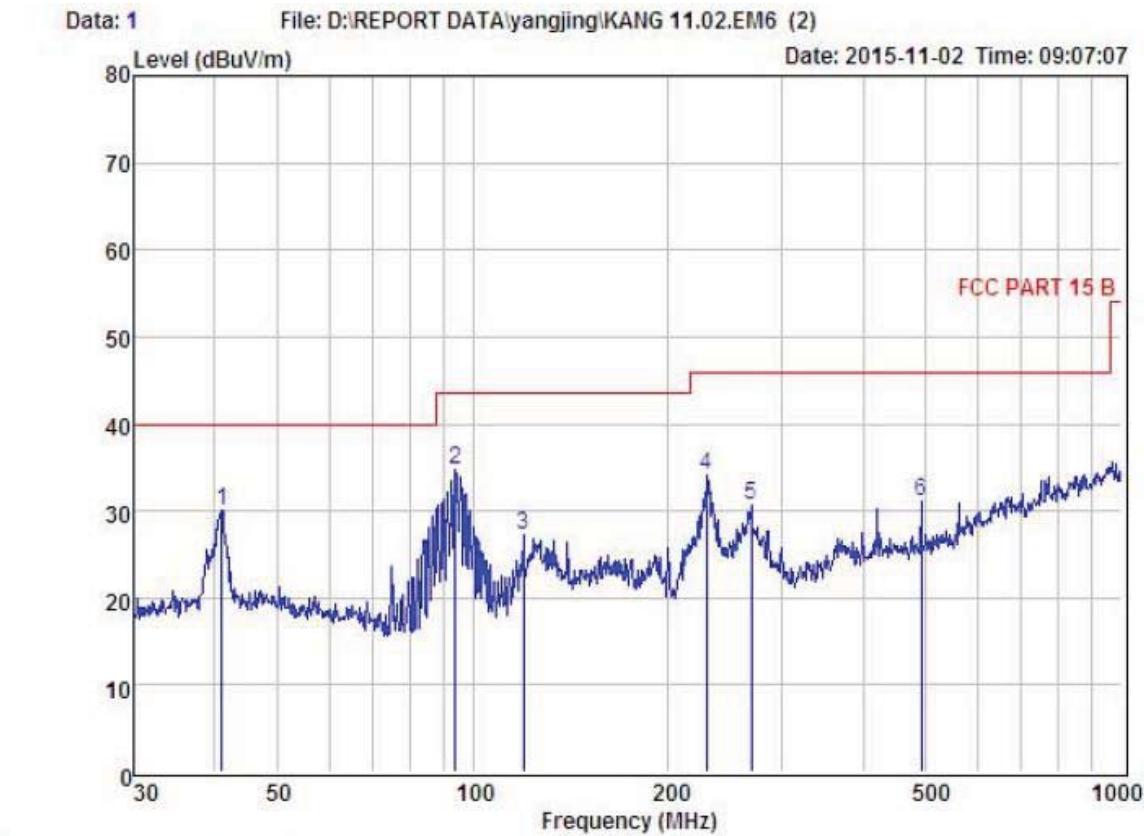
Remark :

Temp : 24°C

Hum : 32%

| Item | Freq   | Read  | Antenna | Preamp | Cable      | Level | Limit | Margin | Remark |
|------|--------|-------|---------|--------|------------|-------|-------|--------|--------|
|      |        | Level | Factor  | Factor | Cable Loss | dBuV  | dBuV  | dBuV   |        |
|      | MHz    | dBuV  | dB      | dB     | dB         |       |       |        |        |
| 1    | 47.16  | 37.43 | 13.59   | 30.10  | 0.08       | 21.00 | 40.00 | -19.00 | Peak   |
| 2    | 94.43  | 59.78 | 9.87    | 30.20  | 0.32       | 39.77 | 43.50 | -3.73  | Peak   |
| 3    | 128.56 | 51.62 | 12.68   | 29.53  | 0.38       | 35.15 | 43.50 | -8.35  | Peak   |
| 4    | 230.91 | 55.36 | 11.26   | 28.05  | 0.61       | 39.18 | 46.00 | -6.82  | Peak   |
| 5    | 277.09 | 56.42 | 12.31   | 28.09  | 0.49       | 41.13 | 46.00 | -4.87  | Peak   |
| 6    | 438.66 | 40.83 | 15.68   | 27.31  | 0.78       | 29.98 | 46.00 | -16.02 | Peak   |

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



| Condition     |        | : FCC PART 15 B                   |                | 3m            |            | POL: VERTICAL |       |        |        |
|---------------|--------|-----------------------------------|----------------|---------------|------------|---------------|-------|--------|--------|
| EUT           |        | :                                 |                |               |            |               |       |        |        |
| Model No      |        | :                                 |                |               |            |               |       |        |        |
| Test Mode     |        | :                                 |                |               |            |               |       |        |        |
| Power         |        | : DC 5V from PC with AC 120V/60Hz |                |               |            |               |       |        |        |
| Test Engineer |        | :                                 |                |               |            |               |       |        |        |
| Remark        |        | :                                 |                |               |            |               |       |        |        |
| Temp          |        | : 24°C                            |                |               |            |               |       |        |        |
| Hum           |        | : 32%                             |                |               |            |               |       |        |        |
| Item          | Freq   | Read Level                        | Antenna Factor | Preamp Factor | Cable Loss | Level         | Limit | Margin | Remark |
|               | MHz    | dBuV                              | dB             | dB            | dB         | dBuV          | dBuV  | dBuV   |        |
| 1             | 40.99  | 46.85                             | 13.93          | 30.85         | 0.18       | 30.11         | 40.00 | -9.89  | Peak   |
| 2             | 94.10  | 54.99                             | 9.72           | 30.20         | 0.32       | 34.83         | 43.50 | -8.67  | Peak   |
| 3             | 119.86 | 44.51                             | 12.06          | 29.68         | 0.36       | 27.25         | 43.50 | -16.25 | Peak   |
| 4             | 229.29 | 50.43                             | 11.21          | 28.14         | 0.55       | 34.05         | 46.00 | -11.95 | Peak   |
| 5             | 268.49 | 46.14                             | 12.03          | 28.14         | 0.70       | 30.73         | 46.00 | -15.27 | Peak   |
| 6             | 490.74 | 40.71                             | 16.41          | 27.19         | 1.08       | 31.01         | 46.00 | -14.99 | Peak   |

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

### Above 1GHz

| 1GHz—25GHz Radiated emission Test result                         |            |                     |                       |                 |                 |                 |                |             |        |
|--|------------|---------------------|-----------------------|-----------------|-----------------|-----------------|----------------|-------------|--------|
| EUT: Smart Badge   |            | M/N: iUL8           |                       |                 |                 |                 |                |             |        |
| Power: DC 3.7V from battery                                      |            |                     |                       |                 |                 |                 |                |             |        |
| Test date: 2015-10-26 Test site: 3m Chamber Tested by: Store Chu |            |                     |                       |                 |                 |                 |                |             |        |
| Test mode: GFSK Tx CH1 2402MHz                                   |            |                     |                       |                 |                 |                 |                |             |        |
| Antenna polarity: Vertical                                       |            |                     |                       |                 |                 |                 |                |             |        |
| No   | Freq (MHz) | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss(d B) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
| 1  | 4804       | 41.67               | 33.95                 | 10.18           | 34.26           | 51.54           | 74             | 22.46       | PK     |
| 2  | 4804       | 33.28               | 33.95                 | 10.18           | 34.26           | 43.15           | 54             | 10.85       | AV     |
| 3  | 7206       | /                   |                       |                 |                 |                 |                |             |        |
| 4  | 9608       | /                   |                       |                 |                 |                 |                |             |        |
| 5  | 12010      | /                   |                       |                 |                 |                 |                |             |        |
| Antenna Polarity: Horizontal                                     |            |                     |                       |                 |                 |                 |                |             |        |
| 1  | 4804       | 41.26               | 33.95                 | 10.18           | 34.26           | 51.13           | 74             | 22.87       | PK     |
| 2  | 4804       | 32.64               | 33.95                 | 10.18           | 34.26           | 42.51           | 54             | 11.49       | AV     |
| 3  | 7206       | /                   |                       |                 |                 |                 |                |             |        |
| 4  | 9608       | /                   |                       |                 |                 |                 |                |             |        |
| 5  | 12010      | /                   |                       |                 |                 |                 |                |             |        |





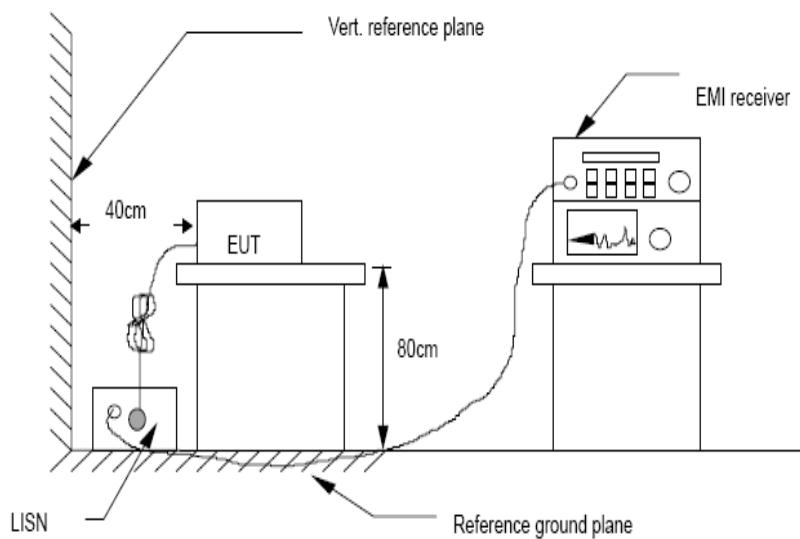
## 6 POWER LINE CONDUCTED EMISSION

### 6.1 Conducted Emission Limits(15.207)

| Frequency<br>MHz | Limits dB( $\mu$ V) |               |
|------------------|---------------------|---------------|
|                  | Quasi-peak Level    | Average Level |
| 0.15 -0.50       | 66 -56*             | 56 - 46*      |
| 0.50 -5.00       | 56                  | 46            |
| 5.00 -30.00      | 60                  | 50            |

Notes: 1. \*Decreasing linearly with logarithm of frequency.  
 2. The lower limit shall apply at the transition frequencies.  
 3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

### 6.2 Test Setup



### 6.3 Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI ANSI C63.4:2014 on Conducted Emission Measurement. The bandwidth of test receiver (R & S ESCI) is set at 9 kHz.

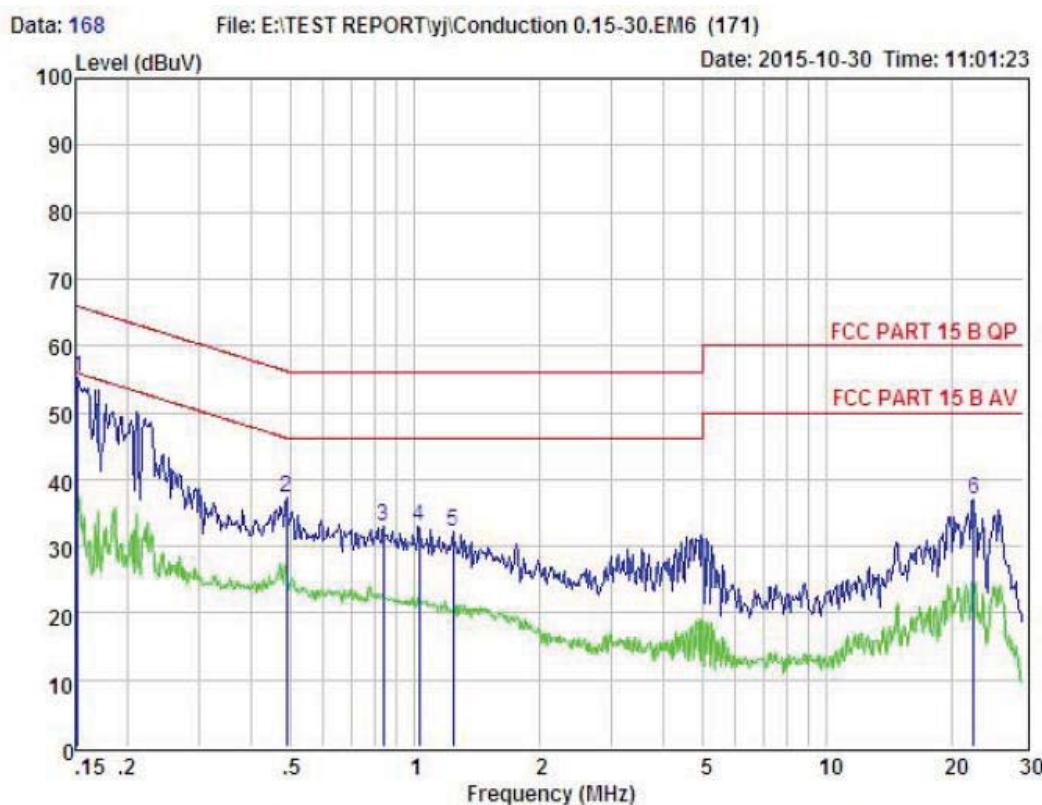
### 6.4 Test Results

TX MODE

Worse case is reported only

**PASS**

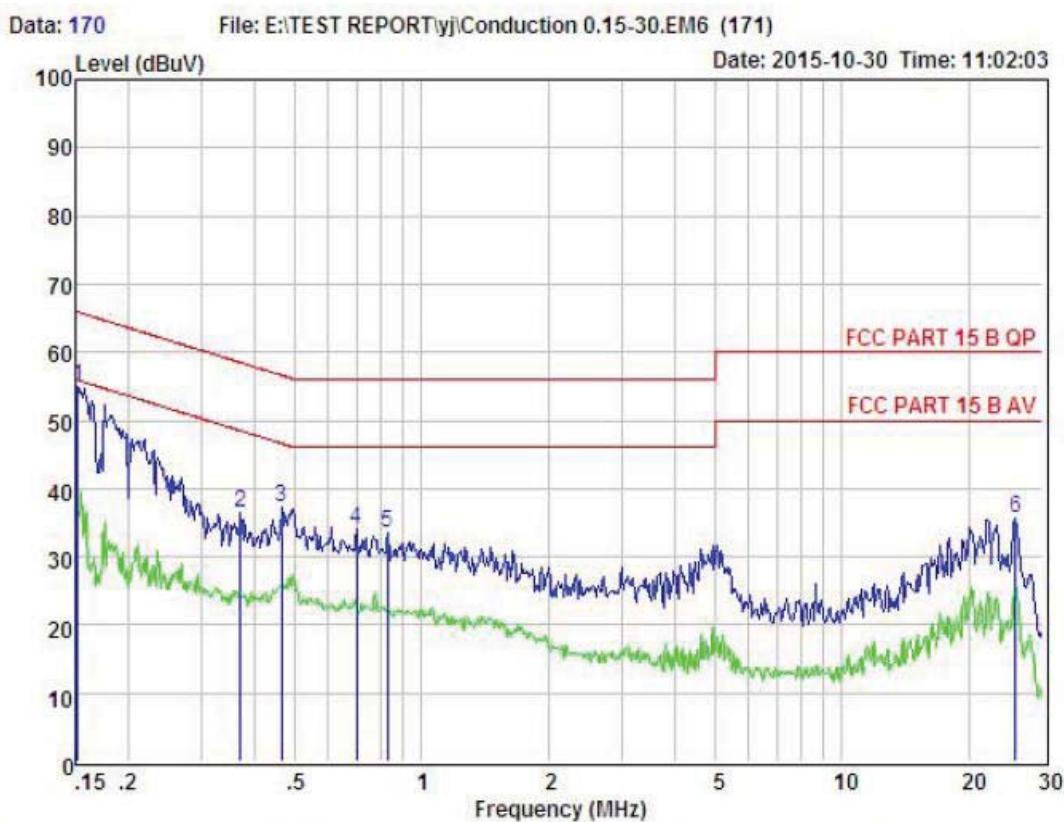
Detailed information please see the following page.



Condition : FCC PART 15 B QP      POL: LINE      Temp:24 °C      Hum:56 %  
 EUT :  
 Model No :  
 Test Mode :  
 Power : DC 5V from PC with AC 120V/60Hz  
 Test Engineer:  
 Remark :

| Item | Freq   | Read  | LISN   | Preamp | Cable | Level | Limit | Margin | Remark |
|------|--------|-------|--------|--------|-------|-------|-------|--------|--------|
|      | MHz    | dBuV  | Factor | Factor | dB    | dBuV  | dBuV  | dBuV   |        |
| 1    | 0.152  | 45.51 | 0.03   | -9.52  | 0.10  | 55.16 | 65.91 | -10.75 | Peak   |
| 2    | 0.488  | 27.53 | 0.03   | -9.58  | 0.10  | 37.24 | 56.20 | -18.96 | Peak   |
| 3    | 0.838  | 23.26 | 0.04   | -9.60  | 0.10  | 33.00 | 56.00 | -23.00 | Peak   |
| 4    | 1.023  | 23.18 | 0.04   | -9.63  | 0.10  | 32.95 | 56.00 | -23.05 | Peak   |
| 5    | 1.236  | 22.35 | 0.04   | -9.65  | 0.10  | 32.14 | 56.00 | -23.86 | Peak   |
| 6    | 22.709 | 26.23 | 0.41   | -9.81  | 0.42  | 36.87 | 60.00 | -23.13 | Peak   |

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss



Condition : FCC PART 15 B QP      POL: NEUTRAL   Temp: 24 °C   Hum: 56 %  
 EUT :  
 Model No :  
 Test Mode :  
 Power : DC 5V from PC with AC 120V/60Hz  
 Test Engineer:  
 Remark :

| Item | Freq   | Read  | LISN | Preamp |        |       | Level | Limit  | Margin | Remark |
|------|--------|-------|------|--------|--------|-------|-------|--------|--------|--------|
|      |        |       |      | Factor | Factor | Cable |       |        |        |        |
|      | MHz    | dBuV  | dB   | dB     | dB     | dB    | dBuV  | dBuV   | dBuV   |        |
| 1    | 0.152  | 45.44 | 0.03 | -9.52  | 0.10   | 55.09 | 65.91 | -10.82 | Peak   |        |
| 2    | 0.371  | 26.82 | 0.03 | -9.57  | 0.10   | 36.52 | 58.48 | -21.96 | Peak   |        |
| 3    | 0.465  | 27.69 | 0.03 | -9.58  | 0.10   | 37.40 | 56.61 | -19.21 | Peak   |        |
| 4    | 0.701  | 24.29 | 0.04 | -9.59  | 0.10   | 34.02 | 56.00 | -21.98 | Peak   |        |
| 5    | 0.831  | 23.87 | 0.02 | -9.60  | 0.10   | 33.59 | 56.00 | -22.41 | Peak   |        |
| 6    | 25.871 | 24.96 | 0.46 | -9.83  | 0.51   | 35.76 | 60.00 | -24.24 | Peak   |        |

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

## 7 Conducted Maximum Output Power

### 7.1 Test limit

Please refer section 15.247.

### 7.2 Test Procedure

Details see the KDB558074 Meas Guidance V03

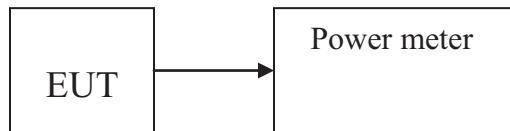
7.2.1 Place the EUT on the table and set it in transmitting mode.

7.2.2 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

Details see the KDB558074 DTS Meas Guidance V03

### 7.3 Test Setup



### 7.4 Test Results

**PASS**

Detailed information please see the following page.

| EUT: Smart Badge      |                 | M/N: iUL8            |             |                       |
|-----------------------|-----------------|----------------------|-------------|-----------------------|
| Test date: 2015-10-26 |                 | Test site: RF site   |             | Tested by: Eric Huang |
| Mode                  | Frequency (MHz) | PK Output power(dBm) | Limit (dBm) | Judgment              |
| GFSK                  | CH0: 2402       | 0.910                | 30          | Pass                  |
|                       | CH19: 2440      | 0.291                | 30          | Pass                  |
|                       | CH39: 2480      | -0.351               | 30          | Pass                  |
| Conclusion: PASS      |                 |                      |             |                       |

## 8 PEAK POWER SPECTRAL DENSITY

### 8.1 Test limit

- 8.1.1 Please refer section 15.247.
- 8.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
- 8.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 8.2 Method of measurement

Details see the KDB558074 DTS Meas Guidance V03

- 8.2.1 Place the EUT on the table and set it in transmitting mode.
- 8.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 8.2.3 Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, span=5-30%EBW, detail see the test plot.
- 8.2.4 Record the max reading.
- 8.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

### 8.3 Test Setup



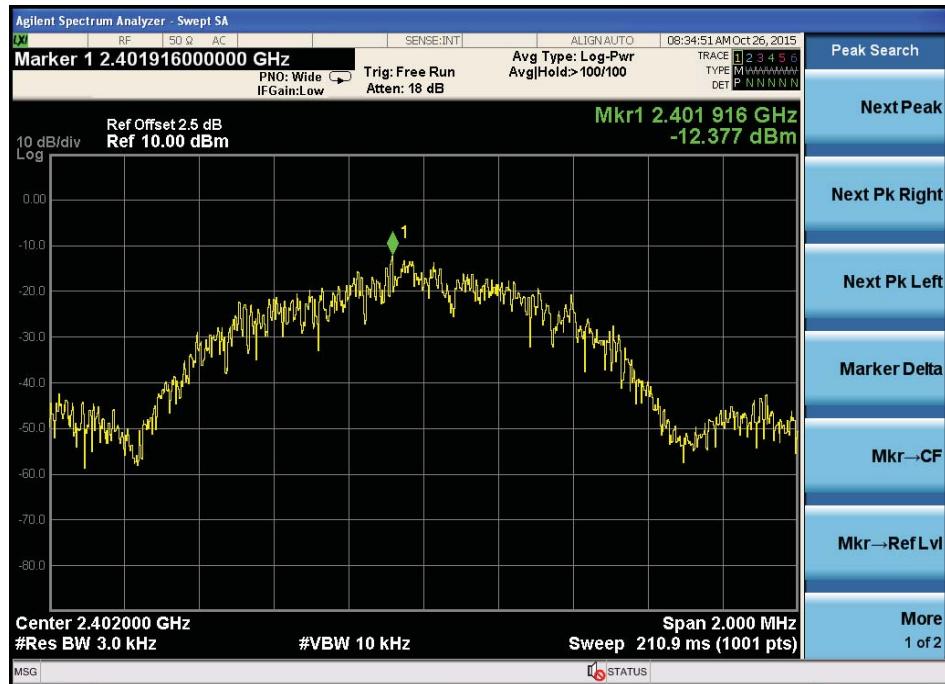
## 8.4 Test Results

PASS.

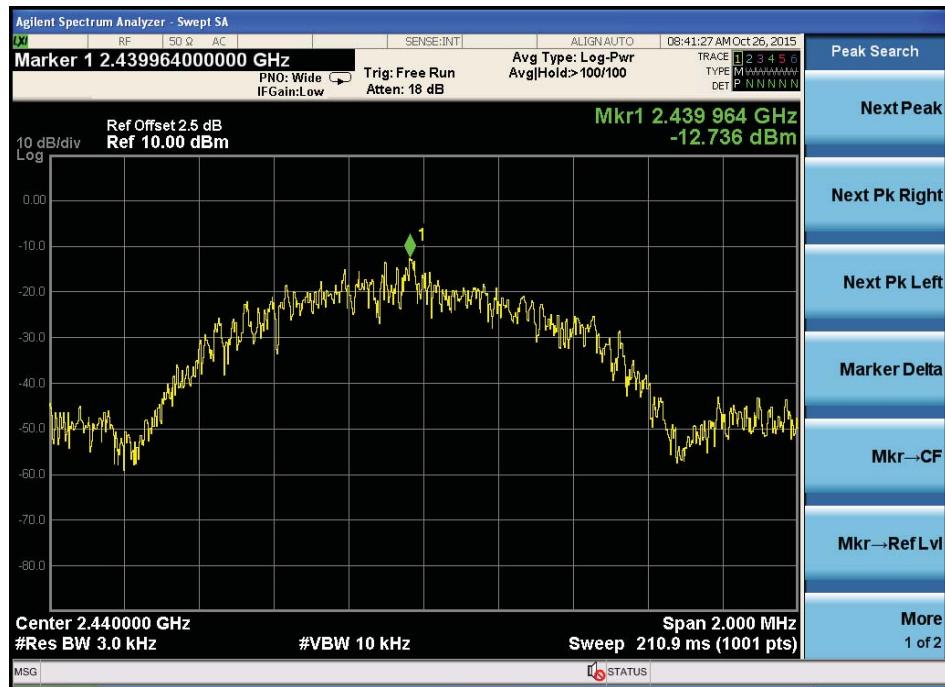
Detailed information please see the following page.

| EUT: Smart Badge      |                 | M/N: iUL8            |                       |        |
|-----------------------|-----------------|----------------------|-----------------------|--------|
| Test date: 2015-10-26 |                 | Test site: RF site   | Tested by: Eric Huang |        |
| Mode                  | Frequency (MHz) | PK Output power(dBm) | Limit (dBm)           | Result |
| GFSK                  | CH0: 2402       | -12. 377             | 8                     | PASS   |
|                       | CH19: 2440      | -12. 736             | 8                     | PASS   |
|                       | CH39: 2480      | -13. 359             | 8                     | PASS   |
| Conclusion: PASS      |                 |                      |                       |        |

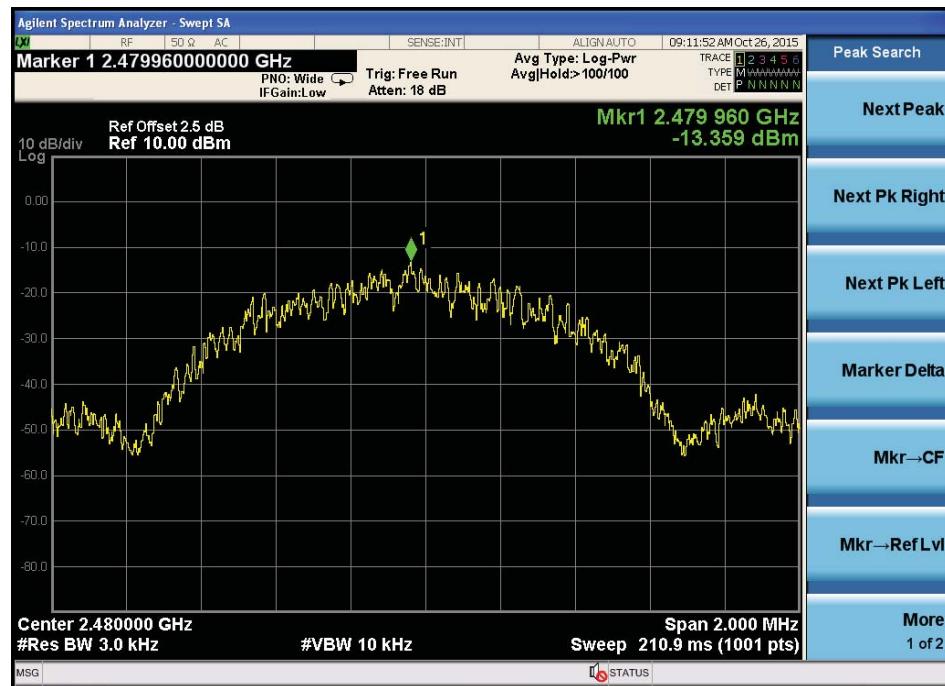
GFSK :  
CH Low :



CH Mid:



CH Hig:



## 9 Bandwidth

### 9.1 Test limit

Please refer section 15.247

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

### 9.2 Method of measurement

Details see the KDB558074 D01 Meas Guidance

- a) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver set RBW = 1-5 % EBW, VBW $\geq$ 3RBW, Sweep time set auto, detail see the test plot. Peak detector is used.

### 9.3 Test Setup



### 9.4 Test Results

PASS.

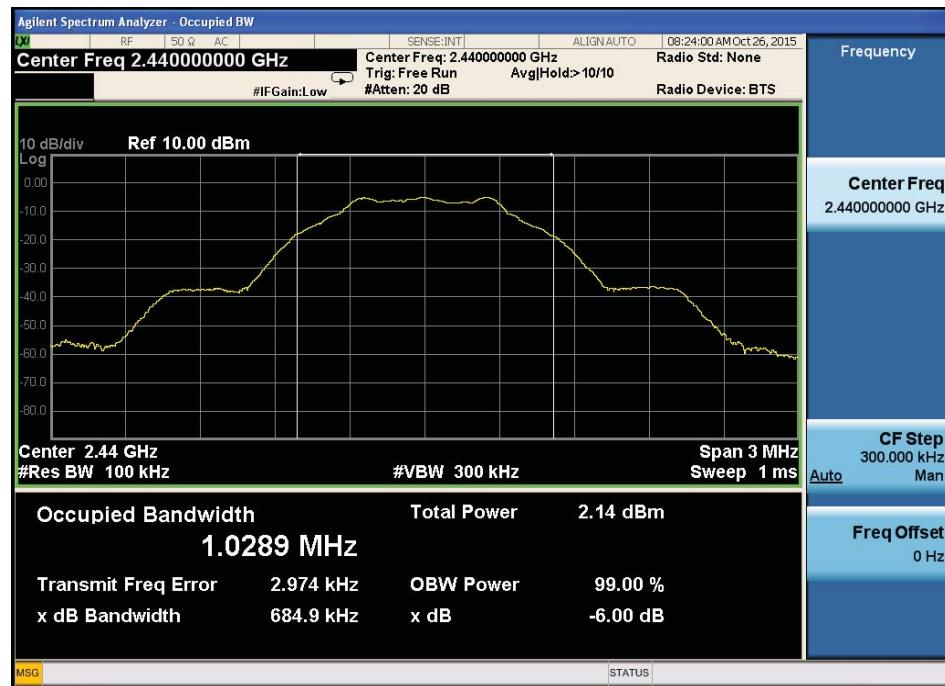
Detailed information please see the following page.

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) | Limit (MHz) | Result |
|---------|-----------------|---------------------|------------------------------|-------------|--------|
| GFSK:   |                 |                     |                              |             |        |
| Low     | 2402            | 0.6874              | 1.028                        | 0.5         | PASS   |
| Mid     | 2440            | 0.6849              | 1.029                        | 0.5         | PASS   |
| High    | 2480            | 0.6148              | 1.114                        | 0.5         | PASS   |

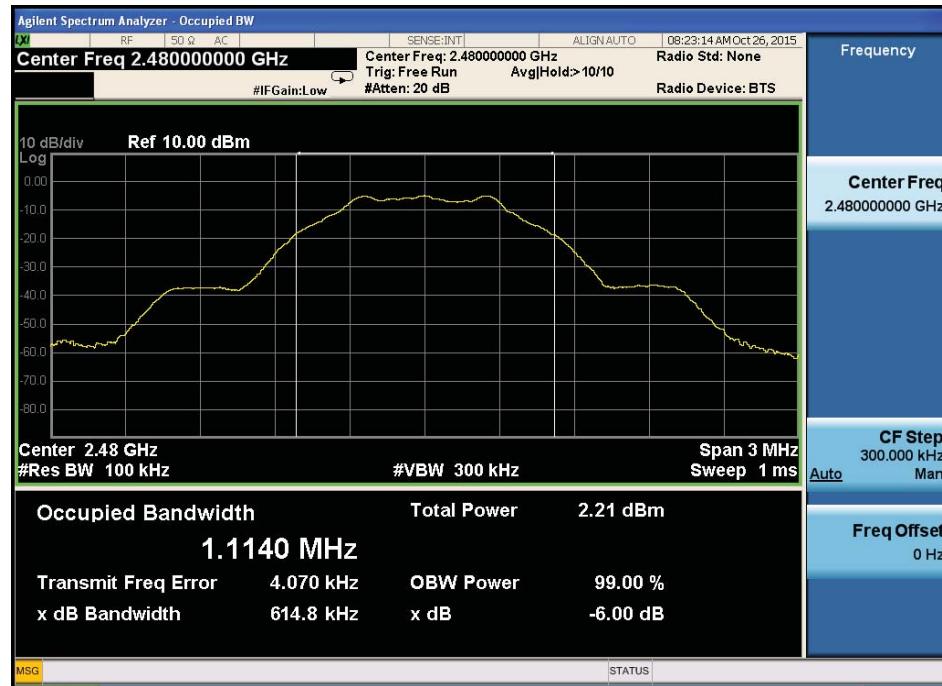
GFSK:  
CH Low :



CH Mid :



CH High :



## 10 Band Edge Check

### 10.1 Test limit

Please refer section 15.247.

### 10.2 Test Procedure

- 12.2.1 Put the EUT on a 0.8m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission
- 12.2.2 Check the spurious emissions out of band.
- 12.2.3 RBW 1MHz ,VBW 3MHz ,peak detector for peak value , RBW 1MHz ,VBW 3MHz ,RMS detector for AV value.

### 10.3 Test Setup

Same as 5.2.2.

### 10.4 Test Result

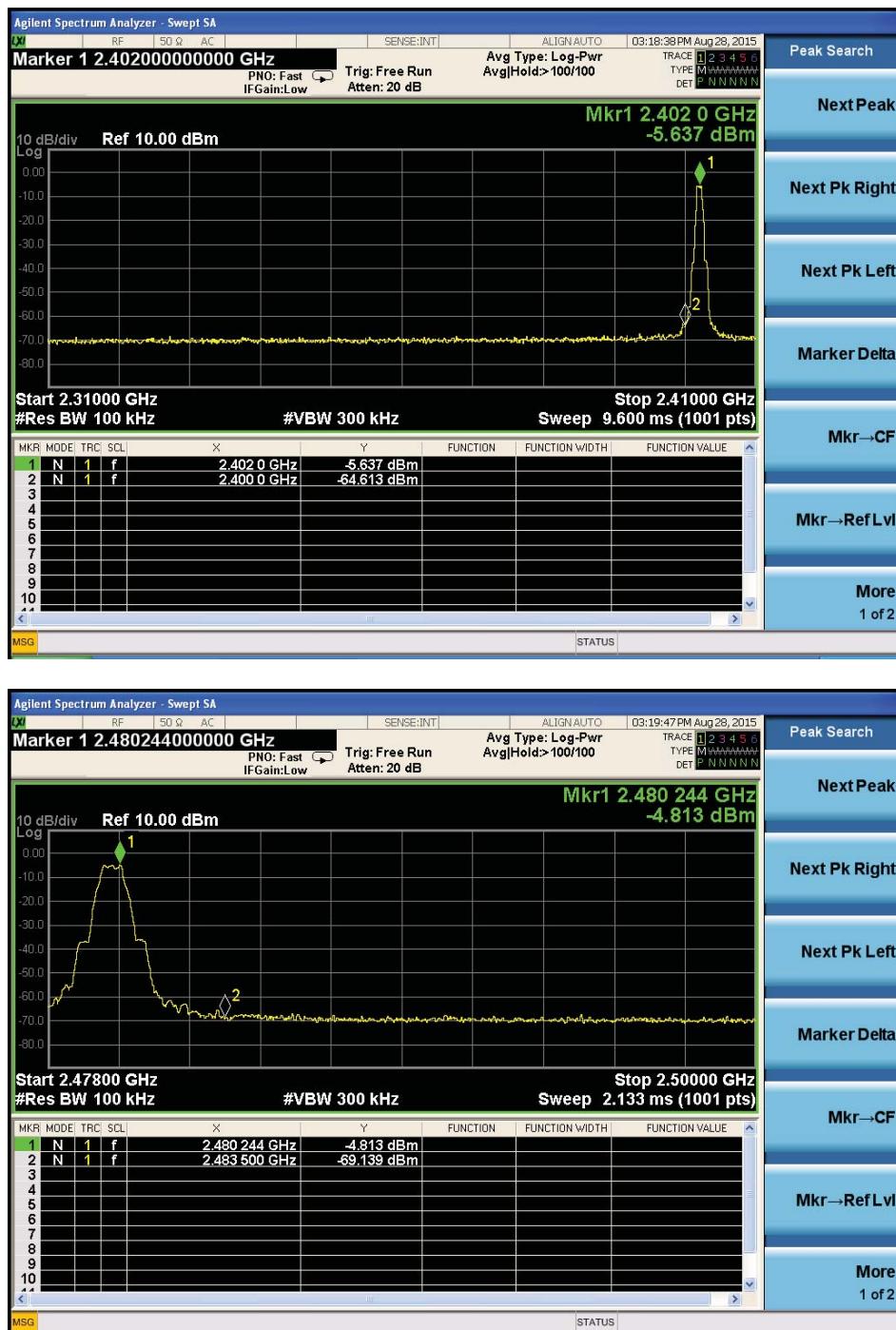
PASS.

Detailed information please see the following page.

## Radiated Method: GFSK



Conducted Method:  
GFSK



## 11 Antenna Requirement

### 11.1 Standard Requirement

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 shall be considered sufficient to comply with the provisions of this Section. 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.

### 11.2 Antenna Connected Construction

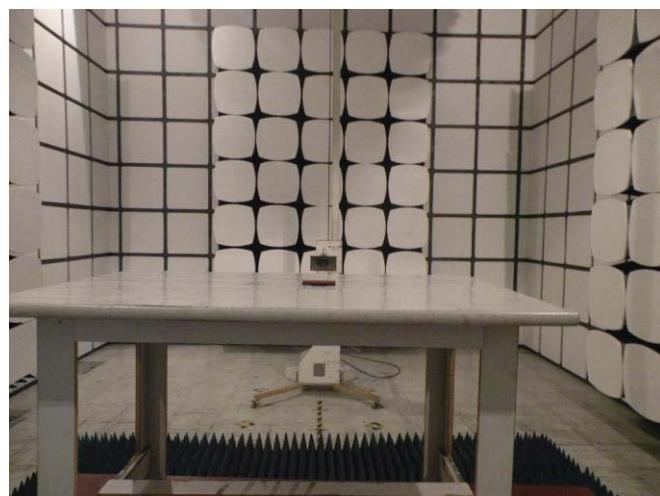
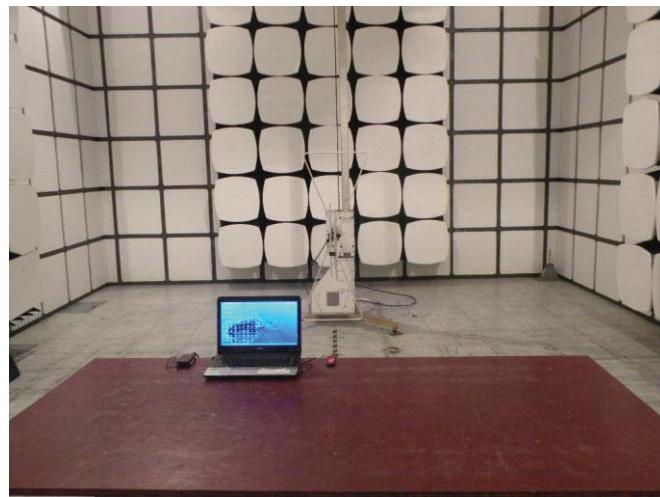
The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

### 11.3 Result

The EUT antenna is Integrated Antenna. It comply with the standard requirement.

## 12 Test setup photo

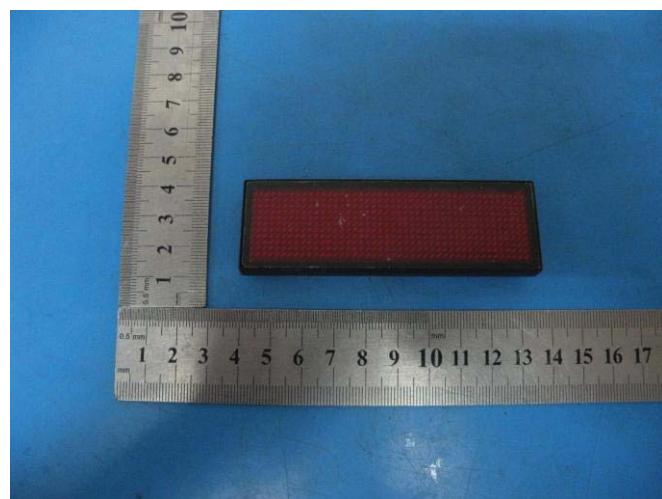
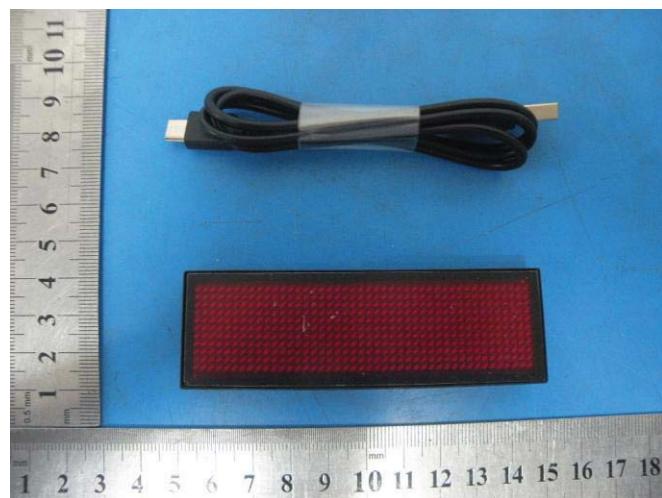
### 12.1 Photos of Radiated emission

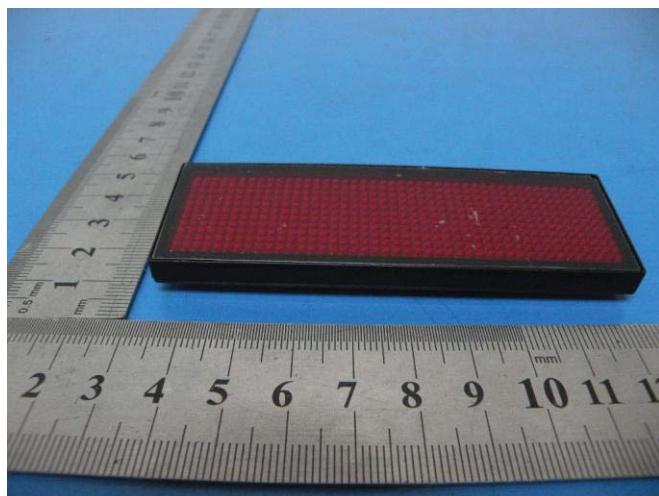
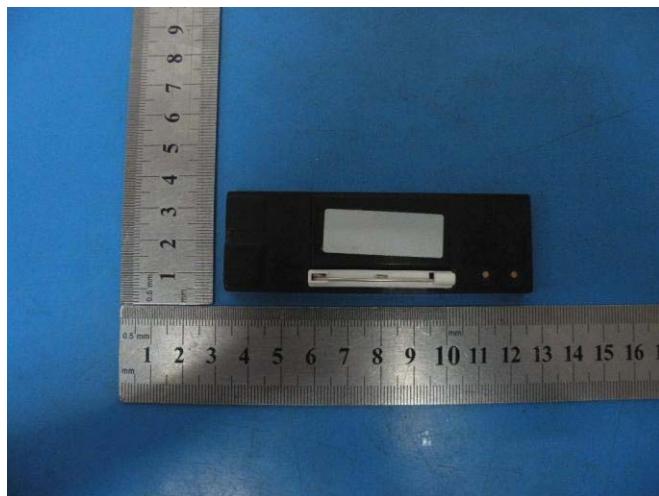


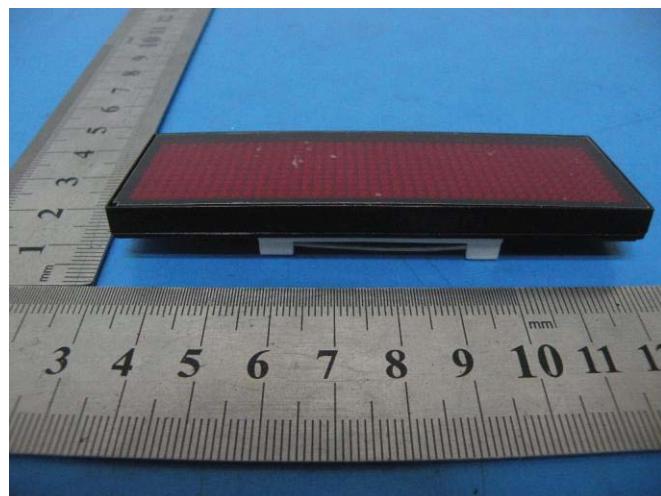
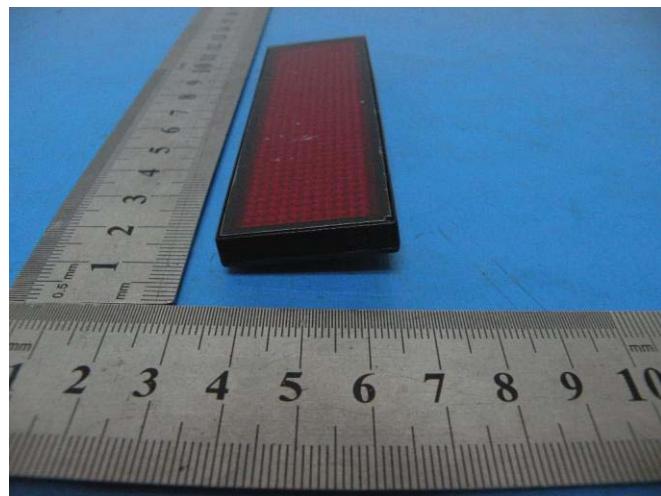
## 12.2 Photos of Conducted Emission test

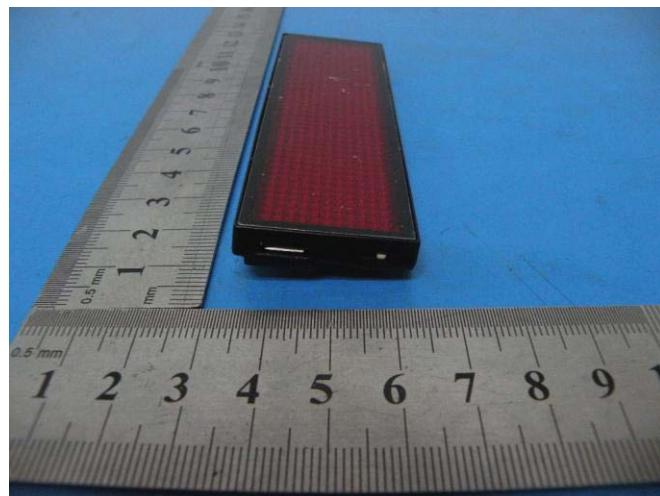


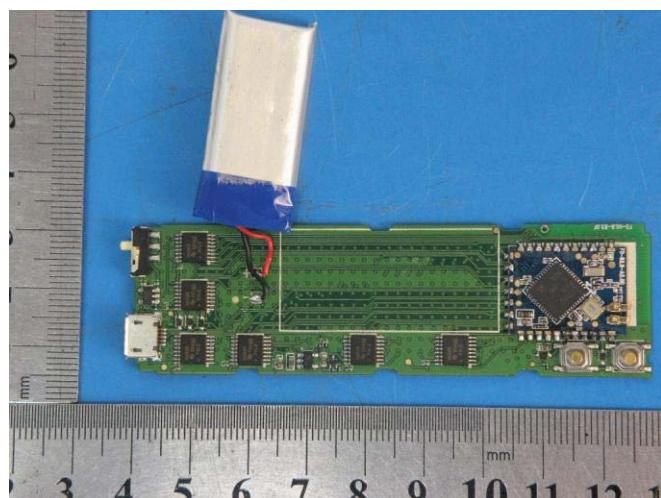
## 12 Photographs of EUT

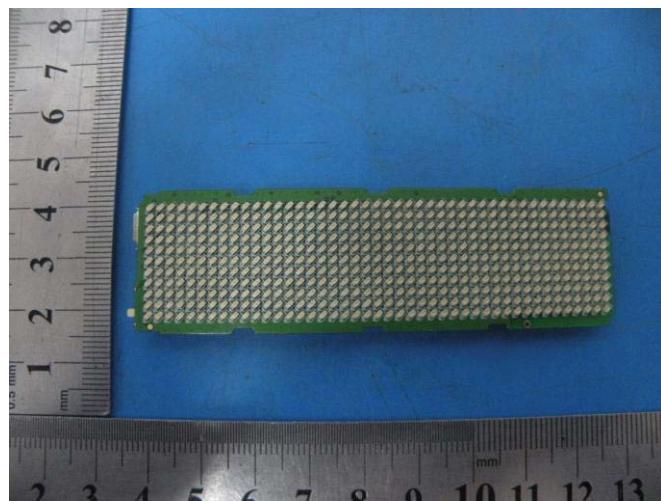












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