



## Test Report of FCC Part 15 C for FCC Certificate

On Behalf of

### Shenzhen Aoni Electronic Industry Co., Ltd

**FCC ID:** VO8-I6

**Product Description:** Bluetooth Headset

**Model Name:** I6

**Brand:** **Bluedio** 蓝弦®

**Applicant:** Guangzhou Liwei Electronics Co.,LTD.

Guotang Industrial Zone, Shenshan, Baiyun District, Guangzhou City, Guangdong Province, P.R.China

**Manufacturer:** Guangzhou Liwei Electronics Co.,LTD.

Guotang Industrial Zone, Shenshan, Baiyun District, Guangzhou City, Guangdong Province, P.R.China

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**Test Date:** January 01~10, 2015

**Test by:**

**Reviewed By:**

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: **Guangzhou Liwei Electronics Co.,LTD.**  
Address of applicant: Guotang Industrial Zone, Shenshan, Baiyun District,  
Guangzhou City, Guangdong Province, P.R.China  
Manufacturer: **Guangzhou Liwei Electronics Co.,LTD.**  
Address of manufacturer: Guotang Industrial Zone, Shenshan, Baiyun District,  
Guangzhou City, Guangdong Province, P.R.China

#### General Description of E.U.T

| Items               | Description                               |
|---------------------|---|
| EUT Description:    | Bluetooth Headset                         |
| Model No.:          | I6  |
| Trade mark:         | <b>Bluedio 蓝弦®</b>                        |
| Type of Modulation: | GFSK                                      |
| Frequency Band:     | 2402 MHz ~ 2480 MHz                       |
| Number of Channels: | 40  |
| Channel Bandwidth:  | 2 MHz                                     |
| Antenna Type:       | Integrated antenna, fixed on PCB          |
| Antenna Gain:       | 0dBi                                      |
| Rated Voltage:      | 3.7V from battery and charged by USB DC5V |
| Bluetooth Version:  | BT 4.1                                    |

**Note:**

\* The test data gathered are from the production sample provided by the manufacturer,



## 1.2 Test Facility

All measurement required was performed at laboratory of Centre Testing International (ShenZhen) Corporation ,Location at Building C, Sienific Innovation Park,Tiegang Reservoir, Xixiang, Baoan District, Shenzhen, Guangdong, The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards.

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

### FCC – Registration No.: 565659

Centre Testing International (Shenzhen) Co., Ltd. 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 565659, expiration date is 01/27/2017.

### IC Registration No.: 7408B

The 3m alternate test site of CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7408B on December 29, 2009.

### CNAS - Registration No.: L1910

CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION,. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.The acceptance letter from the CNAS is maintained in our files: Registration:L1910,January 12,2010.

## 1.3 Related Submittal(s) / Grant (s)

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.209, and 15.247 rules.

## 1.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Test item          | Value (dB) |
|--------------------|------------|
| Conducted Emission | 3.2        |
| Radiated Emission  | 4.5        |



## 2. SYSTEM TEST CONFIGURATION

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 Part 15 Subpart C.

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

### 2.3 General Test Procedures

**Conducted Emissions** The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

**Radiated Emissions** The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m/10m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

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## 2.4 List of Measuring Equipments

Test equipments list of CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION.

| Shielding Room No. 1 - Conducted disturbance Test |              |          |            |            |
|---|--------------|----------|------------|------------|
| Equipment   | Manufacturer | Model    | Serial No. | Due Date   |
| Receiver  | R&S          | ESCI     | 100009     | 07/19/2015 |
| LISN  | ETS-LINDGREN | 3850/2   | 00051952   | 07/19/2015 |
| LISN  | R&S          | ENV216   | 100098     | 07/19/2015 |
| Voltage Probe                                     | R&S          | ESH2-Z3  | 100042     | 07/19/2015 |
| Current Probe                                     | R&S          | EZ17     | 100106     | 07/19/2015 |
| ISN   | TESEQ GmbH   | ISN T800 | 30297      | 07/04/2015 |

| Control Room - Conducted disturbance Test (10m part) |                 |          |            |            |
|--|-----------------|----------|------------|------------|
| Equipment  | Manufacturer    | Model    | Serial No. | Due Date   |
| Receiver   | R&S             | ESCI     | 100435     | 07/19/2015 |
| LISN   | schwarzbeck     | NNLK8121 | 8121-529   | 07/19/2015 |
| Transient Limiter                                    | ELECTRO-METRICS | EM-7600  | 806        | 07/29/2015 |
| Voltage Probe  | R&S             | ESH2-Z3  | 100042     | 07/19/2015 |
| Current Probe  | R&S             | EZ17     | 100106     | 07/19/2015 |
| ISN  | TESEQ GmbH      | ISN T800 | 30297      | 07/04/2015 |
| Horn Antenna   | ETS-LINGREN     | 3117     | 00057407   | 07/19/2015 |

| 3M Semi-anechoic Chamber - Radiated disturbance Test |              |           |            |            |
|--|--------------|-----------|------------|------------|
| Equipment  | Manufacturer | Model     | Serial No. | Due Date   |
| 3M Chamber & Accessory Equipment                     | ETS-LINDGREN | FACT-3    | 3510       | 07/09/2015 |
| Spectrum Analyzer                                    | Agilent      | E4440A    | MY46185649 | 07/07/2015 |
| TRILOG Broadband Antenna                             | schwarzbeck  | VULB 9163 | 401        | 07/21/2015 |
| Multi device Controller                              | ETS-LINGREN  | 2090      | 00057230   | N/A        |
| Horn Antenna   | ETS-LINGREN  | 3117      | 00057407   | 07/19/2015 |
| Microwave Preamplifier                               | Agilent      | 8449B     | 3008A02425 | 07/29/2015 |

| 10M Semi-anechoic Chamber - Radiated disturbance Test |              |        |            |            |
|---|--------------|--------|------------|------------|
| Equipment   | Manufacturer | Model  | Serial No. | Due Date   |
| 10M Chamber & Accessory Equipment                     | Rainford     | --     | --         | 07/06/2015 |
| Receiver  | R&S          | ESCI   | 100435     | 07/19/2015 |
| Spectrum Analyzer                                     | R&S          | FSP40  | 100416     | 07/06/2015 |
| EMI test receiver                                     | R&S          | ESIB40 | 2023282915 | 07/24/2015 |



|                          |             |           |            |            |
|--------------------------|-------------|-----------|------------|------------|
| TRILOG Broadband Antenna | schwarzbeck | VULB 9163 | 484        | 07/21/2015 |
| Horn Antenna             | ETS-LINGREN | 3117      | 00044562   | 07/07/2015 |
| Microwave Preamplifier   | Agilent     | 11909A    | 186871     | 07/06/2015 |
| Microwave Preamplifier   | HP          | HP 8447F  | 2805A03379 | 07/06/2015 |
| Microwave Preamplifier   | CD          | PAP-1G18G | 2001       | 07/29/2015 |

| Shielding Room No. 2 - Harmonic / Flicker Test (EN 61000-3-2) / (EN 61000-3-3) |                        |                |            |            |
|--|------------------------|----------------|------------|------------|
| Equipment  | Manufacturer           | Model          | Serial No. | Due Date   |
| 5KVA AC POWER SOURCE   | California instruments | 5001iX-400-413 | 57344      | 07/29/2015 |
| Flicker & Harmonic Tester  | California instruments | PACS-1         | 72492      | 07/29/2015 |

| Shielding Room No. 3 - ESD Test (IEC 61000-4-2) |              |        |             |            |
|---|--------------|--------|-------------|------------|
| Equipment                                       | Manufacturer | Model  | Serial No.  | Due Date   |
| ESD Simulator                                   | EM TEST      | ESD30C | V0603101091 | 07/30/2015 |
| ESD Simulator                                   | TESEQ        | NSG437 | 478         | 08/22/2015 |

| 3M Full-anechoic Chamber - Radio-frequency electromagnetic field Immunity Test (IEC 61000-4-3) |              |           |            |            |
|--|--------------|-----------|------------|------------|
| Equipment  | Manufacturer | Model     | Serial No. | Due Date   |
| 3M Chamber & Accessory Equipment   | ETS-LINDGREN | FACT-3    | 3510       | 07/09/2015 |
| ESG Vector signal generators   | Agilent      | E4438C    | MY45095744 | 07/07/2015 |
| Power Amplifier  | AR           | 150W1000  | 0322288    | 07/19/2015 |
| TRILOG Broadband Antenna   | schwarzbeck  | VULB 9163 | 401        | 07/21/2015 |
| Temperature & Humidity Chamber   | ESPEC        | DSW0540   | ER-009     | 09/29/2015 |

| Shielding Room No. 3 - EFT / Surges Test (IEC 61000-4-4) (IEC 61000-4-5) |              |             |              |            |
|--|--------------|-------------|--------------|------------|
| Equipment  | Manufacturer | Model       | Serial No.   | Due Date   |
| Compact Generator  | EM-Test      | UCS500M/6B  | V0603101093  | 07/19/2015 |
| Capacitive Clamp   | EM-Test      | C Clamp HFK | 0306-43      | 07/19/2015 |
| CDN for Telecom Port   | EM-Test      | CNV504S1    | V0603101094  | 07/19/2015 |
| EFT Generator  | SCHAFFNER    | NSG 2025    | 19878        | 07/29/2015 |
| SURGE Generator  | SCHAFFNER    | NSG 2050    | 200313-135AR | 07/29/2015 |
| CDN  | SCHAFFNER    | CDN-131/133 | 34397        | 07/29/2015 |

| Shielding Room No. 2 - Radio-frequency continuous conducted Immunity Test (IEC 61000-4-6) |              |       |            |          |
|---|--------------|-------|------------|----------|
| Equipment   | Manufacturer | Model | Serial No. | Due Date |





|                  |         |           |            |            |
|------------------|---------|-----------|------------|------------|
| Signal Generator | IFR     | 2023B     | 202307/883 | 07/07/2015 |
| Power Amplifier  | AR      | 75A 250A  | 320297     | 07/29/2015 |
| Attenuator       | EM-Test | ATT6/75   | 0320837    | 07/19/2015 |
| CDN              | EM-Test | CDN M2/M3 | 0204-01    | 07/19/2015 |
| EM-Clamp         | EM-Test | EM101     | 35770      | 07/19/2015 |

| Shielding Room No. 2 - Power-frequency magnetic fields Immunity Test (IEC 61000-4-8) |         |            |             |            |
|--|---------|------------|-------------|------------|
| Compact Generator  | EM-Test | UCS500M/6B | V0603101093 | 07/19/2015 |
| Induction Coil   | EM-Test | MS100      | 0106-47     | 07/29/2015 |
| Current Transformer  | EM-Test | MC2630     | 0106-02     | 07/29/2015 |

| Shielding Room No. 2 -Voltage dips and interruptions Test (IEC 61000-4-11) |                        |                |            |            |
|--|------------------------|----------------|------------|------------|
| Equipment  | Manufacturer           | Model          | Serial No. | Due Date   |
| 5KVA AC POWER SOURCE   | California instruments | 5001iX-400-413 | 57344      | 07/29/2015 |
| Electronic output switch   | California instruments | EOS-1          | 72616      | 07/29/2015 |

## 2.5 List of auxiliary device

| Equipment | Manufacturer | Model        | Specification  | Cert.              |
|-----------|--------------|--------------|--|--------------------|
| Notebook  | Lenovo       | E46L         | Input: DC20V ( 3.25A)<br>Output: USB DC5V              | FCC DoC,<br>CE,CCC |
| Adapter   | Lenovo       | PA-1650-56LC | Input:100~240V (1.7A)50-60Hz<br>Output: DC20V ( 3.25A) | FCC DoC,<br>CE,CCC |



### 3. SUMMARY OF TEST RESULTS

| FCC Rules        | Description of Test          | Result |
|------------------|------------------------------|--------|
| 15.207(a)        | Condcuted Emission Test      | Pass   |
| 15.247(e)        | Power Spectral Density       | Pass   |
| 15.247(a)(2)     | 6dB Bandwidth                | Pass   |
| 15.247(a)        | Occupied Bandwidth           | Pass   |
| 15.247(b)(1)     | Maximum Peak Output Power    | Pass   |
| 15.205           | Emissions At Restricted Band | Pass   |
| 15.247(d),15.209 | Spurious Radiated Emission   | Pass   |
| 15.203           | Antenna Requirement          | Pass   |



## 4. Conducted Emission Test

### 4.1 Applicable Standard

Section 15.207(a): for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

### 4.2 Limits

Limits for Class A digital devices

| Frequency range (MHz) | Limits dB( $\mu$ V) |         |
|-----------------------|---------------------|---------|
|                       | Quasi-peak          | Average |
| 0.15 to 0.50          | 79                  | 66      |
| 0.50 to 30            | 73                  | 60      |

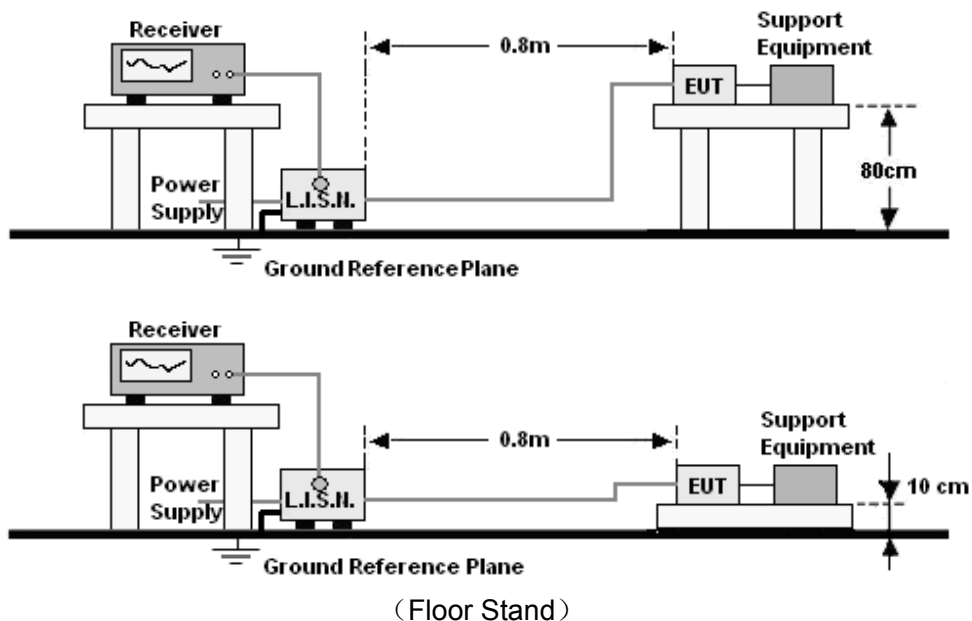
NOTE: The lower limit shall apply at the transition frequency.

Limits for Class B digital devices

| Frequency range (MHz) | Limits dB( $\mu$ V) |          |
|-----------------------|---------------------|----------|
|                       | Quasi-peak          | Average  |
| 0.15 to 0.50          | 66 to 56            | 56 to 46 |
| 0.50 to 5             | 56                  | 46       |
| 5 to 30               | 60                  | 50       |

NOTE: 1. The lower limit shall apply at the transition frequencies.  
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

### 4.3 EUT Test Setup



#### 4.4 Procedure Of Conducted Emission Test

- a. The Product was placed on a nonconductive table above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

#### 4.5 Test Result

|   |  |
|---|--|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset                       |
| Humidity (%RH) : 50~54                  | M/N:I6                                       |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Charging and BT working |

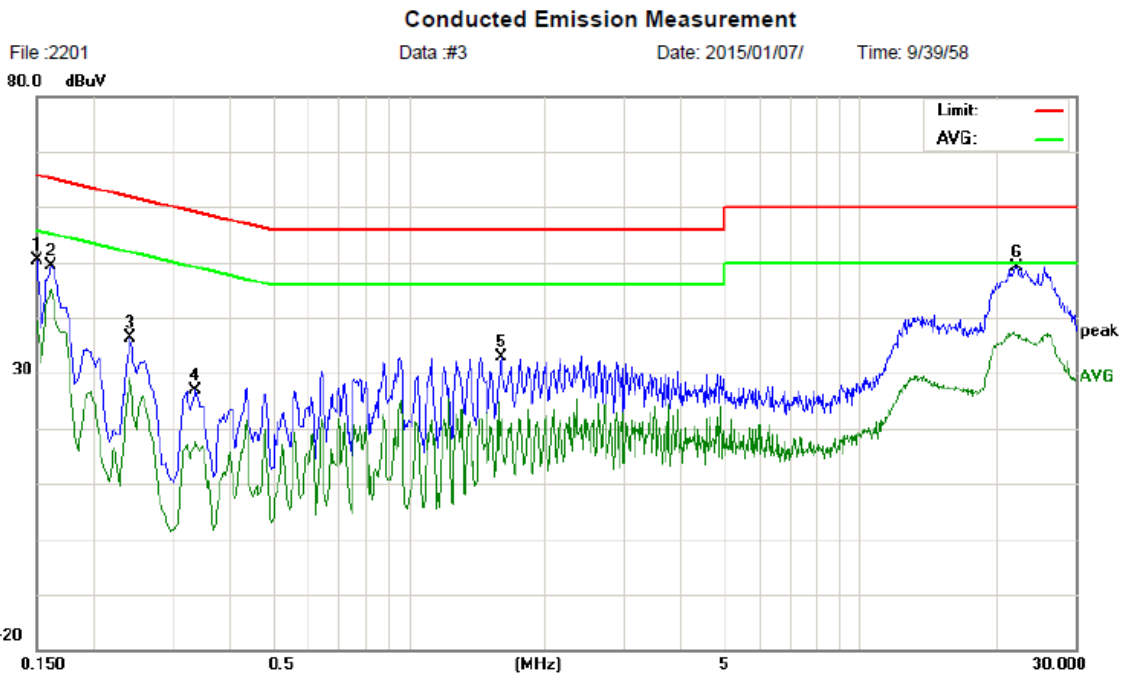
The charging and BT working mode test data worse than charging mode,so only record this mode test datas





The Test Data Of Conducted Emission

EUT: Bluetooth Headset  
 M/N: I6  
 Operating Condition: Charging and BT working  
 Test Site: CHAMBER  
 Operator: Owen Li  
 Comment: Line:L  
 Tem:22°C Hum:50%

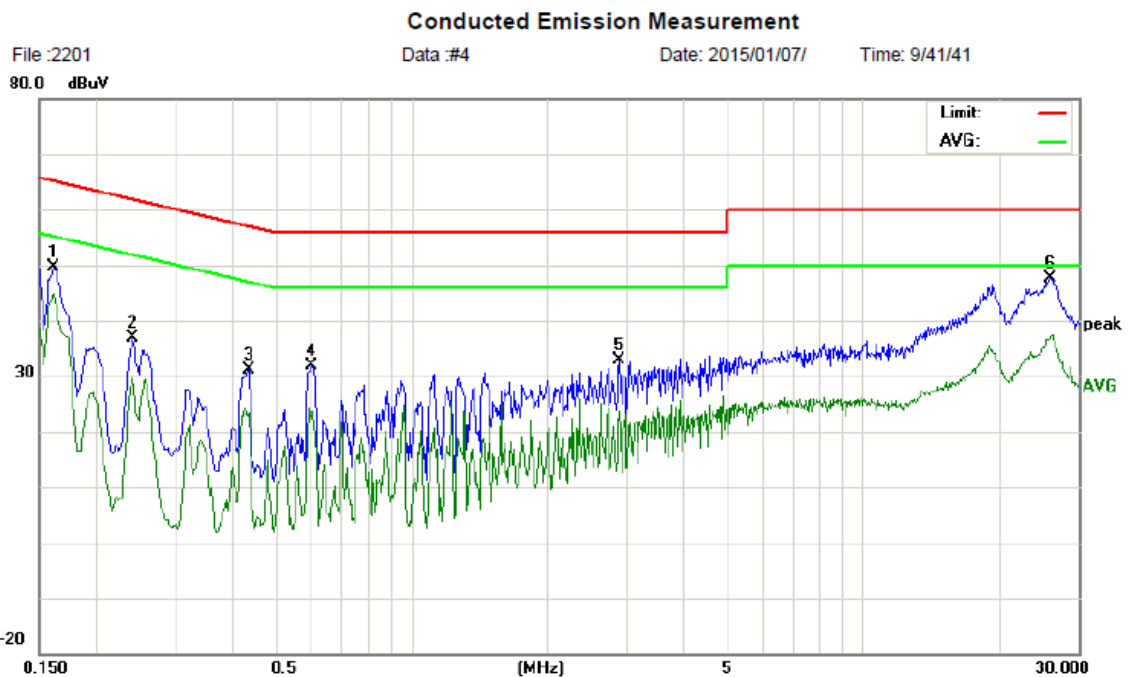


| Site site #1 |           | Phase: L1            |    |       |                   |                    |    |       |              | Temperature: 22 |             |        |     |         |
|--------------|-----------|----------------------|----|-------|-------------------|--------------------|----|-------|--------------|-----------------|-------------|--------|-----|---------|
| No.          | Freq. MHz | Reading_Level (dBuV) |    |       | Correct Factor dB | Measurement (dBuV) |    |       | Limit (dBuV) |                 | Margin (dB) |        | P/F | Comment |
|              |           | Peak                 | QP | AVG   |                   | peak               | QP | AVG   | QP           | AVG             | QP          | AVG    |     |         |
| 1            | 0.1500    | 40.67                |    | 29.52 | 9.79              | 50.46              |    | 39.31 | 65.99        | 55.99           | -15.53      | -16.68 | P   |         |
| 2            | 0.1620    | 40.67                |    | 29.52 | 9.79              | 50.46              |    | 39.31 | 65.36        | 55.36           | -14.90      | -16.05 | P   |         |
| 3            | 0.2420    | 26.58                |    | 19.33 | 9.81              | 36.39              |    | 29.14 | 62.02        | 52.02           | -25.63      | -22.88 | P   |         |
| 4            | 0.3379    | 16.96                |    | 7.82  | 9.81              | 26.77              |    | 17.63 | 59.25        | 49.25           | -32.48      | -31.62 | P   |         |
| 5            | 1.6019    | 22.96                |    | 11.91 | 9.88              | 32.84              |    | 21.79 | 56.00        | 46.00           | -23.16      | -24.21 | P   |         |
| 6            | 22.2500   | 38.99                |    | 26.57 | 10.26             | 49.25              |    | 36.83 | 60.00        | 50.00           | -10.75      | -13.17 | P   |         |



The Test Data Of Conducted Emission

EUT: Bluetooth Headset  
 M/N: I6  
 Operating Condition: Charging and BT working  
 Test Site: CHAMBER  
 Operator: Owen Li  
 Comment: Line:N  
 Tem:22°C Hum:50%



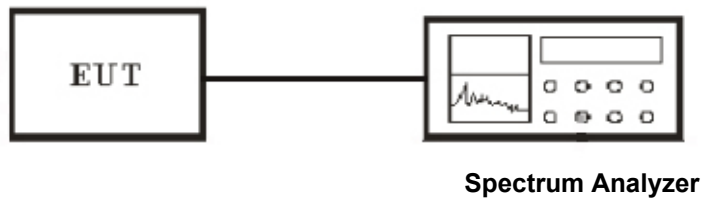
| Site site #1 |           | Phase: N             |    |       |                   |                    |    |       |              |       |             | Temperature: 22 |     |         |
|--------------|-----------|----------------------|----|-------|-------------------|--------------------|----|-------|--------------|-------|-------------|-----------------|-----|---------|
| No.          | Freq. MHz | Reading_Level (dBuV) |    |       | Correct Factor dB | Measurement (dBuV) |    |       | Limit (dBuV) |       | Margin (dB) |                 | P/F | Comment |
|              |           | Peak                 | QP | AVG   |                   | peak               | QP | AVG   | QP           | AVG   | QP          | AVG             |     |         |
| 1            | 0.1620    | 39.88                |    | 34.97 | 9.79              | 49.67              |    | 44.76 | 65.36        | 55.36 | -15.69      | -10.60          | P   |         |
| 2            | 0.2420    | 27.18                |    | 19.99 | 9.81              | 36.99              |    | 29.80 | 62.02        | 52.02 | -25.03      | -22.22          | P   |         |
| 3            | 0.4380    | 21.40                |    | 13.61 | 9.81              | 31.21              |    | 23.42 | 57.10        | 47.10 | -25.89      | -23.68          | P   |         |
| 4            | 0.6020    | 22.08                |    | 12.46 | 9.83              | 31.91              |    | 22.29 | 56.00        | 46.00 | -24.09      | -23.71          | P   |         |
| 5            | 2.8980    | 22.88                |    | 13.83 | 9.92              | 32.80              |    | 23.75 | 56.00        | 46.00 | -23.20      | -22.25          | P   |         |
| 6            | 26.0419   | 37.33                |    | 26.62 | 10.38             | 47.71              |    | 37.00 | 60.00        | 50.00 | -12.29      | -13.00          | P   |         |

## 5. Power Spectral Density Measurement

### 5.1 Applicable Standard

According to §15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 5.2 EUT Setup



### 5.3 Test Equipment List and Details

See section 2.4.

### 5.4 Test Procedure

1. The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
2. The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
3. Set the RBW = 3 kHz.
4. Set the VBW  $\geq 3 \times$  RBW.
5. Set the span to 1.5 times the DTS channel bandwidth.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

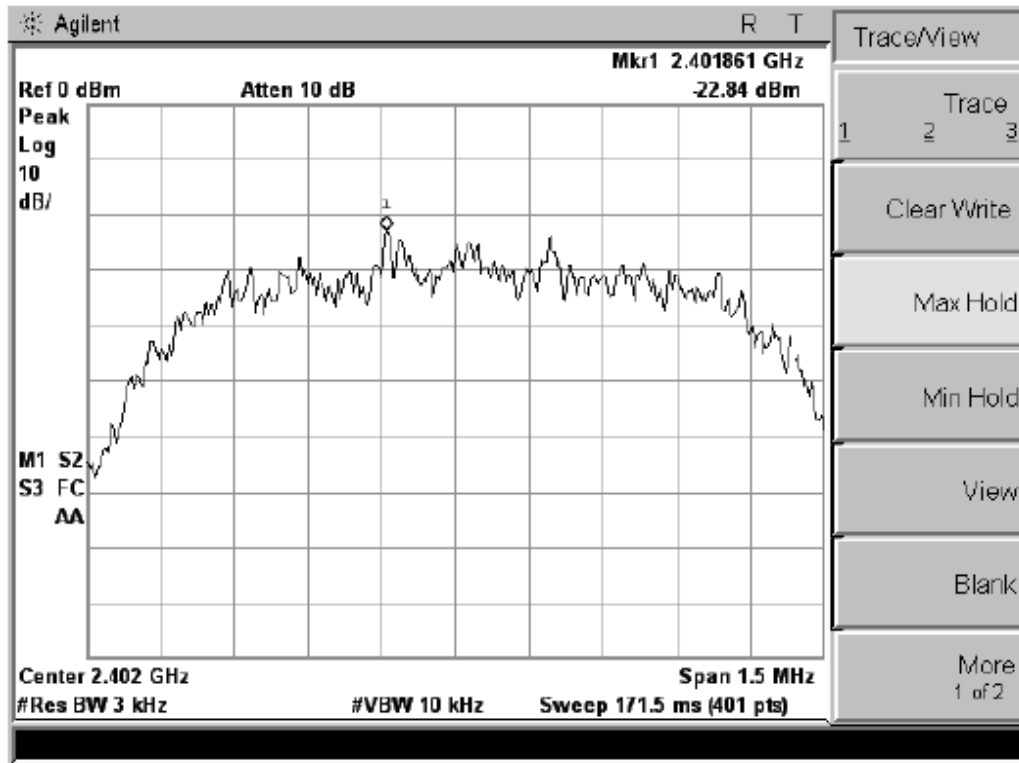
### 5.5 Test Result

|   |                              |
|---|------------------------------|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset       |
| Humidity (%RH) : 50~54                  | M/N:I6                       |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode |

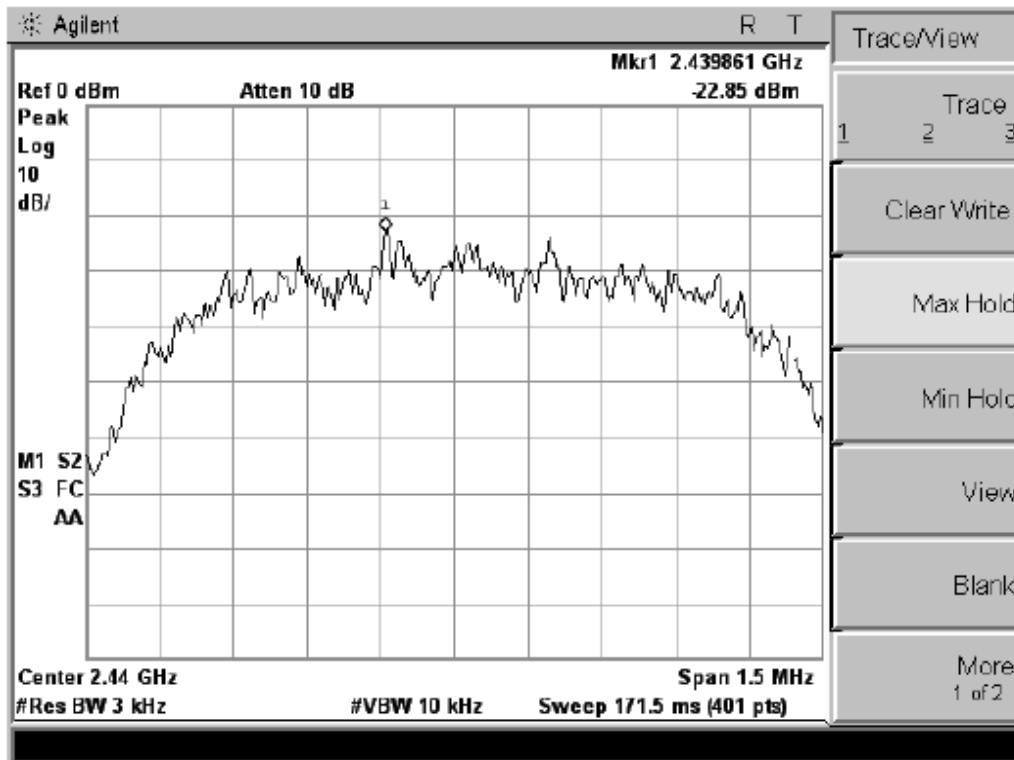
| Modulation | Frequency (MHz) | Reading Level (dBm) | Max. Limit (dBm/3KHz) | Result |
|------------|-----------------|---------------------|-----------------------|--------|
| GFSK       | 2402            | -22.84              | 8                     | Pass   |
|            | 2440            | -22.85              | 8                     | Pass   |
|            | 2480            | -23.58              | 8                     | Pass   |



Low Channel, 2402MHz



Middle Channel, 2440MHz







High Channel, 2480MHz

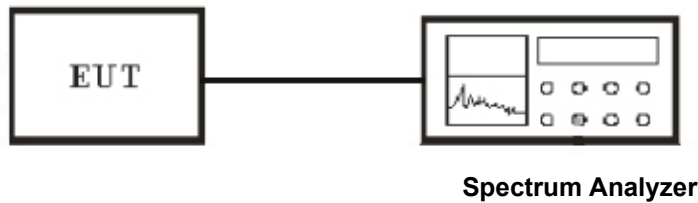


## 6. 6 dB Spectrum Bandwidth Measurement

### 6.1 Applicable Standard

According to §15.247(a)(2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

### 6.2 EUT Setup



### 6.3 Test Equipment List and Details

See section 2.4.

### 6.4 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The resolution bandwidth and the video bandwidth were set according to KDB558074.
3. Set Detector to Peak, Trace to Max Hold and Sweep Time is 100ms.

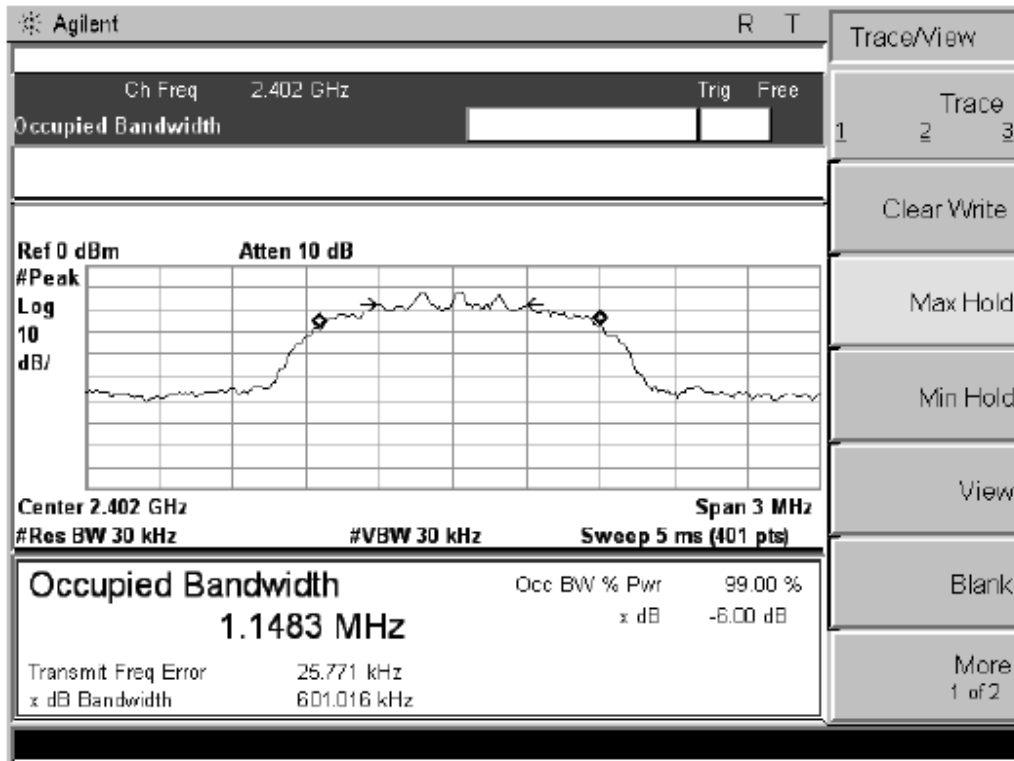
### 6.5 Test Result

|   |                              |
|---|------------------------------|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset       |
| Humidity (%RH) : 50~54                  | M/N:16                       |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode |

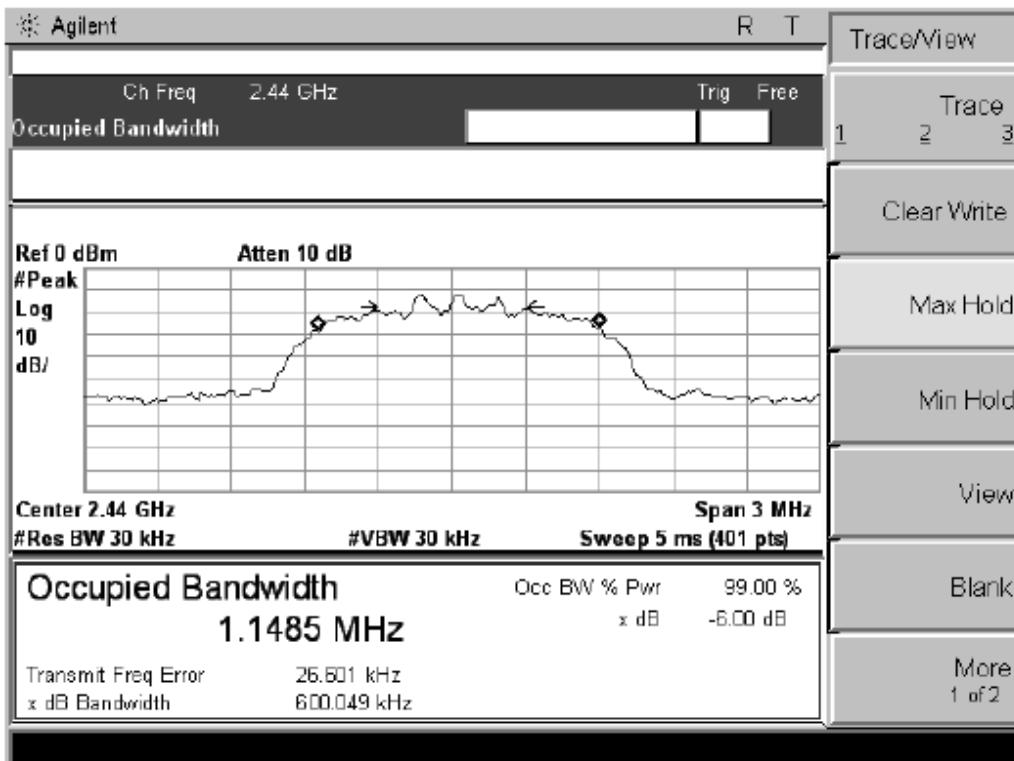
| Modulation Type | Frequency (MHz) | 6dB Bandwidth (KHz) | Min. Limit (KHz) | Result |
|-----------------|-----------------|---------------------|------------------|--------|
| GFSK            | 2402            | 601.02              | 500              | Pass   |
|                 | 2440            | 600.05              | 500              | Pass   |
|                 | 2480            | 601.30              | 500              | Pass   |



Low Channel, 2402MHz

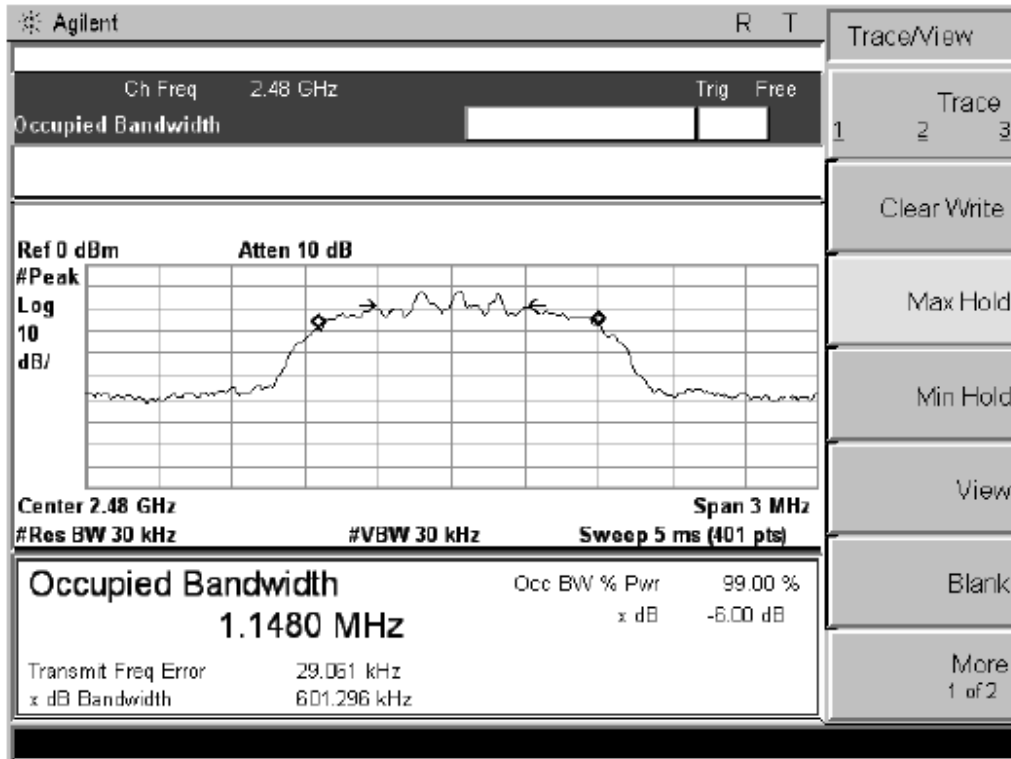


Middle Channel, 2440MHz





High Channel, 2480MHz



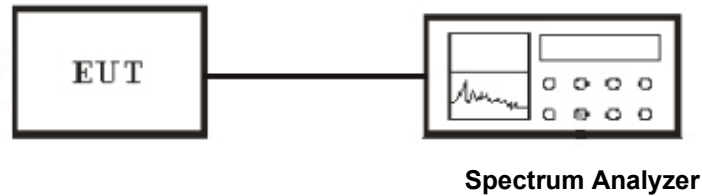
## 7. Occupied Bandwidth

### 7.1 Applicable Standard

According to §15.247(a): Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

### 7.2 EUT Setup



### 7.3 Test Equipment List and Details

See section 2.4.

### 7.4 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.
3. Set Detector to Peak, Trace to Max Hold and Sweep Time is 100ms.
4. Set the Span >RBW.

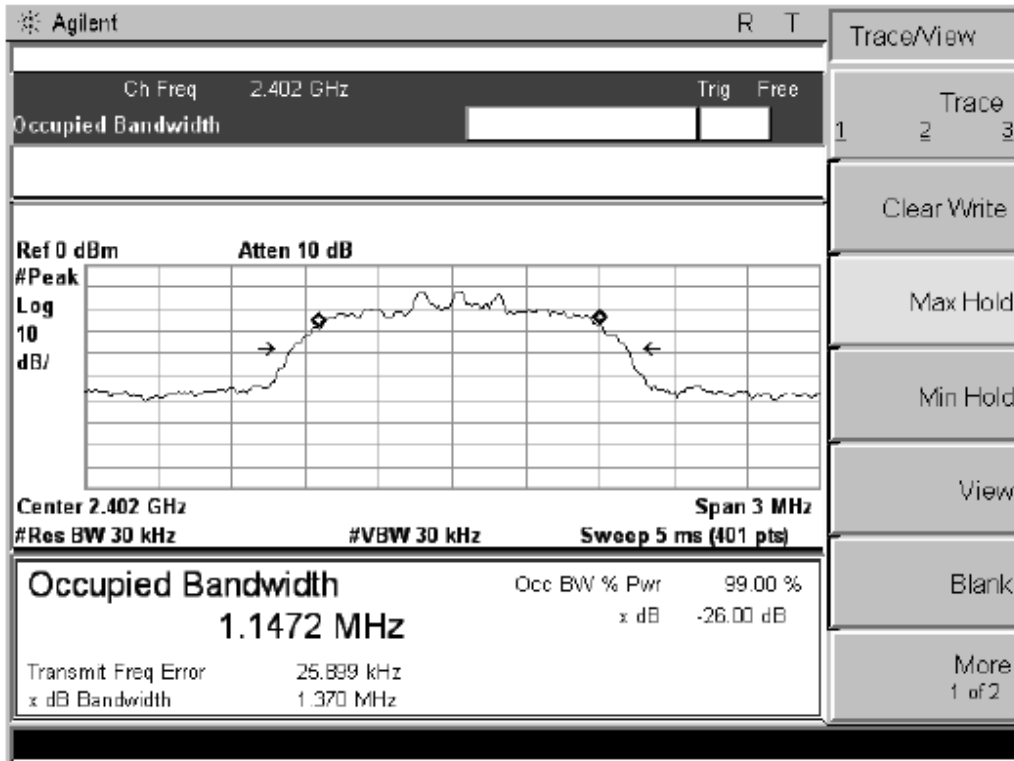
### 7.5 Test Result

|   |                              |
|---|------------------------------|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset       |
| Humidity (%RH) : 50~54                  | M/N:I6                       |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode |

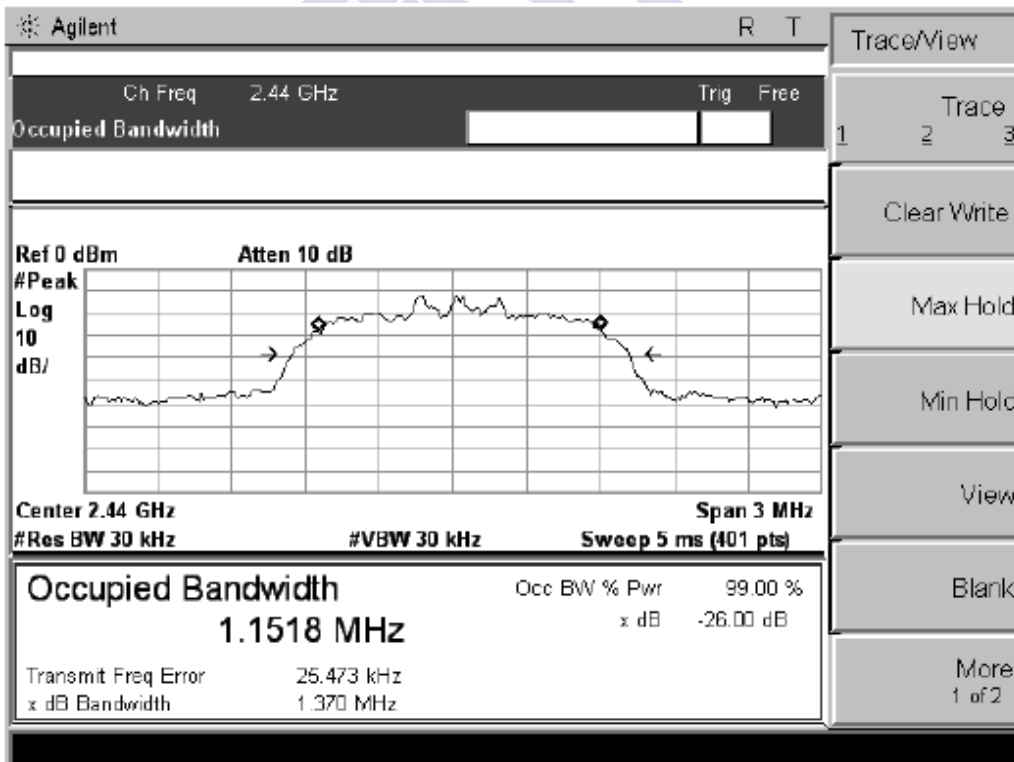
| Channel | Frequency | 99% OBW (MHz) |
|---------|-----------|---------------|
| 1       | 2402      | 1.147         |
| 20      | 2440      | 1.152         |
| 40      | 2480      | 1.147         |



Low Channel:

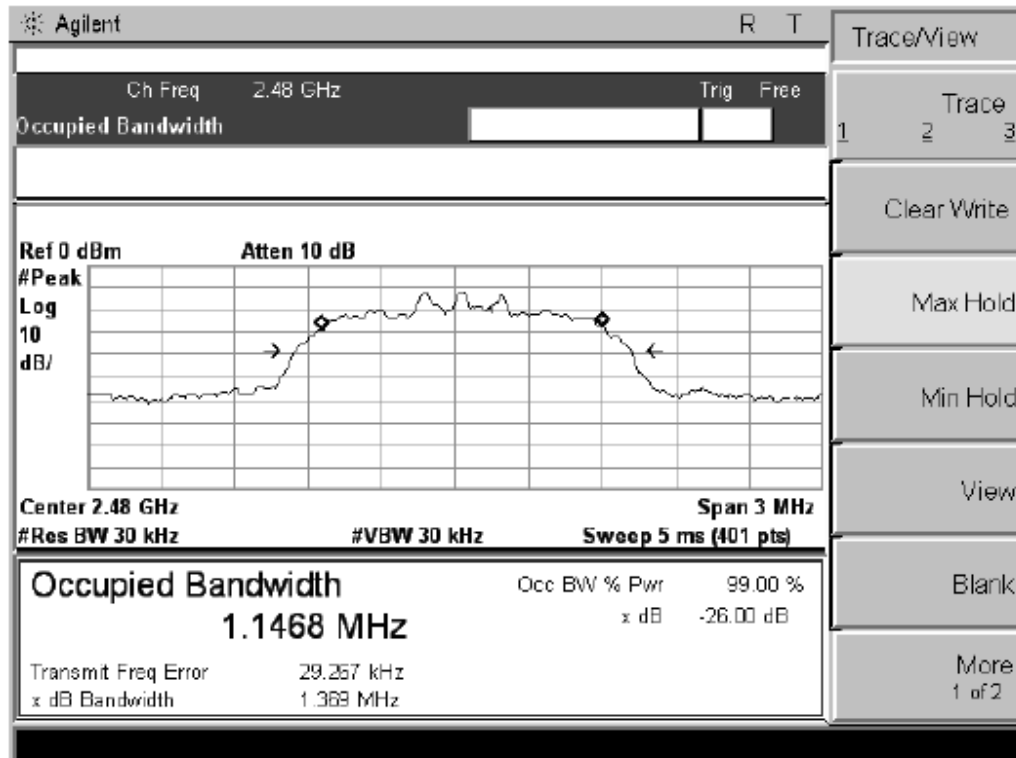


Middle Channel:





High Channel:



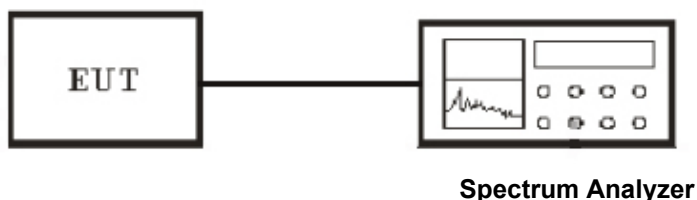
## 8. Test of Maximum Peak Output Power

### 8.1 Applicable Standard

According to §15.247(b): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.

### 8.2 EUT Setup



### 8.3 Test Equipment List and Details

See section 2.4.

### 8.4 Test Equipment List and Details

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 3MHz and VBW to 3MHz.Span to10MHz
3. Set Detector to Peak,

### 8.5 Test Result

|   |                              |
|---|------------------------------|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset       |
| Humidity (%RH) : 50~54                  | M/N:I6                       |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode |

| Channel | Frequency (MHz) | Output Power EIRP(dBm) | Output Power EIRP(mW) | Limits (mW) | Result |
|---------|-----------------|------------------------|-----------------------|-------------|--------|
| GFSK    | 2402            | 0.61                   | 1.15                  | 1000        | Pass   |
|         | 2440            | 0.65                   | 1.16                  | 1000        | Pass   |
|         | 2480            | 0.58                   | 1.14                  | 1000        | Pass   |



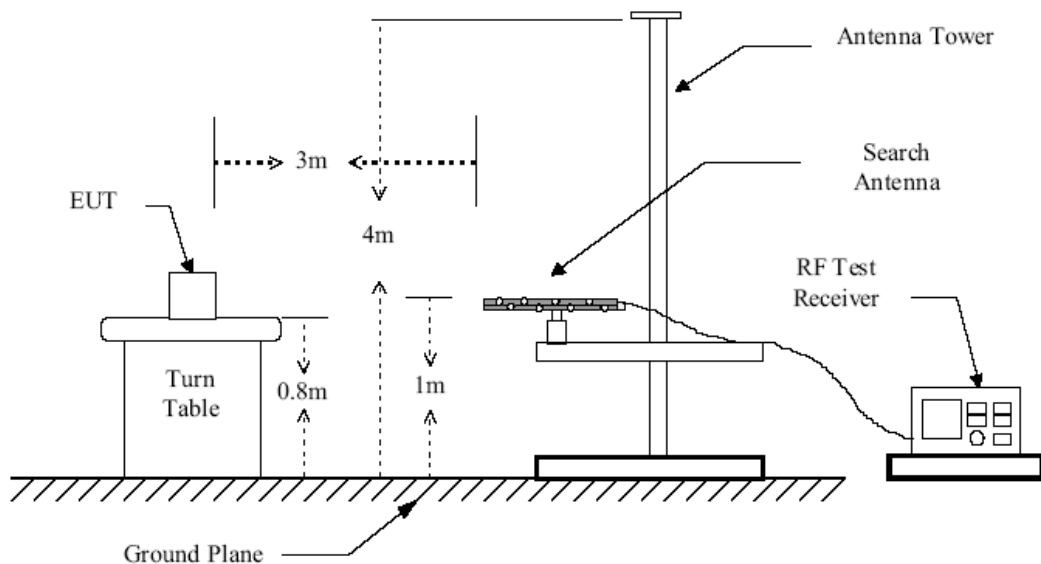
## 9. Test of Band Edges Emission

### 9.1 Applicable Standard

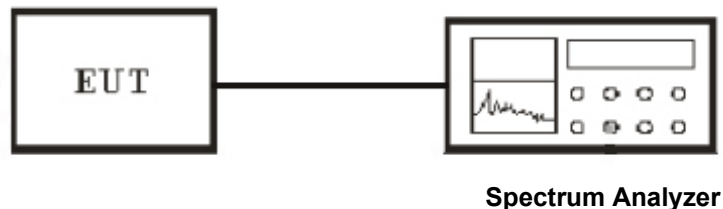
Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

### 9.2 EUT Setup

#### Radiated Measurement Setup



#### Conducted Measurement Setup



### 9.3 Test Equipment List and Details

See section 2.4.

### 9.4 Test Procedure

#### Conducted Measurement

1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100MHz bandwidth from lower band edge. Then detector set to peak and max hold this trace.
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

#### Radiated Measurement

1. Configure the EUT according to ANSI C63.4-2003
2. 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 emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For band edge emission, use 1MHz VBW and 1MHz RBW for reading under AV and use 1MHz VBW and 1MHz RBW for reading under PK.

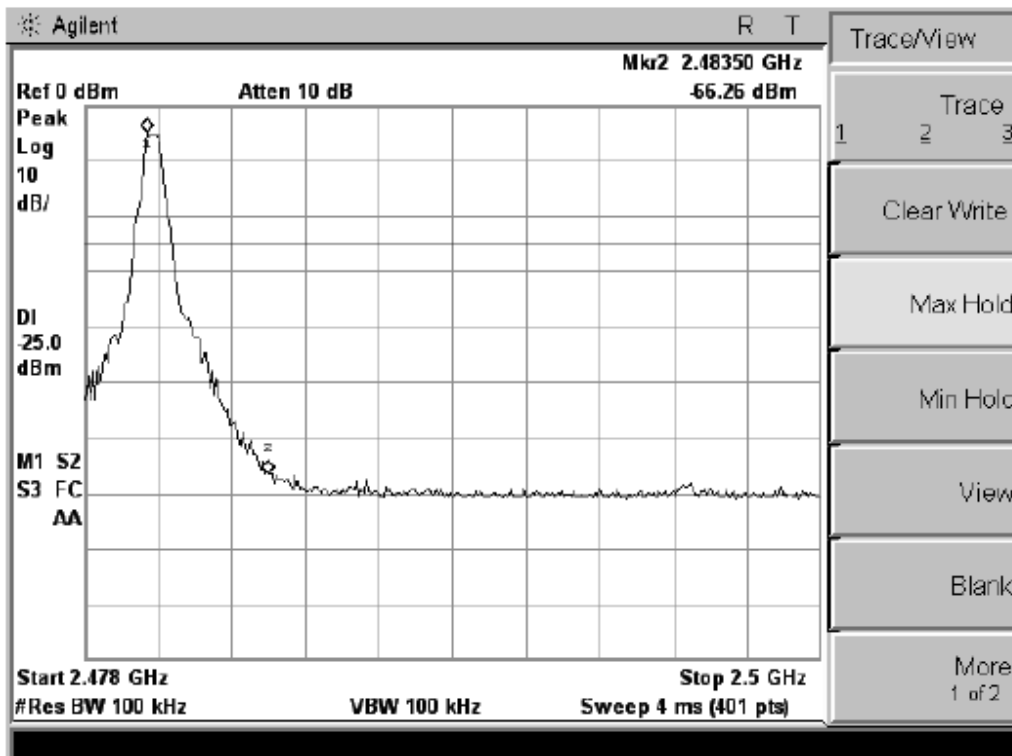
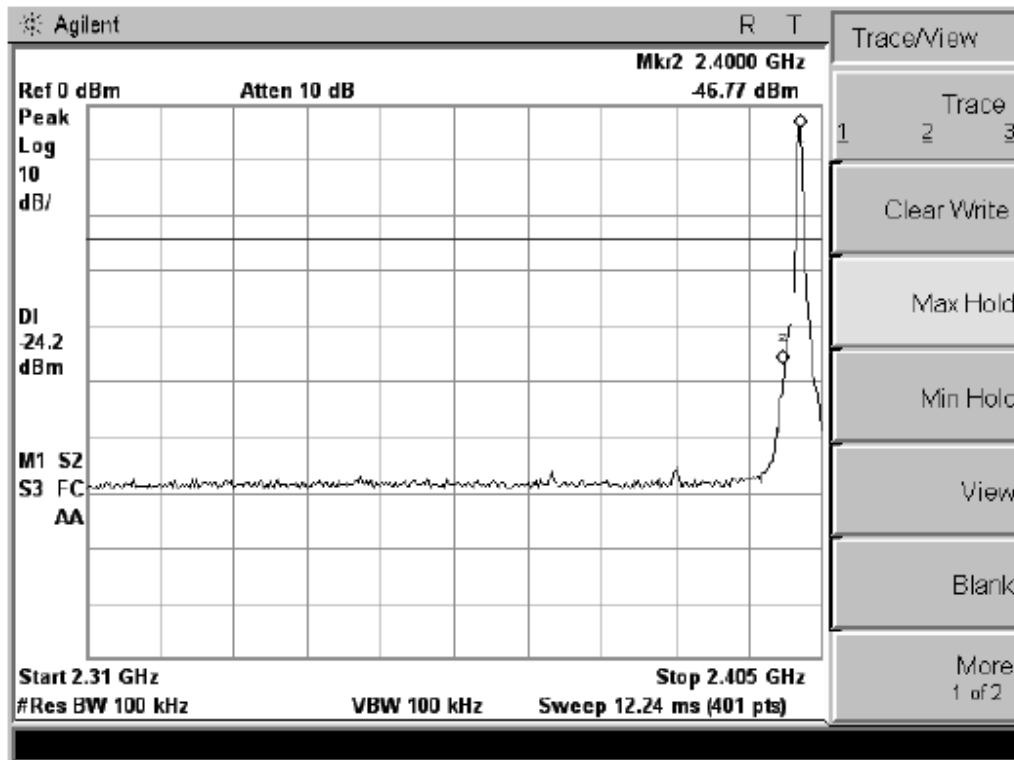
### 9.5 Test Result

|   |   |
|---|---|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset                    |
| Humidity (%RH) : 50~54                  | M/N:I6                                    |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode hopping mode |

Note:Channel low,mid and high,30MHz-25GHz conducted emissions all more than 20 dB below fundamental.And only record the worst band edge test datas.

#### Radiated Test Result

| Frequency(MHz) |
|----------------|
| <2400          |
| >2483.5        |



## 10. Test of Spurious Radiated Emission

### 10.1 Applicable Standard

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

**Limits for Class B digital devices**

| Frequency (MHz) | limits at 3m dB( $\mu$ V/m) |
|-----------------|-----------------------------|
| 30-88           | 40.0                        |
| 88-216          | 43.5                        |
| 216-960         | 46.0                        |
| Above 960       | 54.0                        |

- NOTE:**
1. The lower limit shall apply at the transition frequency.
  2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
  3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

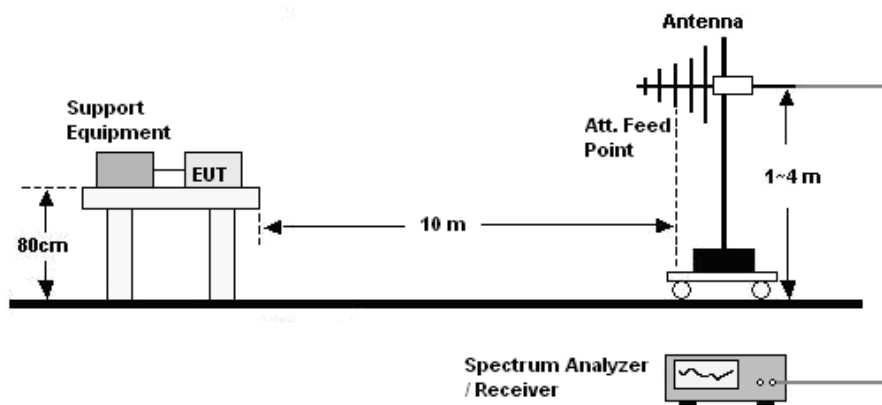
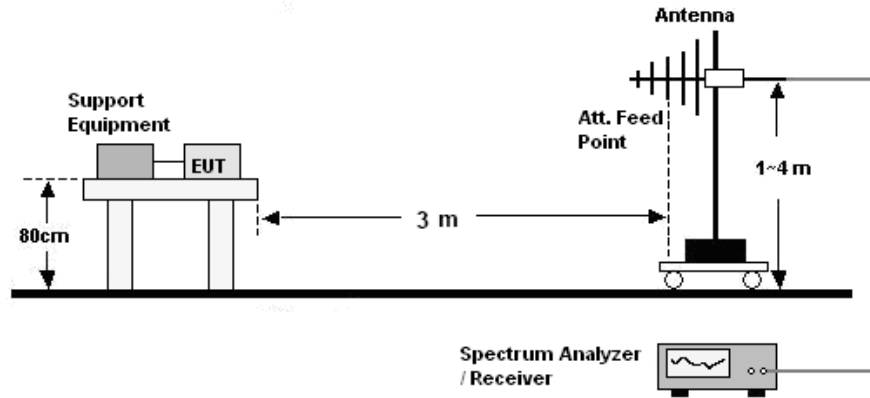
**Limits for Class B digital devices**

| Frequency (MHz) | limits at 10m dB( $\mu$ V/m) |
|-----------------|------------------------------|
| 30-88           | 30.0                         |
| 88-216          | 33.5                         |
| 216-960         | 56.0                         |
| Above 960       | 64.0                         |

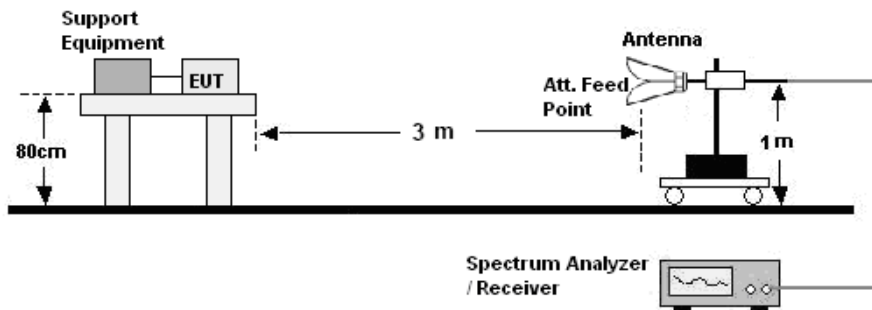
- NOTE:**
1. The lower limit shall apply at the transition frequency.
  2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
  3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

### 10.2 Radiated Measurement Setup

30MHz ~ 1GHz:



Above 1GHz:



### 10.3 Test Equipment List and Details

See section 2.4.

### 10.4 Radiated Measurement Test Procedure

#### 30MHz ~ 1GHz:

- a. The Product was placed on the non-conductive turntable 0.8/0.1 m above the ground at a chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

#### Above 1GHz:

- a. The Product was placed on the non-conductive turntable 0.8/0.1 m above the ground at a chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

### 10.5 Test Result

|   |                                       |
|---|---------------------------------------|
| Temperature ( °C ) : 22~23              | EUT: Bluetooth Headset                |
| Humidity (%RH) : 50~54                  | M/N:16                                |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Normal operation |

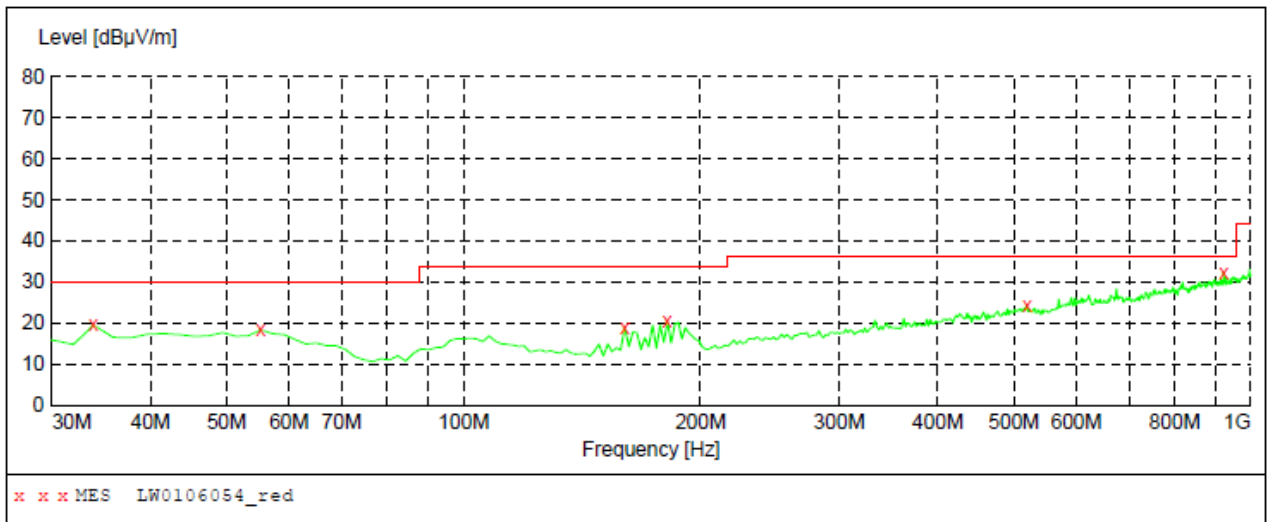


The Spurious Emission (30~1000MHz) Of Horizontal (BT TX Model L)

EUT: Bluetooth Headset
M/N: I6
Operating Condition: BT TX Channel Low
Test Site: 10m CHAMBER
Operator: Owen Li
Test Specification: DC 3.7V
Comment: Polarization: Horizontal
Tem:23°C Hum:50%

SWEEP TABLE: "test (30M-1G) 8447F"

Table with columns: Short Description, Field Strength, Start, Stop, Detector, Meas., IF, Transducer, Frequency, Frequency, Time, Bandw., MaxPeak, Coupled, 100 kHz, VBLU9163-484



MEASUREMENT RESULT: "LW0106054\_red"

1/6/2015 5:16PM

Table with columns: Frequency MHz, Level dBuV/m, Transd dB, Limit dBuV/m, Margin dB, Det., Height cm, Azimuth deg, Polarization

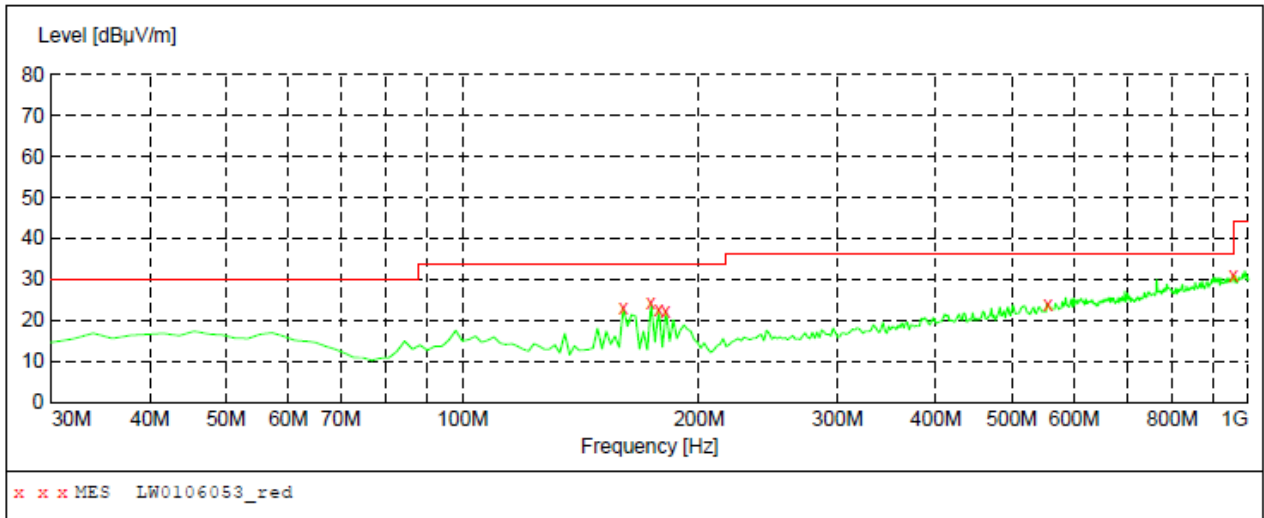


The Spurious Emission (30~1000MHz) Of Vertical (BT TX Model L)

EUT: Bluetooth Headset  
 M/N: I6  
 Operating Condition: BT TX Channel Low  
 Test Site: 10m CHAMBER  
 Operator: Owen Li  
 Test Specification: DC 3.7V  
 Comment: Polarization: Vertical  
 Tem:23°C Hum:50%

**SWEEP TABLE: "test (30M-1G) 8447F"**

| Short Description: |           | Field Strength |         |         |              |
|--------------------|-----------|----------------|---------|---------|--------------|
| Start              | Stop      | Detector       | Meas.   | IF      | Transducer   |
| Frequency          | Frequency |                | Time    | Bandw.  |              |
| 30.0 MHz           | 1.0 GHz   | MaxPeak        | Coupled | 100 kHz | VBLU9163-484 |



**MEASUREMENT RESULT: "LW0106053\_red"**

1/6/2015 5:10PM

| Frequency  | Level  | Transd | Limit  | Margin | Det. | Height | Azimuth | Polarization |
|------------|--------|--------|--------|--------|------|--------|---------|--------------|
| MHz        | dBuV/m | dB     | dBuV/m | dB     |      | cm     | deg     |              |
| 160.240481 | 22.90  | -15.4  | 33.5   | 10.6   | ---  | 100.0  | 364.00  | VERTICAL     |
| 173.847695 | 24.20  | -14.6  | 33.5   | 9.3    | ---  | 100.0  | 349.00  | VERTICAL     |
| 177.735471 | 22.70  | -14.3  | 33.5   | 10.8   | ---  | 100.0  | 349.00  | VERTICAL     |
| 181.623246 | 22.10  | -13.9  | 33.5   | 11.4   | ---  | 100.0  | 44.00   | VERTICAL     |
| 556.793587 | 24.00  | -5.3   | 36.0   | 12.0   | ---  | 100.0  | 258.00  | VERTICAL     |
| 957.234469 | 30.80  | 0.3    | 36.0   | 5.2    | ---  | 100.0  | 364.00  | VERTICAL     |



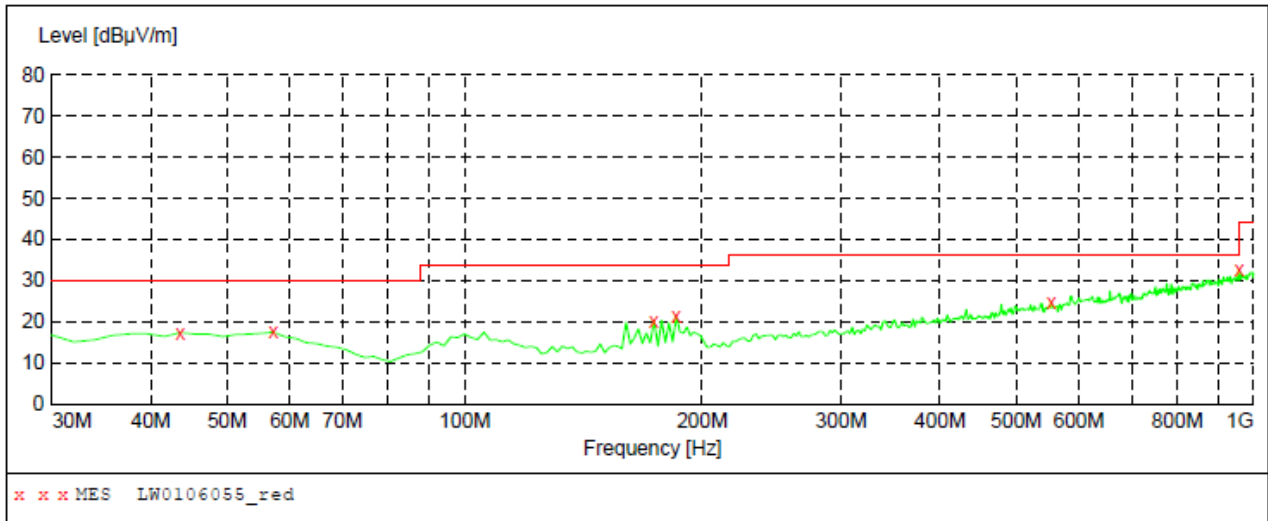


The Spurious Emission (30~1000MHz) Of Horizontal (BT TX Model M)

EUT: Bluetooth Headset
M/N: I6
Operating Condition: BT TX Channel Middle
Test Site: 10m CHAMBER
Operator: Owen Li
Test Specification: DC 3.7V
Comment: Polarization: Horizontal
Tem:23°C Hum:50%

SWEEP TABLE: "test (30M-1G) 8447F"

Table with 6 columns: Short Description, Start Frequency, Stop Frequency, Detector, Meas. Time, IF Bandw., Transducer. Row 1: Field Strength, 30.0 MHz, 1.0 GHz, MaxPeak, Coupled, 100 kHz, VBLU9163-484



MEASUREMENT RESULT: "LW0106055\_red"

1/6/2015 5:23PM

Table with 9 columns: Frequency MHz, Level dBuV/m, Transd dB, Limit dBuV/m, Margin dB, Det., Height cm, Azimuth deg, Polarization. Contains 6 rows of measurement data.

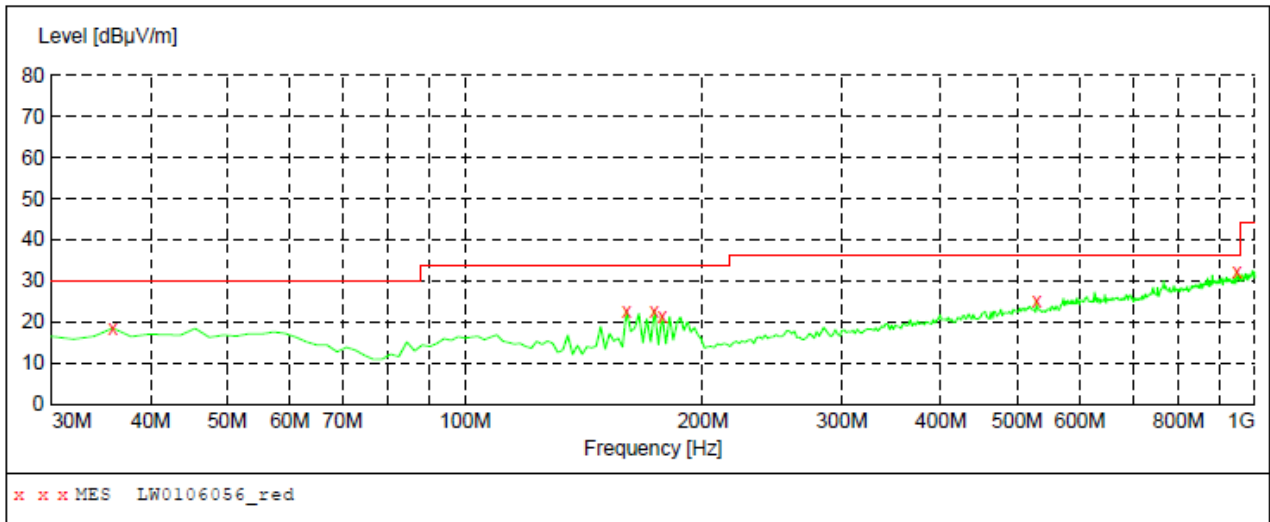


The Spurious Emission (30~1000MHz) Of Vertical (BT TX Model M)

EUT: Bluetooth Headset
M/N: I6
Operating Condition: BT TX Channel Middle
Test Site: 10m CHAMBER
Operator: Owen Li
Test Specification: DC 3.7V
Comment: Polarization: Vertical
Tem:23°C Hum:50%

SWEEP TABLE: "test (30M-1G) 8447F"

Table with 6 columns: Start Frequency, Stop Frequency, Detector, Meas. Time, IF Bandw., Transducer. Row 1: 30.0 MHz, 1.0 GHz, MaxPeak, Coupled, 100 kHz, VBLU9163-484



MEASUREMENT RESULT: "LW0106056\_red"

1/6/2015 5:29PM

Table with 9 columns: Frequency MHz, Level dBuV/m, Transd dB, Limit dBuV/m, Margin dB, Det., Height cm, Azimuth deg, Polarization. Contains 6 rows of measurement data.

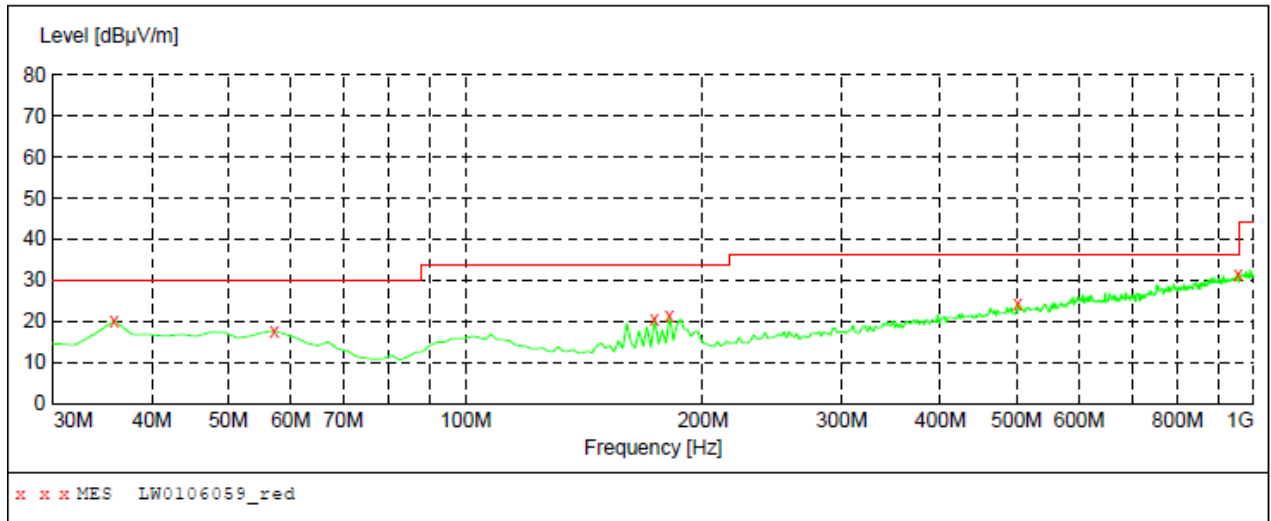


The Spurious Emission (30~1000MHz) Of Horizontal (BT TX Model H)

EUT: Bluetooth Headset
M/N: I6
Operating Condition: BT TX Channel High
Test Site: 10m CHAMBER
Operator: Owen Li
Test Specification: DC 3.7V
Comment: Polarization: Horizontal
Tem:23°C Hum:50%

SWEEP TABLE: "test (30M-1G) 8447F"

Table with 6 columns: Short Description, Start Frequency, Stop Frequency, Detector, Meas. Time, IF Bandw., Transducer. Row 1: Field Strength, 30.0 MHz, 1.0 GHz, MaxPeak, Coupled, 100 kHz, VBLU9163-484



MEASUREMENT RESULT: "LW0106059\_red"

1/6/2015 5:49PM

Table with 10 columns: Frequency MHz, Level dBuV/m, Transd dB, Limit dBuV/m, Margin dB, Det., Height cm, Azimuth deg, Polarization. Contains 5 rows of measurement data.

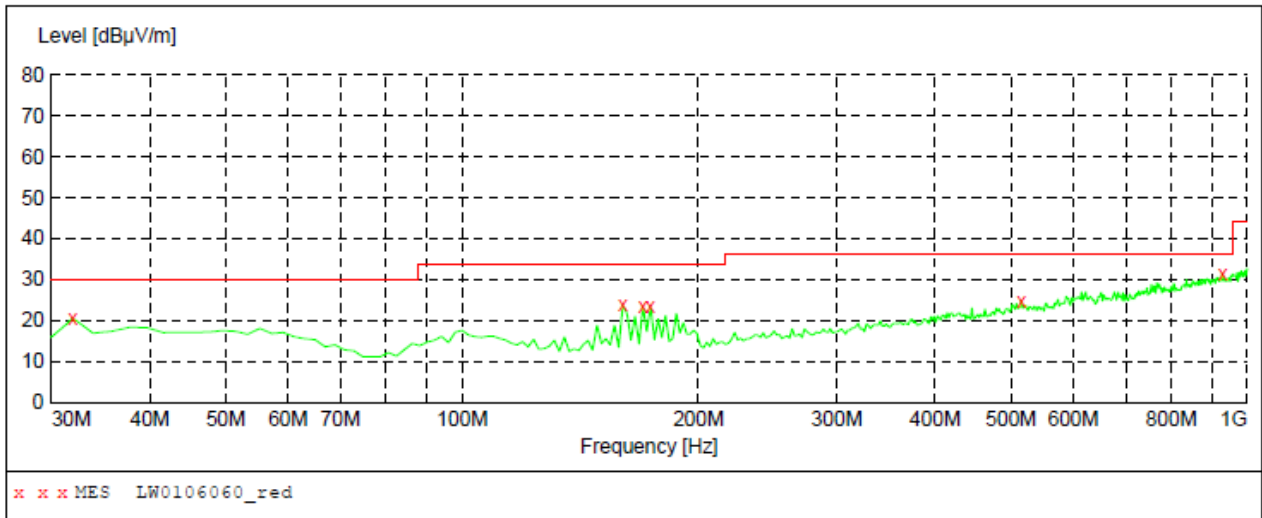


The Spurious Emission (30~1000MHz) Of Vertical (BT TX Model H)

EUT: Bluetooth Headset
M/N: I6
Operating Condition: BT TX Channel High
Test Site: 10m CHAMBER
Operator: Owen Li
Test Specification: DC 3.7V
Comment: Polarization: Vertical
Tem:23°C Hum:50%

SWEEP TABLE: "test (30M-1G) 8447F"

Table with 7 columns: Short Description, Start Frequency, Stop Frequency, Detector, Meas. Time, IF Bandw., Transducer. Row 1: Field Strength, 30.0 MHz, 1.0 GHz, MaxPeak, Coupled, 100 kHz, VBLU9163-484



MEASUREMENT RESULT: "LW0106060\_red"

1/6/2015 5:55PM

Table with 10 columns: Frequency MHz, Level dBuV/m, Transd dB, Limit dBuV/m, Margin dB, Det., Height cm, Azimuth deg, Polarization. Contains 6 rows of measurement data.



The Spurious Emission (Above 1GHz)

| Test Results-(Measurement Distance: 3m)_Channel low |                   |             |                        |             |             |               |              |
|---|-------------------|-------------|------------------------|-------------|-------------|---------------|--------------|
| Frequency (MHz)                                     | Measurement value |             | Correction Factor (dB) | Limit       |             | Antenna (H/V) | Result (P/F) |
|   | PK (dBμV/m)       | AV (dBμV/m) |                        | PK (dBμV/m) | AV (dBμV/m) |               |              |
| 2402.000*   | 90.67             | 89.42       | 1.5                    | ---         | ---         | H             | P            |
| 4804.000  | 43.64             | 42.51       | 3.7                    | 74          | 54          | H             | P            |
| 7206.000  | 31.29             | 30.87       | 6.3                    | 74          | 54          | H             | P            |
| 2402.000*   | 89.72             | 87.69       | 1.3                    | ---         | ---         | V             | P            |
| 4804.000  | 41.52             | 40.38       | 3.4                    | 74          | 54          | V             | P            |
| 7206.000  | 29.44             | 28.37       | 6.1                    | 74          | 54          | V             | P            |

\*: fundamental frequency

Remark:

- According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report. All outside of operating frequency band and restricted band specified are below 15.209.
- Calculation of result is:  
Measurement value(dBμV/m) = Reading Value(dBμV/m) + Correction Factor (dB)
- The Measurement value must be less than limit,the result is Pass.

| Test Results-(Measurement Distance: 3m)_Channel middle |                   |             |                        |             |             |               |              |
|--|-------------------|-------------|------------------------|-------------|-------------|---------------|--------------|
| Frequency (MHz)  | Measurement value |             | Correction Factor (dB) | Limit       |             | Antenna (H/V) | Result (P/F) |
|  | PK (dBμV/m)       | AV (dBμV/m) |                        | PK (dBμV/m) | AV (dBμV/m) |               |              |
| 2440.000*  | 91.45             | 90.63       | 1.8                    | ---         | ---         | H             | P            |
| 4880.000   | 43.28             | 41.54       | 4.1                    | 74          | 54          | H             | P            |
| 7320.000   | 31.08             | 29.87       | 6.8                    | 74          | 54          | H             | P            |
| 2440.000*  | 90.16             | 88.35       | 1.7                    | ---         | ---         | V             | P            |
| 4880.000   | 40.87             | 38.26       | 3.8                    | 74          | 54          | V             | P            |
| 7320.000   | 28.76             | 27.33       | 6.5                    | 74          | 54          | V             | P            |

\*: fundamental frequency

Remark:

- According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report. All outside of operating frequency band and restricted band specified are below 15.209.
- Calculation of result is:  
Measurement value(dBμV/m) = Reading Value(dBμV/m) + Correction Factor (dB)
- The Measurement value must be less than limit,the result is Pass.

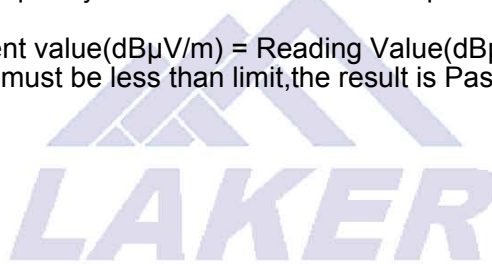
| Test Results-(Measurement Distance: 3m)_Channel High |                   |                   |                        |                   |                   |               |              |
|--|-------------------|-------------------|------------------------|-------------------|-------------------|---------------|--------------|
| Frequency (MHz)                                      | Measurement value |                   | Correction Factor (dB) | Limit             |                   | Antenna (H/V) | Result (P/F) |
|  | PK (dB $\mu$ V/m) | AV (dB $\mu$ V/m) |                        | PK (dB $\mu$ V/m) | AV (dB $\mu$ V/m) |               |              |
| 2480.000*  | 89.42             | 897.63            | 2.2                    | ---               | ---               | H             | P            |
| 4960.000   | 39.45             | 37.84             | 4.4                    | 74                | 54                | H             | P            |
| 7440.000   | 29.67             | 27.59             | 7.3                    | 74                | 54                | H             | P            |
| 2480.000*  | 88.93             | 87.52             | 2.1                    | ---               | ---               | V             | P            |
| 4960.000   | 37.21             | 36.49             | 4.0                    | 74                | 54                | V             | P            |
| 7440.000   | 28.69             | 27.31             | 7.2                    | 74                | 54                | V             | P            |

\*: fundamental frequency

Remark:

1. According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report. All outside of operating frequency band and restricted band specified are below 15.209.
2. Calculation of result is:  

$$\text{Measurement value(dB}\mu\text{V/m)} = \text{Reading Value(dB}\mu\text{V/m)} + \text{Correction Factor (dB)}$$
3. The Measurement value must be less than limit,the result is Pass.





## 11. ANTENNA REQUIREMENT

### 11.1 Standard Applicable

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. 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.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

### 11.2 Antenna Connected Construction

The antenna used in this product is complied with Standard. The maximum Gain of the antenna lower than 6.0dBi and the antenna is integrated, fixed on PCB.

APPENDIX A - External Photographs

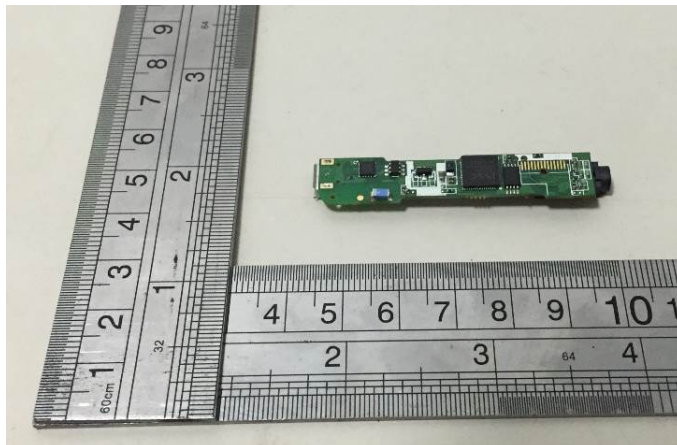
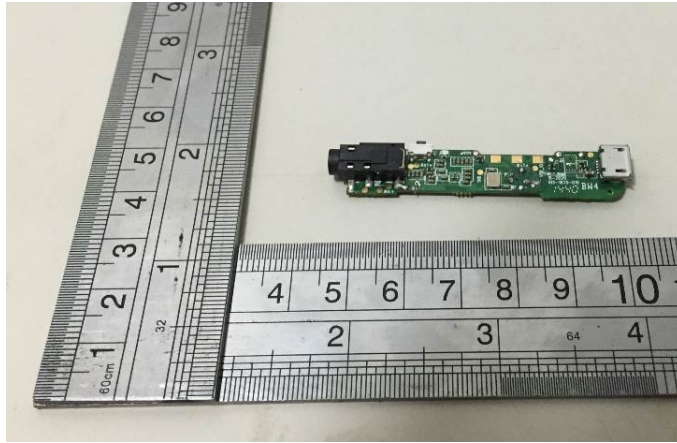




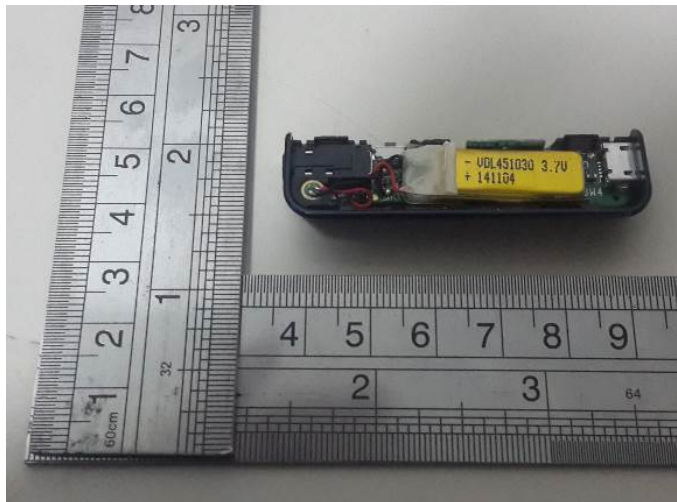


## APPENDIX B - Internal Photographs

### EUT –PCB View



### EUT –Battery View



## APPENDIX C - Test Setup Photographs

### Conducted Emission Test



### Radiated Emission Test

