



FCC TEST REPORT

**Test report
On Behalf of
Shenzhen Shengxingwang Precision Technology Co., Ltd For
True wireless earbuds
Model No.: TWS-P10**

FCC ID: 2AOQK-TWSP10

Prepared for : Shenzhen Shengxingwang Precision Technology Co., Ltd
7/F, Building G, LongJing Industrial Park, Bantian Street, Shenzhen, Guangdong,
China

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

Date of Test: Sep. 05, 2018 ~ Sep. 12, 2018

Date of Report: Sep. 17, 2018

Report Number: HK1809111028E



TEST RESULT CERTIFICATION

Applicant's name : Shenzhen Shengxingwang Precision Technology Co., Ltd
 Address : 7/F, Building G, LongJing Industrial Park, Bantian Street, Shenzhen, Guangdong, China
Manufacture's Name : Shenzhen Shengxingwang Precision Technology Co., Ltd
 Address : 7/F, Building G, LongJing Industrial Park, Bantian Street, Shenzhen, Guangdong, China

Product description

Trade Mark : N/A
 Product Name : True wireless earbuds
 Model and/or type reference : TWS-P10
 Series Model..... G08, TWS-P9, TWS-S10, TWS-A10, TWS-A9, TWS-F10, TWS-X7, TWS-i10, TWS-F9, TWS-E9, TWS-i9, TWS-E10, TWS-D10, TWS-Z9
 Difference Description All the same except for the model name.
Standards : FCC Rules and Regulations Part 15 Subpart C Section 15.249
 ANSI C63.10: 2013

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Date of Test :
 Date (s) of performance of tests : Sep. 05, 2018 ~ Sep. 12, 2018
 Date of Issue : Sep. 17, 2018
 Test Result : **Pass**

Testing Engineer : Gary Qian
 (Gary Qian)

Technical Manager : Eden Hu
 (Eden Hu)

Authorized Signatory : Jason Zhou
 (Jason Zhou)



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1. TEST SUMMARY

1.1. TEST PROCEDURES AND RESULTS

| DESCRIPTION OF TEST | RESULT |
|--------------------------------|-----------|
| CONDUCTED EMISSIONS TEST | N/A |
| RADIATED EMISSION TEST | COMPLIANT |
| BAND EDGE | COMPLIANT |
| OCCUPIED BANDWIDTH MEASUREMENT | COMPLIANT |
| ANTENNA REQUIREMENT | COMPLIANT |

Note: N/A means it's not applicable to this item.

1.2. TEST FACILITY

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

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

Designation Number: : CN1229

Test Firm Registration Number : 616276

1.3. MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty(9kHz-30MHz) = 3.08dB, k=2

Radiated emission expanded uncertainty(30MHz-1000MHz) = 4.42dB, k=2

Radiated emission expanded uncertainty(Above 1GHz) = 4.06dB, k=2



2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Operation Frequency | 2.402 GHz to 2.480GHz |
| Bluetooth Version | V5.0 |
| Modulation | BR <input checked="" type="checkbox"/> GFSK, EDR <input checked="" type="checkbox"/> π /4-DQPSK, <input checked="" type="checkbox"/> 8DPSK BLE <input type="checkbox"/> GFSK |
| Number of channels | 79 |
| Hardware Version | V1.1 |
| Software Version | V1 |
| Antenna Designation | Ceramic Antenna |
| Antenna Gain | 3.19dBi |
| Power Supply | DC 3.7V by battery |
| Note: 1. The BT function of EUT didn't work when charging. 2. The EUT comprises left and right channel earphone, both are the same and have been tested. Only the test data of right earphone recorded in this report. 3. EUT didn't support BLE. | |



2.2. CARRIER FREQUENCY OF CHANNELS

BR/EDR Channel List

| Frequency Band | Channel Number | Frequency |
|----------------|----------------|-----------|
| 2400~2483.5MHz | 0 | 2402MHz |
| | 1 | 2403MHz |
| | : | : |
| | 38 | 2440 MHz |
| | 39 | 2441 MHz |
| | 40 | 2442 MHz |
| | : | : |
| | 77 | 2479 MHz |
| | 78 | 2480 MHz |

2.3. OPERATION OF EUT DURING TESTING

| NO. | TEST MODE DESCRIPTION |
|-----|-------------------------------|
| 1 | Low channel GFSK |
| 2 | Middle channel GFSK |
| 3 | High channel GFSK |
| 4 | Low channel $\pi/4$ -DQPSK |
| 5 | Middle channel $\pi/4$ -DQPSK |
| 6 | High channel $\pi/4$ -DQPSK |
| 7 | Middle channel 8DPSK |
| 8 | High channel 8DPSK |
| 9 | BT Link(Hopping mode) |

Note:

1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. The EUT used fully-charged battery when tested.

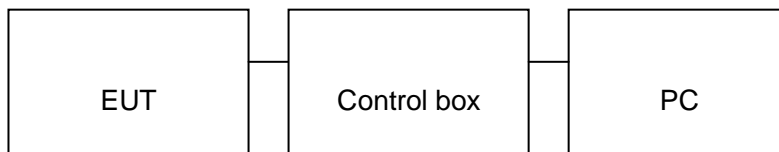


2.4. DESCRIPTION OF TEST SETUP

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



2.5. EQUIPMENT USED IN EUT SYSTEM

| Item | Equipment | Mfr/Brand | Model/Type No. | Remark |
|------|-----------------------|---------------|-----------------|-----------|
| 1 | True wireless earbuds | Shengxingwang | TWS-P10 | EUT |
| 2 | Battery | TW | 541114 | Accessory |
| 3 | PC | APPLE | A1465 | A.E |
| 4 | IPOD | APPLE | A1367 | A.E |
| 5 | Control box | AIROHA | N/A | A.E |
| 6 | USB Cable | N/A | 0.3m Unshielded | Accessory |
| 7 | USB Cable | N/A | 1m Unshielded | A.E |

**2.6. MEASUREMENT INSTRUMENTS LIST****TEST EQUIPMENT OF RADIATED EMISSION TEST**

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|--------------------------|-----------------|--------------|------------|---------------|---------------|
| 1. | Spectrum analyzer | Agilent | N9020A | HKE-048 | Dec. 28, 2017 | 1 Year |
| 2. | Preamplifier | Schwarzbeck | BBV 9743 | HKE-006 | Dec. 28, 2017 | 1 Year |
| 3. | EMI Test Receiver | Rohde & Schwarz | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 4. | Bilog Broadband Antenna | Schwarzbeck | VULB9163 | HKE-012 | Dec. 28, 2017 | 1 Year |
| 5. | Loop Antenna | Schwarzbeck | FMZB 1519 B | HKE-014 | Dec. 28, 2017 | 1 Year |
| 6. | Horn Antenna | Schwarzbeck | 9120D | HKE-013 | Dec. 28, 2017 | 1 Year |
| 7. | Broad-band Horn Antenna | Schwarzbeck | LB-180400-KF | HKE-031 | Dec. 28, 2017 | 1 Year |
| 8. | Pre-amplifier | EMCI | EMC051845SE | HKE-015 | Dec. 28, 2017 | 1 Year |
| 9. | Pre-amplifier | Agilent | 83051A | HKE-016 | Dec. 28, 2017 | 1 Year |
| 10. | Filter (2.4-2.483GHz) | Micro-tronics | 087 | -- | N/A | N/A |
| 11. | Radiation Cable 1 | MXT | HK1 | R05 | N/A | N/A |
| 12. | Radiation Cable 2 | MXT | HK1 | R06 | N/A | N/A |

3. CONDUCTED EMISSIONS TEST

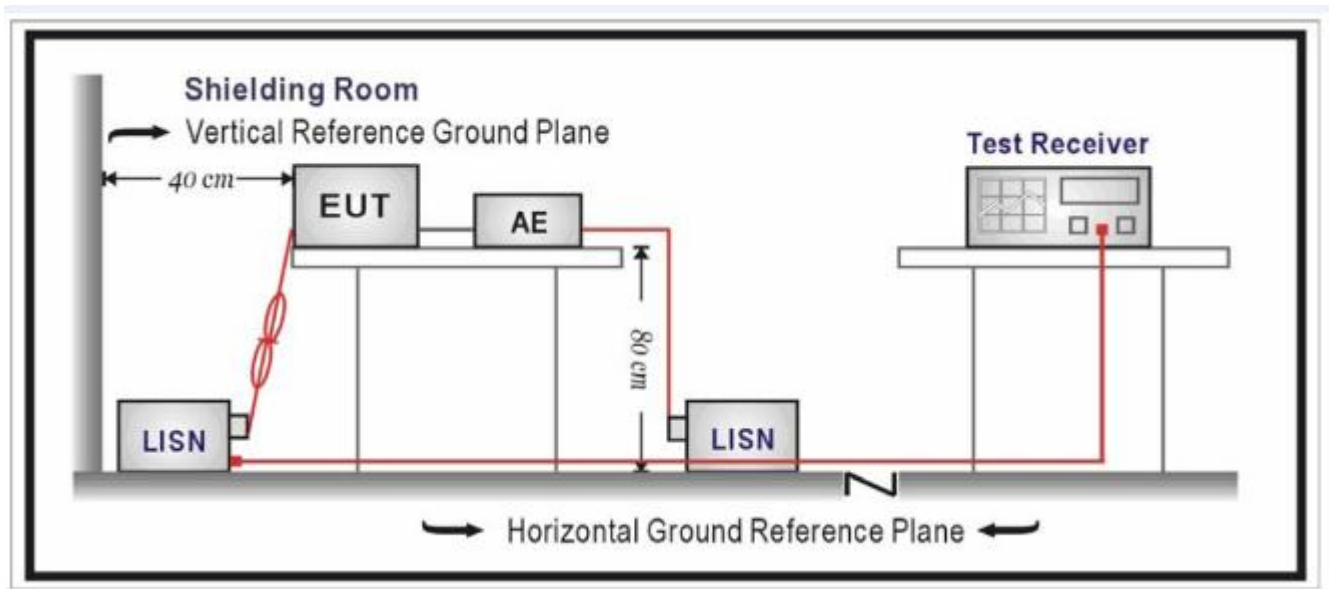
3.1. LIMITS OF LINE CONDUCTED EMISSION TEST

| Frequency | Maximum RF Line Voltage | |
|---------------|-------------------------|----------------|
| | Q.P.(dBuV) | Average(dBuV) |
| 150kHz~500kHz | 66-56 | 56-46 |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |

Note:

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

3.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST





3.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10-2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter or PC which received 120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

3.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

3.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

N/A

Note: The BT function of EUT didn't work when charging.



4. RADIATED EMISSION TEST

4.1 TEST LIMIT

Standard FCC15.249

| Fundamental Frequency | Field Strength of Fundamental (millivolts/meter) | Field Strength of Harmonics (microvolts/meter) |
|-----------------------|--|--|
| 900-928MHz | 50 | 500 |
| 2400-2483.5MHz | 50 | 500 |
| 5725-5875MHz | 50 | 500 |
| 24.0-24.25GHz | 250 | 2500 |

Standard FCC 15.209

| Frequency (MHz) | Distance Meters | Field Strengths Limit | |
|-----------------|-----------------|--|----------------|
| | | μ V/m | dB(μ V)/m |
| 0.009 ~ 0.490 | 300 | 2400/F(kHz) | --- |
| 0.490 ~ 1.705 | 30 | 24000/F(kHz) | --- |
| 1.705 ~ 30 | 30 | 30 | --- |
| 30 ~ 88 | 3 | 100 | 40.0 |
| 88 ~ 216 | 3 | 150 | 43.5 |
| 216 ~ 960 | 3 | 200 | 46.0 |
| 960 ~ 1000 | 3 | 500 | 54.0 |
| Above 1000 | 3 | Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average) | |

Remark:

- (1) Emission level $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.



4.2. MEASUREMENT PROCEDURE

1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

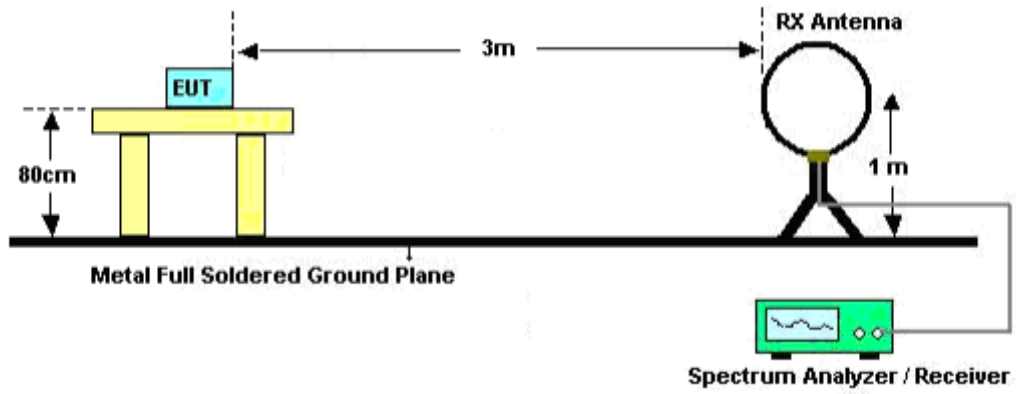


The following table is the setting of spectrum analyzer and receiver.

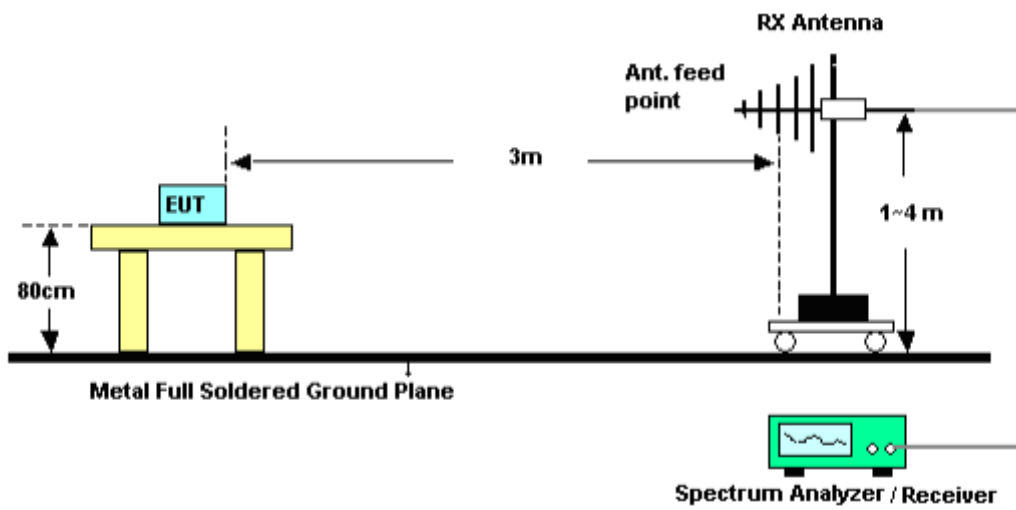
| Spectrum Parameter | Setting |
|---------------------------|--|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |
| Start ~Stop Frequency | Fundamental: 2.4~2.483GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 2MHz/ VBW 10Hz for Average Harmonics: 1GHz~25GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 10Hz for Average |
| Receiver Parameter | Setting |
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |

4.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz

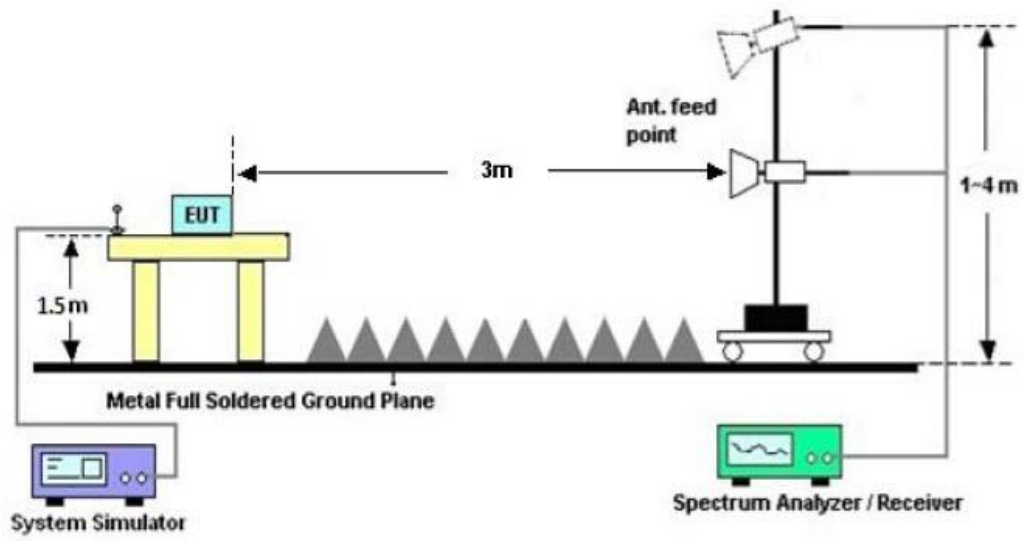


RADIATED EMISSION TEST SETUP 30MHz-1000MHz





RADIATED EMISSION TEST SETUP ABOVE 1000MHz





4.4. TEST RESULT

FOR BR/EDR

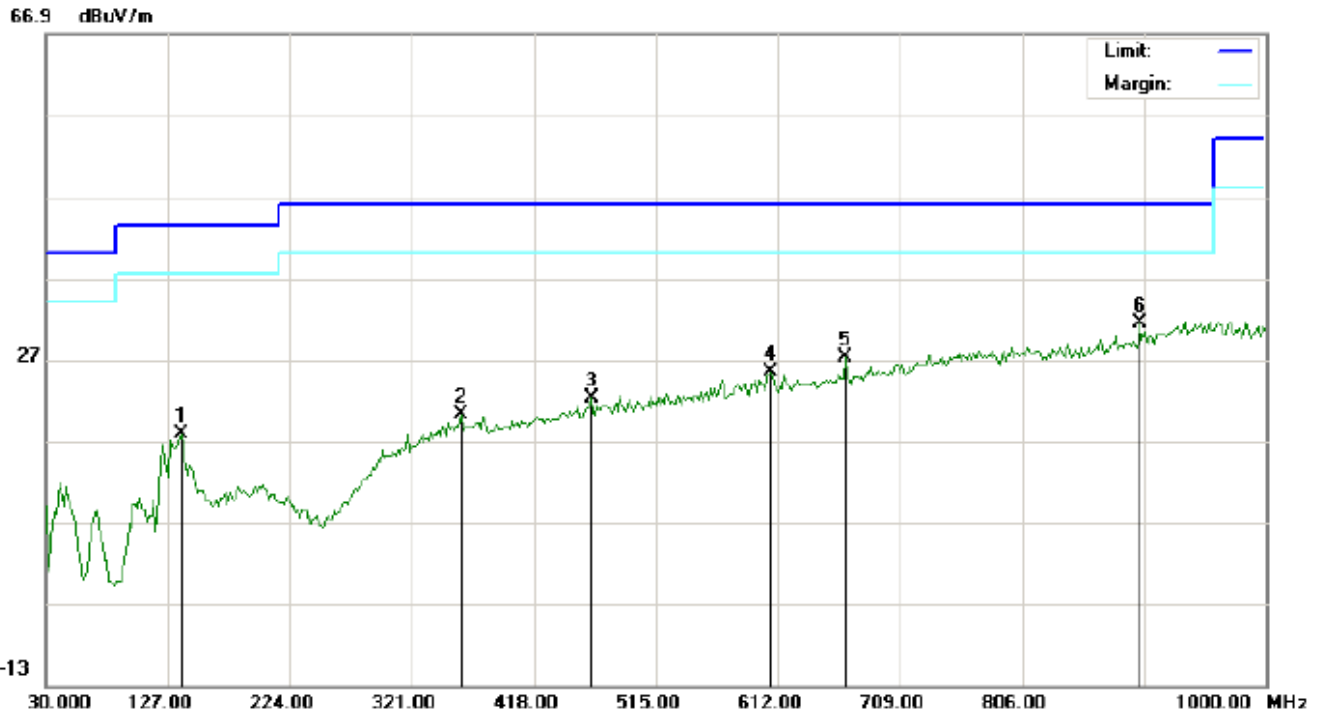
(Worst modulation: GFSK)

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHz

RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL



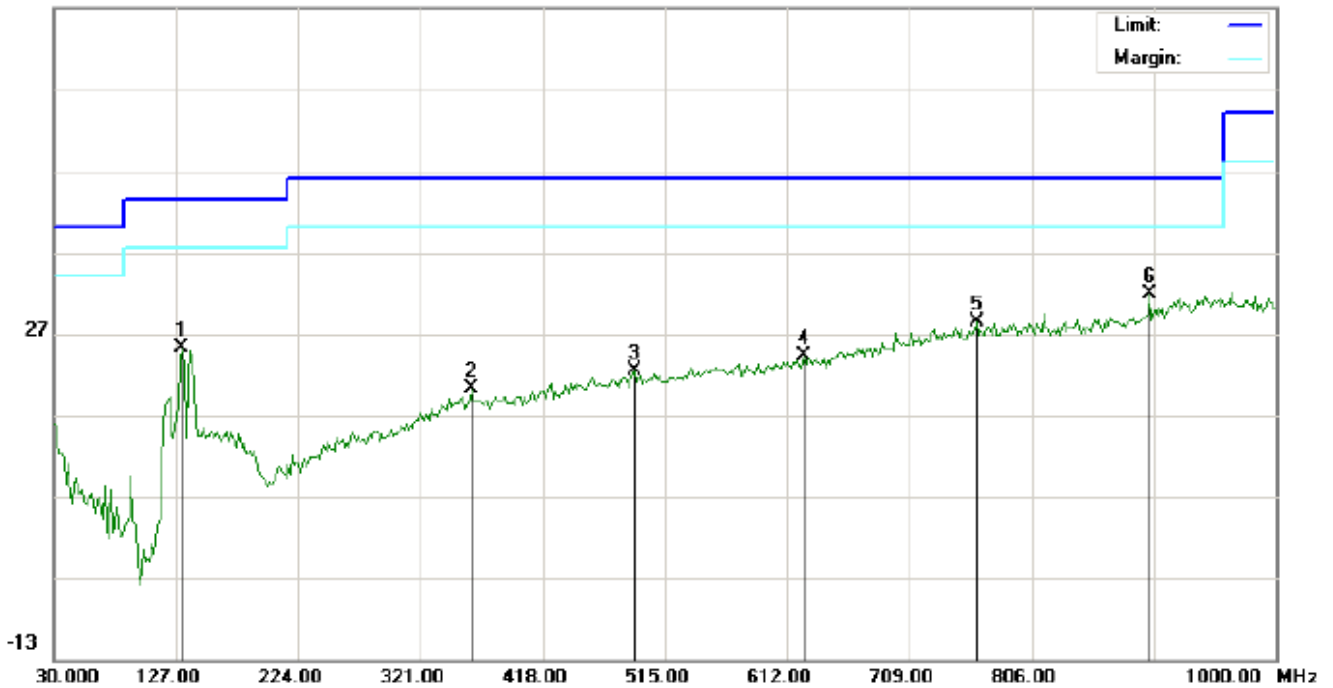
| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 138.3167 | 3.44 | 14.41 | 17.85 | 43.50 | -25.65 | peak | | | |
| 2 | | 359.8000 | 1.43 | 18.80 | 20.23 | 46.00 | -25.77 | peak | | | |
| 3 | | 463.2667 | 1.51 | 20.73 | 22.24 | 46.00 | -23.76 | peak | | | |
| 4 | | 605.5333 | 1.61 | 23.74 | 25.35 | 46.00 | -20.65 | peak | | | |
| 5 | | 665.3500 | 2.93 | 24.27 | 27.20 | 46.00 | -18.80 | peak | | | |
| 6 | * | 899.7667 | 2.90 | 28.60 | 31.50 | 46.00 | -14.50 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL

66.9 dBuV/m



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 131.8500 | 13.44 | 11.80 | 25.24 | 43.50 | -18.26 | peak | | | |
| 2 | | 361.4166 | 1.36 | 18.82 | 20.18 | 46.00 | -25.82 | peak | | | |
| 3 | | 490.7500 | 1.36 | 21.03 | 22.39 | 46.00 | -23.61 | peak | | | |
| 4 | | 624.9333 | 0.95 | 23.29 | 24.24 | 46.00 | -21.76 | peak | | | |
| 5 | | 762.3500 | 1.67 | 26.80 | 28.47 | 46.00 | -17.53 | peak | | | |
| 6 | * | 899.7667 | 3.19 | 28.60 | 31.79 | 46.00 | -14.21 | peak | | | |

RESULT: PASS

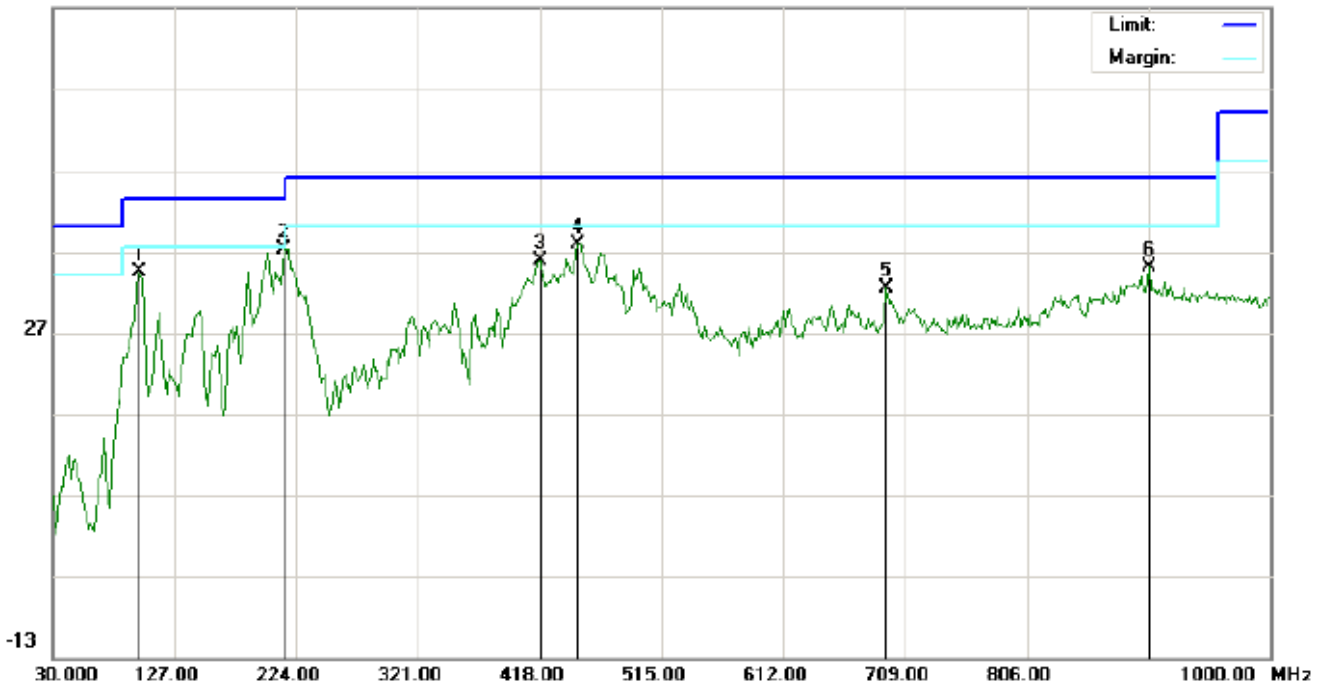
Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL

66.9 dBuV/m

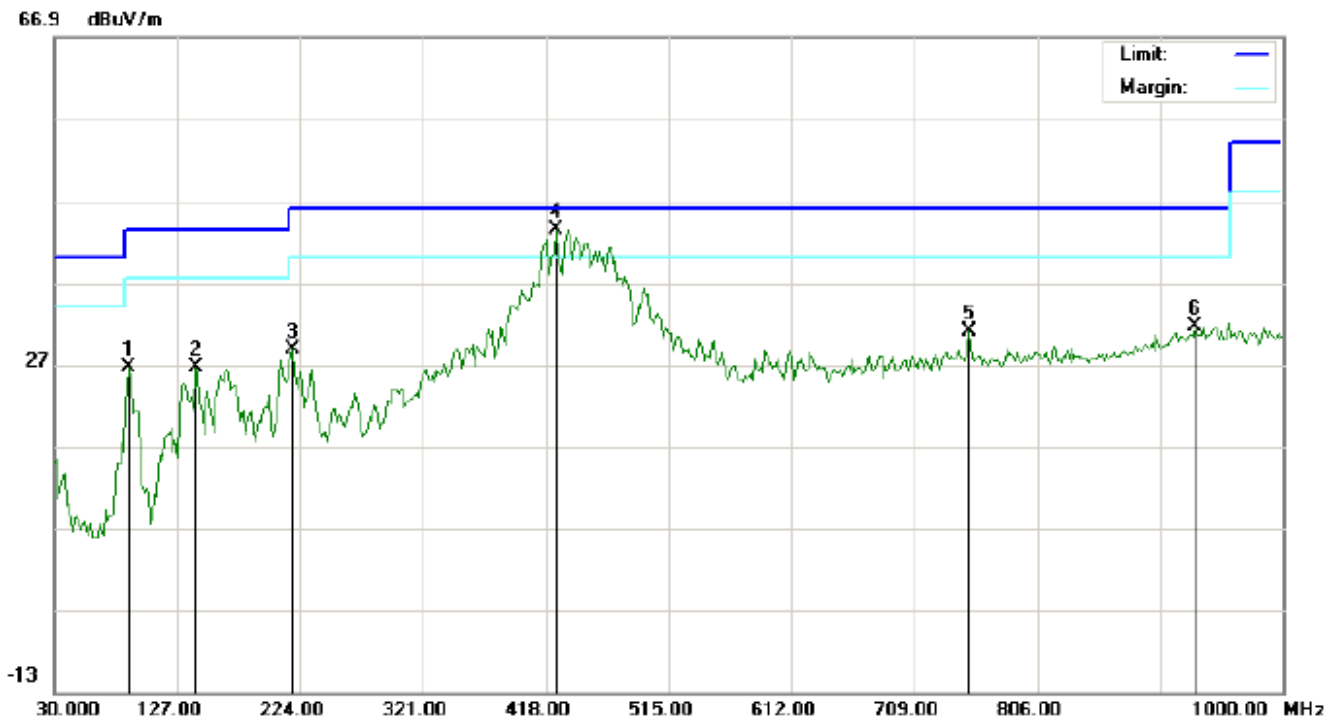


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 99.5167 | 24.36 | 10.00 | 34.36 | 43.50 | -9.14 | peak | | | |
| 2 | * | 214.3000 | 26.73 | 10.54 | 37.27 | 43.50 | -6.23 | peak | | | |
| 3 | | 418.0000 | 16.21 | 19.62 | 35.83 | 46.00 | -10.17 | peak | | | |
| 4 | | 448.7167 | 17.18 | 20.55 | 37.73 | 46.00 | -8.27 | peak | | | |
| 5 | | 694.4500 | 7.24 | 25.07 | 32.31 | 46.00 | -13.69 | peak | | | |
| 6 | | 903.0000 | 6.26 | 28.69 | 34.95 | 46.00 | -11.05 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (30MHz-1GHz)- MIDDLE CHANNEL -VERTICAL



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 88.2000 | 21.89 | 4.74 | 26.63 | 43.50 | -16.87 | peak | | | |
| 2 | | 141.5500 | 11.47 | 15.21 | 26.68 | 43.50 | -16.82 | peak | | | |
| 3 | | 217.5333 | 18.08 | 10.72 | 28.80 | 46.00 | -17.20 | peak | | | |
| 4 | * | 426.0833 | 23.63 | 19.86 | 43.49 | 46.00 | -2.51 | peak | | | |
| 5 | | 752.6500 | 4.41 | 26.67 | 31.08 | 46.00 | -14.92 | peak | | | |
| 6 | | 930.4833 | 2.15 | 29.46 | 31.61 | 46.00 | -14.39 | peak | | | |

RESULT: PASS

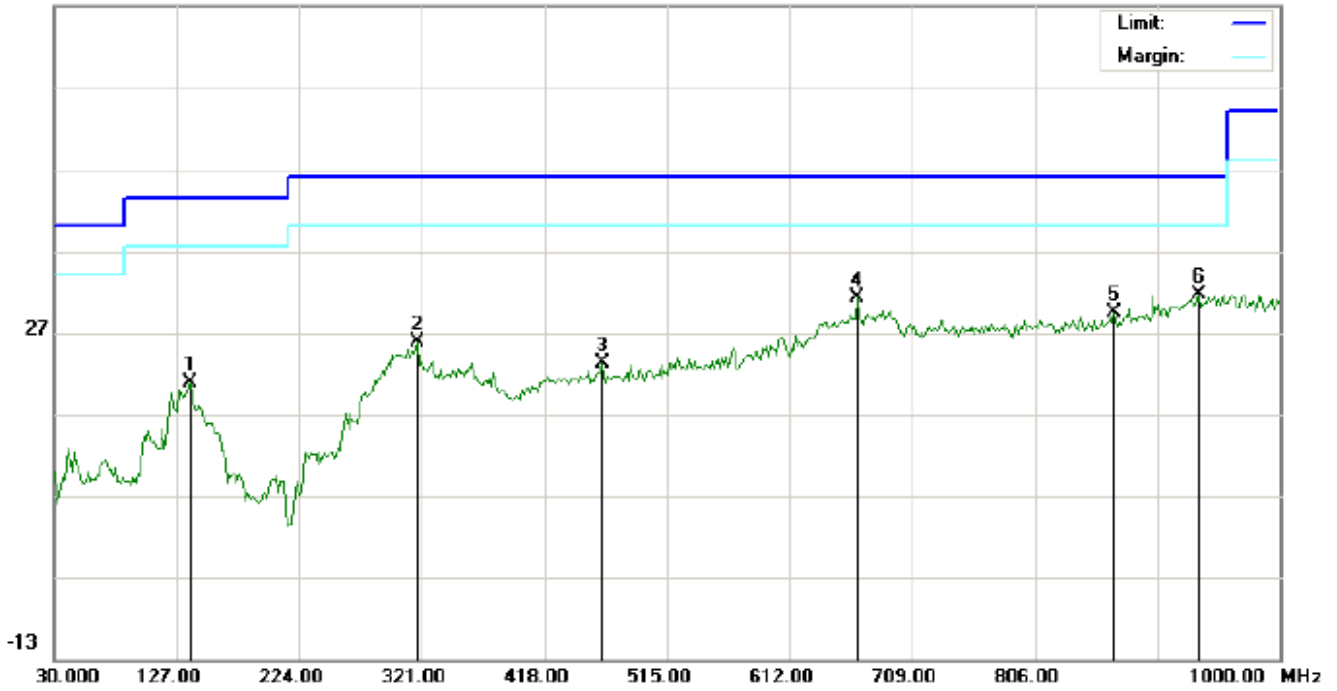
Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



RADIATED EMISSION TEST- (30MHZ-1GHz)-HIGH CHANNEL-HORIZONTAL

66.9 dBuV/m



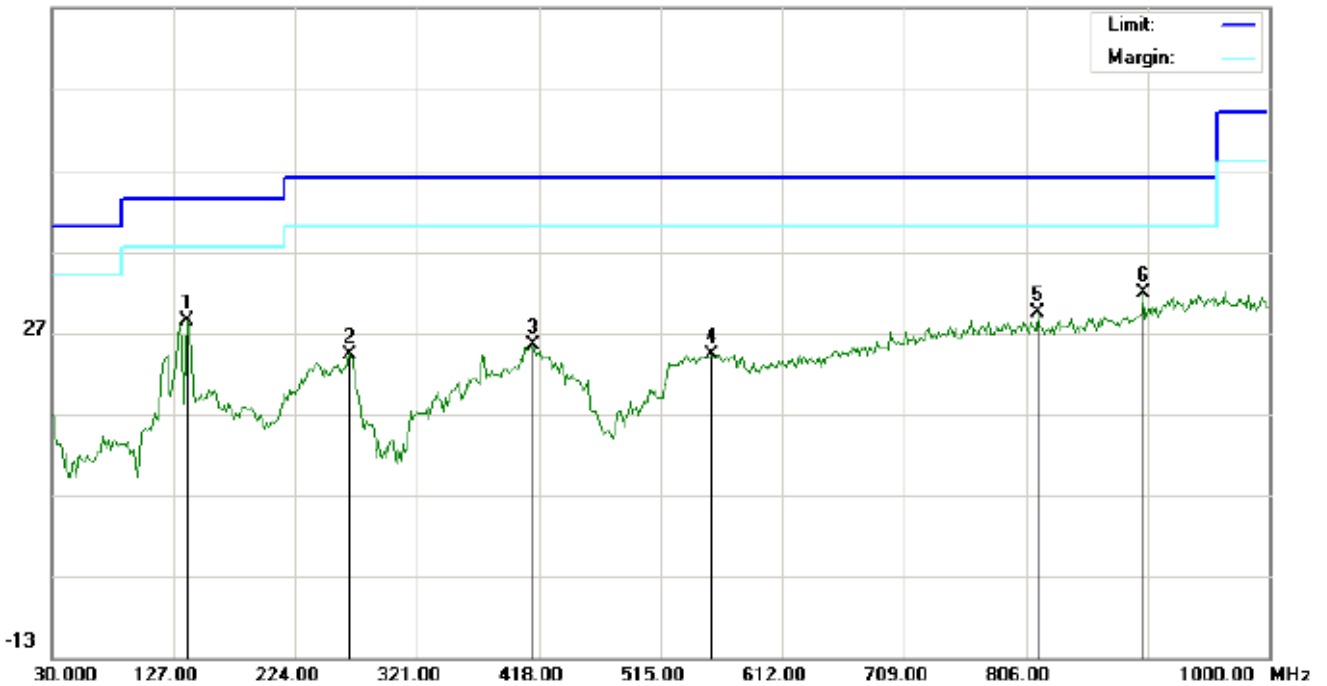
| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 138.3166 | 6.44 | 14.41 | 20.85 | 43.50 | -22.65 | peak | | | |
| 2 | | 317.7667 | 9.24 | 16.59 | 25.83 | 46.00 | -20.17 | peak | | | |
| 3 | | 463.2667 | 2.51 | 20.73 | 23.24 | 46.00 | -22.76 | peak | | | |
| 4 | | 665.3500 | 6.93 | 24.27 | 31.20 | 46.00 | -14.80 | peak | | | |
| 5 | | 869.0499 | 1.59 | 27.81 | 29.40 | 46.00 | -16.60 | peak | | | |
| 6 | * | 935.3333 | 1.98 | 29.59 | 31.57 | 46.00 | -14.43 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL

66.9 dBuV/m



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 138.3166 | 13.81 | 14.50 | 28.31 | 43.50 | -15.19 | peak | | | |
| 2 | | 267.6499 | 9.87 | 14.43 | 24.30 | 46.00 | -21.70 | peak | | | |
| 3 | | 413.1499 | 5.93 | 19.47 | 25.40 | 46.00 | -20.60 | peak | | | |
| 4 | | 555.4166 | 1.76 | 22.51 | 24.27 | 46.00 | -21.73 | peak | | | |
| 5 | | 815.7000 | 1.99 | 27.32 | 29.31 | 46.00 | -16.69 | peak | | | |
| 6 | * | 899.7667 | 3.19 | 28.60 | 31.79 | 46.00 | -14.21 | peak | | | |

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

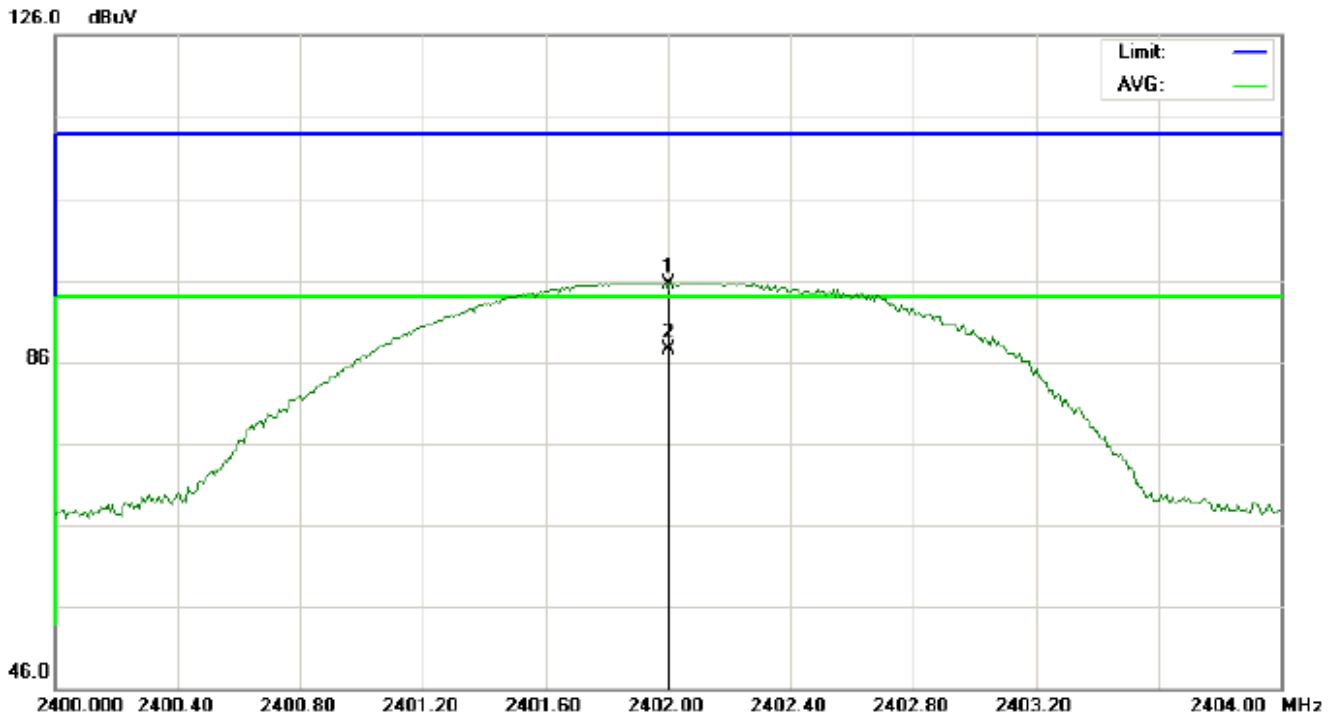
2. The "Factor" value can be calculated automatically by software of measurement system.



**RADIATED EMISSION ABOVE 1GHz
FOR BR/EDR
(Worst modulation: GFSK)**

For Fundamental

RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL

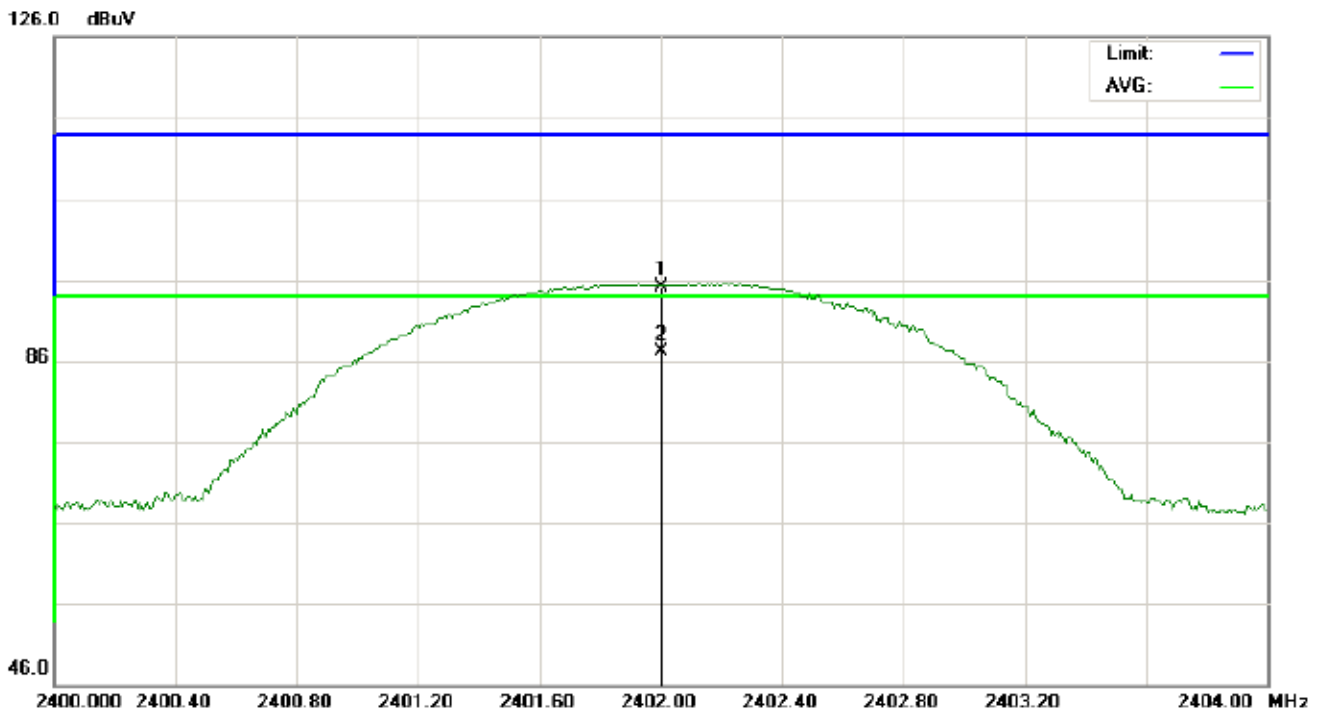


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | cm | degree | |
| 1 | | 2402.000 | 82.00 | 13.46 | 95.46 | 114.00 | -18.54 | peak | | | |
| 2 | * | 2402.000 | 74.09 | 13.46 | 87.55 | 94.00 | -6.45 | AVG | 100 | 75 | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL

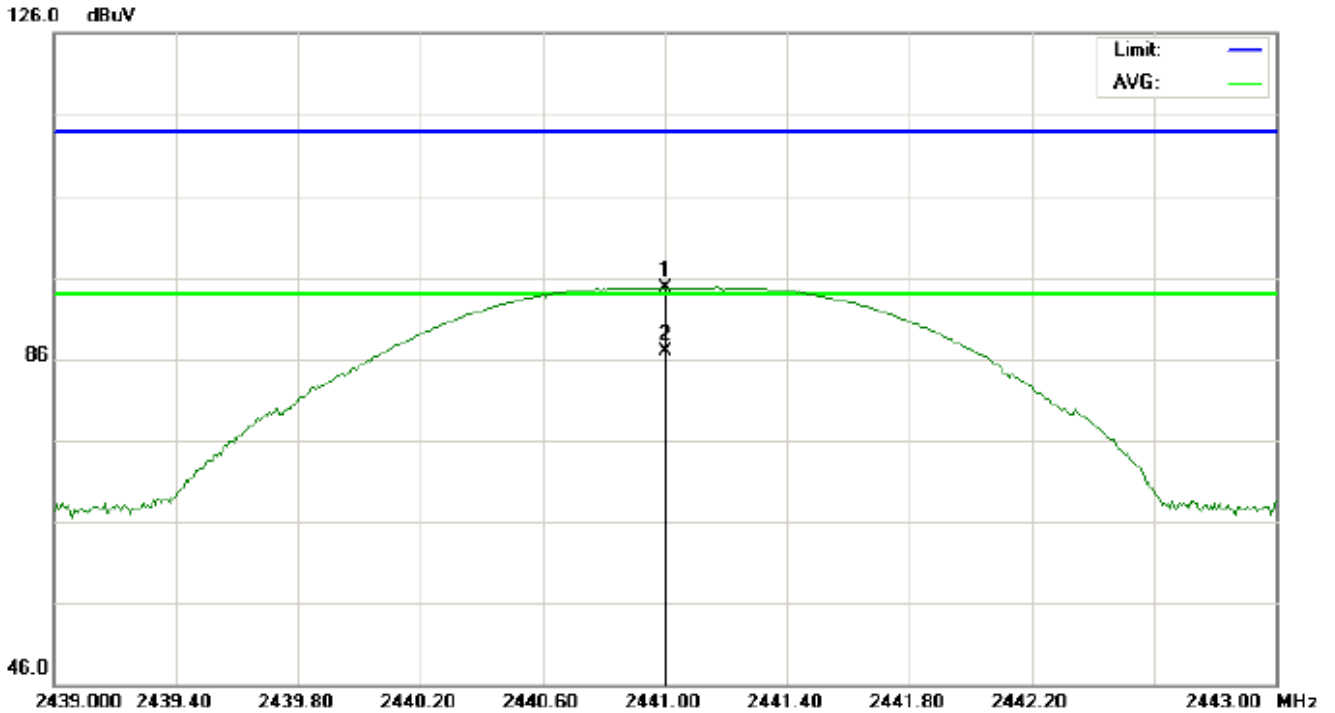


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | cm | degree | |
| 1 | | 2402.000 | 81.57 | 13.46 | 95.03 | 114.00 | -18.97 | peak | | | |
| 2 | * | 2402.000 | 73.57 | 13.46 | 87.03 | 94.00 | -6.97 | AVG | 100 | 335 | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL

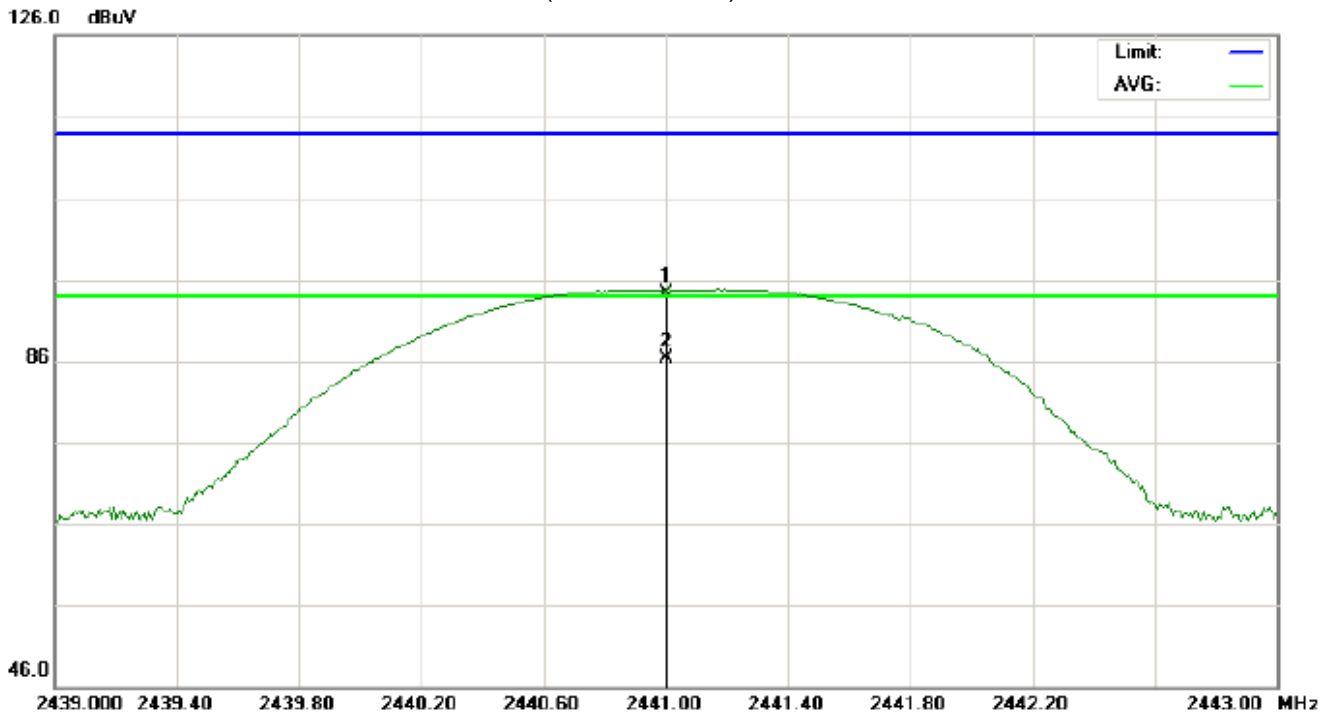


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | cm | degree | |
| 1 | | 2441.000 | 80.91 | 13.88 | 94.79 | 114.00 | -19.21 | peak | | | |
| 2 | * | 2441.000 | 73.00 | 13.88 | 86.88 | 94.00 | -7.12 | AVG | 100 | 77 | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL

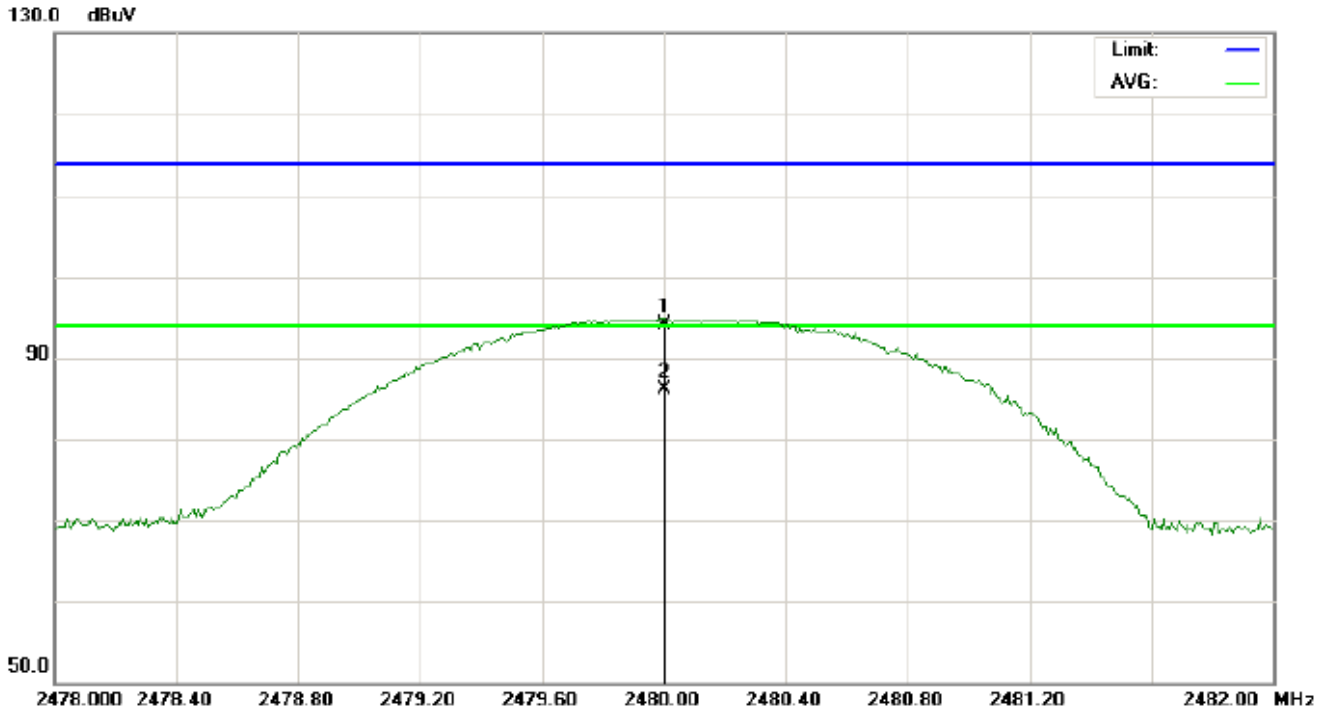


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | cm | degree | |
| 1 | | 2441.000 | 80.44 | 13.88 | 94.32 | 114.00 | -19.68 | peak | | | |
| 2 | * | 2441.000 | 72.50 | 13.88 | 86.38 | 94.00 | -7.62 | AVG | 100 | 337 | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL

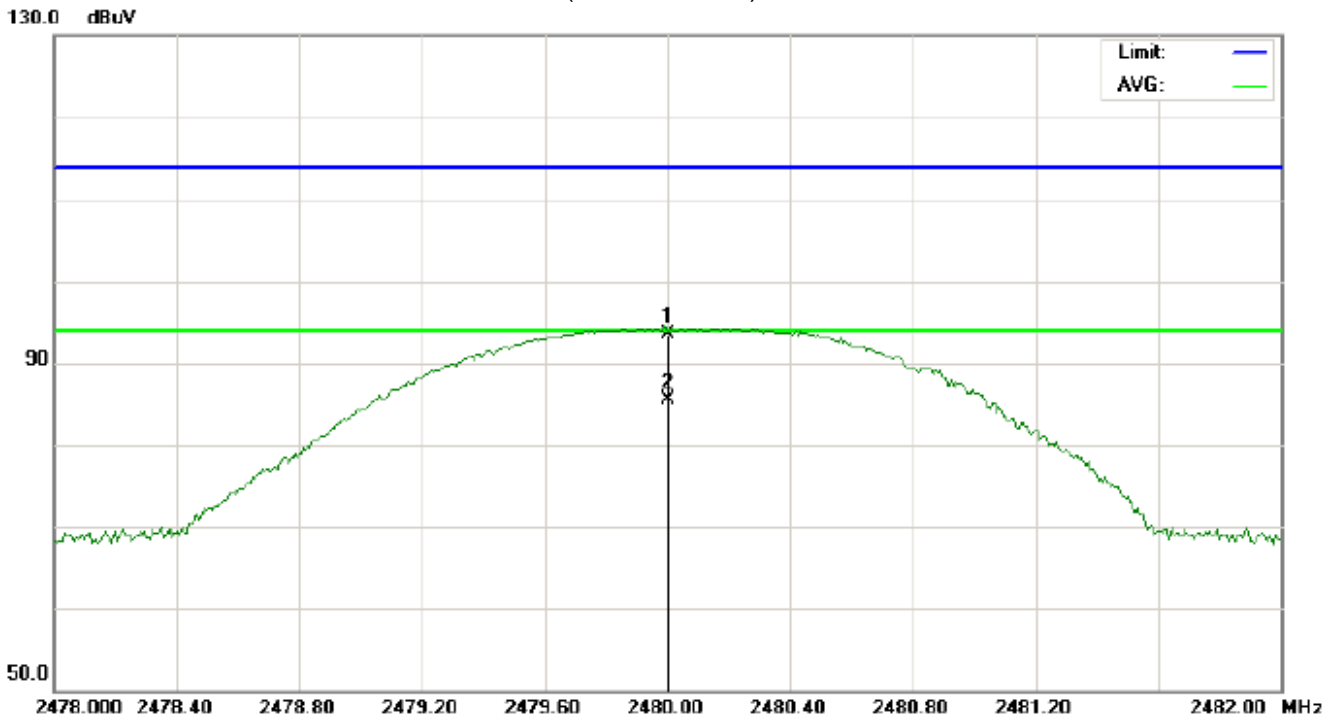


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | cm | degree | |
| 1 | | 2480.000 | 79.97 | 14.11 | 94.08 | 114.00 | -19.92 | peak | | | |
| 2 | * | 2480.000 | 72.05 | 14.11 | 86.16 | 94.00 | -7.84 | AVG | 100 | 79 | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | | cm | degree | |
| 1 | | 2480.000 | 79.48 | 14.11 | 93.59 | 114.00 | -20.41 | peak | | | |
| 2 | * | 2480.000 | 71.49 | 14.11 | 85.60 | 94.00 | -8.40 | AVG | 100 | 339 | |

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

**Field strength of the fundamental signal****1Mbps Result:****Peak value**

| Frequency | Reading Level | Factor | Measurement | Limit | Over | Antenna |
|-----------|---------------|--------|-------------|----------|--------|--------------|
| (MHz) | (dBuv) | (dB/m) | (dBuv/m) | (dBuv/m) | (dB) | Polarization |
| 2402 | 82.00 | 13.46 | 95.46 | 114 | -18.54 | Horizontal |
| 2402 | 81.57 | 13.46 | 95.03 | 114 | -18.97 | Vertical |
| 2441 | 80.91 | 13.88 | 94.79 | 114 | -19.21 | Horizontal |
| 2441 | 80.44 | 13.88 | 94.32 | 114 | -19.68 | Vertical |
| 2480 | 79.97 | 14.11 | 94.08 | 114 | -19.92 | Horizontal |
| 2480 | 79.48 | 14.11 | 93.59 | 114 | -20.41 | Vertical |

Average value

| Frequency | Reading Level | Factor | Measurement | Limit | Over | Antenna |
|-----------|---------------|--------|-------------|----------|-------|--------------|
| (MHz) | (dBuv) | (dB/m) | (dBuv/m) | (dBuv/m) | (dB) | Polarization |
| 2402 | 74.09 | 13.46 | 87.55 | 94 | -6.45 | Horizontal |
| 2402 | 73.57 | 13.46 | 87.03 | 94 | -6.97 | Vertical |
| 2441 | 73.00 | 13.88 | 86.88 | 94 | -7.12 | Horizontal |
| 2441 | 72.50 | 13.88 | 86.38 | 94 | -7.62 | Vertical |
| 2480 | 72.05 | 14.11 | 86.16 | 94 | -7.84 | Horizontal |
| 2480 | 71.49 | 14.11 | 85.60 | 94 | -8.40 | Vertical |

**2Mbps Result:****Peak value**

| Frequency | Reading Level | Factor | Measurement | Limit | Over | Antenna |
|-----------|---------------|--------|-------------|----------|--------|--------------|
| (MHz) | (dBuv) | (dB/m) | (dBuv/m) | (dBuv/m) | (dB) | Polarization |
| 2402 | 81.59 | 13.46 | 95.05 | 114 | -18.95 | Horizontal |
| 2402 | 81.05 | 13.46 | 94.51 | 114 | -19.49 | Vertical |
| 2441 | 80.49 | 13.88 | 94.37 | 114 | -19.63 | Horizontal |
| 2441 | 80.04 | 13.88 | 93.92 | 114 | -20.08 | Vertical |
| 2480 | 79.54 | 14.11 | 93.65 | 114 | -20.35 | Horizontal |
| 2480 | 79.03 | 14.11 | 93.14 | 114 | -20.86 | Vertical |

Average value

| Frequency | Reading Level | Factor | Measurement | Limit | Over | Antenna |
|-----------|---------------|--------|-------------|----------|-------|--------------|
| (MHz) | (dBuv) | (dB/m) | (dBuv/m) | (dBuv/m) | (dB) | Polarization |
| 2402 | 73.58 | 13.46 | 87.04 | 94 | -6.96 | Horizontal |
| 2402 | 73.08 | 13.46 | 86.54 | 94 | -7.46 | Vertical |
| 2441 | 72.45 | 13.88 | 86.33 | 94 | -7.67 | Horizontal |
| 2441 | 71.99 | 13.88 | 85.87 | 94 | -8.13 | Vertical |
| 2480 | 71.60 | 14.11 | 85.71 | 94 | -8.29 | Horizontal |
| 2480 | 71.08 | 14.11 | 85.19 | 94 | -8.81 | Vertical |

**3Mbps Result:****Peak value**

| Frequency | Reading Level | Factor | Measurement | Limit | Over | Antenna |
|-----------|---------------|--------|-------------|----------|--------|--------------|
| (MHz) | (dBuv) | (dB/m) | (dBuv/m) | (dBuv/m) | (dB) | Polarization |
| 2402 | 81.12 | 13.46 | 94.58 | 114 | -19.42 | Horizontal |
| 2402 | 80.62 | 13.46 | 94.08 | 114 | -19.92 | Vertical |
| 2441 | 80.08 | 13.88 | 93.96 | 114 | -20.04 | Horizontal |
| 2441 | 79.60 | 13.88 | 93.48 | 114 | -20.52 | Vertical |
| 2480 | 79.06 | 14.11 | 93.17 | 114 | -20.83 | Horizontal |
| 2480 | 78.55 | 14.11 | 92.66 | 114 | -21.34 | Vertical |

Average value

| Frequency | Reading Level | Factor | Measurement | Limit | Over | Antenna |
|-----------|---------------|--------|-------------|----------|-------|--------------|
| (MHz) | (dBuv) | (dB/m) | (dBuv/m) | (dBuv/m) | (dB) | Polarization |
| 2402 | 73.09 | 13.46 | 86.55 | 94 | -7.45 | Horizontal |
| 2402 | 72.58 | 13.46 | 86.04 | 94 | -7.96 | Vertical |
| 2441 | 72.04 | 13.88 | 85.92 | 94 | -8.08 | Horizontal |
| 2441 | 71.56 | 13.88 | 85.44 | 94 | -8.56 | Vertical |
| 2480 | 71.14 | 14.11 | 85.25 | 94 | -8.75 | Horizontal |
| 2480 | 70.64 | 14.11 | 84.75 | 94 | -9.25 | Vertical |

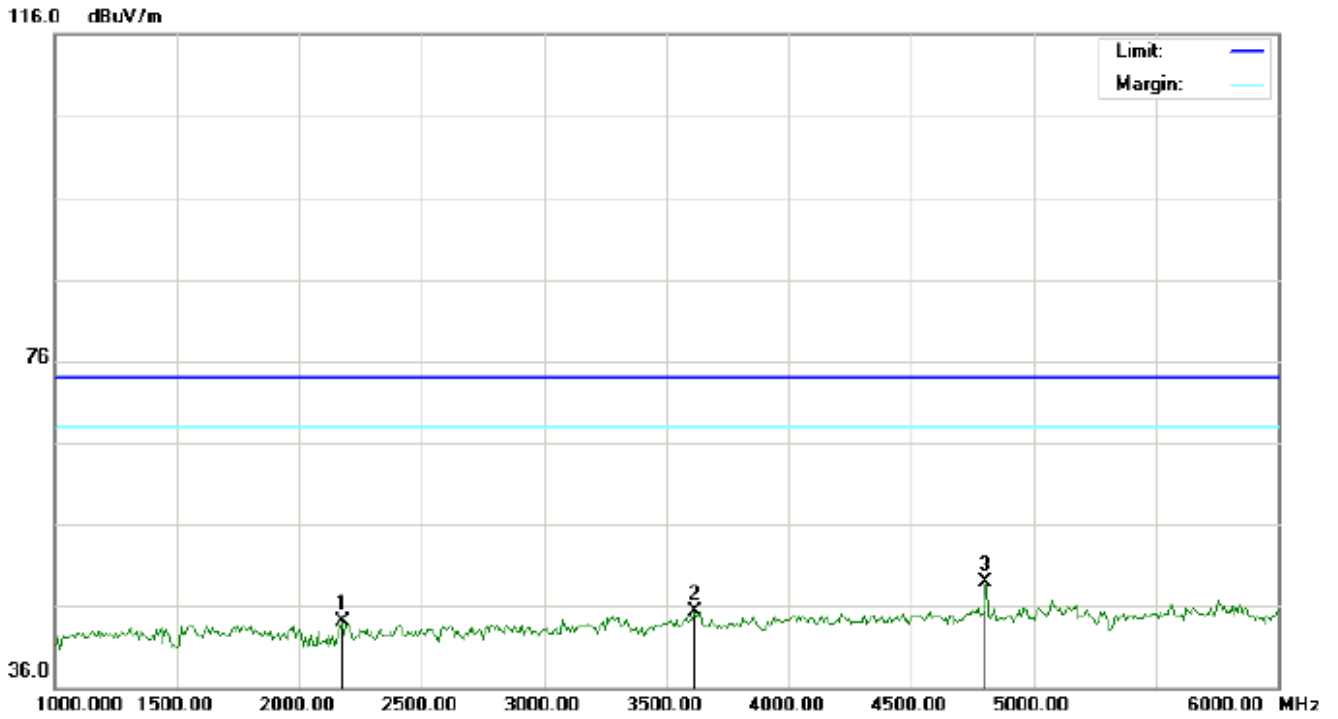


FOR BR/EDR

(Worst modulation: GFSK)

For Harmonics

RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



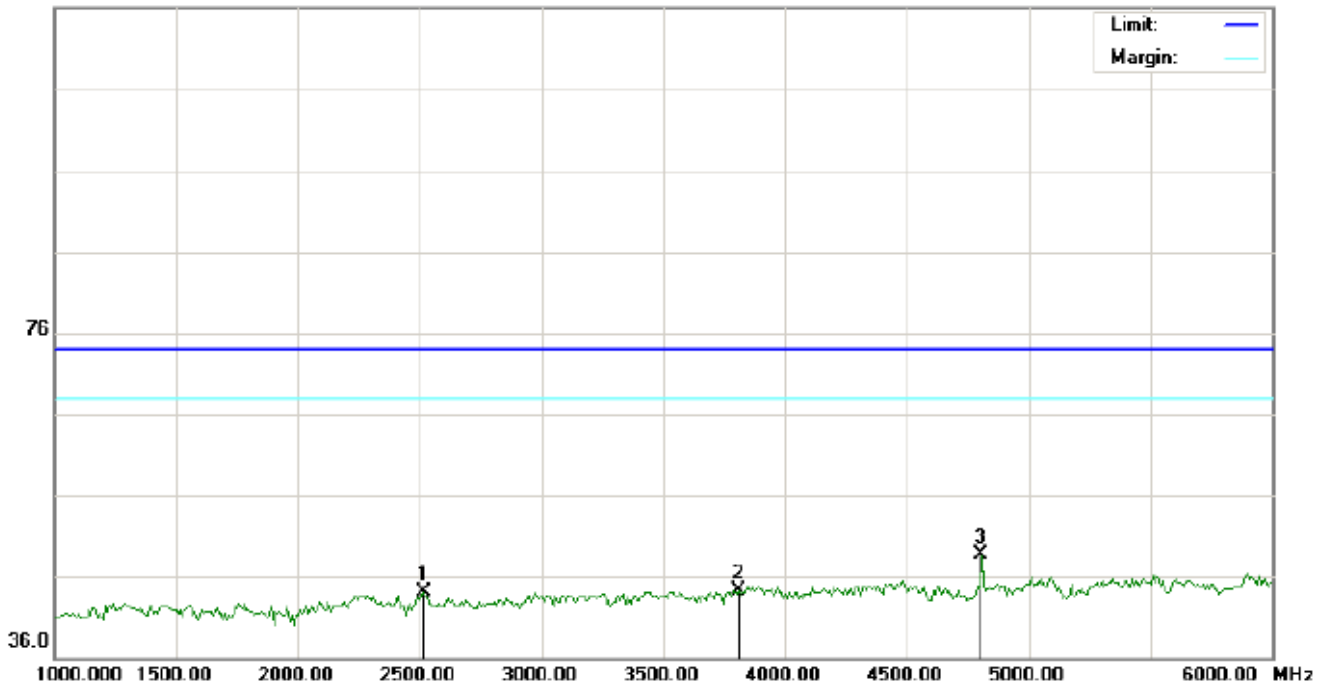
| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2175.000 | 34.00 | 10.07 | 44.07 | 74.00 | -29.93 | peak | | | |
| 2 | | 3616.667 | 32.55 | 12.83 | 45.38 | 74.00 | -28.62 | peak | | | |
| 3 | * | 4804.000 | 41.21 | 7.69 | 48.90 | 74.00 | -25.10 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL

116.0 dBuV/m

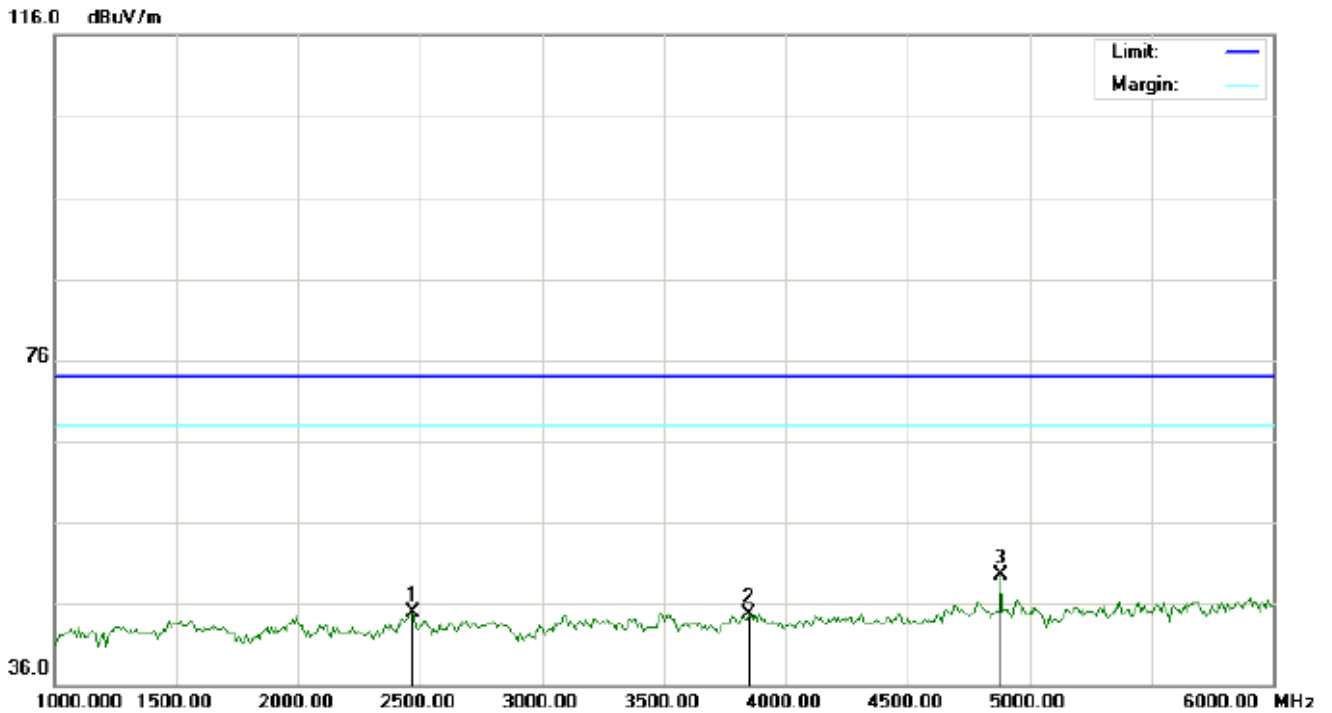


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2516.667 | 33.56 | 10.47 | 44.03 | 74.00 | -29.97 | peak | | | |
| 2 | | 3808.333 | 30.37 | 14.01 | 44.38 | 74.00 | -29.62 | peak | | | |
| 3 | * | 4804.000 | 41.05 | 7.69 | 48.74 | 74.00 | -25.26 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2466.667 | 34.42 | 10.39 | 44.81 | 74.00 | -29.19 | peak | | | |
| 2 | | 3850.000 | 30.53 | 14.27 | 44.80 | 74.00 | -29.20 | peak | | | |
| 3 | * | 4882.000 | 41.66 | 7.89 | 49.55 | 74.00 | -24.45 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL

116.0 dBuV/m

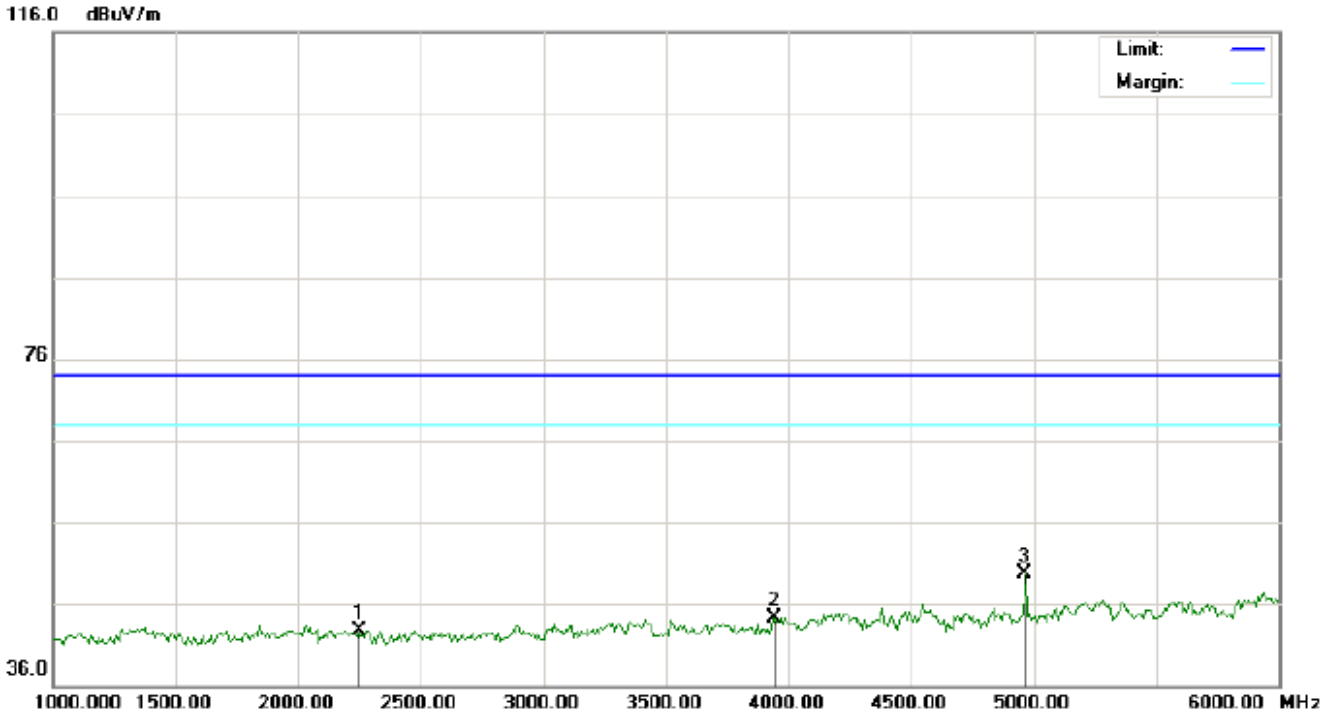


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2433.333 | 33.05 | 10.36 | 43.41 | 74.00 | -30.59 | peak | | | |
| 2 | | 3841.667 | 31.36 | 14.21 | 45.57 | 74.00 | -28.43 | peak | | | |
| 3 | * | 4882.000 | 40.89 | 7.89 | 48.78 | 74.00 | -25.22 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL

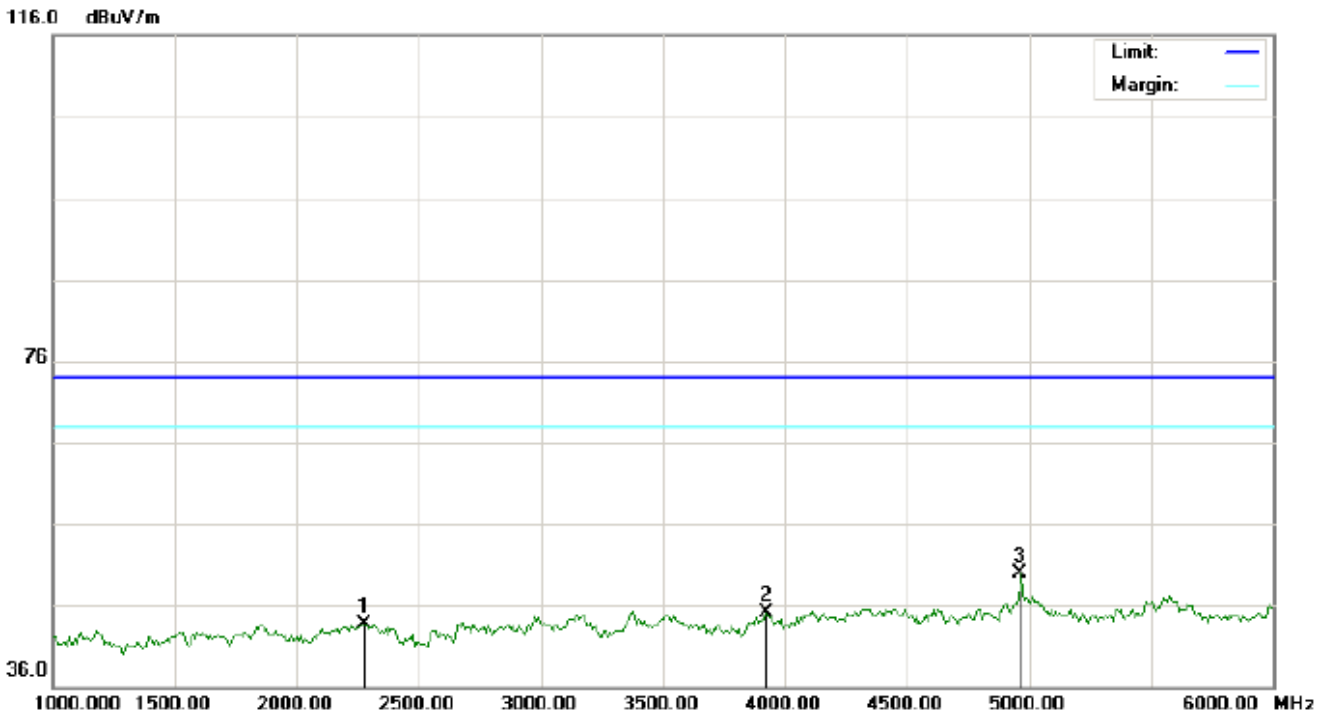


| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2250.000 | 32.63 | 10.15 | 42.78 | 74.00 | -31.22 | peak | | | |
| 2 | | 3941.667 | 29.44 | 14.83 | 44.27 | 74.00 | -29.73 | peak | | | |
| 3 | * | 4960.000 | 41.60 | 8.09 | 49.69 | 74.00 | -24.31 | peak | | | |

RESULT: PASS



RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2275.000 | 33.52 | 10.18 | 43.70 | 74.00 | -30.30 | peak | | | |
| 2 | | 3925.000 | 30.33 | 14.73 | 45.06 | 74.00 | -28.94 | peak | | | |
| 3 | * | 4960.000 | 41.91 | 8.09 | 50.00 | 74.00 | -24.00 | peak | | | |

RESULT: PASS

Note: 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

5. BAND EDGE

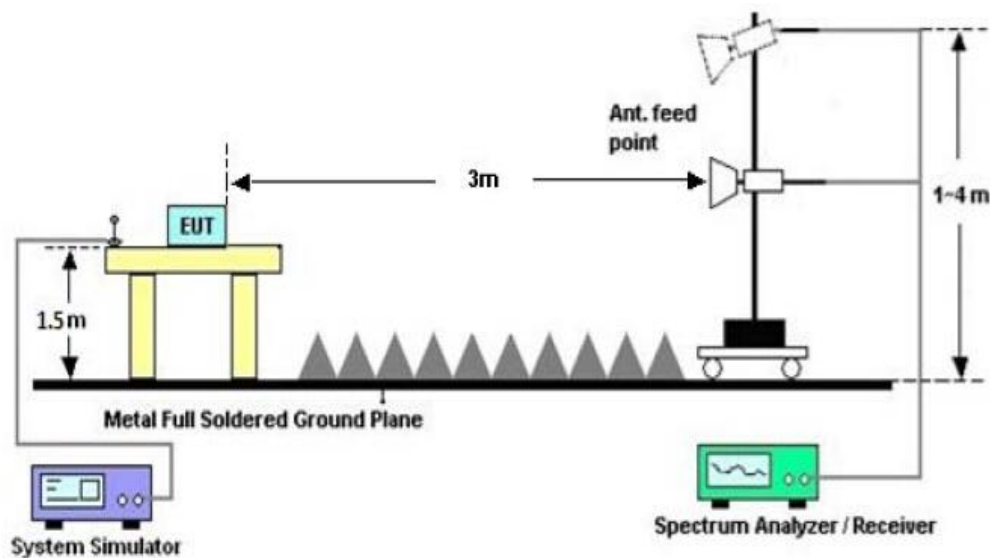
5.1. MEASUREMENT PROCEDURE

1. The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

| Start frequency(MHz) | Stop frequency(MHz) |
|----------------------|---------------------|
| 2200 | 2405 |
| 2478 | 2500 |

5.2 TEST SETUP

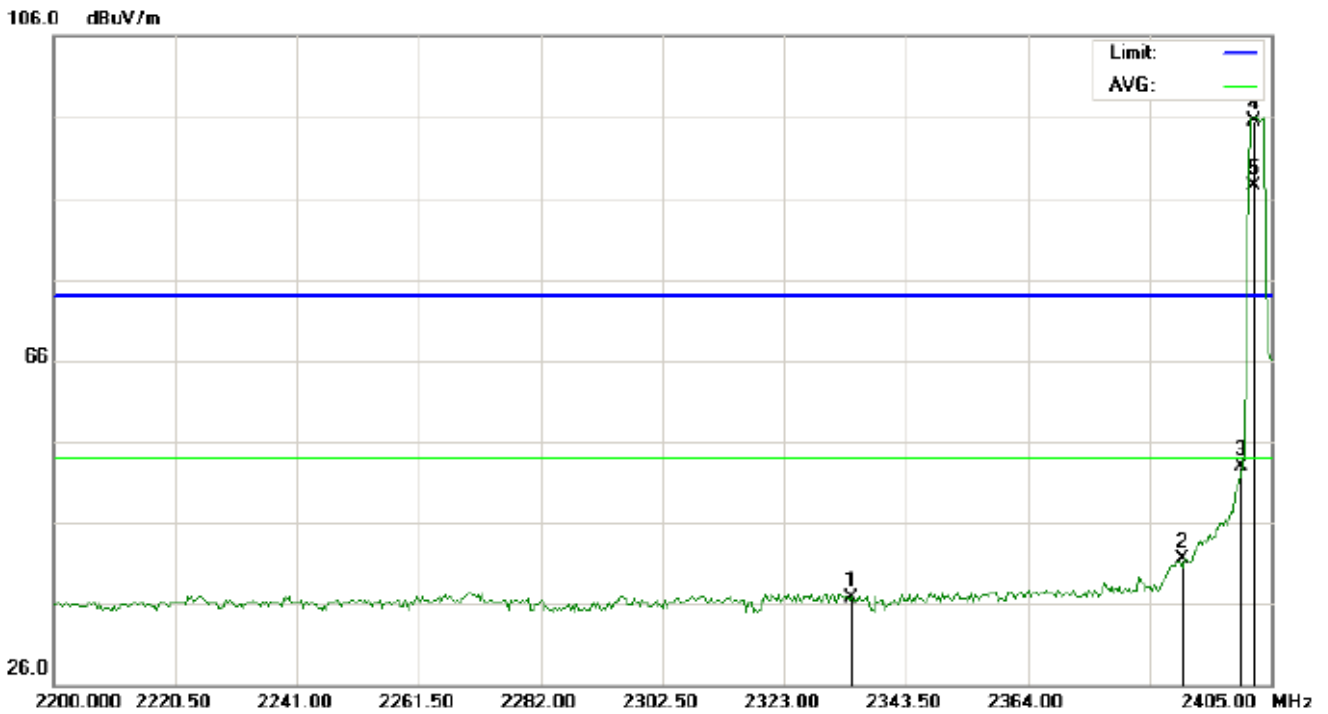
RADIATED EMISSION TEST SETUP





**5.3 RADIATED TEST RESULT
FOR BR/EDR
(Worst modulation: GFSK)**

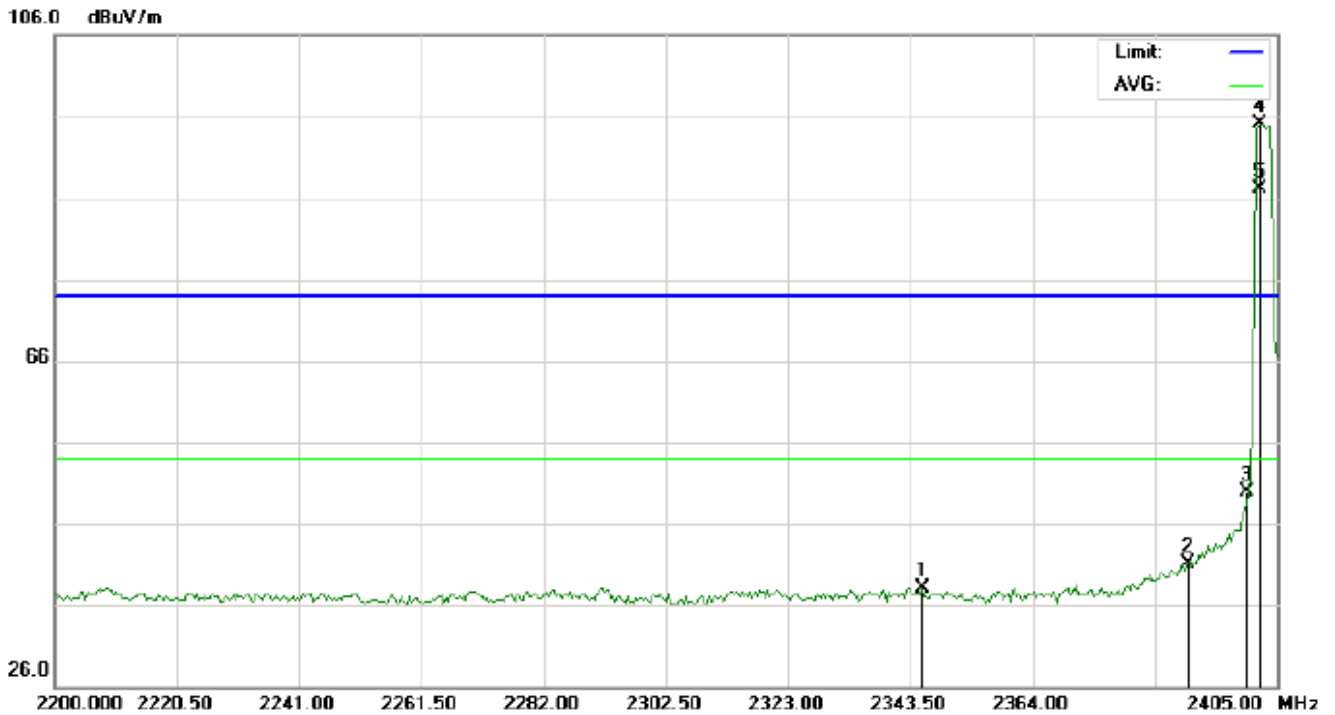
TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2334.275 | 23.29 | 13.46 | 36.75 | 74.00 | -37.25 | peak | | | |
| 2 | | 2390.000 | 28.14 | 13.46 | 41.60 | 74.00 | -32.40 | peak | | | |
| 3 | | 2400.000 | 39.44 | 13.46 | 52.90 | 74.00 | -21.10 | peak | | | |
| 4 | X | 2402.000 | 82.04 | 13.46 | 95.50 | 74.00 | 21.50 | peak | | | |
| 5 | * | 2402.000 | 74.04 | 13.46 | 87.50 | 54.00 | 33.50 | AVG | 100 | 73 | |



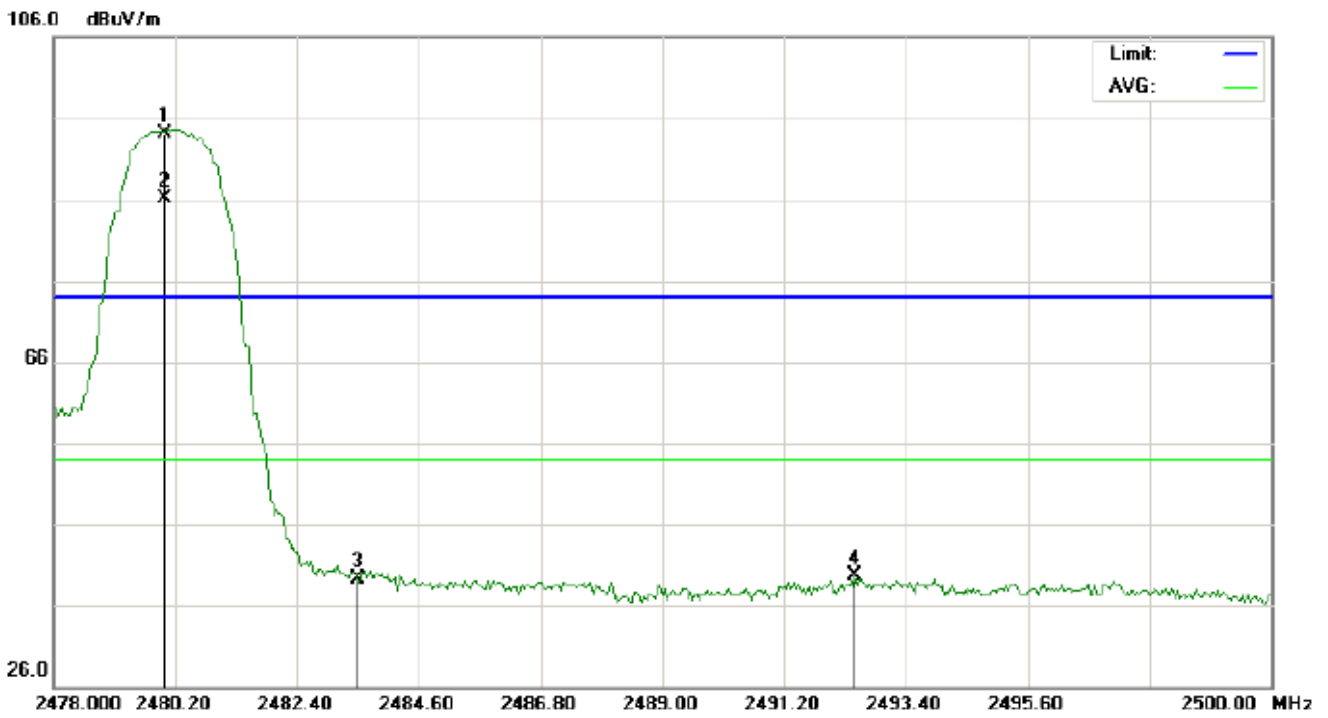
TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 2345.550 | 24.60 | 13.46 | 38.06 | 74.00 | -35.94 | peak | | | |
| 2 | | 2390.000 | 27.67 | 13.46 | 41.13 | 74.00 | -32.87 | peak | | | |
| 3 | | 2400.000 | 36.44 | 13.46 | 49.90 | 74.00 | -24.10 | peak | | | |
| 4 | X | 2402.000 | 81.60 | 13.46 | 95.06 | 74.00 | 21.06 | peak | | | |
| 5 | * | 2402.000 | 73.59 | 13.46 | 87.05 | 54.00 | 33.05 | AVG | 100 | 333 | |



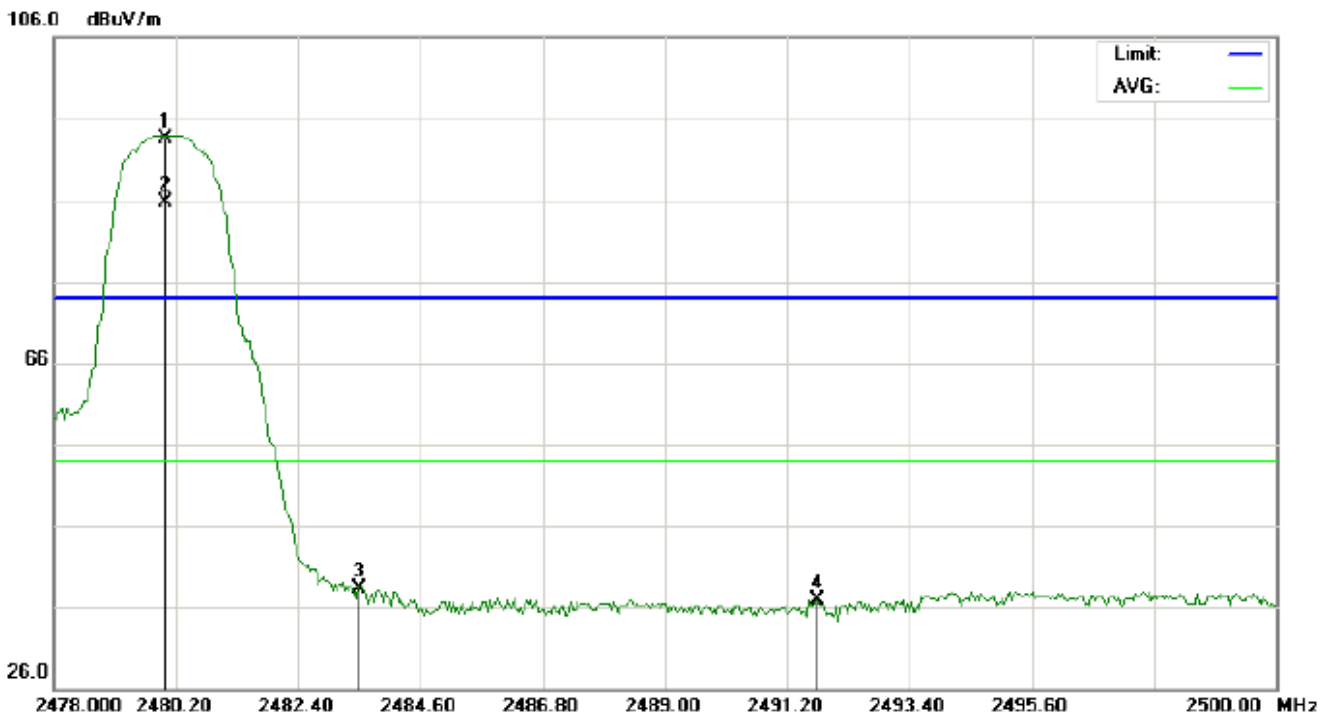
TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | X | 2480.000 | 79.94 | 14.11 | 94.05 | 74.00 | 20.05 | peak | | | |
| 2 | * | 2480.000 | 72.04 | 14.11 | 86.15 | 54.00 | 32.15 | AVG | 100 | 71 | |
| 3 | | 2483.500 | 25.16 | 14.13 | 39.29 | 74.00 | -34.71 | peak | | | |
| 4 | | 2492.483 | 25.53 | 14.18 | 39.71 | 74.00 | -34.29 | peak | | | |



TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | X | 2480.000 | 79.49 | 14.11 | 93.60 | 74.00 | 19.60 | peak | | | |
| 2 | * | 2480.000 | 71.54 | 14.11 | 85.65 | 54.00 | 31.65 | AVG | 100 | 331 | |
| 3 | | 2483.500 | 24.22 | 14.13 | 38.35 | 74.00 | -35.65 | peak | | | |
| 4 | | 2491.750 | 22.70 | 14.18 | 36.88 | 74.00 | -37.12 | peak | | | |

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

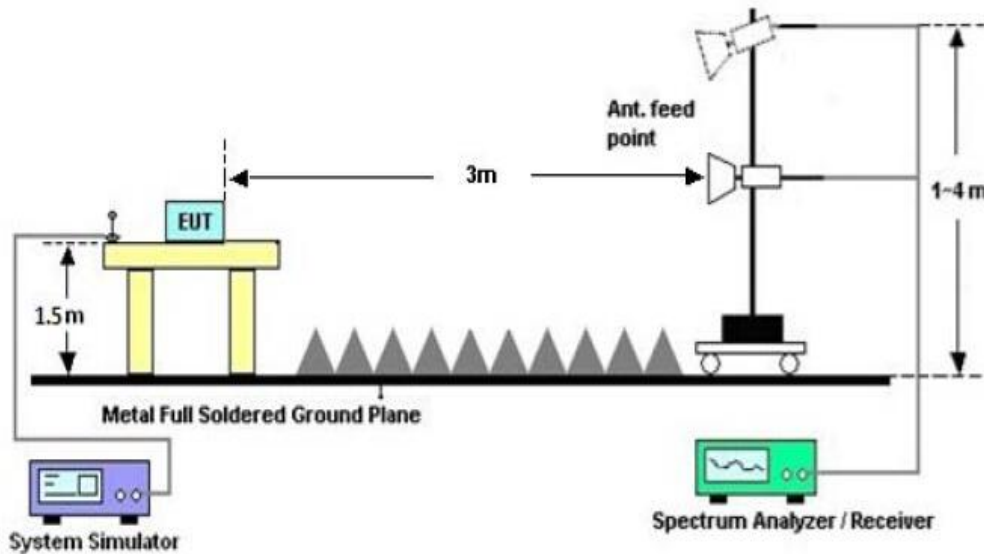
Hopping on mode and Hopping off mode have been tested, but only worst case reported.

6. OCCUPIED BANDWIDTH MEASUREMENT

6.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
 $RBW \geq 1\%$ of the 20 dB bandwidth, $VBW \geq 3RBW$; Sweep = auto; Detector function = peak
3. Set SPA Trace 1 Max hold, then View.

6.2. TEST SET-UP

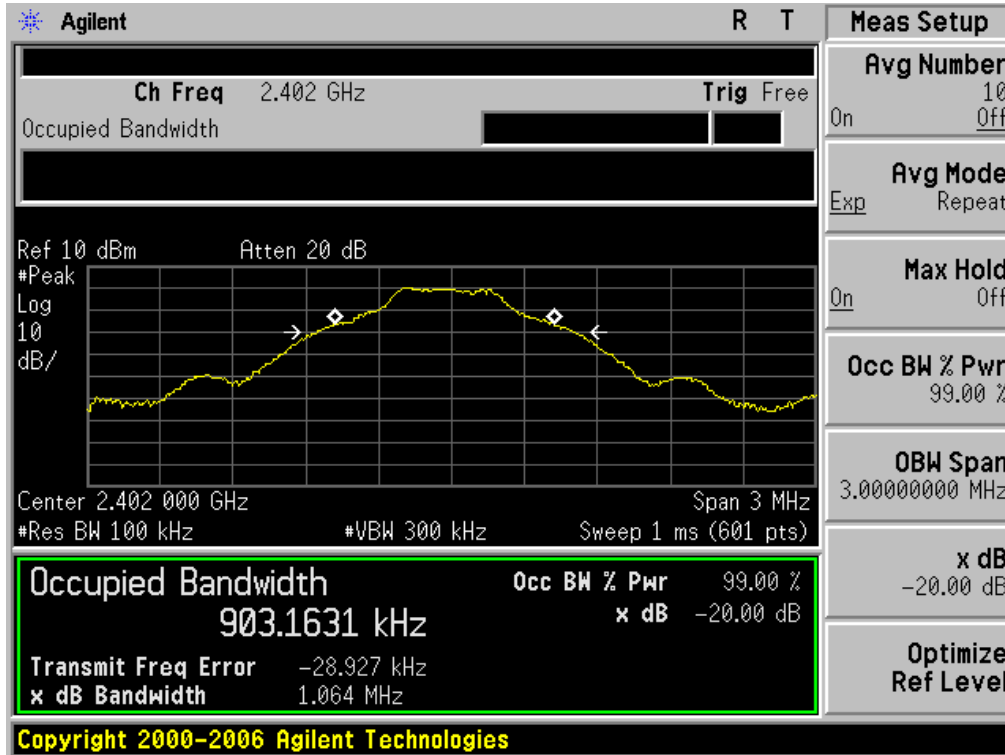


6.3. LIMITS AND MEASUREMENT RESULTS FOR BR/EDR

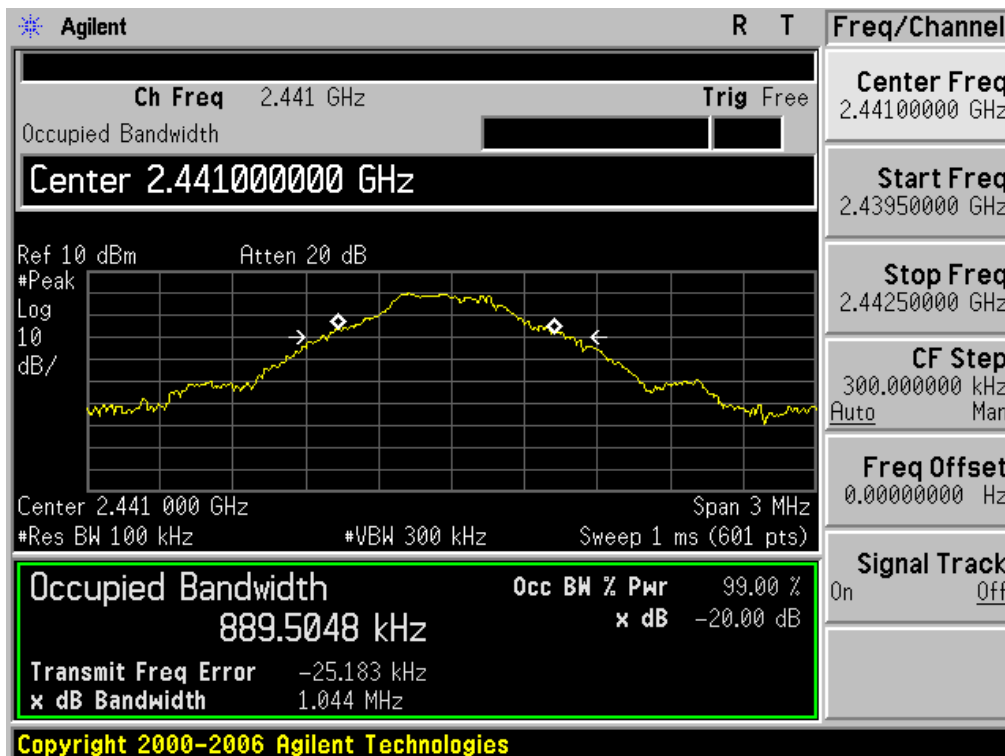
| BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT | | | | |
|---|--------------------|--------------|---------------|--------|
| Applicable Limits | Measurement Result | | | |
| | Test Data (MHz) | | | Result |
| | | 99%OBW (MHz) | -20dB BW(MHz) | |
| N/A | Low Channel | 0.903 | 1.064 | PASS |
| | Middle Channel | 0.890 | 1.044 | PASS |
| | High Channel | 0.898 | 1.037 | PASS |



TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

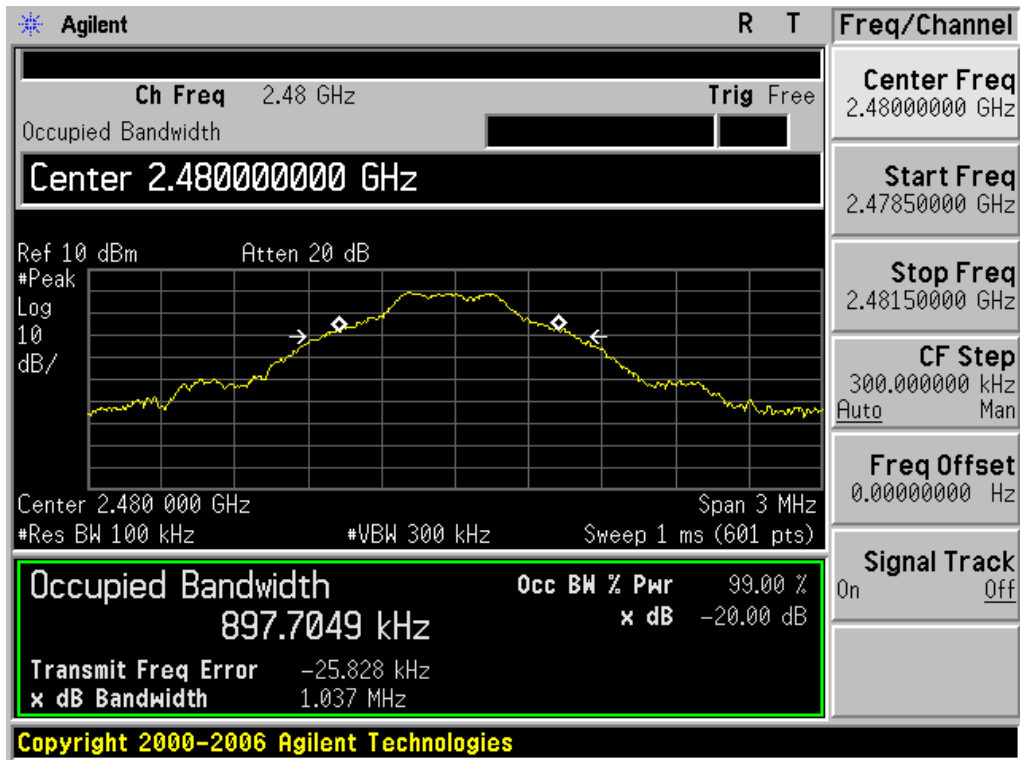


TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL





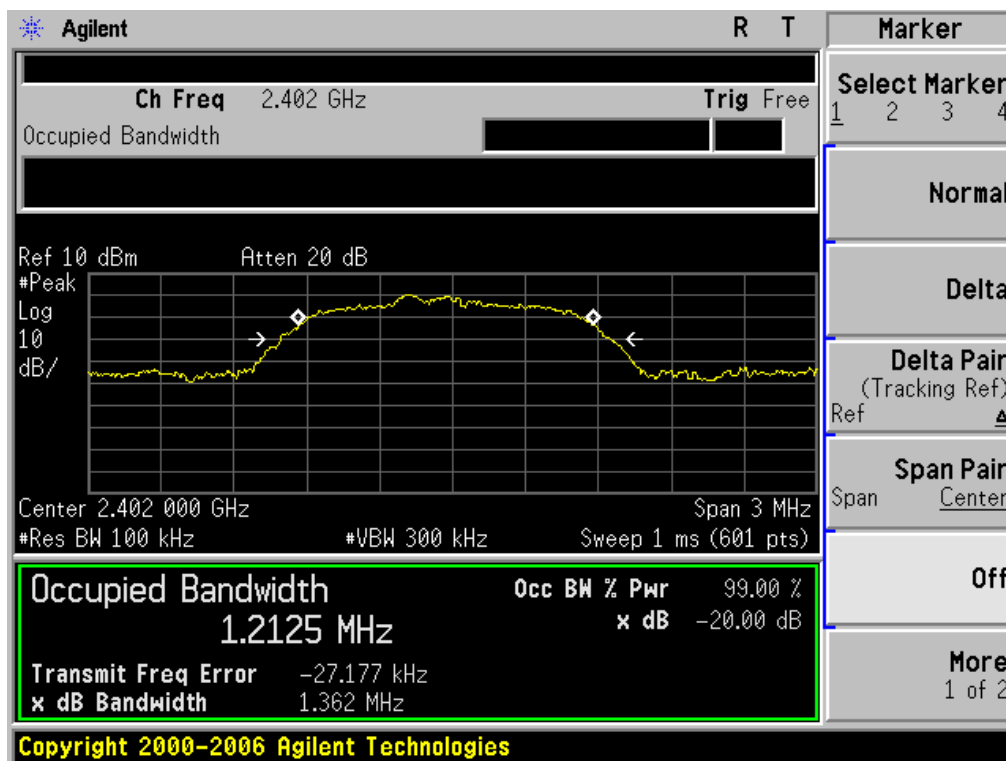
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





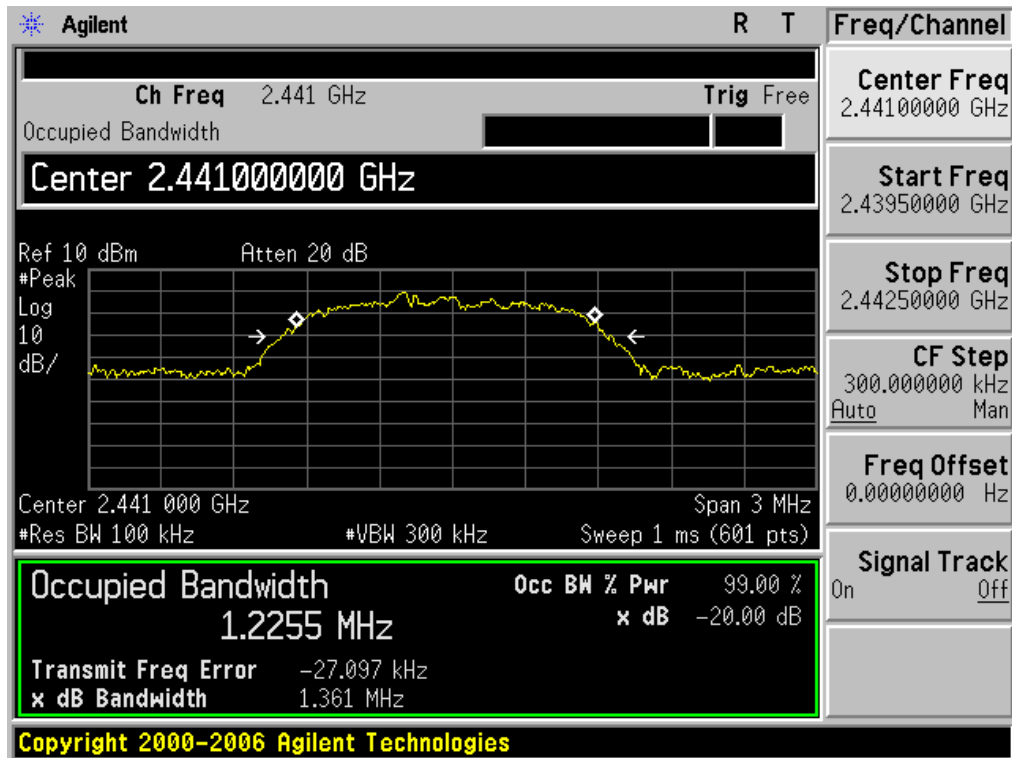
| BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT | | | | |
|---|--------------------|--------------|---------------|--------|
| Applicable Limits | Measurement Result | | | |
| | Test Data (MHz) | | | Result |
| | | 99%OBW (MHz) | -20dB BW(MHz) | |
| N/A | Low Channel | 1.213 | 1.362 | PASS |
| | Middle Channel | 1.226 | 1.361 | PASS |
| | High Channel | 1.228 | 1.370 | PASS |

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

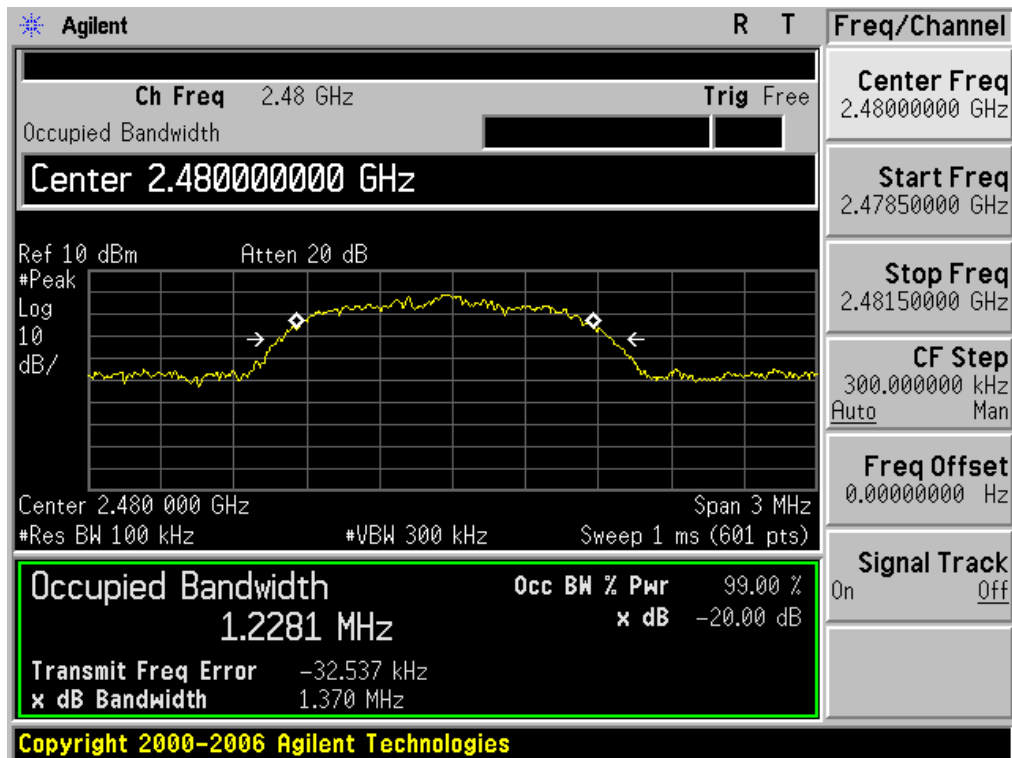




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



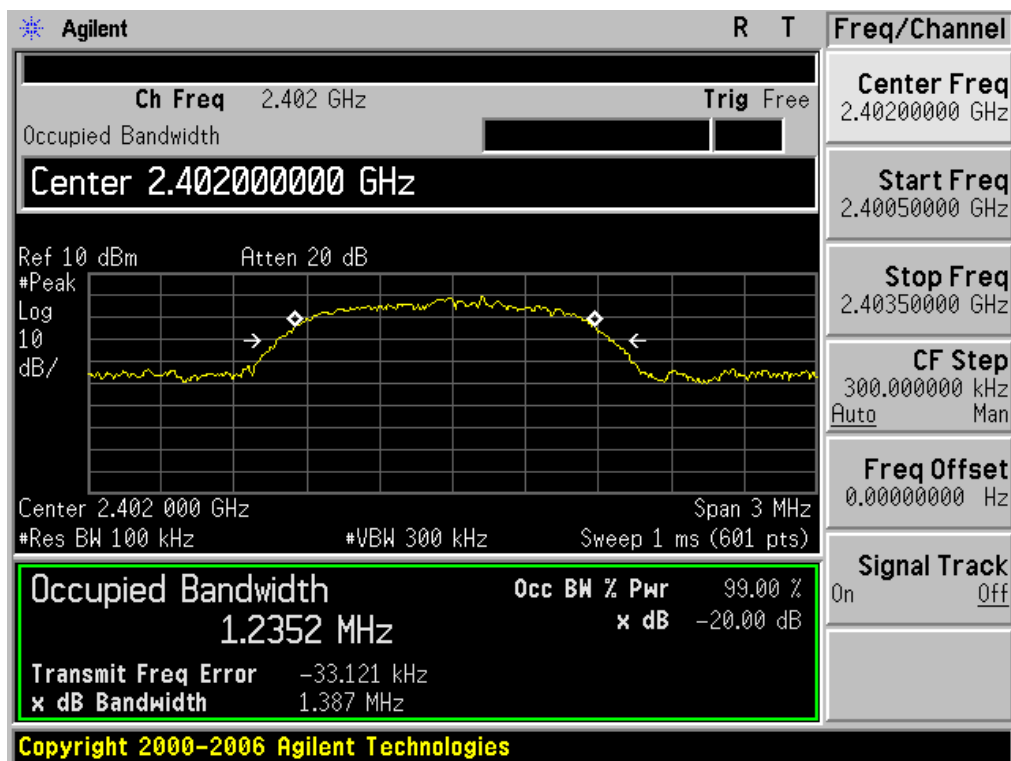
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





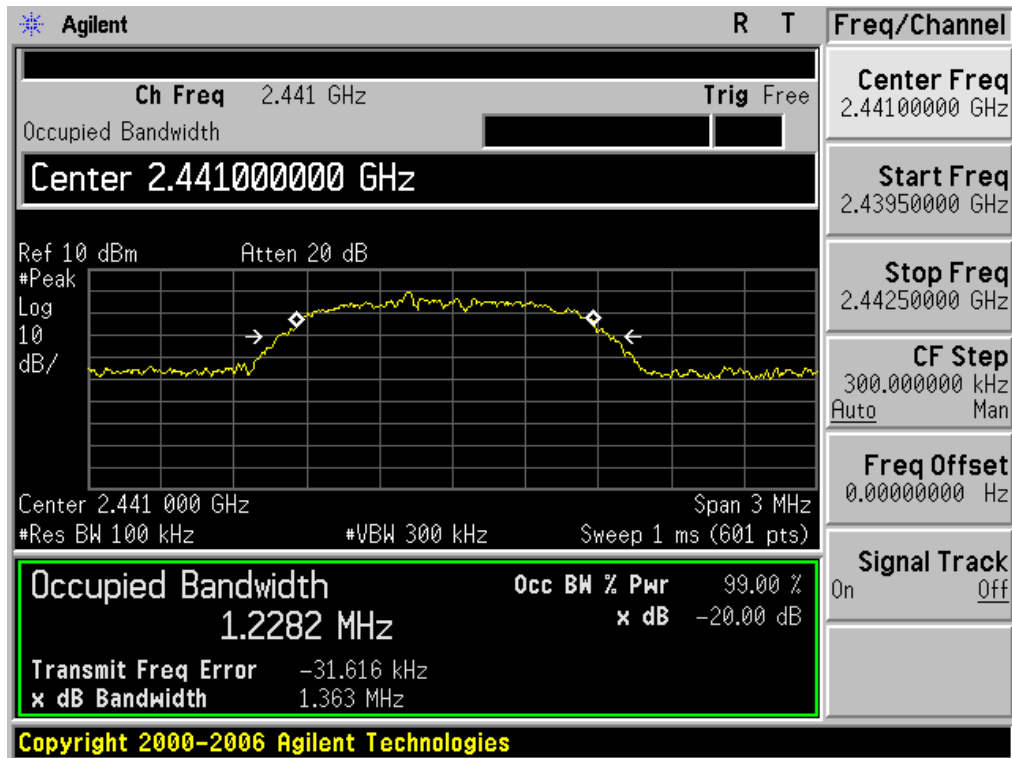
| BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT | | | | |
|---|--------------------|--------------|---------------|--------|
| Applicable Limits | Measurement Result | | | |
| | Test Data (MHz) | | | Result |
| | | 99%OBW (MHz) | -20dB BW(MHz) | |
| N/A | Low Channel | 1.235 | 1.387 | PASS |
| | Middle Channel | 1.228 | 1.363 | PASS |
| | High Channel | 1.209 | 1.319 | PASS |

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

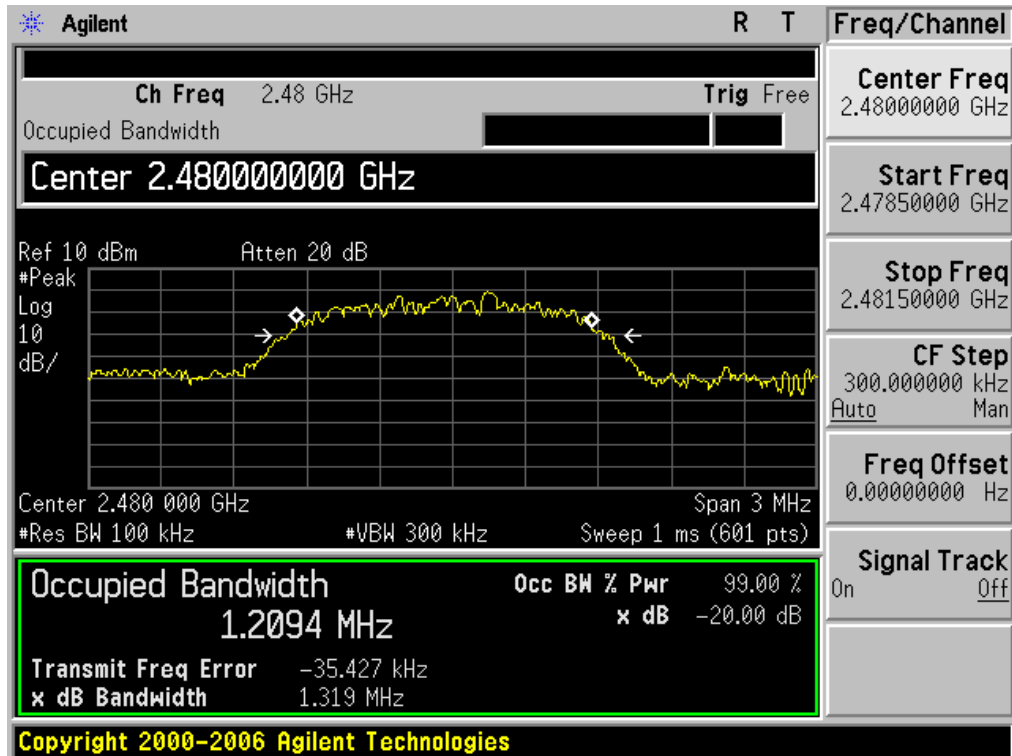




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



7. ANTENNA REQUIREMENT

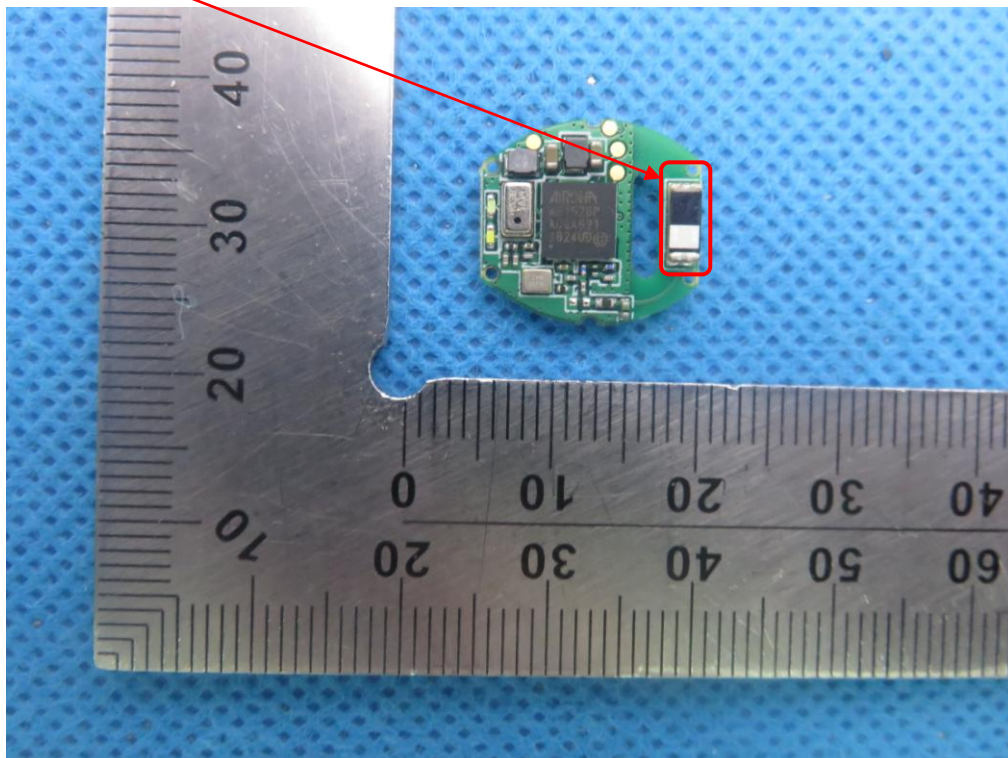
Standard Applicable

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

Refer to statement below for compliance.

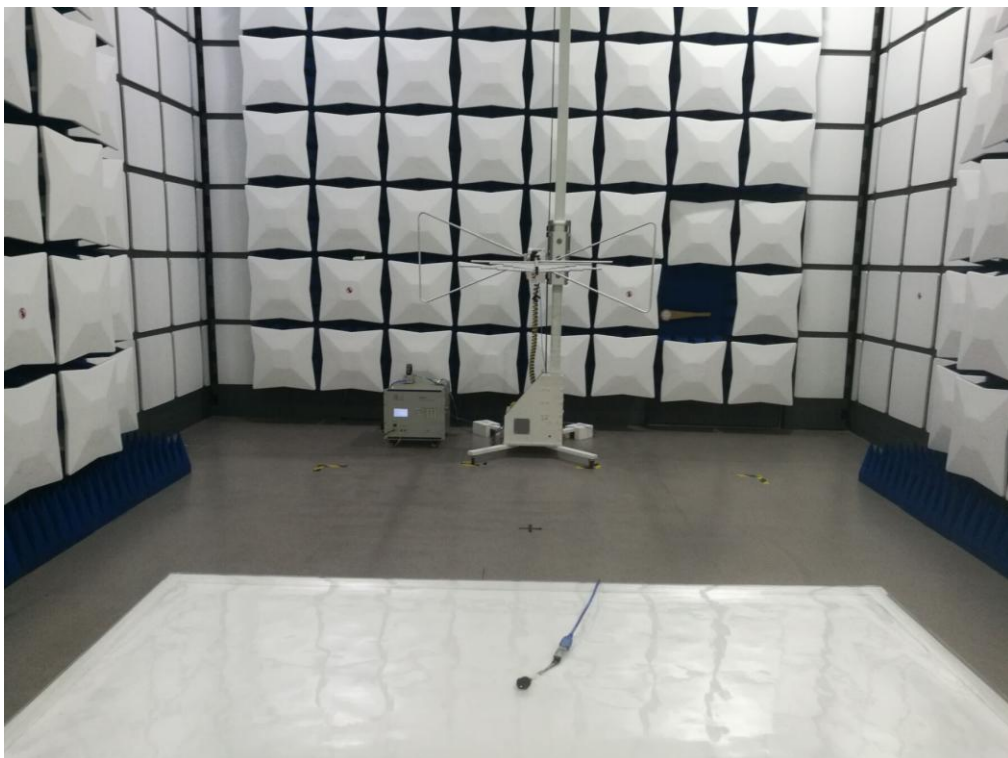
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

ANTENNA



8. PHOTOGRAPH OF TEST

FCC RADIATED EMISSION TEST SETUP



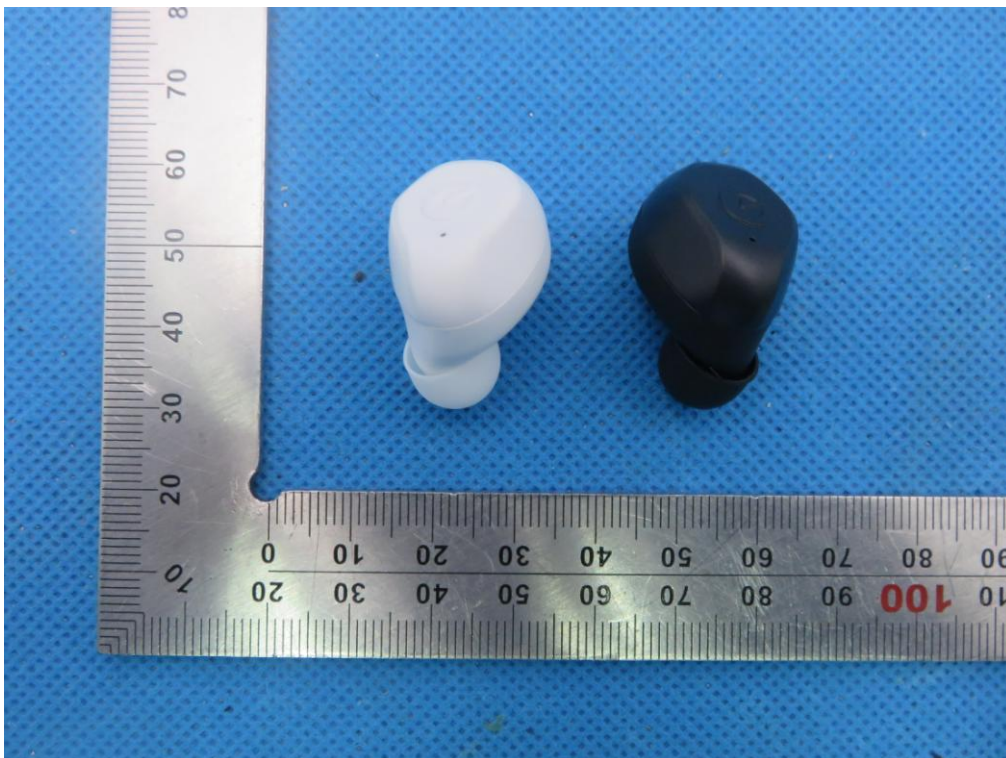


9. PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT



TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW OF EUT

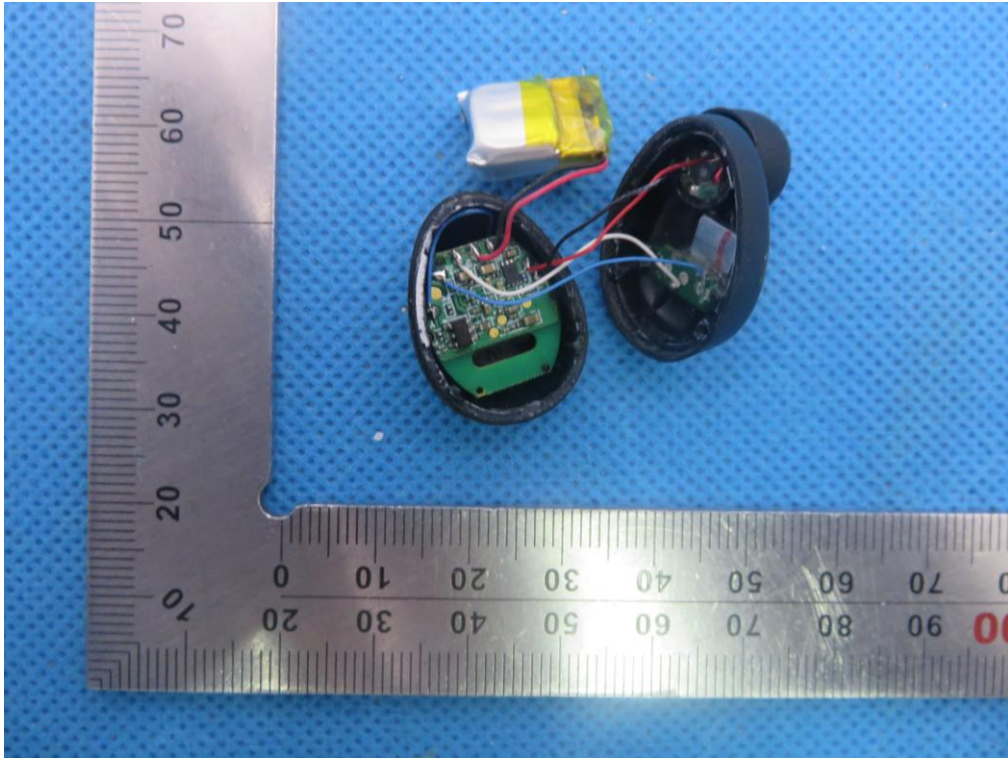


VIEW OF EUT (PORT)

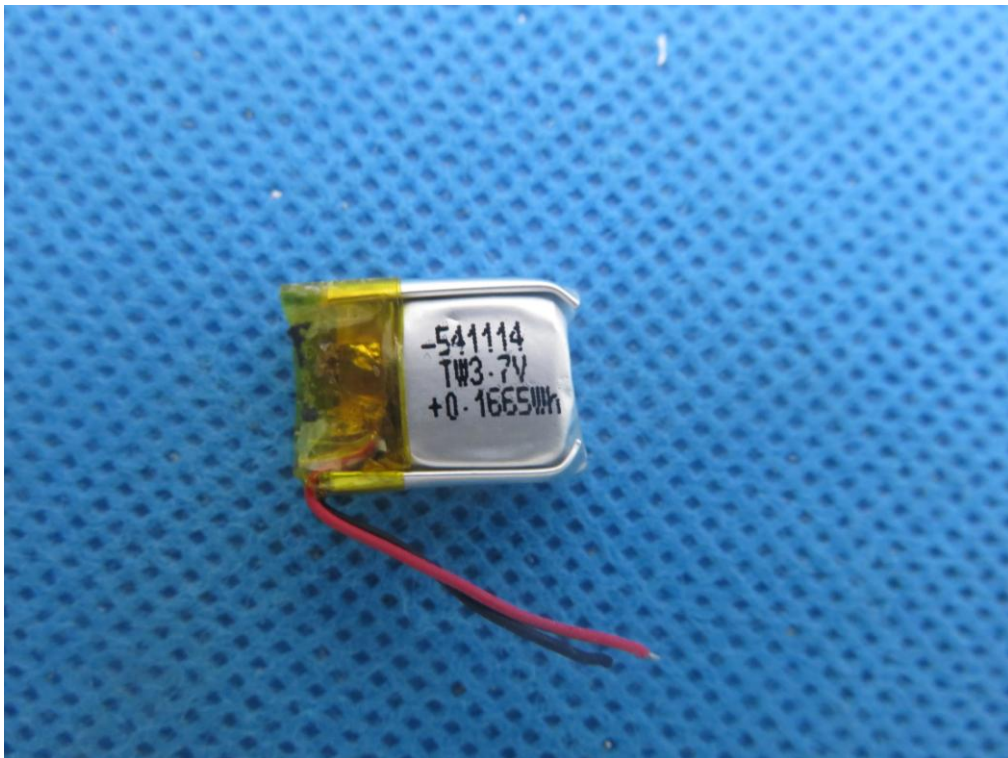




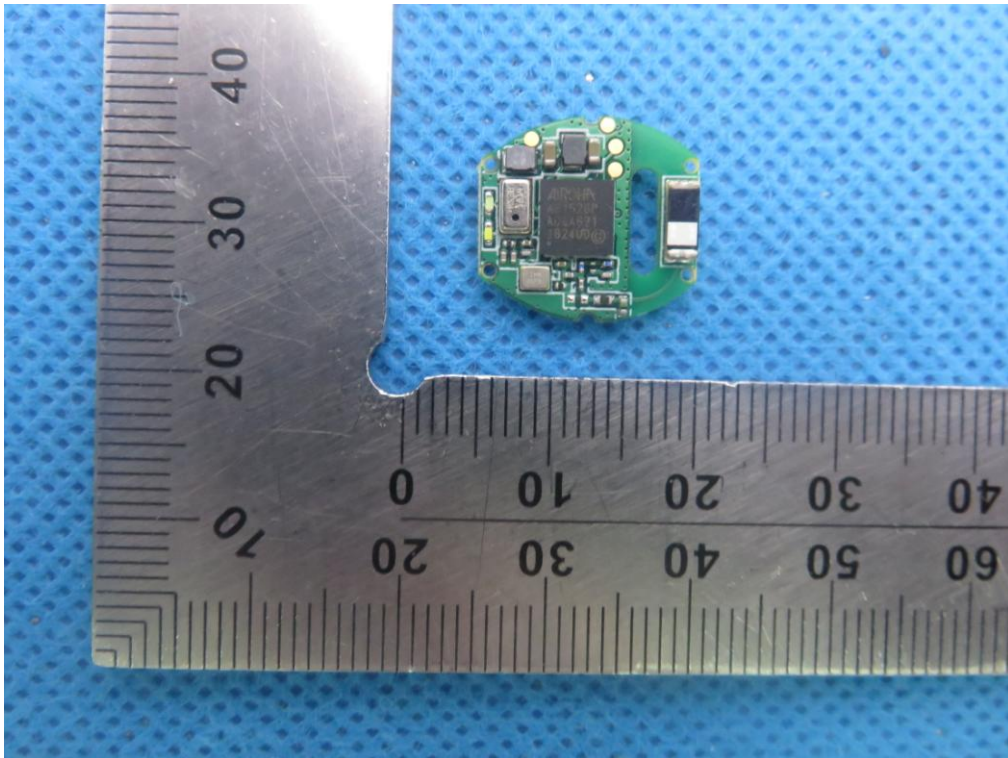
RIGHT
OPEN VIEW OF EUT



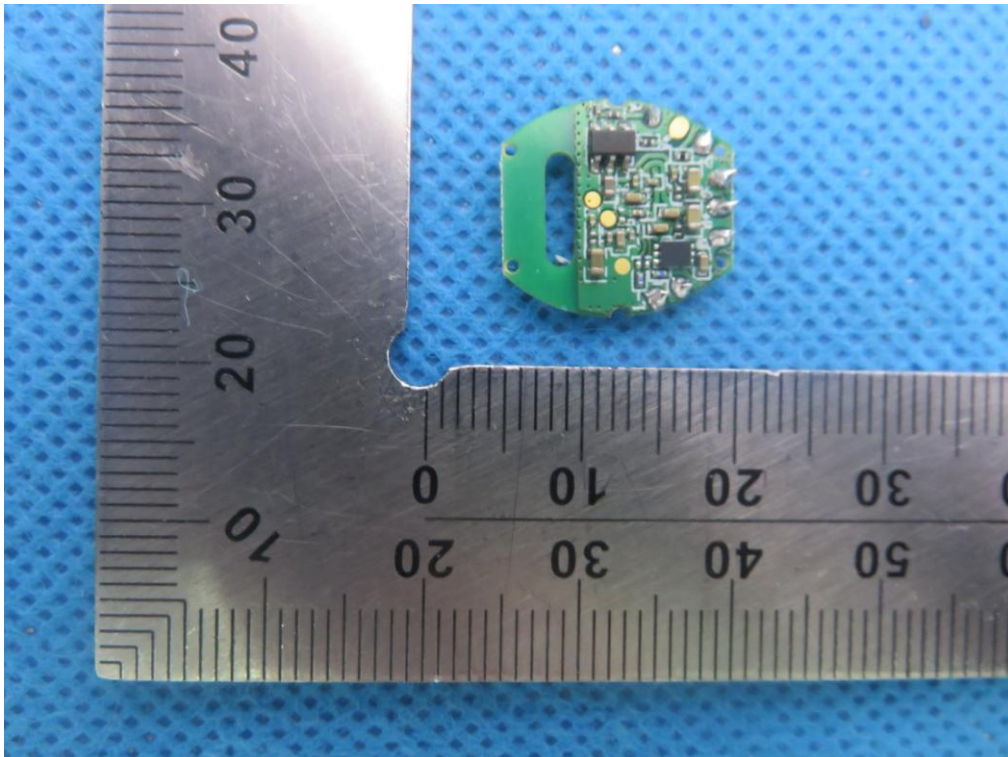
VIEW OF BATTERY



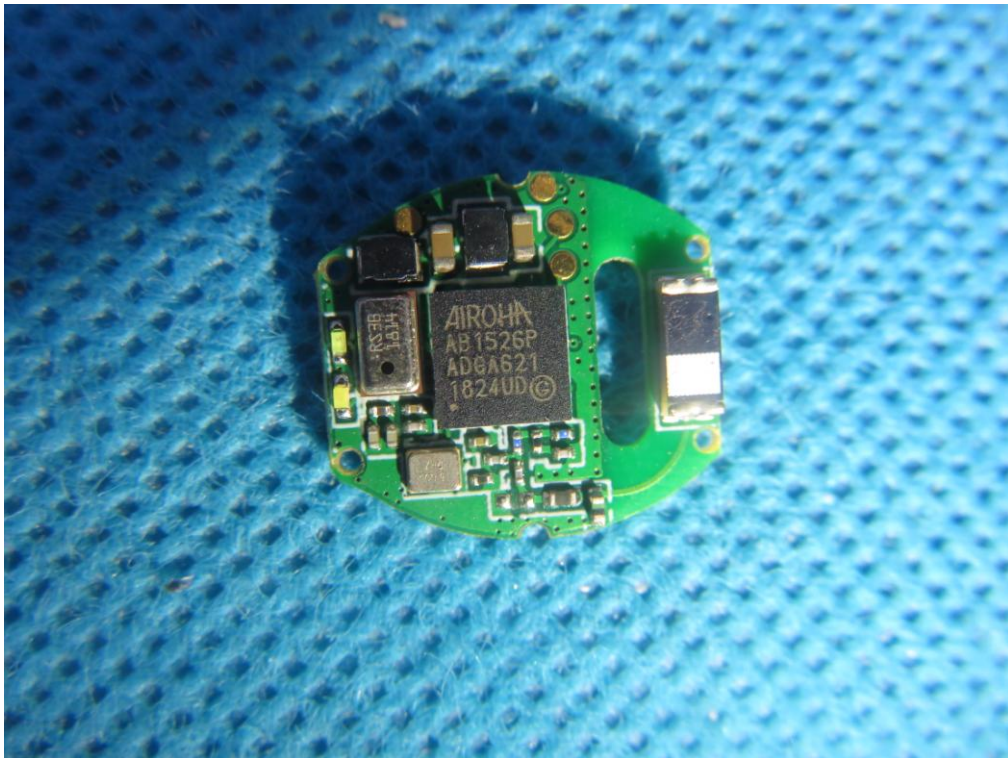
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2

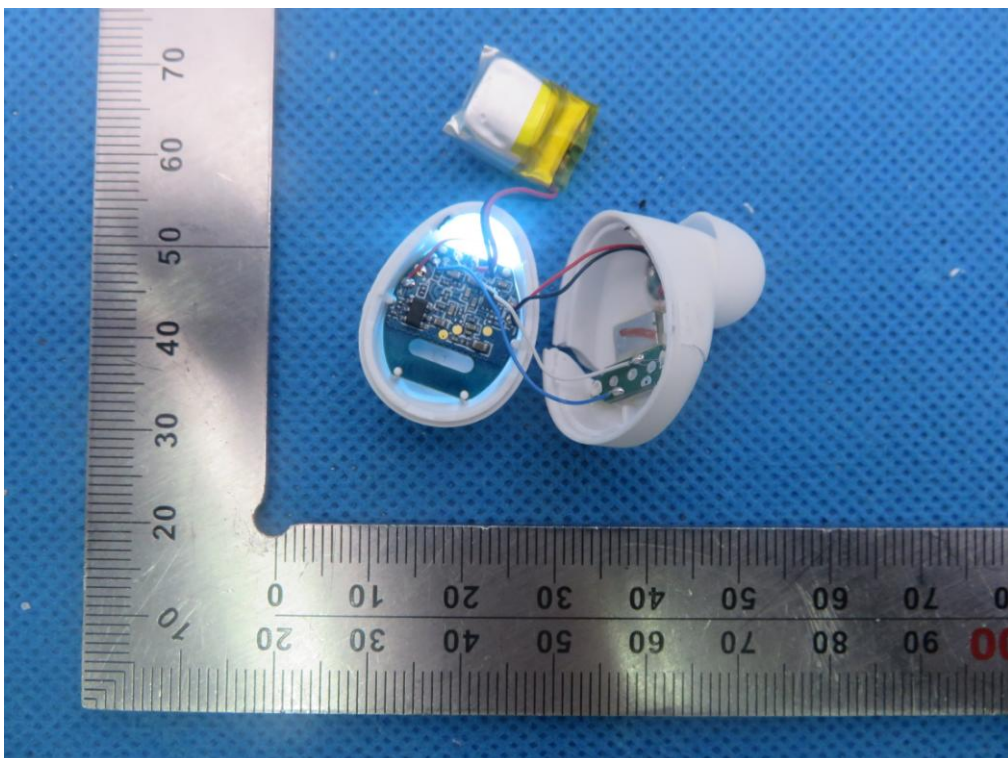


INTERNAL VIEW OF EUT-3



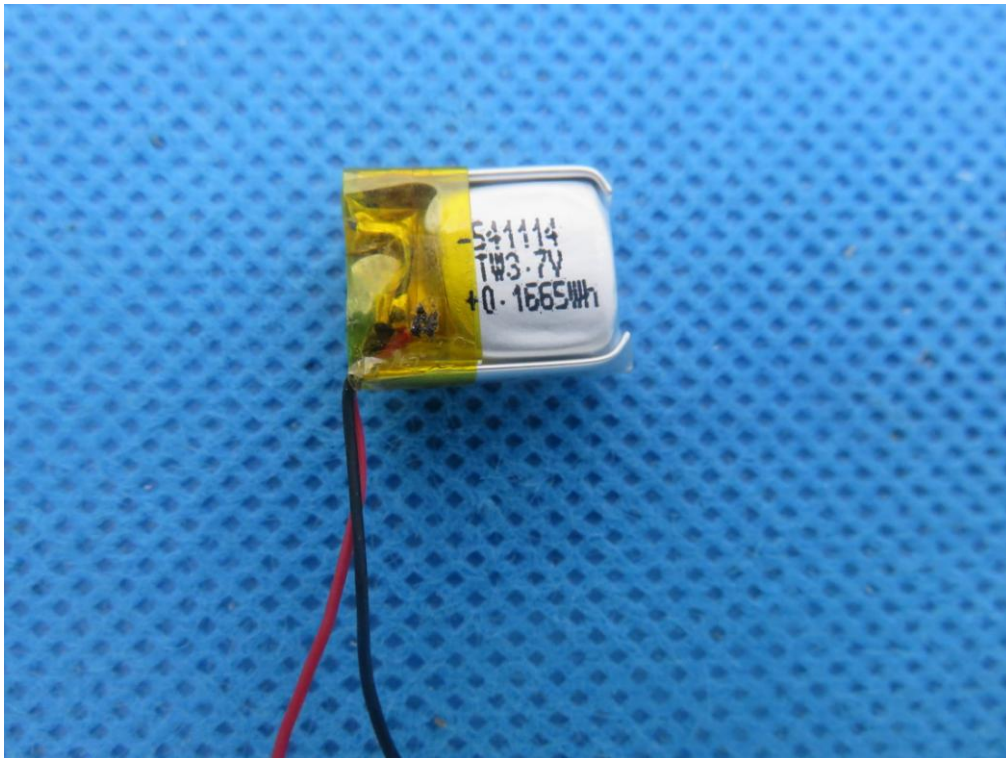
LEFT

OPEN VIEW OF EUT

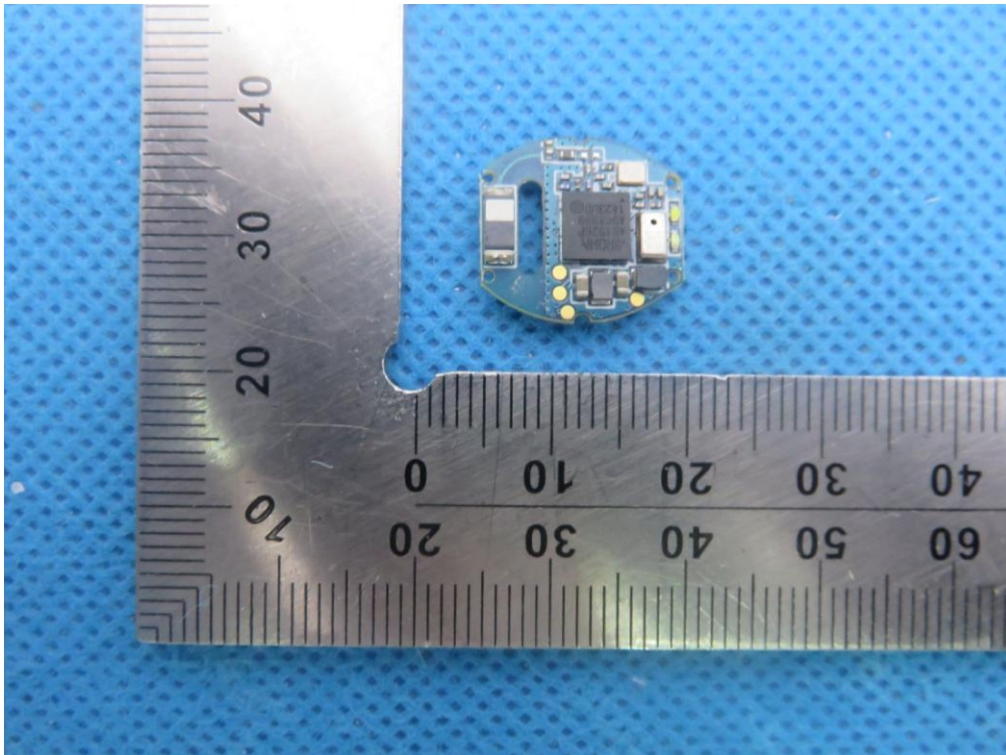




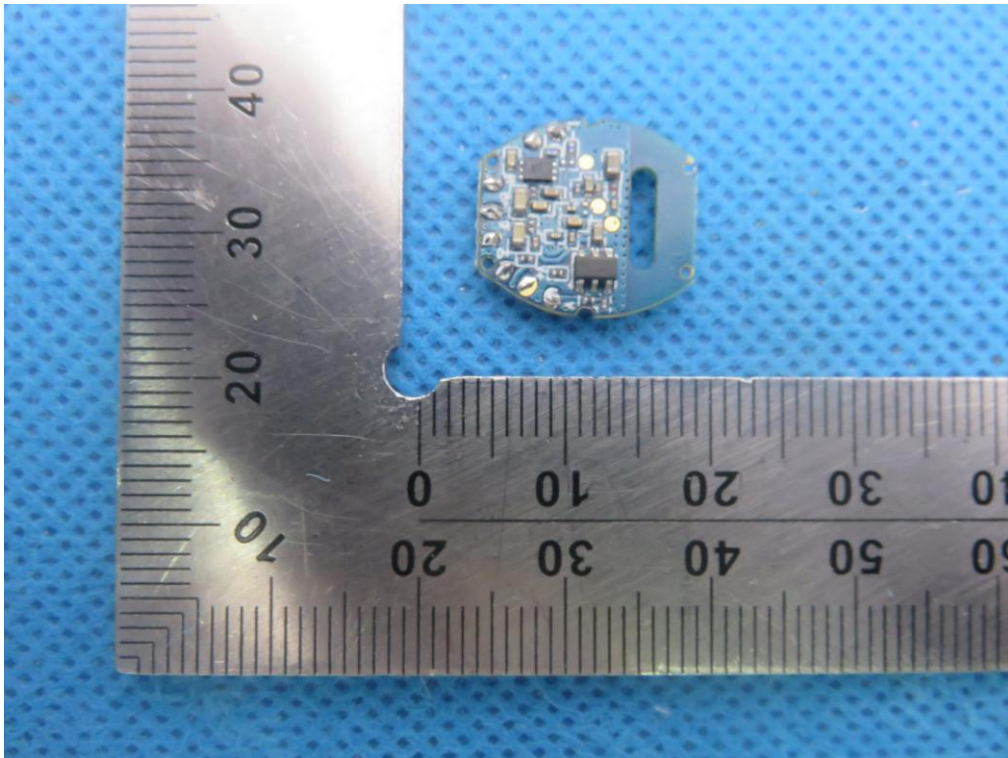
VIEW OF BATTERY



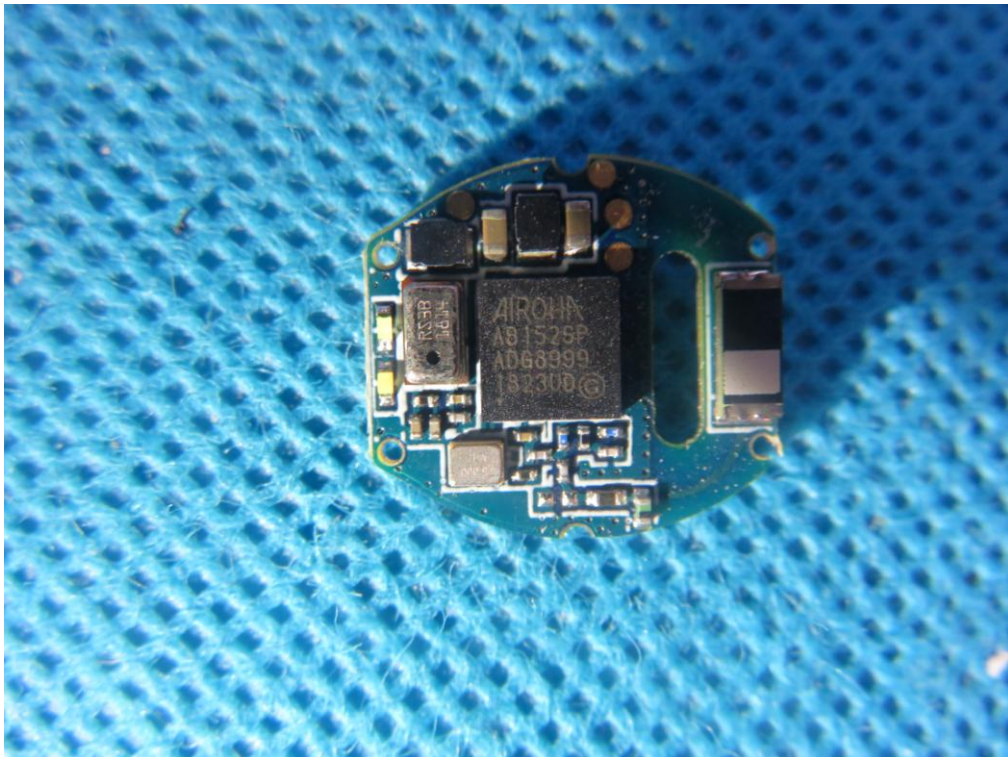
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3





VIEW OF EUT (PORT)-1



VIEW OF EUT (PORT)-2





VIEW OF EUT (PORT)-3



---END OF REPORT---