**SGS-CSTC Standards Technical Services Co., Ltd.**
**Shenzhen Branch**

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# *TEST REPORT*

| | |
|---|---|
| **Application No.**: | SZEM1703002122CR(GZEM1703001380CR) |
| **Applicant:** | Gibson Innovations Limited |
| **Address of Applicant:** | 5/F, Philips Electronics Building. 5 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T. Hong Kong |
| **Manufacturer:** | Gibson Innovations Limited |
| **Address of Manufacturer:** | 5/F, Philips Electronics Building. 5 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T. Hong Kong |
| **Factory:** | Minami Acoustics Limited |
| **Address of Factory:** | NO.13, Maonan Road, Torch Development District, Zhongshan City, Guangdong Province, China. |
| **Equipment Under Test (EUT):** | |
| **EUT Name:** | Bluetooth Headphones |
| **Model No.:** | SHB5250, SHB5250/XX, SHB5250YY/XX,(YY=AA to ZZ;XX=00 to 99).<br>SHQ6500, SHQ6500/XX, SHQ6500YY/XX,(YY=AA to ZZ;XX=00 to 99). ♣ |
| ♣ | Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical. |
| **Trade mark:** | Philips |
| **FCC ID:** | 2AANUSHB5250 |
| **Standards**: | 47 CFR Part 15, Subpart C 15.247 (2016)<br>(only for Conducted Peak Output Power, Radiated Spurious Emissions and Radiated Emissions which fall in the restricted bands) |
| **Date of Receipt**: | 2017-03-20 |
| **Date of Test**: | 2017-03-22 to 2017-03-30 |
| **Date of Issue**: | 2017-04-15 |
| **Test Result :** | **Pass*** |

* In the configuration tested, the EUT complied with the standards specified above.


Jack Zhang
EMC Laboratory Manager

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

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 01 | | 2017-04-15 | | Original |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Tested By** | | Benson Wang | | 2017-03-30 |
| | | **Benson Wang /Project Engineer** | | **Date** |
| **Checked By** | | Eric Fu | | 2017-04-15 |
| | | **Eric Fu /Reviewer** | | **Date** |

# 2 Test Summary

| Radio Spectrum Matter Part | | | | |
|---|---|---|---|---|
| **Item** | **Standard** | **Method** | **Requirement** | **Result** |
| Conducted Peak Output Power | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.5 | 47 CFR Part 15, Subpart C 15.247(b)(1) | Pass |
| Radiated Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.4,6.5,6.6 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass |
| Radiated Emissions which fall in the restricted bands | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.10.5 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass |

**Remark:**

Model No.: SHB5250, SHB5250/XX, SHB5250YY/XX,(YY=AA to ZZ;XX=00 to 99).

SHQ6500, SHQ6500/XX, SHQ6500YY/XX,(YY=AA to ZZ;XX=00 to 99).

Only the model SHB5250 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, only different on model No., outer shape, outer colour and loudspeaker.

This test report (Ref. No.: SZEM151100719403) is only valid with the original test report (Ref. No.: SZEM151100719401).

According to the declaration from the applicant, the new product added the IC protection circuit.

Additionally, updated the below standards.

| Original report standard | The newest report standard |
|---|---|
| 47 CFR Part 15, Subpart C (2014) | 47 CFR Part 15, Subpart C 15.247 (2016) |

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report Conducted Peak Output Power, Radiated Spurious Emissions and Radiated Emissions which fall in the restricted bands were fully retested on Model SHB5250 and shown the data in this report, other tests please refer to original report SZEM151100719401.

# 3 Contents

# 4 General Information

## 4.1 Details of E.U.T.

| | |
|---|---|
| Frequency Range: | 2402MHz to 2480MHz |
| Bluetooth Version: | V4.1 Classic mode |
| Modulation Technique: | Frequency Hopping Spread Spectrum(FHSS) |
| Modulation Type: | GFSK, π/4DQPSK, 8DPSK |
| Number of Channels: | 79 |
| Hopping Channel Type: | Adaptive Frequency Hopping systems |
| Sample Type: | Portable production |
| Antenna Type: | Integral |
| Antenna Gain: | 0dBi |
| Power Supply: | Internal rechargeable battery: DC 3.7V 120mAh<br>Battery: Charge by USB DC 5V |
| Cable: | USB cable: 30cm unshielded |

## 4.2 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|---|---|---|---|
| Adapter | Apple | A1357 W010A051 | REF. No.SEA0500 |

| Operation Frequency each of channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0 | 2402MHz | 20 | 2422MHz | 40 | 2442MHz | 60 | 2462MHz |
| 1 | 2403MHz | 21 | 2423MHz | 41 | 2443MHz | 61 | 2463MHz |
| 2 | 2404MHz | 22 | 2424MHz | 42 | 2444MHz | 62 | 2464MHz |
| 3 | 2405MHz | 23 | 2425MHz | 43 | 2445MHz | 63 | 2465MHz |
| 4 | 2406MHz | 24 | 2426MHz | 44 | 2446MHz | 64 | 2466MHz |
| 5 | 2407MHz | 25 | 2427MHz | 45 | 2447MHz | 65 | 2467MHz |
| 6 | 2408MHz | 26 | 2428MHz | 46 | 2448MHz | 66 | 2468MHz |
| 7 | 2409MHz | 27 | 2429MHz | 47 | 2449MHz | 67 | 2469MHz |
| 8 | 2410MHz | 28 | 2430MHz | 48 | 2450MHz | 68 | 2470MHz |
| 9 | 2411MHz | 29 | 2431MHz | 49 | 2451MHz | 69 | 2471MHz |
| 10 | 2412MHz | 30 | 2432MHz | 50 | 2452MHz | 70 | 2472MHz |
| 11 | 2413MHz | 31 | 2433MHz | 51 | 2453MHz | 71 | 2473MHz |
| 12 | 2414MHz | 32 | 2434MHz | 52 | 2454MHz | 72 | 2474MHz |
| 13 | 2415MHz | 33 | 2435MHz | 53 | 2455MHz | 73 | 2475MHz |
| 14 | 2416MHz | 34 | 2436MHz | 54 | 2456MHz | 74 | 2476MHz |
| 15 | 2417MHz | 35 | 2437MHz | 55 | 2457MHz | 75 | 2477MHz |
| 16 | 2418MHz | 36 | 2438MHz | 56 | 2458MHz | 76 | 2478MHz |
| 17 | 2419MHz | 37 | 2439MHz | 57 | 2459MHz | 77 | 2479MHz |
| 18 | 2420MHz | 38 | 2440MHz | 58 | 2460MHz | 78 | 2480MHz |
| 19 | 2421MHz | 39 | 2441MHz | 59 | 2461MHz | | |

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel | Frequency |
|---|---|
| The Lowest channel | 2402MHz |
| The Middle channel | 2441MHz |
| The Highest channel | 2480MHz |

## 4.3 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Radio Frequency | 7.25 x 10-8 |
| 2 | Duty cycle | 0.37% |
| 3 | Occupied Bandwidth | 3% |
| 4 | RF conducted power | 0.75dB |
| 5 | RF power density | 2.84dB |
| 6 | Conducted Spurious emissions | 0.75dB |
| 7 | RF Radiated power | 4.5dB (below 1GHz) |
| | | 4.8dB (above 1GHz) |
| 8 | Radiated Spurious emission test | 4.5dB (30MHz-1GHz) |
| | | 4.8dB (1GHz-18GHz) |
| 9 | Temperature test | 1℃ |
| 10 | Humidity test | 3% |
| 11 | Supply voltages | 1.5% |
| 12 | Time | 3% |

## 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

## 4.5 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab 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.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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 No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

## 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None

# 5 Equipment List

| RE in Chamber | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No** | **Cal. Date (yyyy-mm-dd)** | **Cal. Due date (yyyy-mm-dd)** |
| 1 | 10m Semi-Anechoic Chamber | SAEMC | FSAC1018 | SEM001-03 | 2016-05-13 | 2017-05-13 |
| 2 | EMI Test Receiver (9k-7GHz) | Rohde & Schwarz | ESR | SEM004-03 | 2016-04-25 | 2017-04-25 |
| 3 | Trilog-Broadband Antenna(30M-1GHz) | Schwarzbeck | VULB9168 | SEM003-18 | 2016-06-29 | 2019-06-29 |
| 4 | Pre-amplifier | Sonoma Instrument Co | 310N | SEM005-03 | 2016-07-06 | 2017-07-06 |
| 5 | Loop Antenna | ETS-Lindgren | 6502 | SEM003-08 | 2015-08-14 | 2018-08-14 |

| RE in Chamber | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. Date (yyyy-mm-dd)** | **Cal. Due date (yyyy-mm-dd)** |
| 1 | 3m Semi-Anechoic Chamber | AUDIX | N/A | SEM001-02 | 2016-05-13 | 2017-05-13 |
| 2 | EXA Spectrum Analyzer | Agilent Technologies Inc | N9010A | SEM004-09 | 2016-07-19 | 2017-07-19 |
| 3 | BiConiLog Antenna (26-3000MHz) | ETS-Lindgren | 3142C | SEM003-02 | 2014-11-15 | 2017-11-15 |
| 4 | Amplifier (0.1-1300MHz) | HP | 8447D | SEM005-02 | 2016-10-09 | 2017-10-09 |
| 5 | Horn Antenna (1-18GHz) | Rohde & Schwarz | HF907 | SEM003-07 | 2015-06-14 | 2018-06-14 |
| 6 | Horn Antenna (18-26GHz) | ETS-Lindgren | 3160 | SEM003-12 | 2014-11-24 | 2017-11-24 |
| 7 | Horn Antenna(26GHz-40GHz) | A.H.Systems, inc. | SAS-573 | SEM003-13 | 2015-02-12 | 2018-02-12 |
| 8 | Low Noise Amplifier | Black Diamond Series | BDLNA-0118-352810 | SEM005-05 | 2016-10-09 | 2017-10-09 |
| 9 | Band filter | Amindeon | Asi 3314 | SEM023-01 | N/A | N/A |

| RF connected test | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. Date (yyyy-mm-dd)** | **Cal. Due date (yyyy-mm-dd)** |
| 1 | DC Power Supply | ZhaoXin | RXN-305D | SEM011-02 | 2016-10-09 | 2017-10-09 |
| 2 | Spectrum Analyzer | Rohde & Schwarz | FSP | SEM004-06 | 2016-10-09 | 2017-10-09 |
| 3 | Signal Generator | Rohde & Schwarz | SML03 | SEM006-02 | 2016-04-25 | 2017-04-25 |
| 4 | Power Meter | Rohde & Schwarz | NRVS | SEM014-02 | 2016-10-09 | 2017-10-09 |

| General used equipment | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. Date (yyyy-mm-dd)** | **Cal. Due date (yyyy-mm-dd)** |
| 1 | Humidity/ Temperature Indicator | Anymetre | TH101B | SEM002-11 | 2016-07-23 | 2017-07-23 |
| 2 | Humidity/ Temperature Indicator | Mingle | N/A | SEM002-12 | 2016-10-12 | 2017-10-12 |
| 3 | Humidity/ Temperature Indicator | Mingle | N/A | SEM002-13 | 2016-10-12 | 2017-10-12 |
| 4 | Barometer | Changchun Meteorological Industry Factory | DYM3 | SEM002-01 | 2016-05-18 | 2017-05-18 |

# 6 Radio Spectrum Matter Test Results

## 6.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.5
Limit:

| Frequency range(MHz) | Output power of the intentional radiator(watt) |
|---|---|
| 902-928 | 1 for ≥50 hopping channels |
| | 0.25 for 25≤ hopping channels <50 |
| | 1 for digital modulation |
| 2400-2483.5 | 1 for ≥75 non-overlapping hopping channels |
| | 0.125 for all other frequency hopping systems |
| | 1 for digital modulation |
| 5725-5850 | 1 for frequency hopping systems and digital modulation |

### 6.1.1 E.U.T. Operation

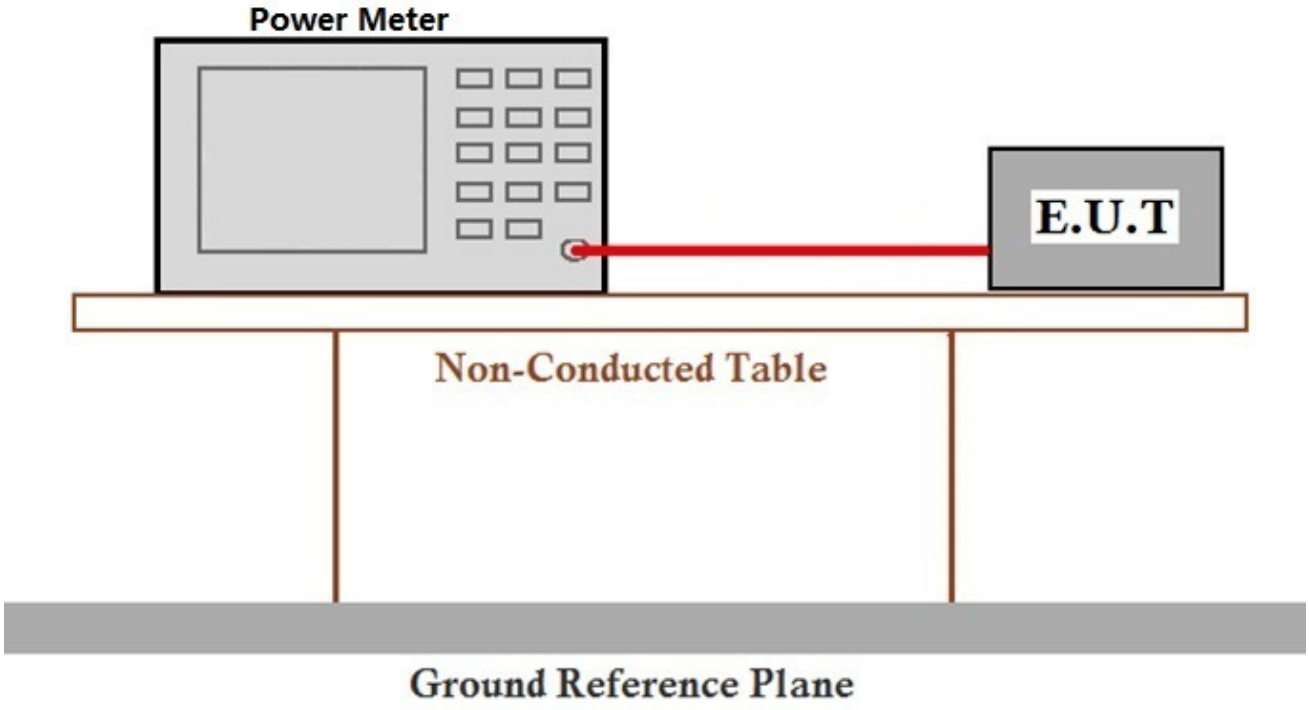
Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1015 mbar

Exploratory Test Mode: Non-hopping transmitting with all kind of modulation and all kind of data type.

Final Test Mode: Through Pre-scan, find the DH1 of data type is the worst case of GFSK modulation type, 2-DH1 of data type is the worst case of π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.

### 6.1.2 Test Setup Diagram




### 6.1.3 Measurement Data

The detailed test data see: Appendix 15.247

## 6.2 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 10m for below 1GHz; 3m for above 1GHz
Limit:

| Frequency(MHz) | Field strength(microvolts/meter) | Measurement distance(meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |
| Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. | | |

### 6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.0 °C Humidity: 50 % RH Atmospheric Pressure: 1015 mbar

Exploratory Test Mode: Non-hopping transmitting mode with all kind of modulation and all kind of data type

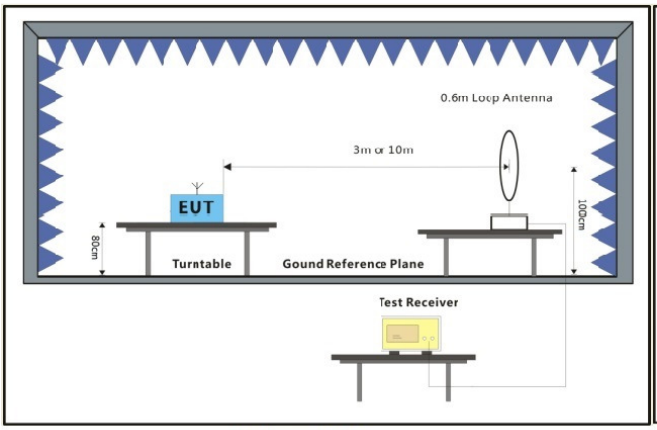
a: Transmitting mode

Final Test Mode: Through Pre-scan, find the 3-DH1 of data type and 8DPSK modulation is the worst case.

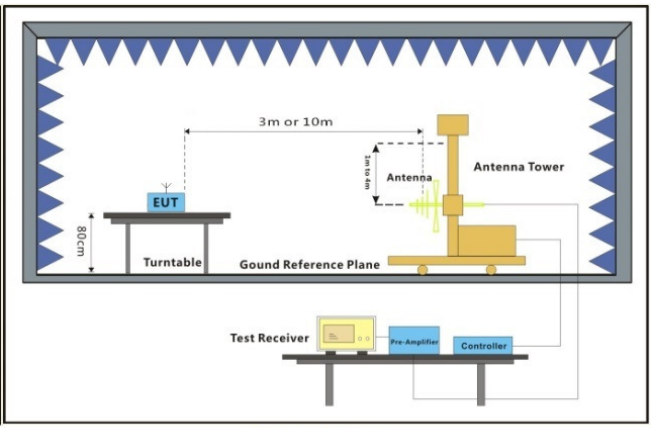
For below 1GHz part, through pre-scan, the worst case is the lowest channel.

Only the worst case is recorded in the report.

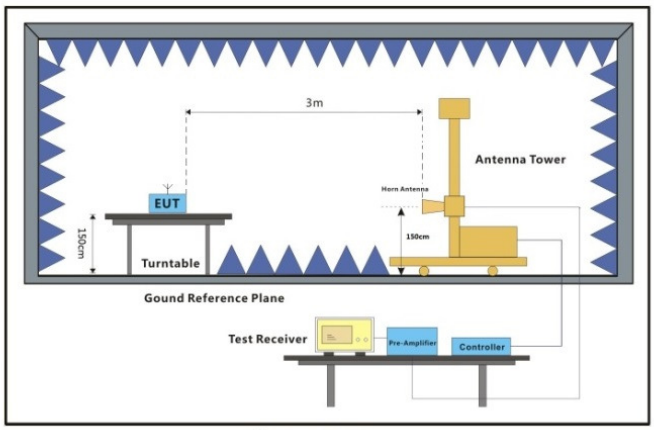
### 6.2.2 Test Setup Diagram




Below 30MHz




30MHz-1GHz




Above 1GHz

### 6.2.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

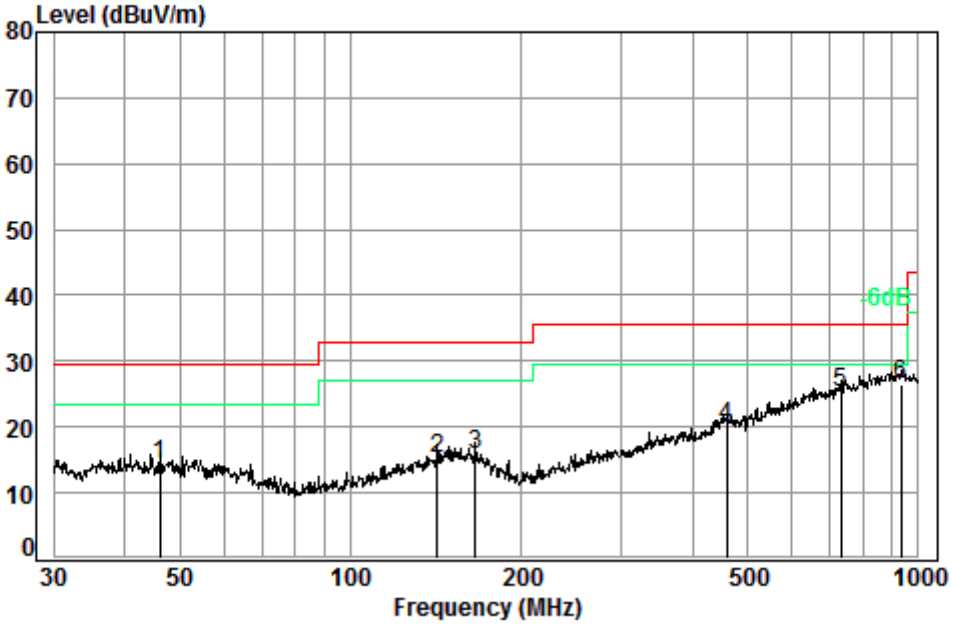
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

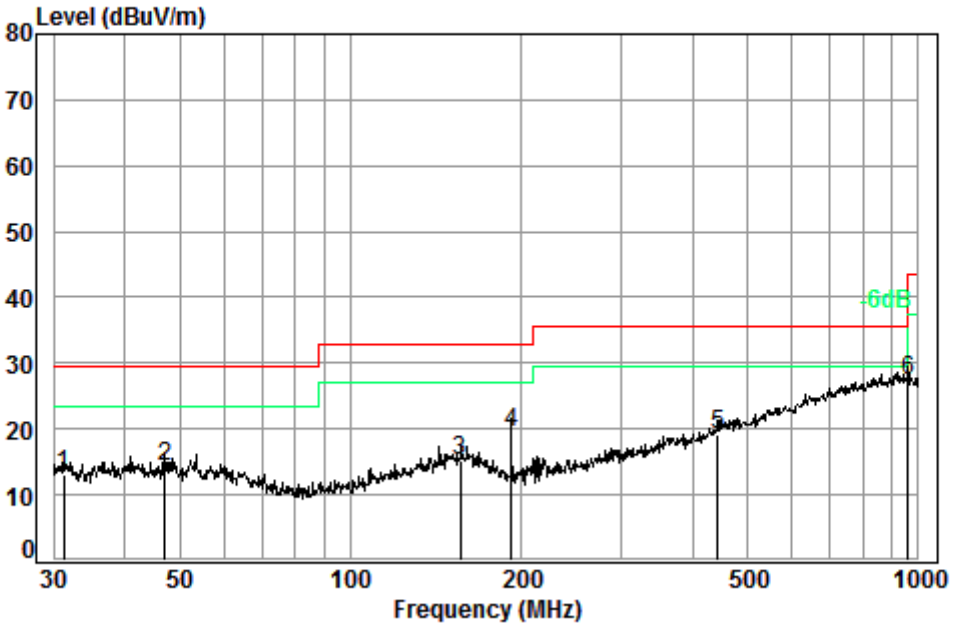
For below 1GHz:
Mode:a;Polarization:Vertical




Condition: 10m VERTICAL
Job No. : 02122CR
Test Mode: TX mode

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 46.18 | 6.82 | 12.87 | 33.00 | 27.57 | 14.26 | 29.50 | -15.24 |
| 2 | 142.32 | 7.41 | 12.92 | 32.75 | 27.70 | 15.28 | 33.00 | -17.72 |
| 3 | 166.07 | 7.50 | 12.79 | 32.73 | 28.20 | 15.76 | 33.00 | -17.24 |
| 4 | 459.11 | 8.45 | 16.28 | 32.60 | 27.90 | 20.03 | 35.60 | -15.57 |
| 5 | 731.92 | 9.20 | 20.55 | 32.60 | 28.02 | 25.17 | 35.60 | -10.43 |
| 6 pp | 932.27 | 9.53 | 22.61 | 32.50 | 26.94 | 26.58 | 35.60 | -9.02 |

Mode:a;Polarization:Horizontal




Condition: 10m HORIZONTAL
Job No. : 02122CR
Test Mode: TX mode

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |
| 1 | 31.29 | 6.70 | 12.52 | 32.97 | 26.77 | 13.02 | 29.50 | -16.48 |
| 2 | 47.16 | 6.84 | 12.85 | 33.00 | 27.58 | 14.27 | 29.50 | -15.23 |
| 3 | 156.46 | 7.48 | 13.40 | 32.74 | 27.14 | 15.28 | 33.00 | -17.72 |
| 4 | 191.75 | 7.56 | 9.70 | 32.71 | 35.05 | 19.60 | 33.00 | -13.40 |
| 5 | 443.29 | 8.41 | 16.01 | 32.60 | 27.39 | 19.21 | 35.60 | -16.39 |
| 6 pp | 958.79 | 9.60 | 22.76 | 32.50 | 27.62 | 27.48 | 35.60 | -8.12 |

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$L_3 / L_{10} = D_{10} / D_3$

Note:

$L_3$: Level @ 3m distance. Unit: uV/m;

$L_{10}$: Level @ 10m distance. Unit: uV/m;

$D_3$: 3m distance. Unit: m

$D_{10}$: 10m distance. Unit: m

The level at 3m test distance is below:

| Frequency (MHz) | Level @ 10m (dBuV/m) | Level @ 10m (uV/m) | Level @ 3m (uV/m) | Level @ 3m (dBuV/m) | Limit @ 3m (dBuV/m) | Margin (dB) | Ant. Polarization |
|---|---|---|---|---|---|---|---|
| 46.18 | 14.26 | 5.16 | 17.21 | 24.72 | 40.00 | -15.28 | V |
| 142.32 | 15.28 | 5.81 | 19.36 | 25.74 | 43.50 | -17.76 | V |
| 166.07 | 15.76 | 6.14 | 20.46 | 26.22 | 43.50 | -17.28 | V |
| 459.11 | 20.03 | 10.03 | 33.45 | 30.49 | 46.00 | -15.51 | V |
| 731.92 | 25.17 | 18.13 | 60.45 | 35.63 | 46.00 | -10.37 | V |
| 932.27 | 26.58 | 21.33 | 71.10 | 37.04 | 46.00 | -8.96 | V |
| 31.29 | 13.02 | 4.48 | 14.92 | 23.48 | 40.00 | -16.52 | H |
| 47.16 | 14.27 | 5.17 | 17.23 | 24.73 | 40.00 | -15.27 | H |
| 156.46 | 15.28 | 5.81 | 19.36 | 25.74 | 43.50 | -17.76 | H |
| 191.75 | 19.60 | 9.55 | 31.83 | 30.06 | 43.50 | -13.44 | H |
| 443.29 | 19.21 | 9.13 | 30.44 | 29.67 | 46.00 | -16.33 | H |
| 958.79 | 27.48 | 23.66 | 78.86 | 37.94 | 46.00 | -8.06 | H |

For Above 1GHz:

Mode: a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:Low; Detector: Peak

| Frequency (MHz) | Antenna factors (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Reading Level (dB V) | Level (dB V/m) | Limit (dB V/m) | Over limit (dB) |
|---|---|---|---|---|---|---|---|
| 3856.668 | 33.22 | 6.59 | 37.99 | 45.22 | 47.04 | 74 | -26.96 |
| 4804.000 | 34.16 | 7.73 | 38.40 | 46.18 | 49.67 | 74 | -24.33 |
| 6001.626 | 34.70 | 8.75 | 38.30 | 45.34 | 50.49 | 74 | -23.51 |
| 7206.000 | 36.42 | 9.65 | 37.11 | 43.64 | 52.60 | 74 | -21.40 |
| 9608.000 | 37.52 | 11.06 | 35.10 | 40.36 | 53.84 | 74 | -20.16 |
| 12255.220 | 38.75 | 12.78 | 36.21 | 38.35 | 53.67 | 74 | -20.33 |

Mode: a; Polarization:Vertical; Modulation Type:8DPSK; Channel:Low; Detector: Peak

| Frequency (MHz) | Antenna factors (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Reading Level (dB V) | Level (dB V/m) | Limit (dB V/m) | Over limit (dB) |
|---|---|---|---|---|---|---|---|
| 3856.668 | 33.22 | 6.59 | 37.99 | 44.39 | 46.21 | 74 | -27.79 |
| 4804.000 | 34.16 | 7.73 | 38.40 | 45.39 | 48.88 | 74 | -25.12 |
| 6142.019 | 34.82 | 8.84 | 38.16 | 45.62 | 51.12 | 74 | -22.88 |
| 7206.000 | 36.42 | 9.65 | 37.11 | 44.13 | 53.09 | 74 | -20.91 |
| 9608.000 | 37.52 | 11.06 | 35.10 | 39.57 | 53.05 | 74 | -20.95 |
| 12397.740 | 38.84 | 12.99 | 36.55 | 37.45 | 52.73 | 74 | -21.27 |

Mode: a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:middle; Detector: Peak

| Frequency (MHz) | Antenna factors (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Reading Level (dB V) | Level (dB V/m) | Limit (dB V/m) | Over limit (dB) |
|---|---|---|---|---|---|---|---|
| 3845.537 | 33.19 | 6.58 | 37.98 | 44.65 | 46.44 | 74 | -27.56 |
| 4882.000 | 34.30 | 7.84 | 38.44 | 45.39 | 49.09 | 74 | -24.91 |
| 5830.640 | 34.60 | 8.59 | 38.33 | 44.95 | 49.81 | 74 | -24.19 |
| 7323.000 | 36.37 | 9.73 | 37.01 | 43.41 | 52.50 | 74 | -21.50 |
| 9764.000 | 37.55 | 11.21 | 35.02 | 39.68 | 53.42 | 74 | -20.58 |
| 12219.850 | 38.73 | 12.73 | 36.13 | 37.81 | 53.14 | 74 | -20.86 |

Mode: a; Polarization:Vertical; Modulation Type:8DPSK; Channel:middle; Detector: Peak

| Frequency (MHz) | Antenna factors (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Reading Level (dB V) | Level (dB V/m) | Limit (dB V/m) | Over limit (dB) |
|---|---|---|---|---|---|---|---|
| 3969.767 | 33.52 | 6.68 | 38.00 | 44.12 | 46.32 | 74 | -27.68 |
| 4882.000 | 34.30 | 7.84 | 38.44 | 45.09 | 48.79 | 74 | -25.21 |
| 6124.292 | 34.80 | 8.83 | 38.18 | 44.52 | 49.97 | 74 | -24.03 |
| 7323.000 | 36.37 | 9.73 | 37.01 | 42.89 | 51.98 | 74 | -22.02 |
| 9764.000 | 37.55 | 11.21 | 35.02 | 39.75 | 53.49 | 74 | -20.51 |
| 12469.610 | 38.88 | 13.10 | 36.73 | 37.75 | 53.00 | 74 | -21.00 |

Mode: a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:High; Detector: Peak

| Frequency (MHz) | Antenna factors (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Reading Level (dB V) | Level (dB V/m) | Limit (dB V/m) | Over limit (dB) |
|---|---|---|---|---|---|---|---|
| 3661.149 | 32.67 | 6.43 | 37.97 | 44.11 | 45.24 | 74 | -28.76 |
| 4960.000 | 34.43 | 7.95 | 38.48 | 45.32 | 49.22 | 74 | -24.78 |
| 6142.019 | 34.82 | 8.84 | 38.16 | 44.25 | 49.75 | 74 | -24.25 |
| 7440.000 | 36.32 | 9.81 | 36.90 | 42.44 | 51.67 | 74 | -22.33 |
| 9920.000 | 37.58 | 11.36 | 34.94 | 38.99 | 52.99 | 74 | -21.01 |
| 12326.270 | 38.80 | 12.89 | 36.38 | 37.49 | 52.80 | 74 | -21.20 |

Mode: a; Polarization:Vertical; Modulation Type:8DPSK; Channel:High; Detector: Peak

| Frequency (MHz) | Antenna factors (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Reading Level (dB V) | Level (dB V/m) | Limit (dB V/m) | Over limit (dB) |
|---|---|---|---|---|---|---|---|
| 3845.537 | 33.19 | 6.58 | 37.98 | 43.46 | 45.25 | 74 | -28.75 |
| 4960.000 | 34.43 | 7.95 | 38.48 | 44.46 | 48.36 | 74 | -25.64 |
| 6583.209 | 35.34 | 9.14 | 37.72 | 42.99 | 49.75 | 74 | -24.25 |
| 7440.000 | 36.32 | 9.81 | 36.90 | 42.78 | 52.01 | 74 | -21.99 |
| 9920.000 | 37.58 | 11.36 | 34.94 | 39.05 | 53.05 | 74 | -20.95 |
| 12361.950 | 38.82 | 12.94 | 36.47 | 37.76 | 53.05 | 74 | -20.95 |

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

## 6.3 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m

### 6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.0 °C Humidity: 56 % RH Atmospheric Pressure: 1015 mbar

Exploratory Test Mode: Non-hopping transmitting mode with all kind of modulation and all kind of data type

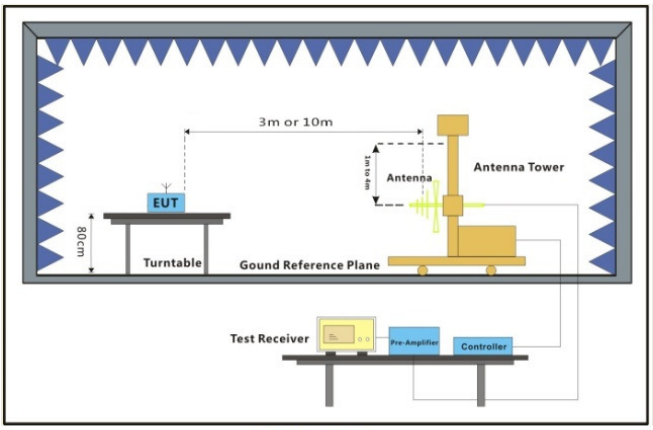
a: Transmitting mode

Final Test Mode: Through Pre-scan, find the 3-DH5 of data type and 8DPSK modulation is the worst case.

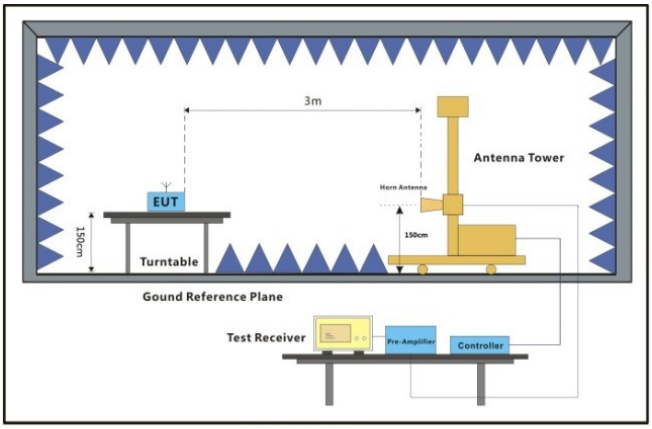
For below 1GHz part, through pre-scan, the worst case is the lowest channel.

Only the worst case is recorded in the report.

### 6.3.2 Test Setup Diagram




30MHz-1GHz




Above 1GHz

### 6.3.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

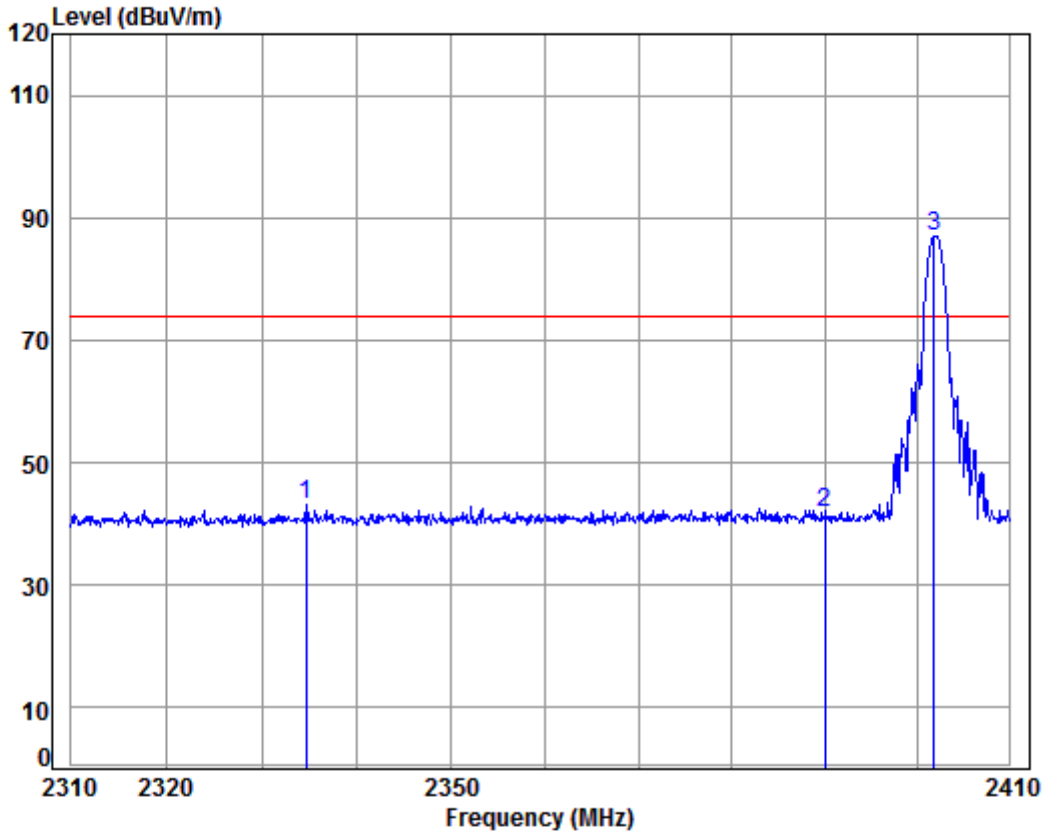
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

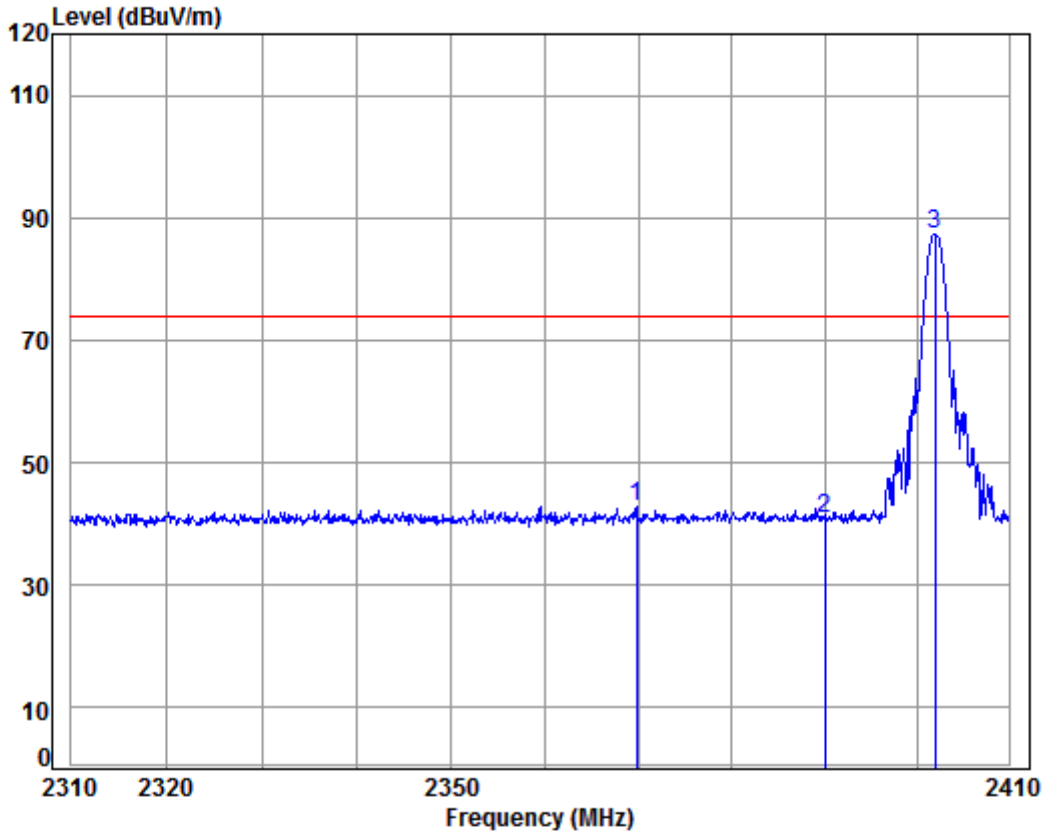
Mode:a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:Low




Condition: 3m HORIZONTAL
Job No: : 02122CR
Mode: : 2402 Bandedge
: BT

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 2334.703 | 5.29 | 28.91 | 37.97 | 46.81 | 43.04 | 74.00 | -30.96 | Peak |
| 2 | 2390.000 | 5.34 | 29.08 | 37.96 | 45.25 | 41.71 | 74.00 | -32.29 | Peak |
| 3 pp | 2401.843 | 5.35 | 29.11 | 37.96 | 90.43 | 86.93 | 74.00 | 12.93 | Peak |

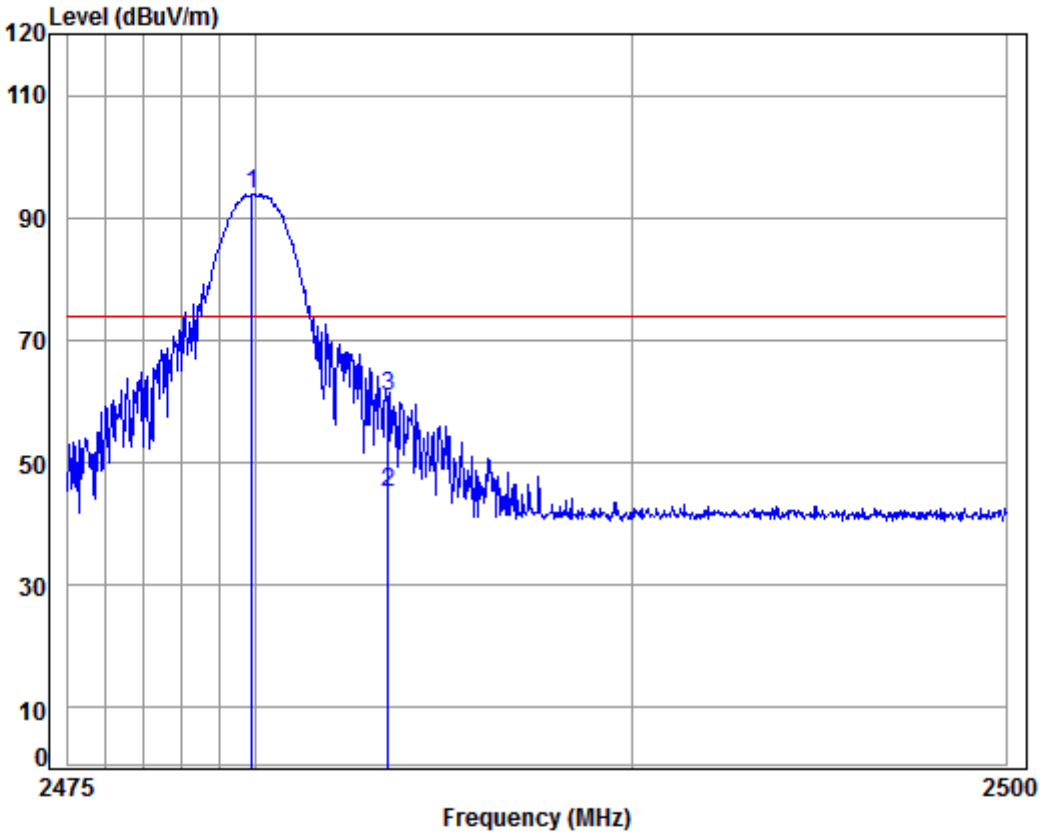
Mode:a; Polarization:Vertical; Modulation Type:8DPSK; Channel:Low




Condition: 3m VERTICAL
Job No: : 02122CR
Mode: : 2402 Bandedge
: BT

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 2369.792 | 5.32 | 29.02 | 37.96 | 46.50 | 42.88 | 74.00 | -31.12 | Peak |
| 2 | 2390.000 | 5.34 | 29.08 | 37.96 | 44.39 | 40.85 | 74.00 | -33.15 | Peak |
| 3 pp | 2401.945 | 5.35 | 29.11 | 37.96 | 90.74 | 87.24 | 74.00 | 13.24 | Peak |

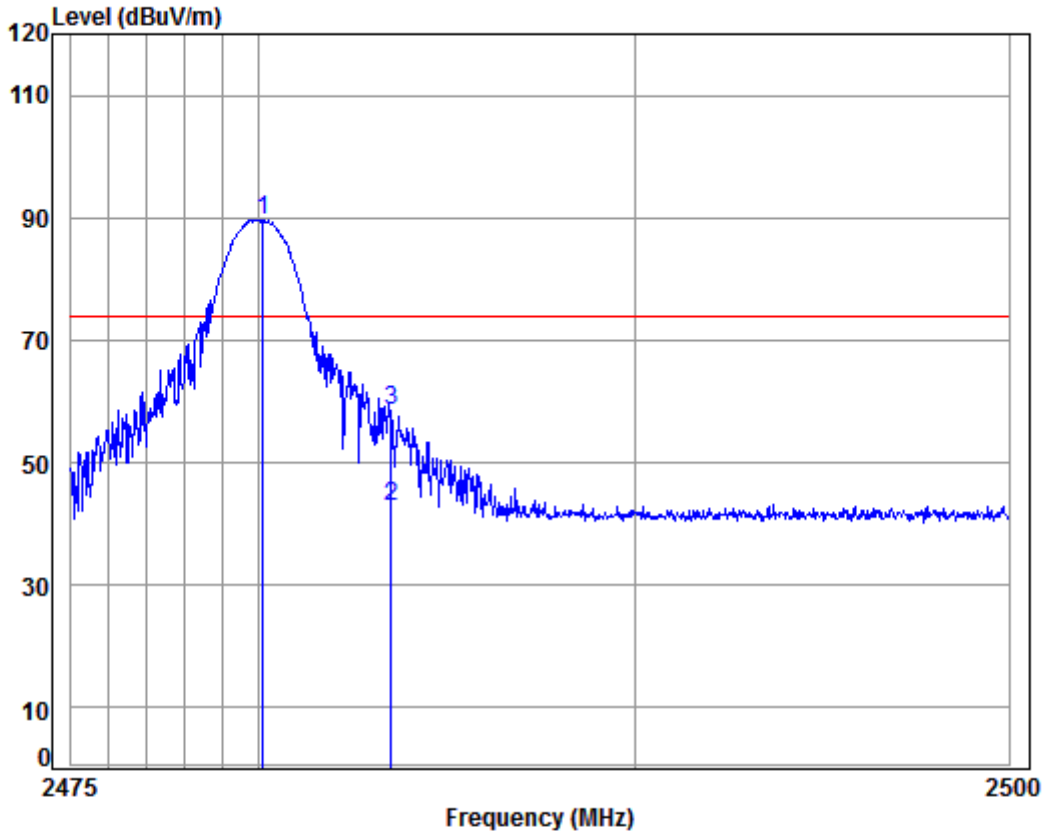
Mode:a; Polarization:Horizontal; Modulation Type:8DPSK; Channel:High




Condition: 3m HORIZONTAL
Job No: : 02122CR
Mode: : 2480 Bandedge
: BT

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | pp 2479.880 | 5.41 | 29.34 | 37.95 | 96.98 | 93.78 | 74.00 | 19.78 | Peak |
| 2 | av 2483.500 | 5.41 | 29.35 | 37.95 | 48.17 | 44.98 | 54.00 | -9.02 | Average |
| 3 | 2483.500 | 5.41 | 29.35 | 37.95 | 63.88 | 60.69 | 74.00 | -13.31 | Peak |

Mode:a; Polarization:Vertical; Modulation Type:8DPSK; Channel:High

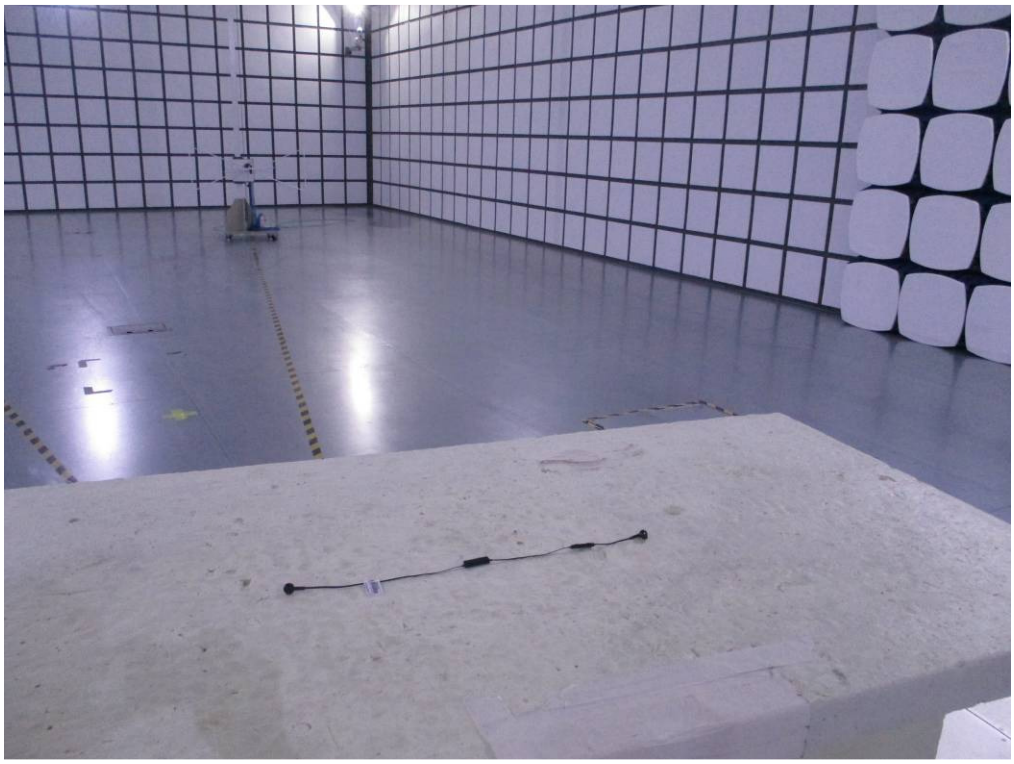


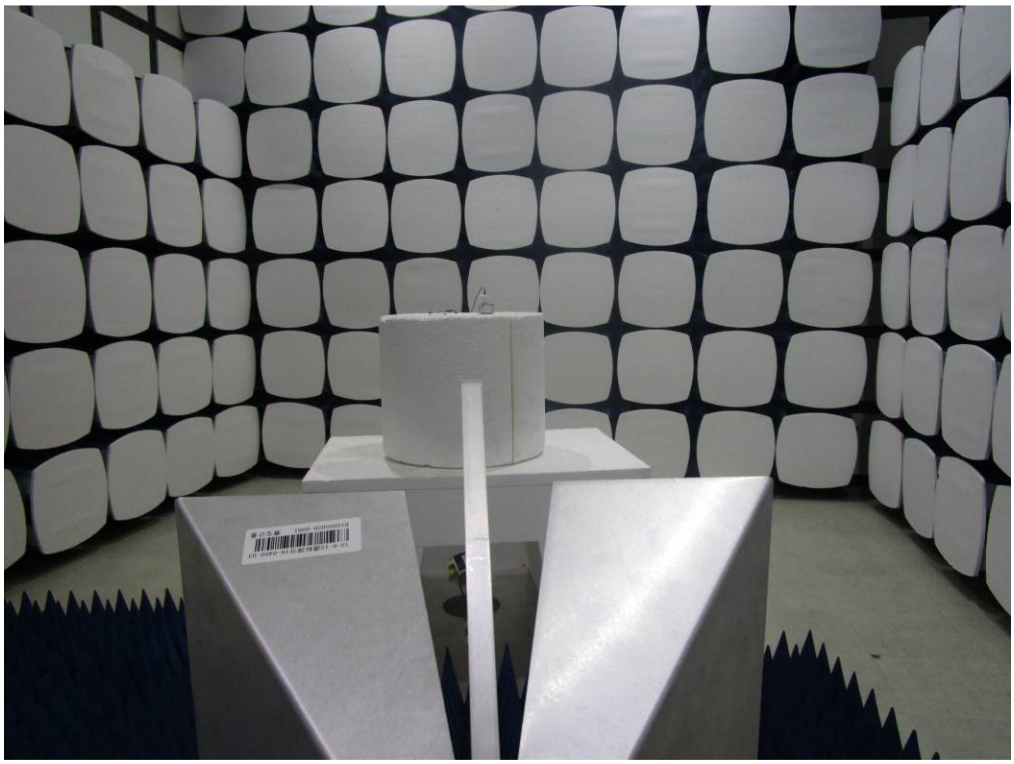

Condition: 3m VERTICAL
Job No: : 02122CR
Mode: : 2480 Bandedge
: BT

| | Freq | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | pp 2480.104 | 5.41 | 29.34 | 37.95 | 92.94 | 89.74 | 74.00 | 15.74 | Peak |
| 2 | av 2483.500 | 5.41 | 29.35 | 37.95 | 46.15 | 42.96 | 54.00 | -11.04 | Average |
| 3 | 2483.500 | 5.41 | 29.35 | 37.95 | 61.58 | 58.39 | 74.00 | -15.61 | Peak |

# 7 Photographs

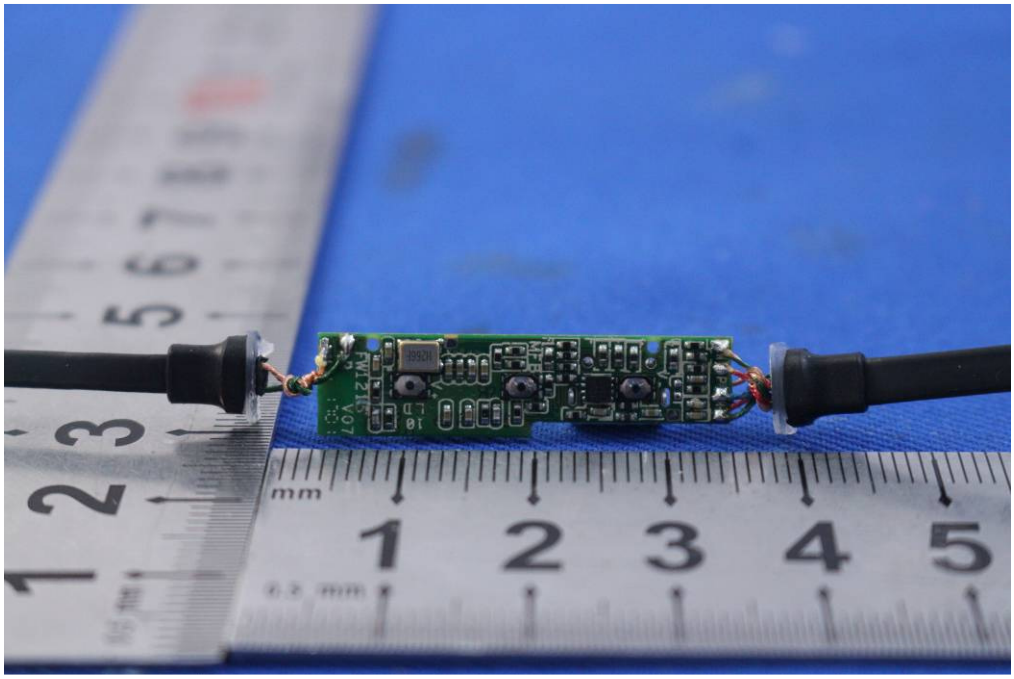
## 7.1 Radiated Spurious Emissions Test Setup

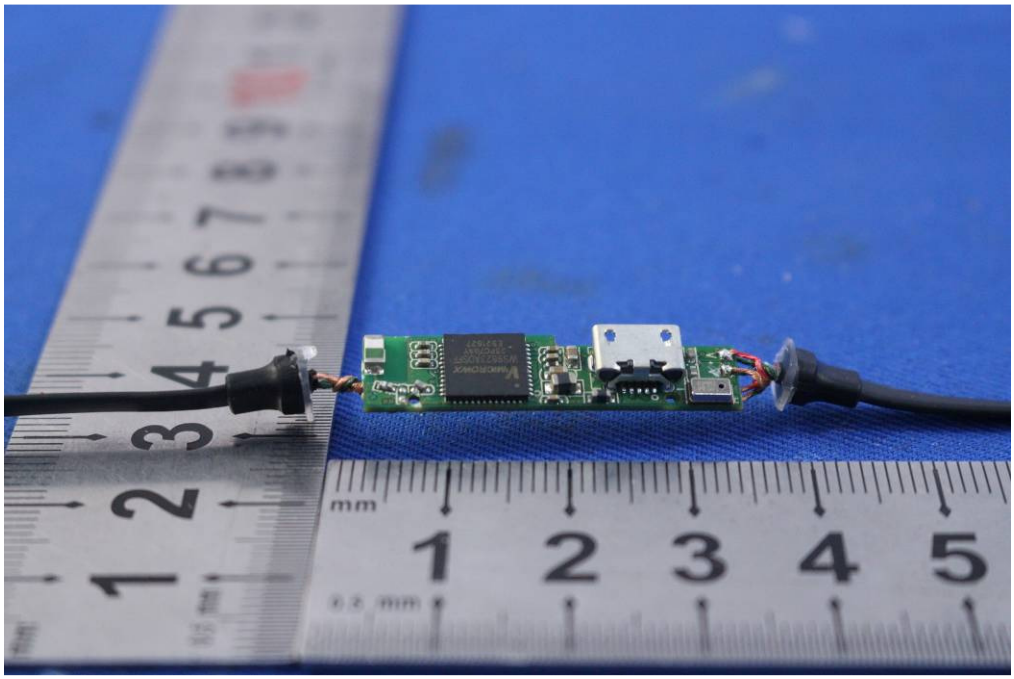


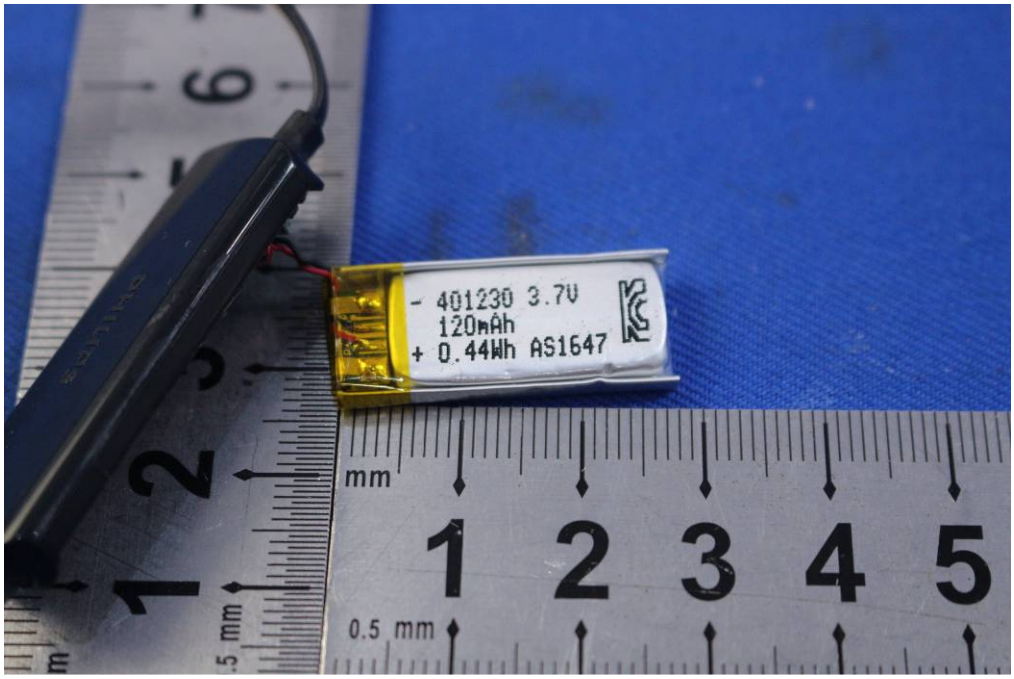


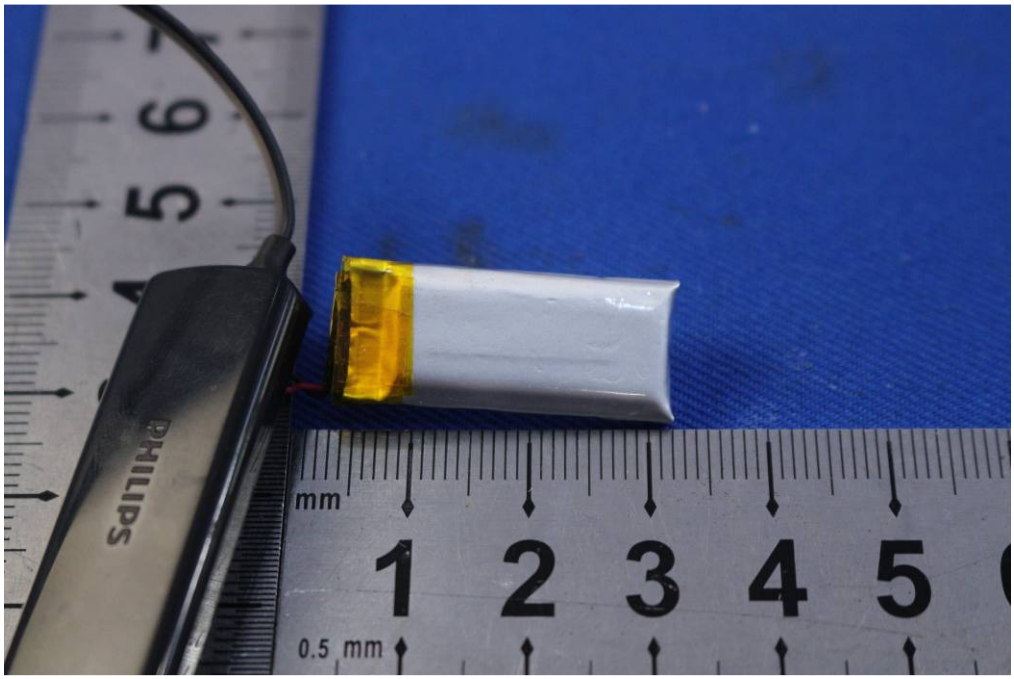
## 7.2 EUT Constructional Details

Test model No.: SHB5250

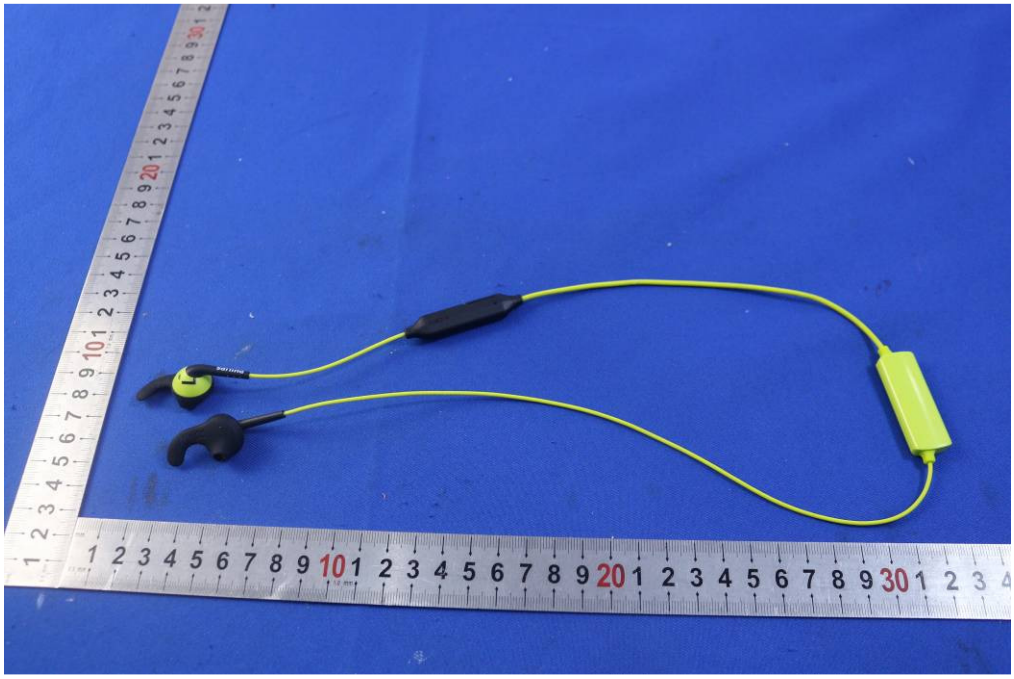


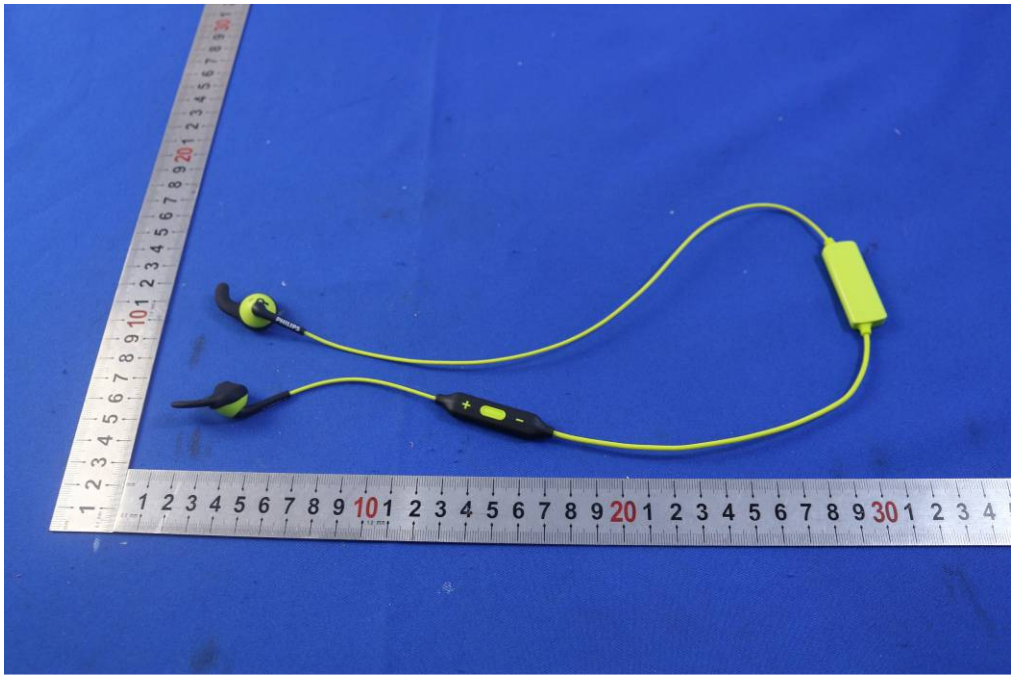


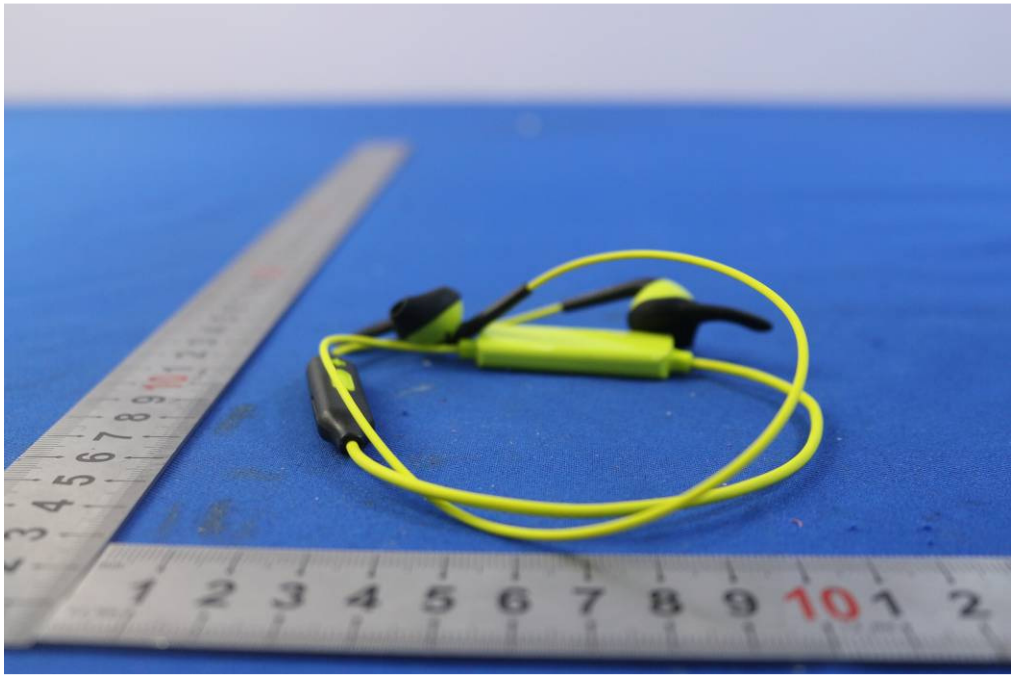


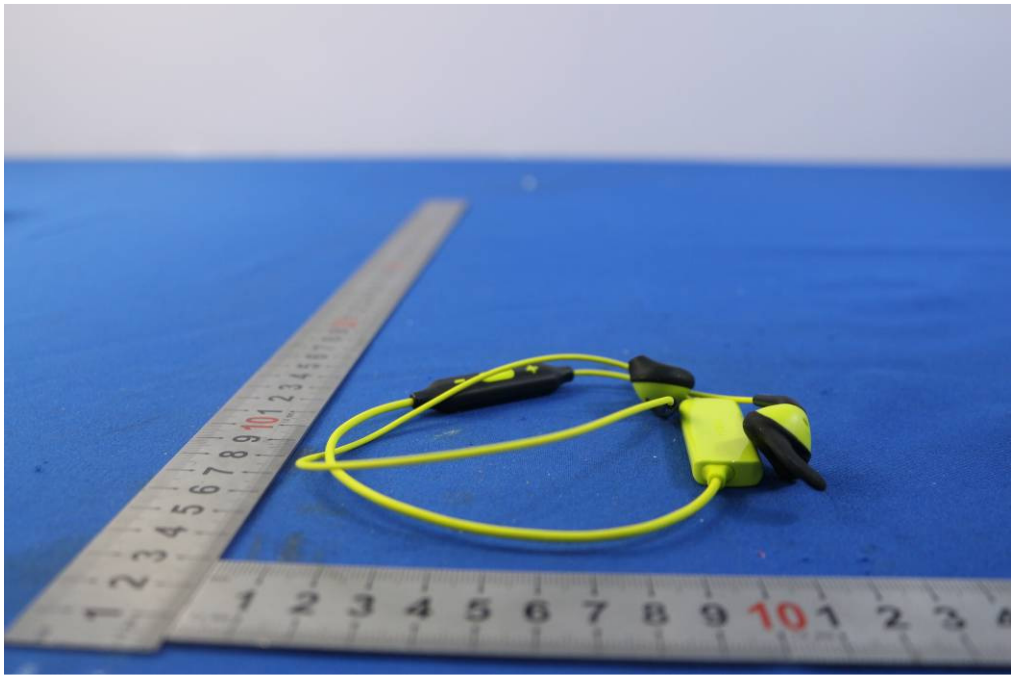



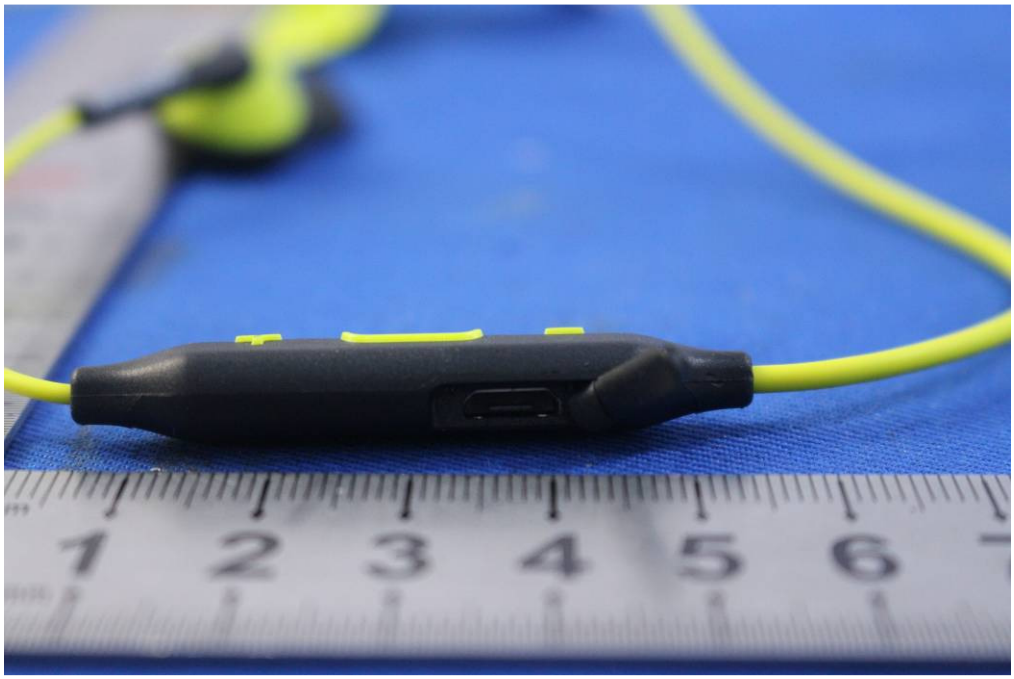
Model No.: SHQ6500

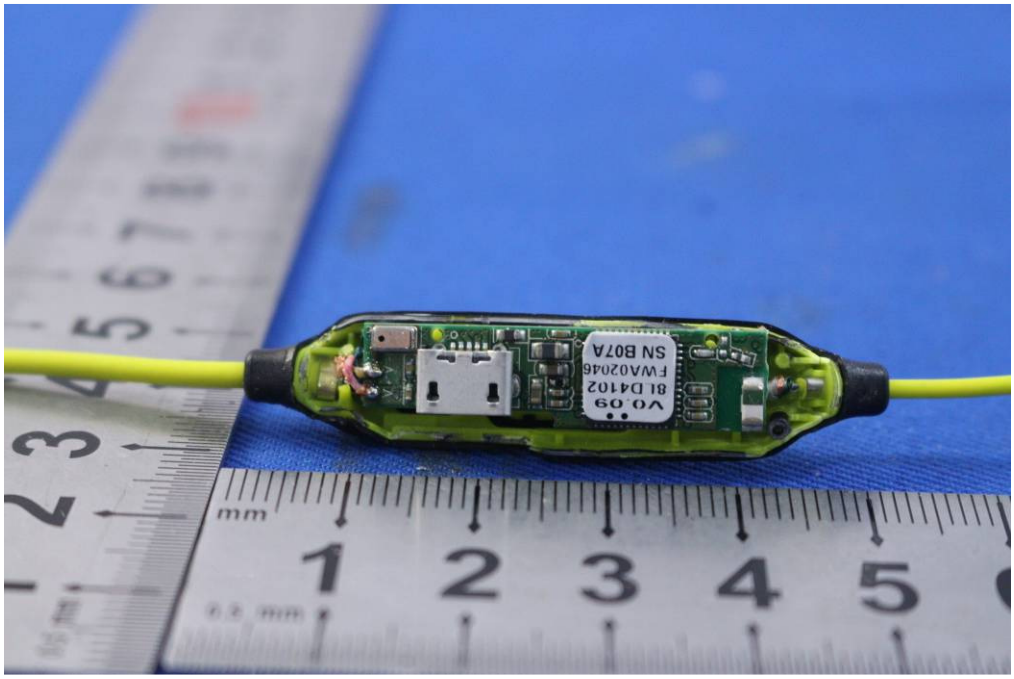


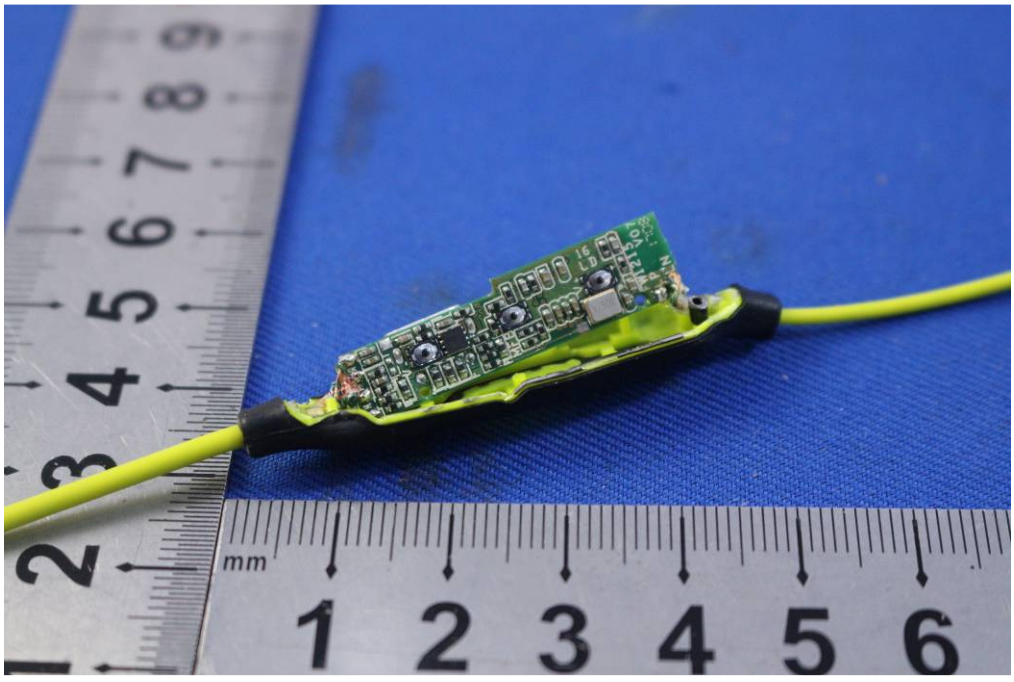


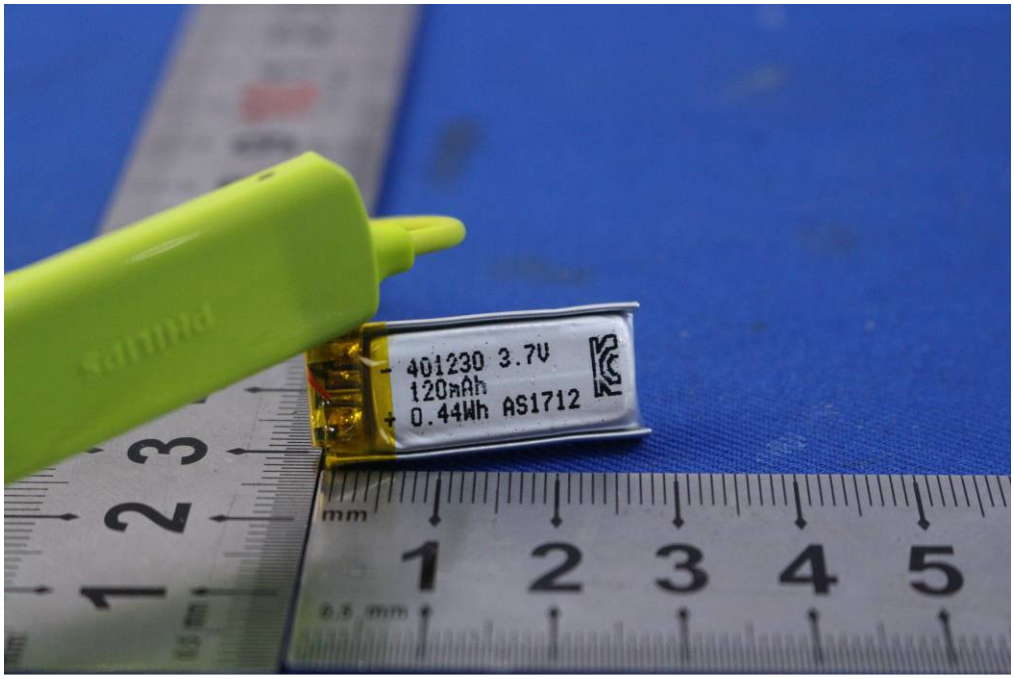


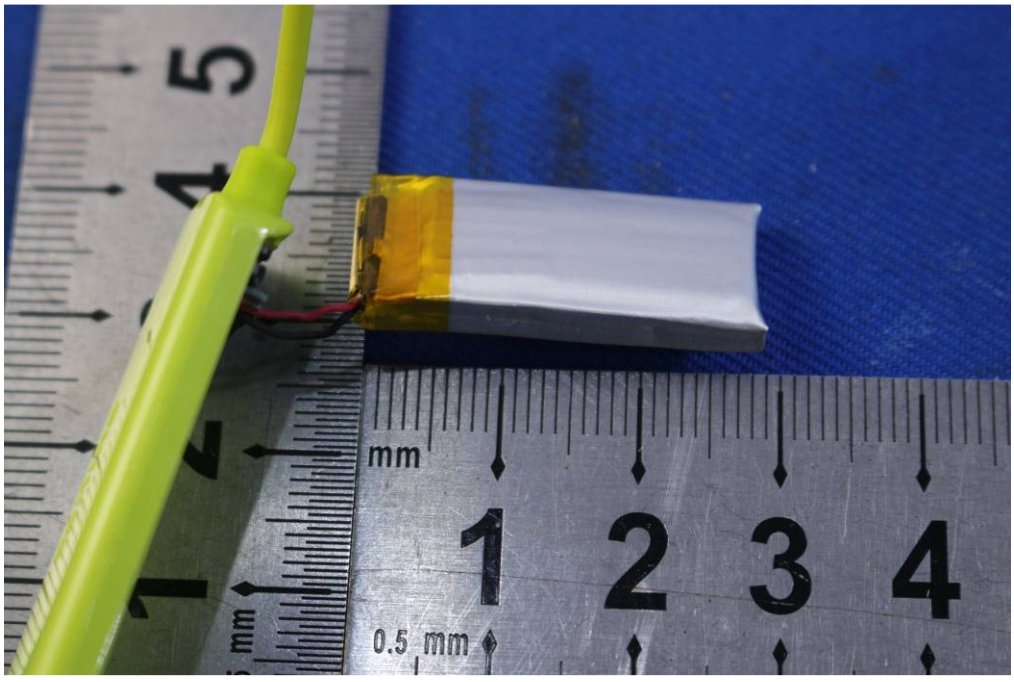








# 8 Appendix

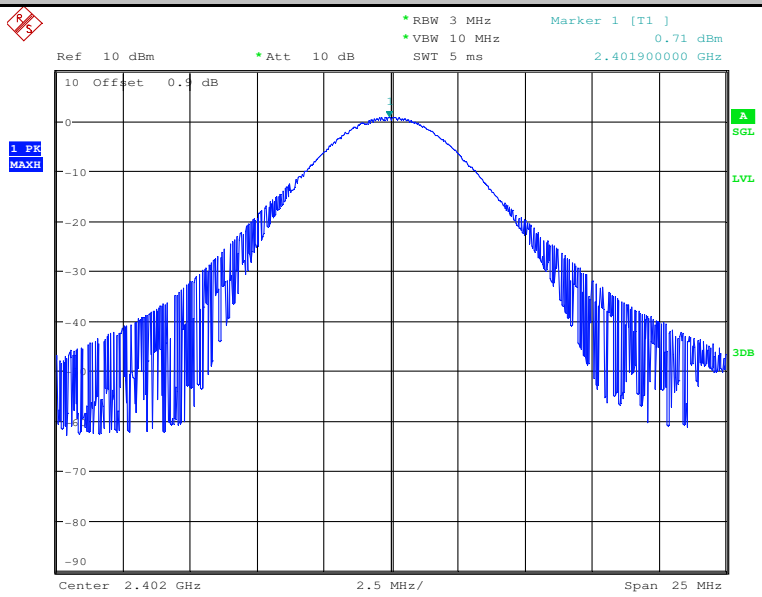
## 8.1 Appendix 15.247

### 2.Conducted Peak Output Power

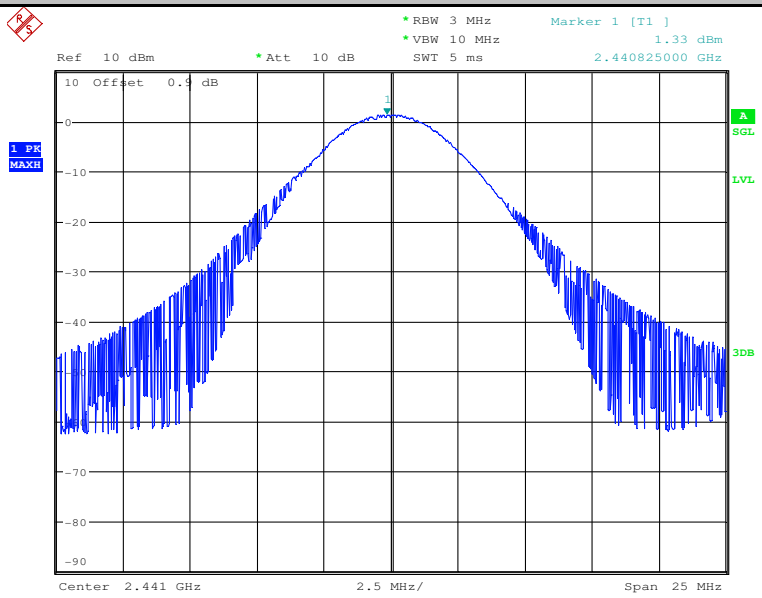
| Test Mode | Test Channel | Power[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|
| DH5 | 2402 | 0.71 | <30 | PASS |
| DH5 | 2441 | 1.33 | <30 | PASS |
| DH5 | 2480 | 1.7 | <30 | PASS |
| 2DH5 | 2402 | 0.93 | <30 | PASS |
| 2DH5 | 2441 | 1.49 | <30 | PASS |
| 2DH5 | 2480 | 1.81 | <30 | PASS |
| 3DH5 | 2402 | 1.16 | <30 | PASS |
| 3DH5 | 2441 | 1.75 | <30 | PASS |
| 3DH5 | 2480 | 2.1 | <30 | PASS |

# TEST PLOT

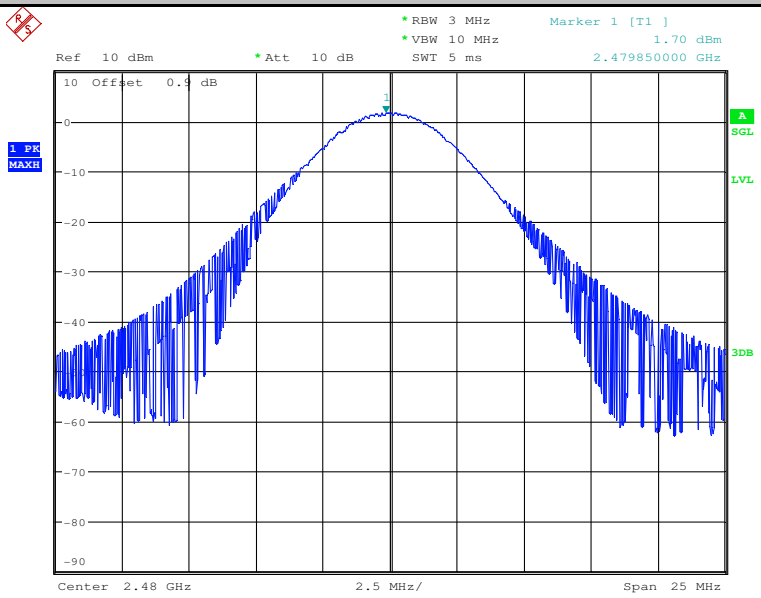
## Conducted Peak Output Power_DH5_2402



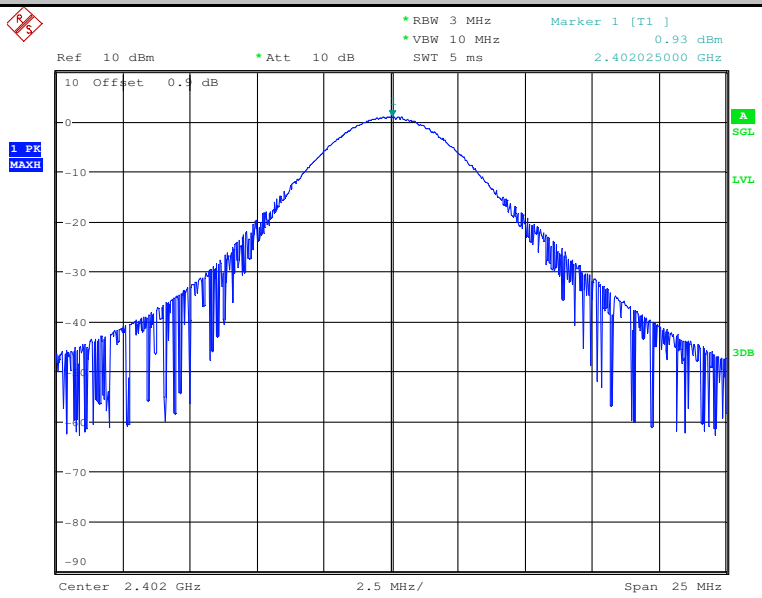
## Conducted Peak Output Power_DH5_2441



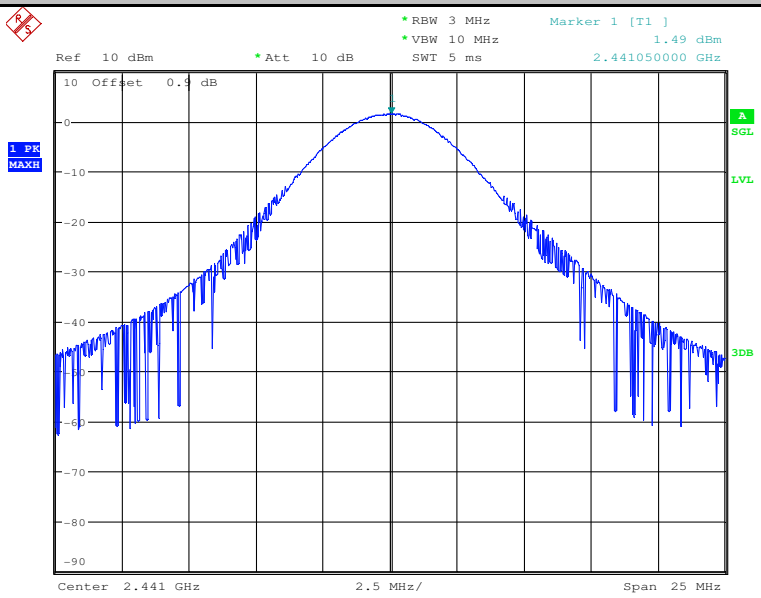
## Conducted Peak Output Power_DH5_2480



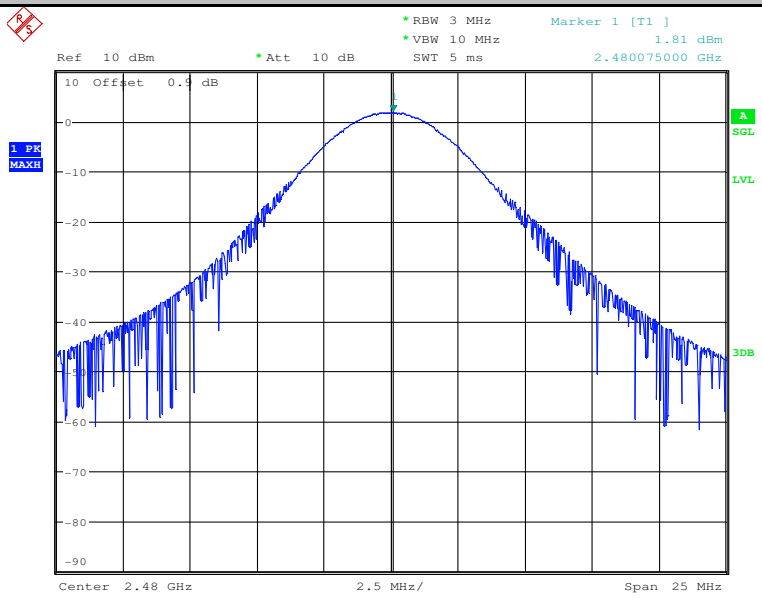
## Conducted Peak Output Power_2DH5_2402



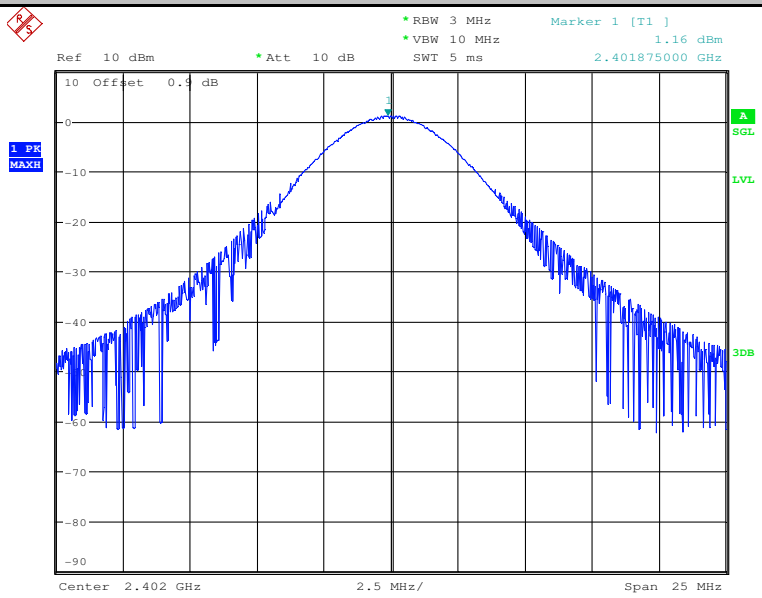
## Conducted Peak Output Power_2DH5_2441



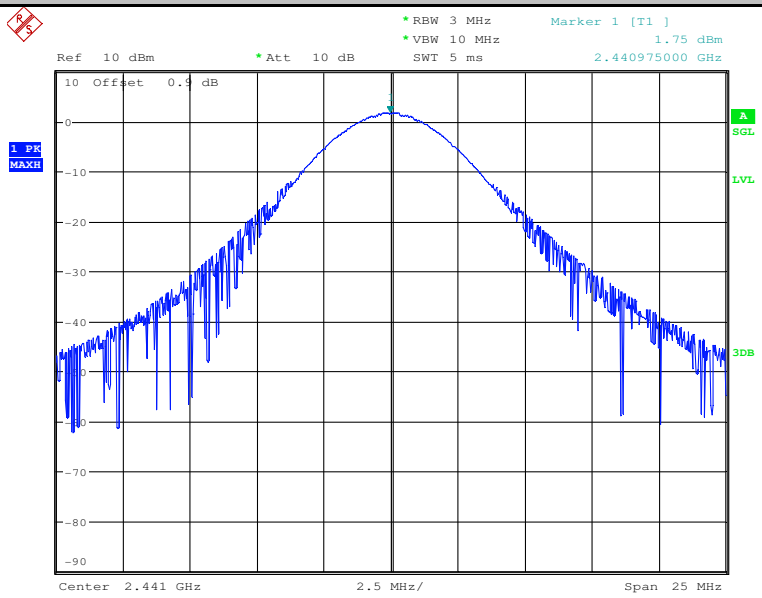
## Conducted Peak Output Power_2DH5_2480



## Conducted Peak Output Power_3DH5_2402



## Conducted Peak Output Power_3DH5_2441



## Conducted Peak Output Power_3DH5_2480