



TEST REPORT

FCC ID: 2AB3E-ISP64

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

Equipment Under Test (EUT):

Name : Mountable Outdoor BT Speaker

Model : KEYSTONE

Trademark : ION

Standards : FCC PART 15, SUBPART C : 2014 (Section 15.247)
RSS-247 ISSUE 1 MAY 2015; RSS-GEN ISSUE 4 NOV 2014
ANSI C63.4:2014 ; ANSI C63.10:2013

Report No : T1860194 05

Date of Test : January 30- March 12 , 2016

Date of Issue : March 14 , 2016

Test Result : PASS

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

A handwritten signature in black ink, appearing to read "Mark Zhu".

(Mark Zhu)

Manager

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

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1. General Information

1.1. Description of Device (EUT)

EUT : Mountable Outdoor BT Speaker

Model No. : KEYSTONE

Difference : N/A

Trade mark : ION

Power supply : DC 15V from adapter or DC 12V from battery

Radio Technology : BT 4.1+EDR

Operation frequency : 2402-2480MHz

Modulation : GFSK, $\pi/4$ DQPSK, 8-DPSK

Antenna Type : Integrated Antenna, max gain 0dBi.

Adapter : NB30D150200HU

Applicant : ION AUDIO, LLC

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

Manufacture : ION AUDIO, LLC

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

1.2. Accessories of device (EUT)

| | | |
|--------------|---|---|
| Description | : | Adapter |
| Manufacturer | : | N/A |
| Model No. | : | NB30D150200HU Input: 100-240~ 50/60Hz 0.8A Output: 15.0VDC 2A |

1.3. Test Lab information

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

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

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

2. Summary of test

2.1. Summary of test result

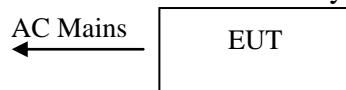
| Description of Test Item | Standard | Results |
|-----------------------------------|---|---------|
| Maximum Peak Output Power | FCC Part 15: 15.247(b)(1) ANSI C63.4 :2014&RSS-247 5.4(2) & ANSI C63.10 :2013 | PASS |
| Bandwidth | FCC Part 15: 15.215 ANSI C63.4 :2014&RSS-247 5.1(2) & ANSI C63.10 :2013 | PASS |
| Carrier Frequency Separation | FCC Part 15: 15.247(a)(1) ANSI C63.4 :2014& RSS-247 5.1(2) & ANSI C63.10 :2013 | PASS |
| Number Of Hopping Channel | FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2014&RSS-247 5.1(4) & ANSI C63.10 :2013 | PASS |
| Dwell Time | FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2014&RSS-247 5.1(4) & ANSI C63.10 :2013 | PASS |
| Radiated Emission | FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.4 :2014&RSS-247 Section 5.5& ANSI C63.10 :2013 | PASS |
| Band Edge Compliance | FCC Part 15: 15.247(d) ANSI C63.4 :2014&RSS-247 Section 5.5& ANSI C63.10 :2013 | PASS |
| Power Line Conducted Emissions | FCC Part 15: 15.207 ANSI C63.4 :2014&IC RSS Gen, Section 7.2.4& ANSI C63.10 :2013 | PASS |
| Antenna requirement | FCC Part 15: 15.203 &IC RSS Gen, Section 7.1.4 | PASS |
| Note: Test with the test software | | |

2.2. Assistant equipment used for test

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

2.3. Block Diagram

1, For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground. EUT was set into BT test mode by software before test.



2, For Power Line Conducted Emissions Test: EUT was connected to notebook by 1.5m USB line



2.4. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode.

| Tested mode, channel, and data rate information | | |
|---|--------------|-----------------|
| Mode | Channel | Frequency (MHz) |
| GFSK | Low :CH1 | 2402 |
| | Middle: CH40 | 2441 |
| | High: CH79 | 2480 |

| Tested mode, channel, and data rate information | | |
|---|--------------|-----------------|
| Mode | Channel | Frequency (MHz) |
| $\pi / 4$ DQPSK | Low :CH1 | 2402 |
| | Middle: CH40 | 2441 |
| | High: CH79 | 2480 |

| Tested mode, channel, and data rate information | | |
|---|--------------|-----------------|
| Mode | Channel | Frequency (MHz) |
| 8- DPSK | Low :CH1 | 2402 |
| | Middle: CH40 | 2441 |
| | High: CH79 | 2480 |

2.5. Test Conditions

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

2.6. Measurement Uncertainty (95% confidence levels, k=2)

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

2.7. Test Equipment

| Equipment | Manufacture | Model No. | Serial No. | Cal. Due day | Cal Interval |
|---------------------|--------------------|------------------|-------------------|---------------------|---------------------|
| 3m Semi-Anechoic | ETS-LINDGREN | N/A | SEL0017 | 2017.01.18 | 1Year |
| Spectrum analyzer | Agilent | E4407B | MY49510055 | 2017.01.18 | 1Year |
| Receiver | R&S | ESCI | 101165 | 2017.01.18 | 1Year |
| Bilog Antenna | SCHWARZBECK | VULB 9168 | 9168-438 | 2017.01.21 | 2Year |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | BBHA 9120 D(1201) | 2017.01.21 | 2Year |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA 9170 D(1432) | 2017.01.21 | 2Year |
| Active Loop Antenna | Beijing Daze | ZN30900A | SEL0097 | 2017.01.18 | 1Year |
| Cable | Resenberger | SUCOFLEX 104 | MY6562/4 | 2017.01.18 | 1Year |
| Cable | Resenberger | SUCOFLEX 104 | 309972/4 | 2017.01.18 | 1Year |
| Cable | Resenberger | SUCOFLEX 104 | 329112/4 | 2017.01.18 | 1Year |
| L.I.S.N.#1 | Schwarzbeck | NSLK8126 | 8126466 | 2017.01.18 | 1 Year |
| L.I.S.N.#2 | ROHDE&SCHWABE RZ | ENV216 | 101043 | 2017.01.18 | 1 Year |
| Power Meter | Anritsu | ML2487A | 6K00001491 | 2017.01.18 | 1Year |
| Power sensor | Anritsu | ML2491A | 32516 | 2017.01.18 | 1Year |
| Pre-amplifier | SCHWARZBECK | BBV9743 | 9743-019 | 2017.01.18 | 1 Year |
| Pre-amplifier | Quietek | AP-180C | CHM-0602012 | 2017.01.18 | 1 Year |

3. Maximum Peak Output power

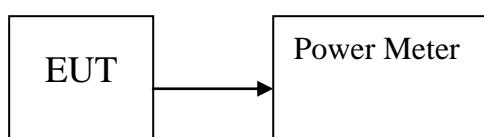
3.1. Limit

Please refer RSS-247 & section 15.247.

3.2. Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

3.3. Test Setup



3.4. Test Result

| EUT: Mountable Outdoor BT Speaker | | M/N: KEYSTONE | | | |
|-----------------------------------|------------|-----------------------|----------------------|------------------|-------------|
| Test date: 2016-02-22 | | Test site: RF site | | Tested by: Peter | |
| Mode | Freq (MHz) | PK Output Power (dBm) | PK Output Power (mW) | Limit (dBm) | Margin (dB) |
| GFSK | 2402 | 4.425 | 2.770 | 21 | 16.575 |
| | 2441 | 4.721 | 2.966 | 21 | 16.279 |
| | 2480 | 4.281 | 2.680 | 21 | 16.719 |
| $\pi/4$ DQPSK, | 2402 | 3.727 | 2.359 | 21 | 17.273 |
| | 2441 | 4.076 | 2.556 | 21 | 16.924 |
| | 2480 | 3.463 | 2.220 | 21 | 17.537 |
| 8- DPSK | 2402 | 3.811 | 2.405 | 21 | 17.189 |
| | 2441 | 4.178 | 2.617 | 21 | 16.822 |
| | 2480 | 3.594 | 2.288 | 21 | 17.406 |
| Conclusion: PASS | | | | | |

4. Bandwidth

4.1. Limit

Please refer RSS-247 & section15.247.

4.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW, PK detector. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

| EUT: Mountable Outdoor BT Speaker | | M/N: KEYSTONE | | |
|-----------------------------------|------------|----------------------|------------------|------------|
| Test date: 2016-02-22 | | Test site: RF site | Tested by: Peter | |
| Mode | Freq (MHz) | 20dB Bandwidth (KHz) | Limit | Conclusion |
| GFSK | 2402 | 847.3 | - | PASS |
| | 2441 | 831.2 | - | PASS |
| | 2480 | 862.8 | - | PASS |
| $\pi / 4$ DQPSK | 2402 | 1228 | - | PASS |
| | 2441 | 1238 | - | PASS |
| | 2480 | 1237 | - | PASS |
| 8- DPSK | 2402 | 1217 | - | PASS |
| | 2441 | 1215 | - | PASS |
| | 2480 | 1220 | - | PASS |

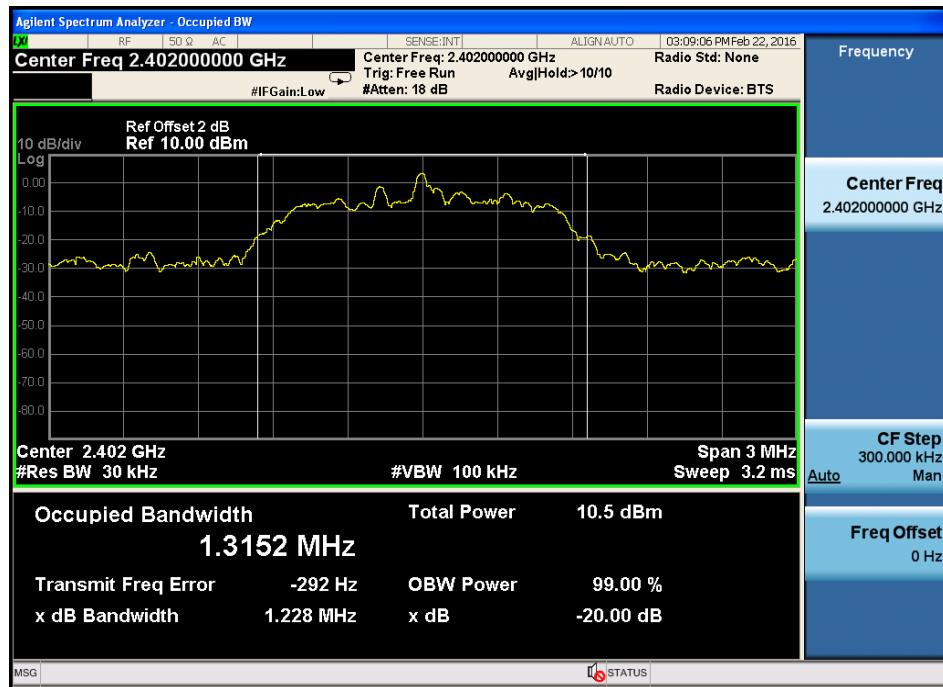
Orginal Test data

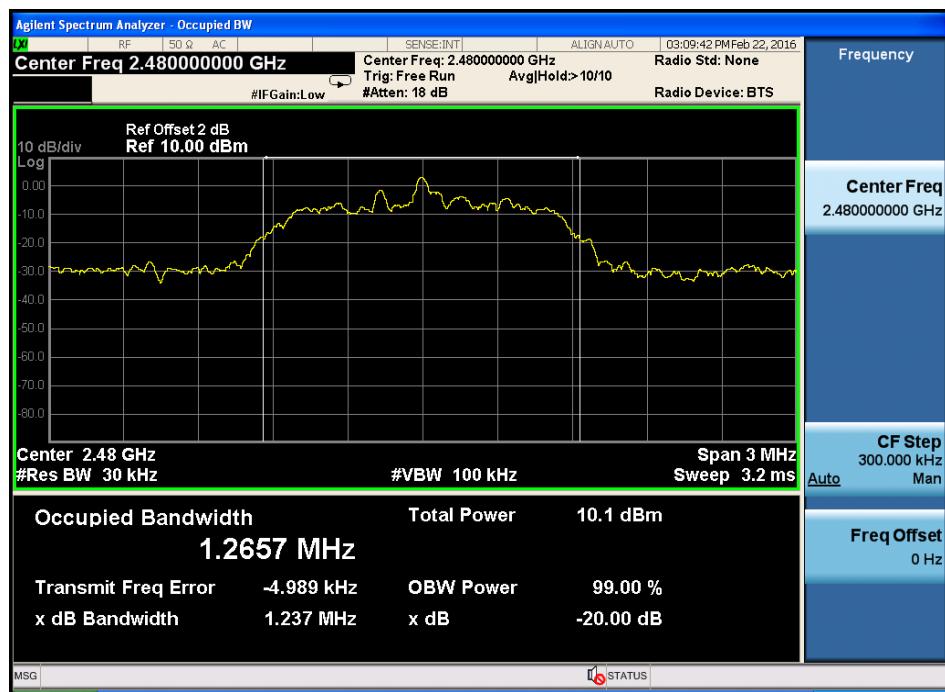
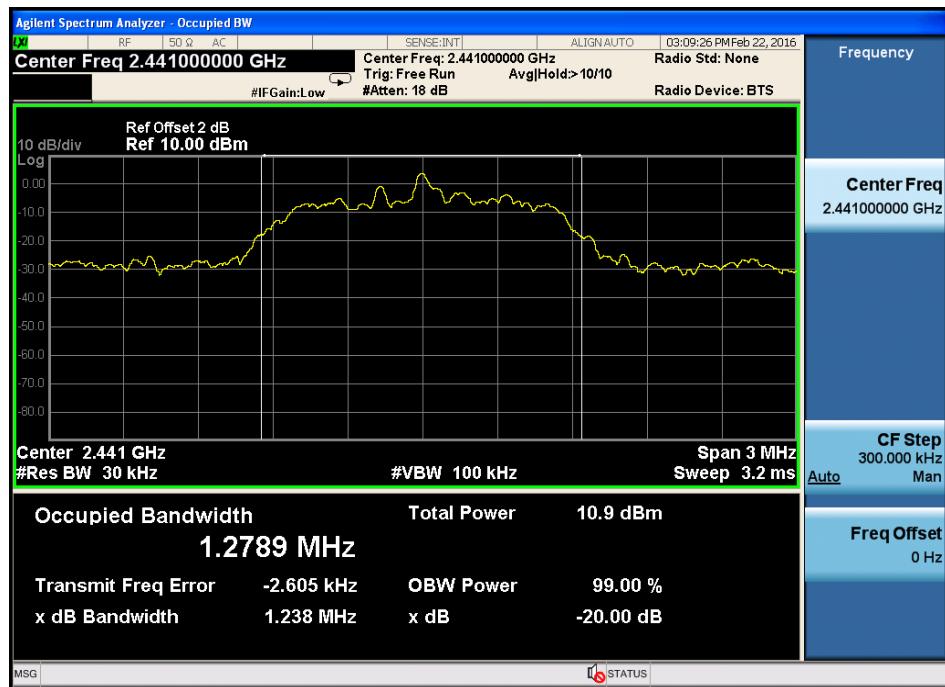
GFSK:



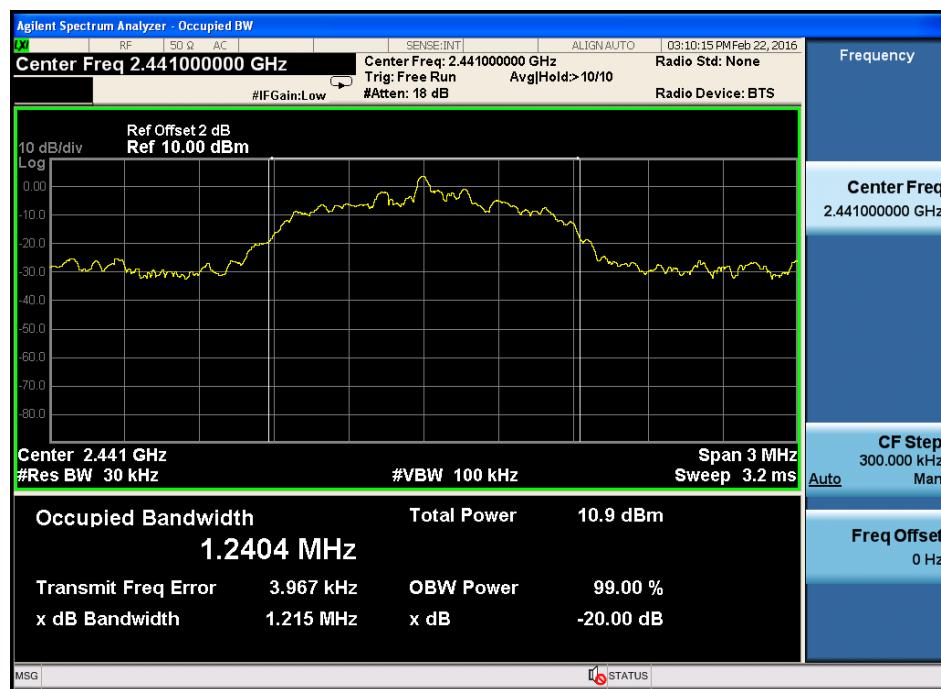
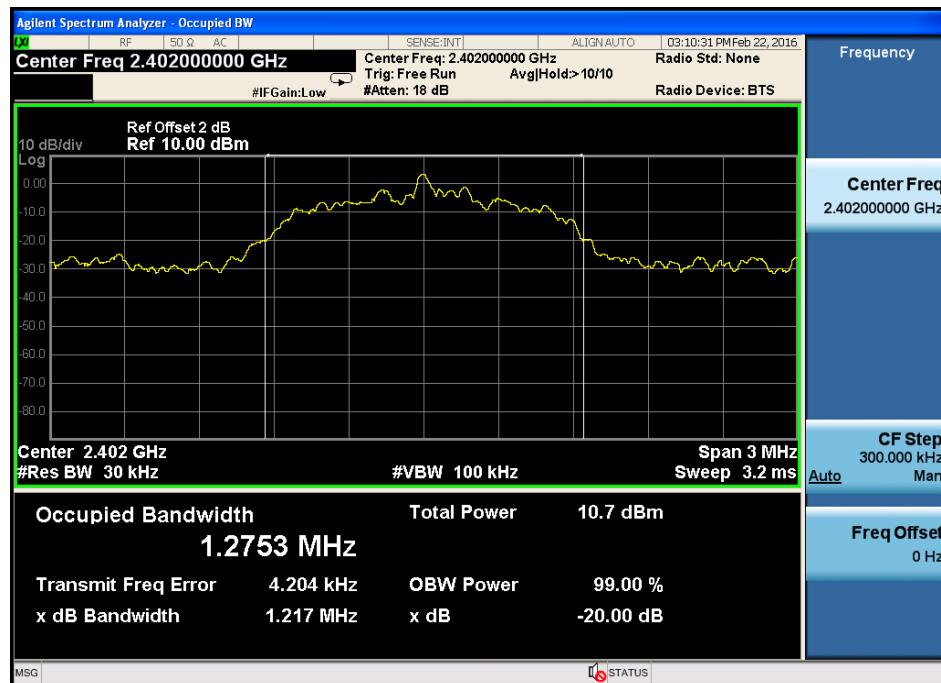


$\pi/4$ DQPSK





8- DPSK





5. Carrier Frequency Separation

5.1. Limit

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 125 mW

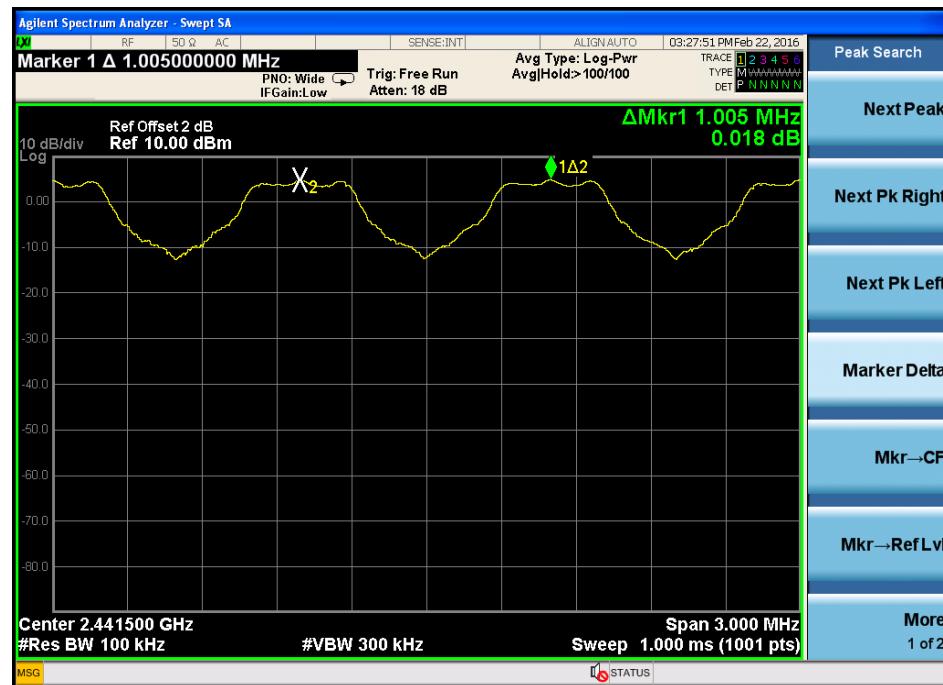
5.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The carrier frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW.

5.3. Test Result

| EUT: Mountable Outdoor BT Speaker M/N: KEYSTONE | | | | |
|---|--------------------------|----------------------|-----------------------------------|------------|
| Test date: 2016-02-22 | | Test site: RF site | Tested by: Peter | |
| Mode/Channel | Channel separation (KHz) | 20dB Bandwidth (KHz) | Limit (KHz) 2/3 20dB bandwidth | Conclusion |
| GFSK | 1005 | 831.200 | 554.133 | PASS |
| $\pi/4$ DQPSK | 1002 | 1238.000 | 825.333 | PASS |
| 8- DPSK | 1002 | 1215.000 | 810.000 | PASS |

Orginal test data for channel separation
GFSK



$\pi/4$ DQPSK



8- DPSK



6. Number Of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

6.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW.

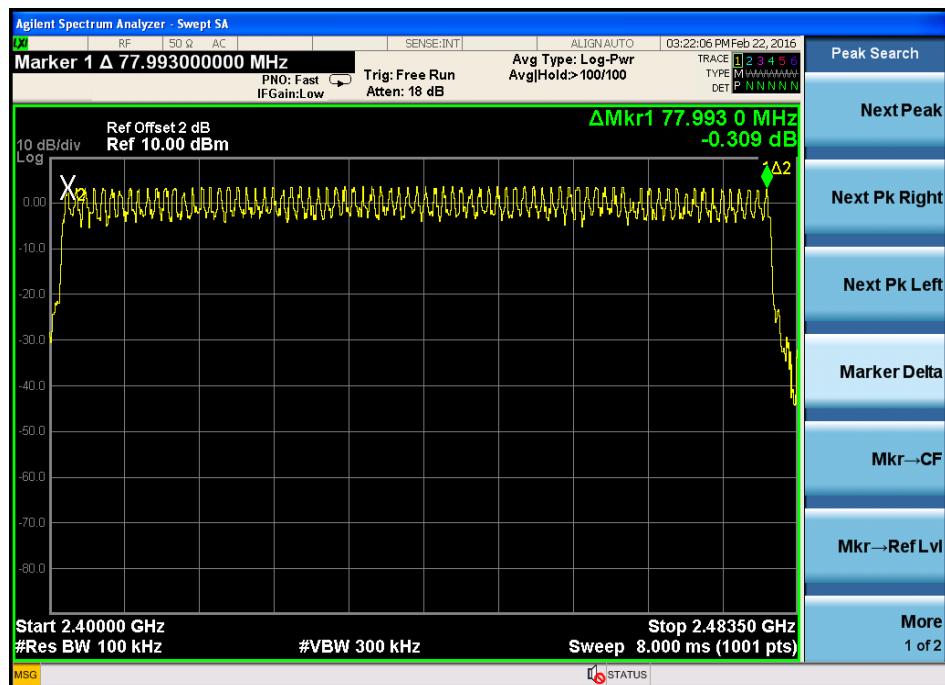
6.3. Test Result

| EUT: Mountable Outdoor BT Speaker M/N: KEYSTONE | | | |
|---|---------------------------|--------------------|------------------|
| Test date: 2016-02-22 | | Test site: RF site | Tested by: Peter |
| Mode | Number of hopping channel | Limit | Conclusion |
| GFSK | 79 | >15 | PASS |
| $\pi/4$ DQPSK | 79 | >15 | PASS |
| 8- DPSK | 79 | >15 | PASS |

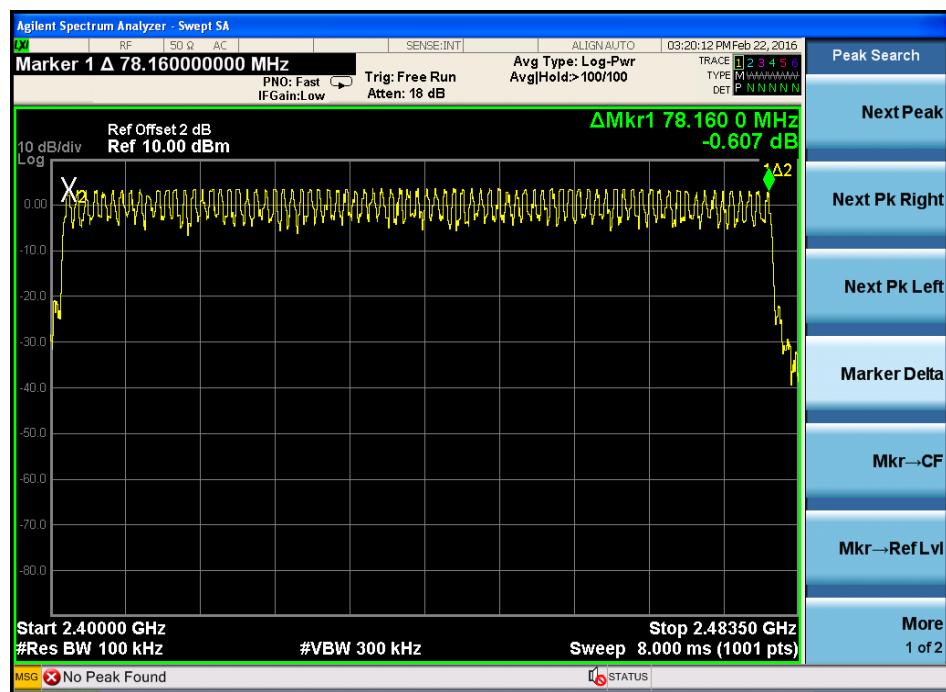
Original test data for hopping channel number
GFSK



$\pi/4$ DQPSK



8- DPSK



7. Dwell Time

7.1. Test limit

Please refer RSS-247 & section15.247.

7.2. Test Procedure

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

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured were complete.

7.3. Test Results

PASS.

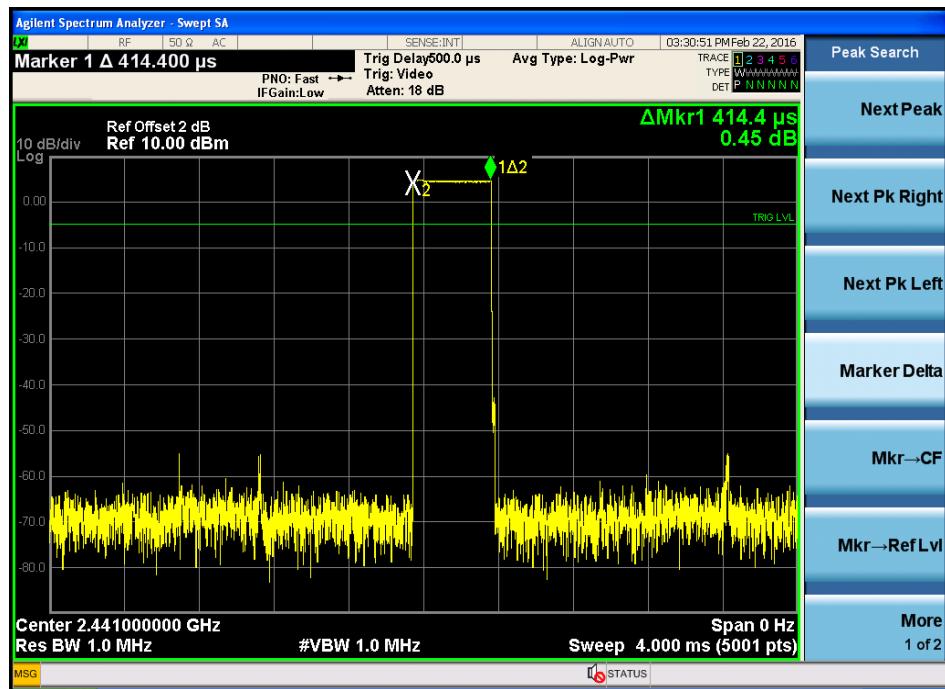
Detailed information please see the following page.

| EUT: Mountable Outdoor BT Speaker M/N: KEYSTONE | | | | | | |
|---|-------------|--------------------|---------------------|------------------|-----------|------------|
| Test date: 2016-02-22 | | Test site: RF site | | Tested by: Peter | | |
| Mode | Data Packet | Frequency (MHz) | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Conclusion |
| GFSK | DH1 | 2441 | 0.4144 | 0.265 | <0.4 | PASS |
| | DH3 | 2441 | 1.665 | 0.355 | <0.4 | PASS |
| | DH5 | 2441 | 2.918 | 0.374 | <0.4 | PASS |
| $\pi/4$ DQPSK | DH1 | 2441 | 0.4264 | 0.273 | <0.4 | PASS |
| | DH3 | 2441 | 1.675 | 0.357 | <0.4 | PASS |
| | DH5 | 2441 | 2.923 | 0.374 | <0.4 | PASS |
| 8- DPSK | DH1 | 2441 | 0.4176 | 0.267 | <0.4 | PASS |
| | DH3 | 2441 | 1.678 | 0.358 | <0.4 | PASS |
| | DH5 | 2441 | 2.928 | 0.375 | <0.4 | PASS |

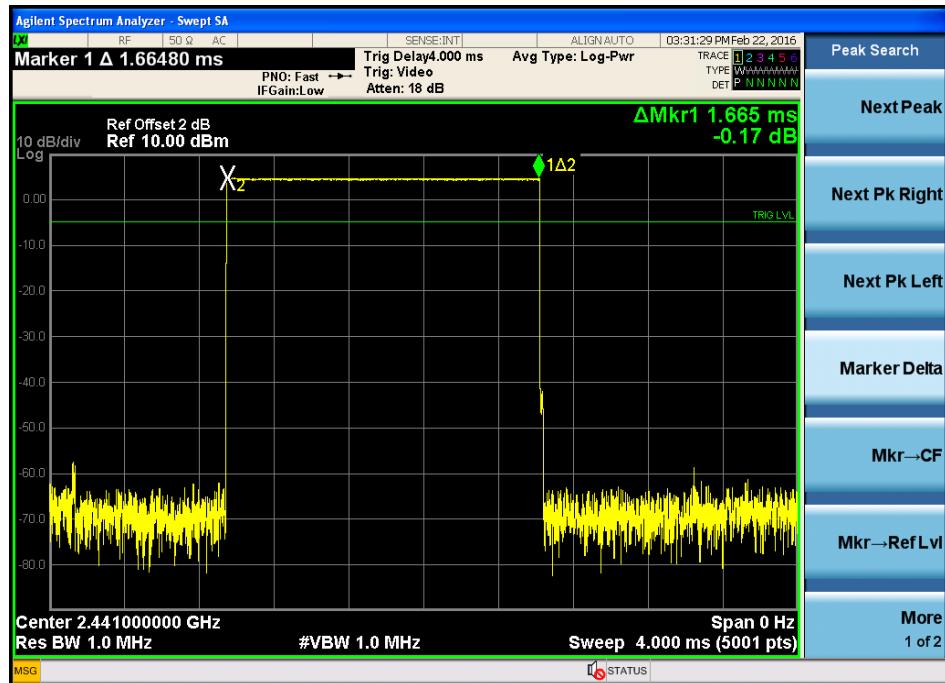
Note: 1 A period time = 0.4 (s) * 79 = 31.6(s)
 2 DH1 time slot = Pulse Duration * (1600/(1*79)) * A period time
 DH3 time slot = Pulse Duration * (1600/(3*79)) * A period time
 DH5 time slot = Pulse Duration * (1600/(5*79)) * A period time

GFSK

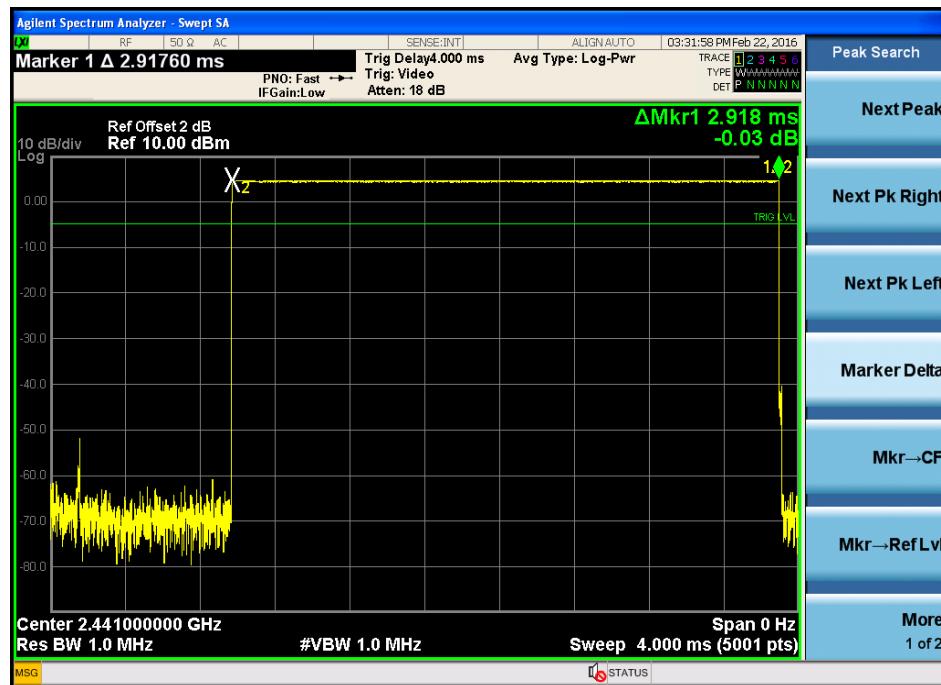
DH1:



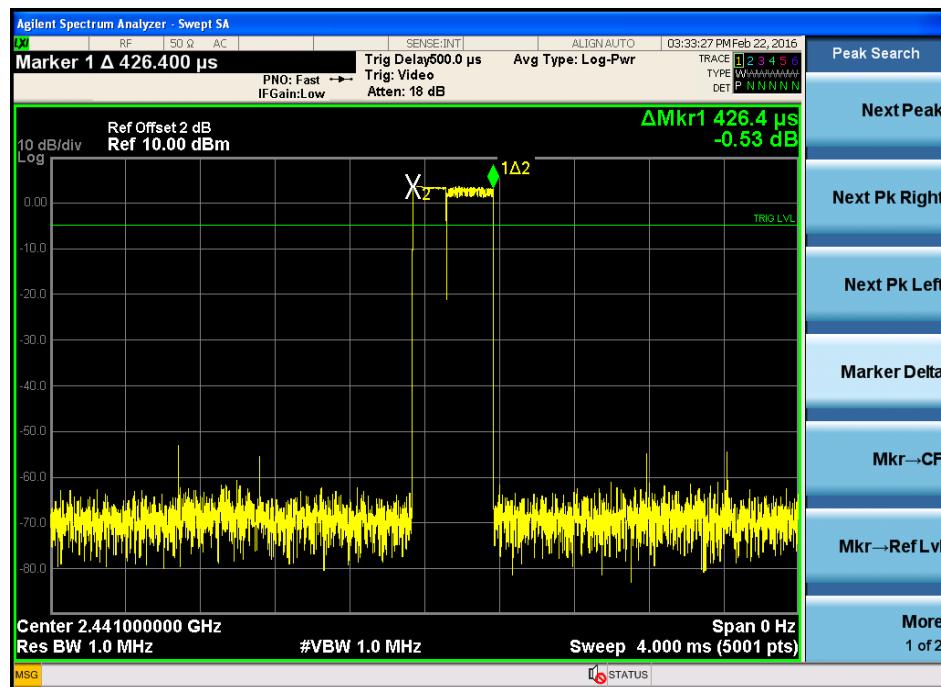
DH3:



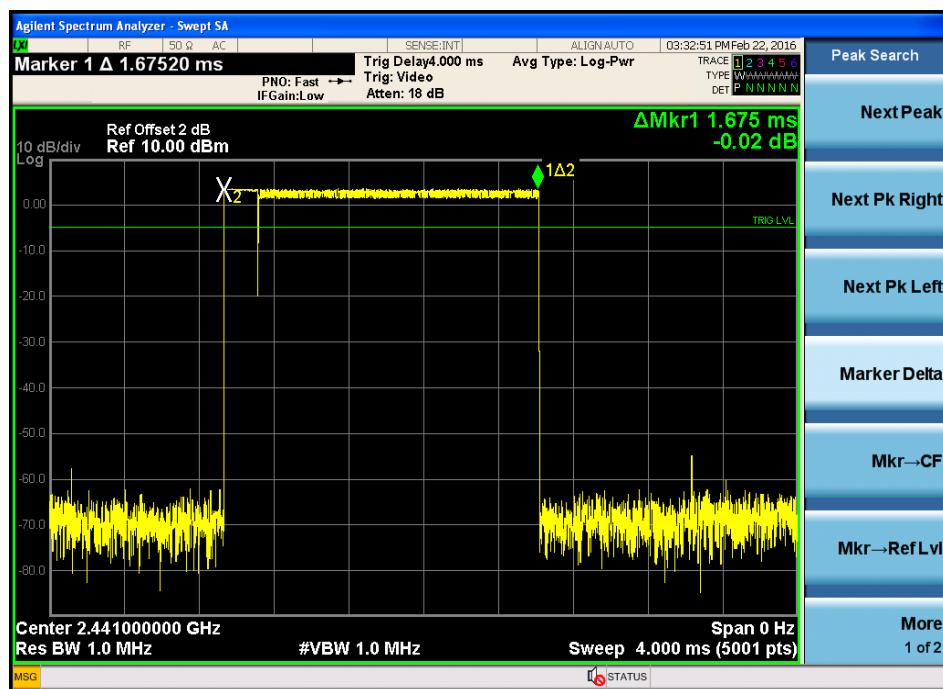
DH5



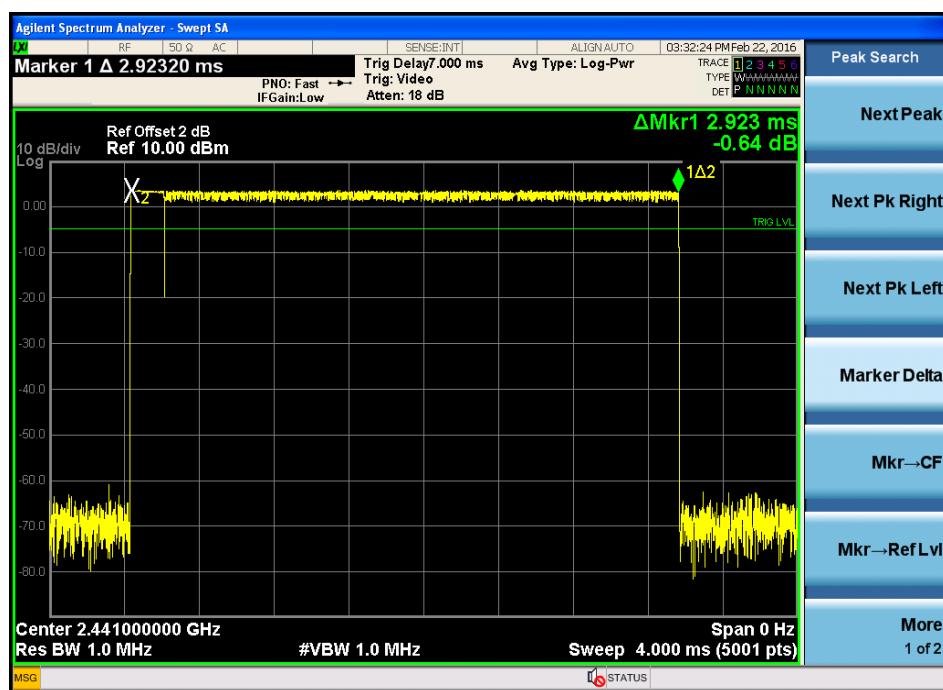
$\pi/4$ DQPSK
DH1



DH3

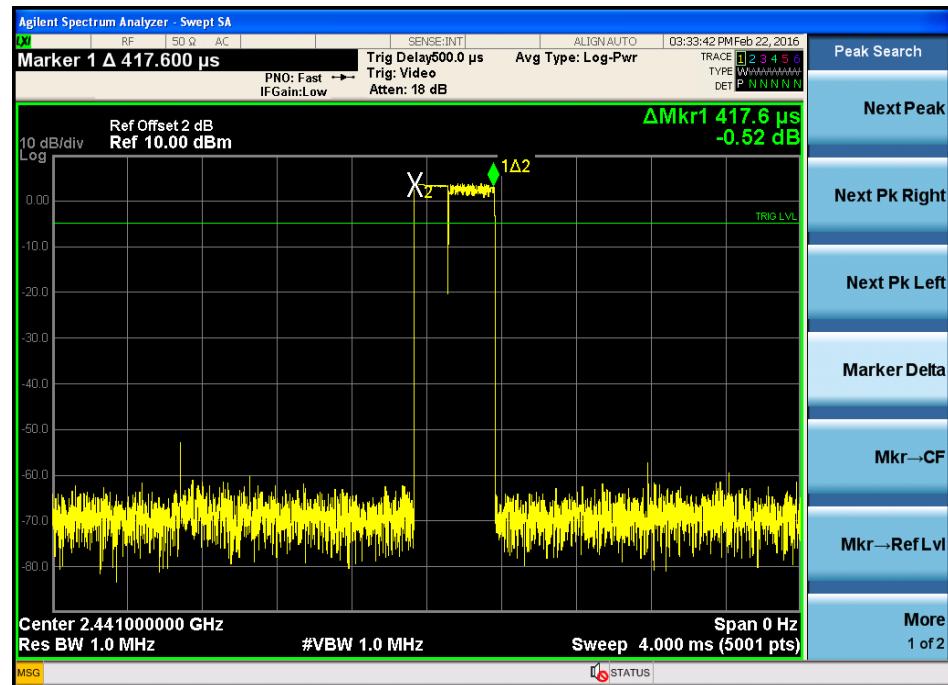


DH5

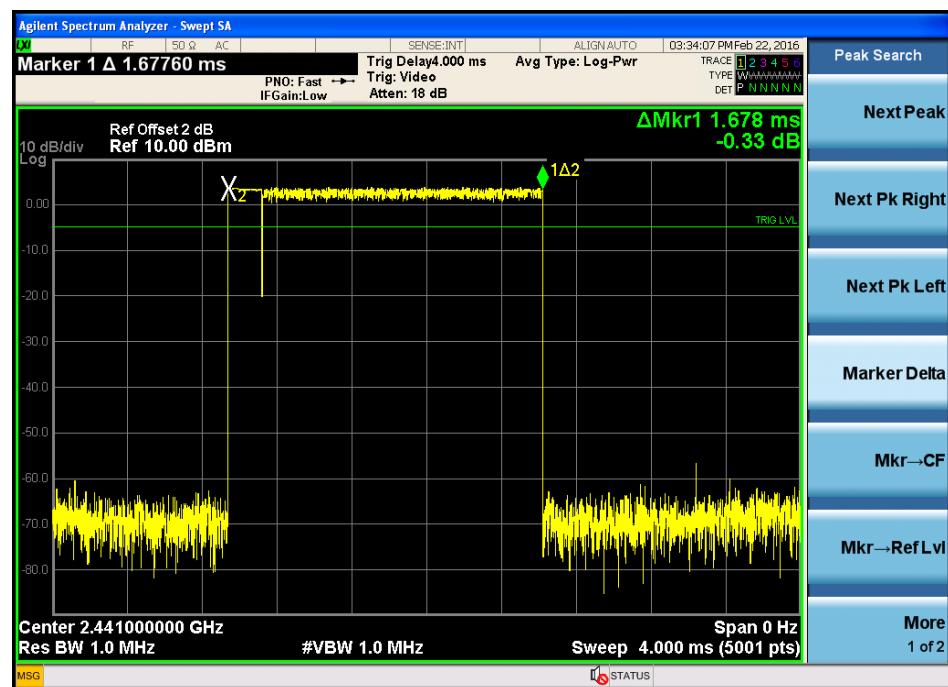


8- DPSK:

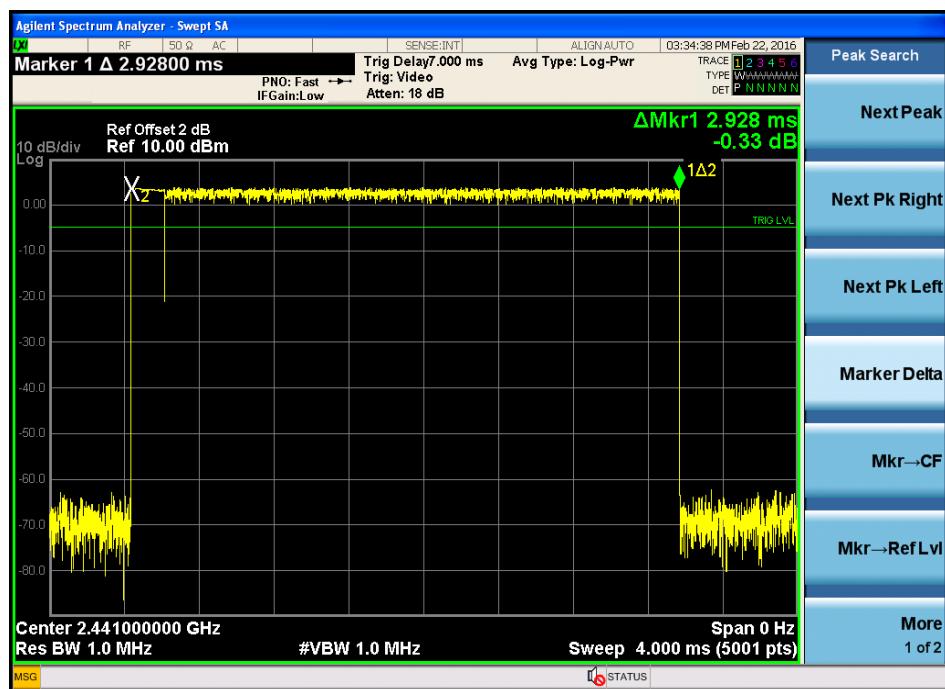
DH1



DH3



DH5



8. Radiated emissions

8.1. Limit

All the emissions appearing within RSS-GEN restricted frequency bands shall not exceed the limits shown in RSS-GEN, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with RSS-GEN limits.

RSS-GEN Restricted frequency band

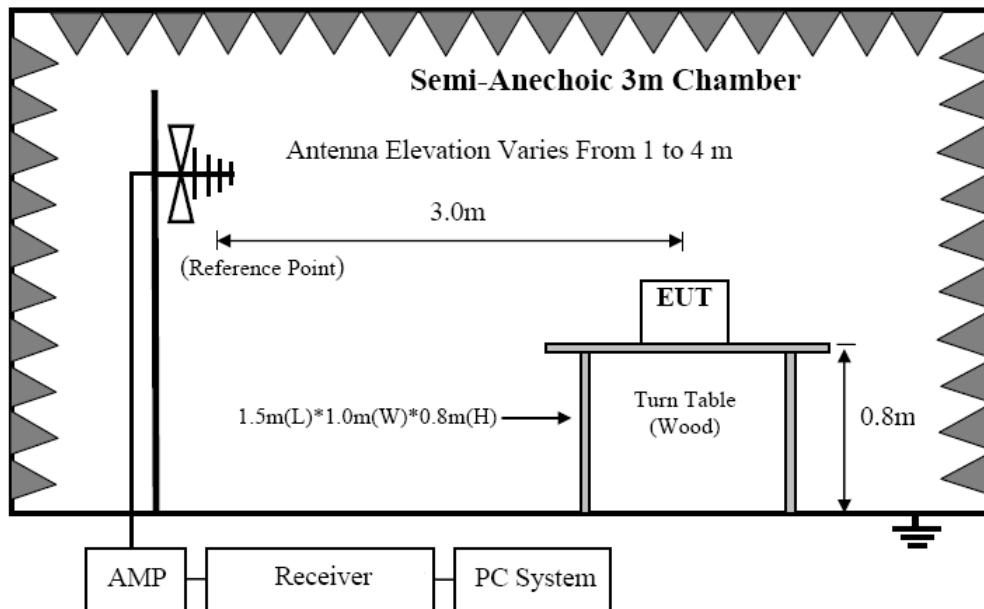
| MHz | MHz | MHz | GHz |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| ¹ 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | (²) |

RSS-GEN Limit

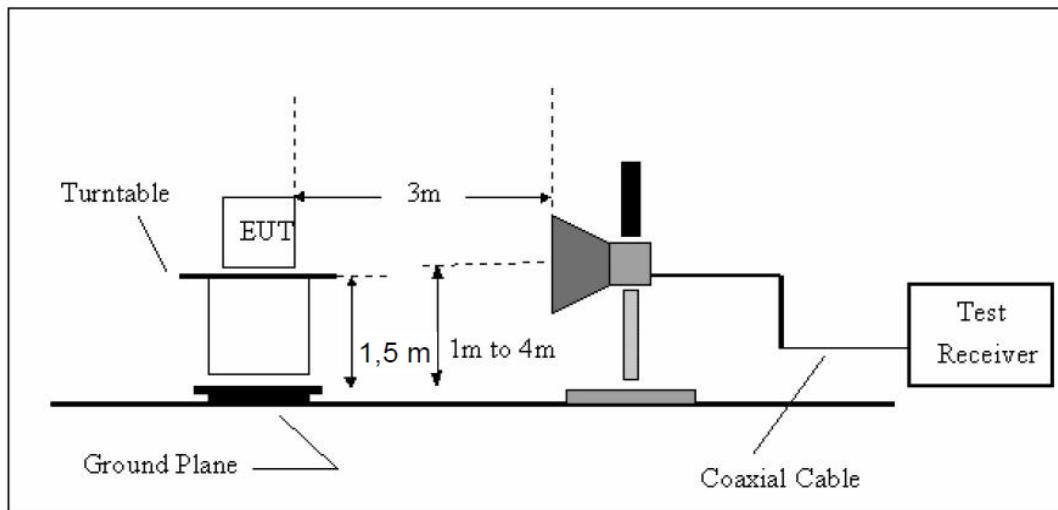
| FREQUENCY MHz | DISTANCE Meters | FIELD STRENGTHS LIMIT | |
|------------------|--------------------|---|----------|
| | | µV/m | dB(µV)/m |
| 0.009-0.490 | 300 | 2400/F(KHz) | / |
| 0.490-1.705 | 30 | 24000/F(KHz) | / |
| 1.705-30 | 30 | 30 | 29.5 |
| 30 ~ 88 | 3 | 100 | 40.0 |
| 88 ~ 216 | 3 | 150 | 43.5 |
| 216 ~ 960 | 3 | 200 | 46.0 |
| 960 ~ 1000 | 3 | 500 | 54.0 |
| Above | 1000 | 74.0 dB(µV)/m (Peak) 54.0 dB(µV)/m (Average) | |

8.2. Block Diagram of Test setup

8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



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



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

8.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz testing, and 150cm for above 1GHz testing.
- (2) Setup EUT and simulator as shown in section 1.4 and 6.1
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on Radiated Emission test.
- (6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

8.4. Test Result

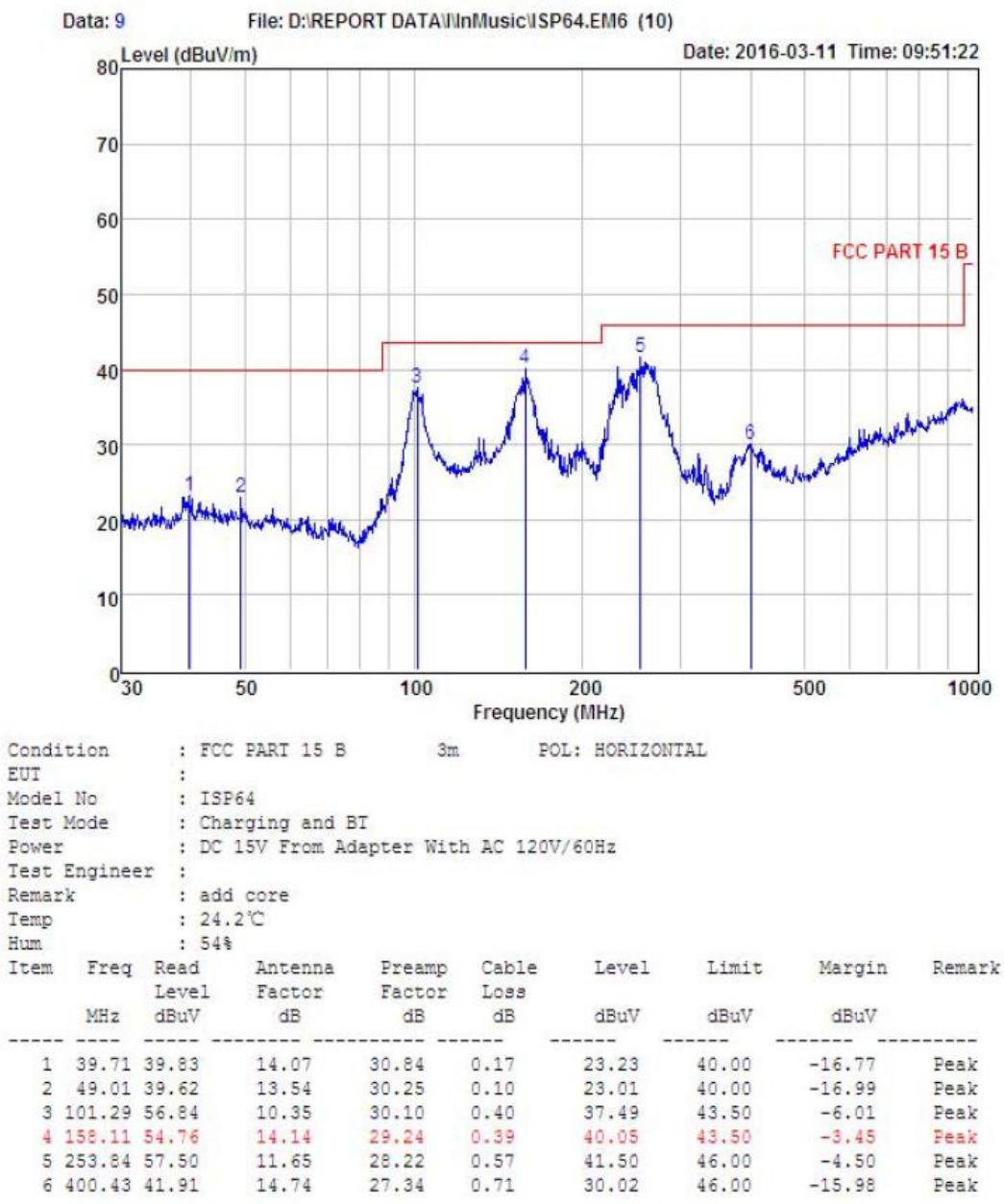
We have scanned the 10th harmonic from 9KHz to the EUT.

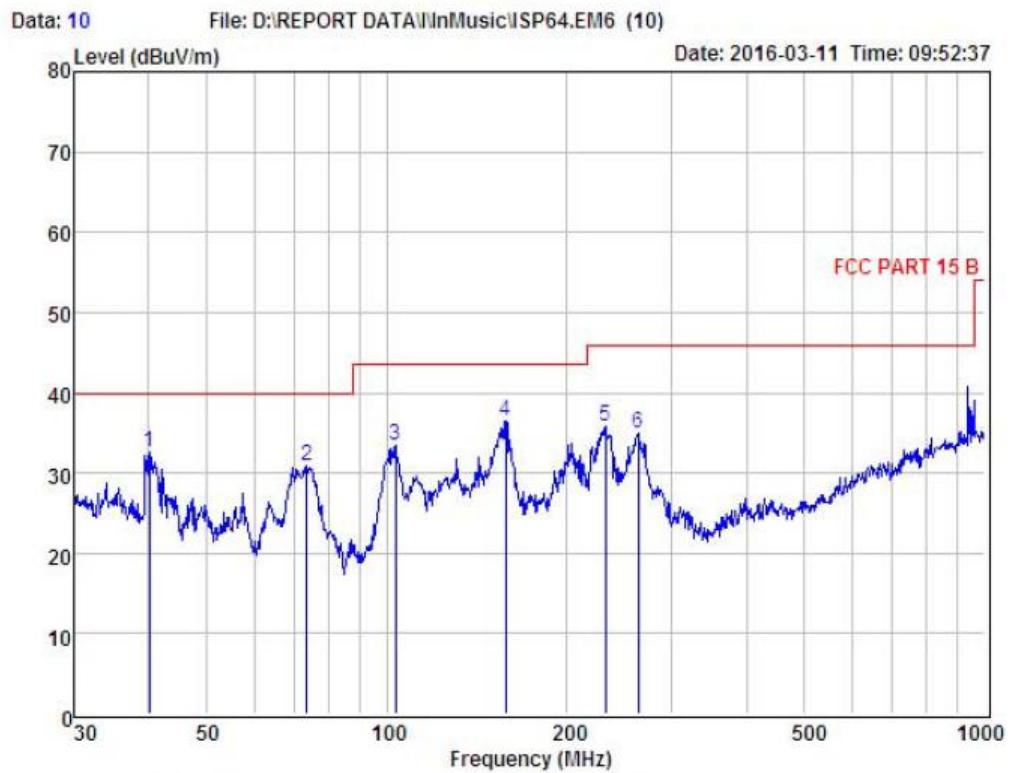
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

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

From 30MHz to 1000MHz: Conclusion: PASS





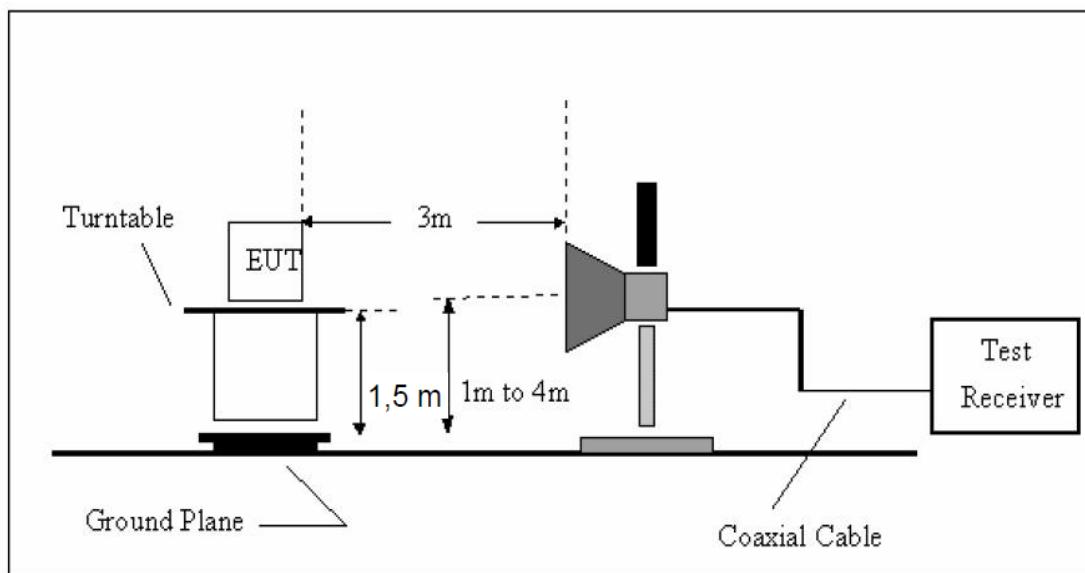
Condition : FCC PART 15 B 3m POL: VERTICAL
 EUT :
 Model No : ISP64
 Test Mode : Charging and BT
 Power : DC 15V From Adapter With AC 120V/60Hz
 Test Engineer :
 Remark : add core
 Temp : 24.2°C
 Hum : 54%

| Item | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|------|--------|------------|----------------|---------------|------------|-------|-------|--------|--------|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 40.13 | 49.17 | 14.07 | 30.85 | 0.17 | 32.56 | 40.00 | -7.44 | Peak |
| 2 | 73.62 | 50.45 | 10.21 | 30.09 | 0.24 | 30.81 | 40.00 | -9.19 | Peak |
| 3 | 103.44 | 52.60 | 10.54 | 30.04 | 0.32 | 33.42 | 43.50 | -10.08 | Peak |
| 4 | 158.11 | 51.25 | 14.14 | 29.24 | 0.39 | 36.54 | 43.50 | -6.96 | Peak |
| 5 | 232.53 | 52.16 | 11.26 | 28.10 | 0.56 | 35.88 | 46.00 | -10.12 | Peak |
| 6 | 263.82 | 50.64 | 11.90 | 28.16 | 0.65 | 35.03 | 46.00 | -10.97 | Peak |

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

9. Band Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in RSS-GEN, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with RSS-GEN limits.

9.3. Test Procedure

All restriction band and non-restriction band have been tested, only worse case is reported.

9.4. Test Result

PASS. (See below detailed test data)

Radiated Method

GFSK (CH Low)

| Band Edge Test result | | | | | | | | | | | |
|-----------------------------------|---------------------------|-----------------------------|-----------------------|-----------------------|--------------------|-------------------|----------------|-----------|--|--|--|
| EUT: Mountable Outdoor BT Speaker | | | | M/N: KEYSTONE | | | | | | | |
| Power: AC 120V/60Hz | | | | | | | | | | | |
| Test date: 2016-02-22 | | Test site: 3m Chamber | | | Tested by: Peter | | | | | | |
| Test mode: Tx CH Low 2402MHz | | | | | | | | | | | |
| Antenna polarity: Vertical | | | | | | | | | | | |
| Freq (MHz) | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss(d B) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | | | |
| 2390 | 46.95 | 27.62 | 3.92 | 34.97 | 43.52 | 74 | 30.48 | PK | | | |
| 2390 | -- | 27.62 | 3.92 | 34.97 | -- | 54 | -- | AV | | | |
| Antenna Polarity: Horizontal | | | | | | | | | | | |
| 2390 | 46.44 | 27.62 | 3.92 | 34.97 | 43.01 | 74 | 30.99 | PK | | | |
| 2390 | -- | 27.62 | 3.92 | 34.97 | -- | 54 | -- | AV | | | |

GFSK (CH High)

GFSK (Hopping Low)

GFSK (Hopping High)

$\pi/4$ DQPSK (CH Low)

$\pi/4$ DQPSK (CH High)

$\pi/4$ DQPSK (Hopping Low)

$\pi/4$ DQPSK (Hopping High)

8- DPSK (CH Low)

8- DPSK (CH High)

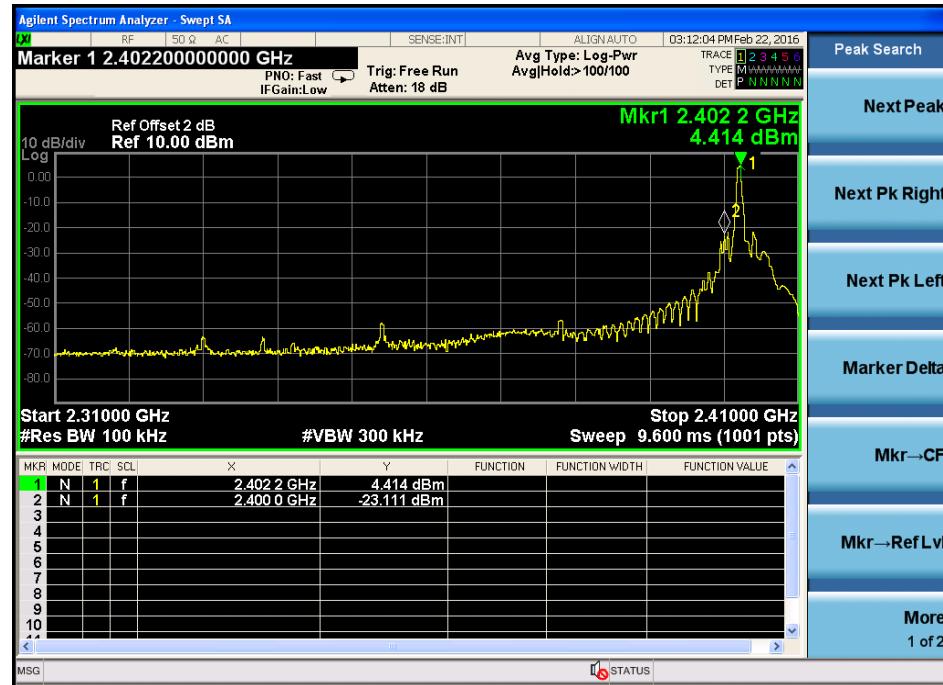
8- DPSK (Hopping Low)

8- DPSK (Hopping High)

Conducted Method

GFSK

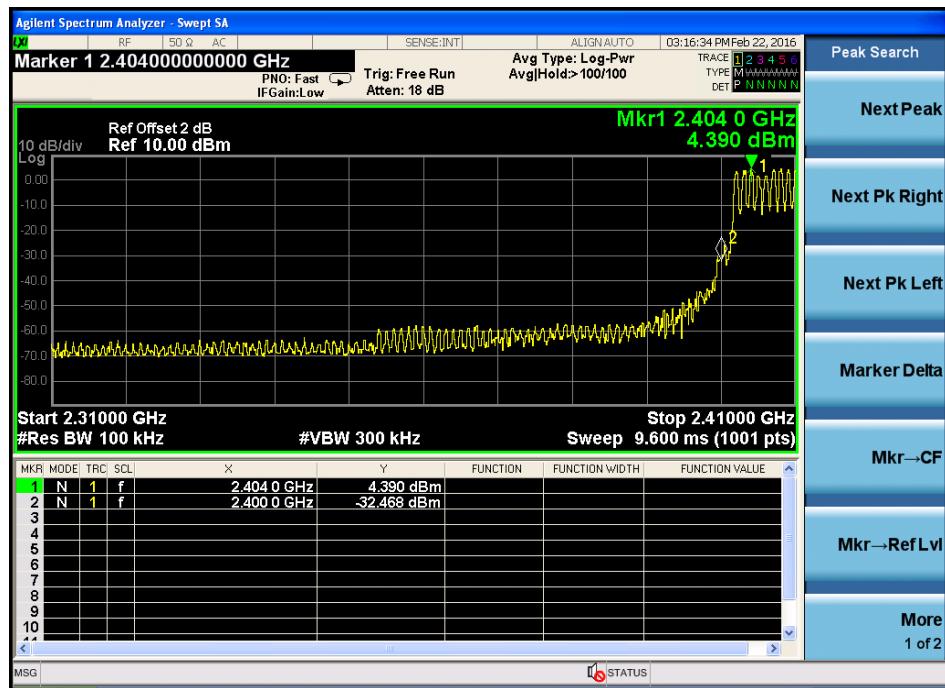
CH LOW :



CH High :



Hopping Low



High



$\pi/4$ DQPSK

Low

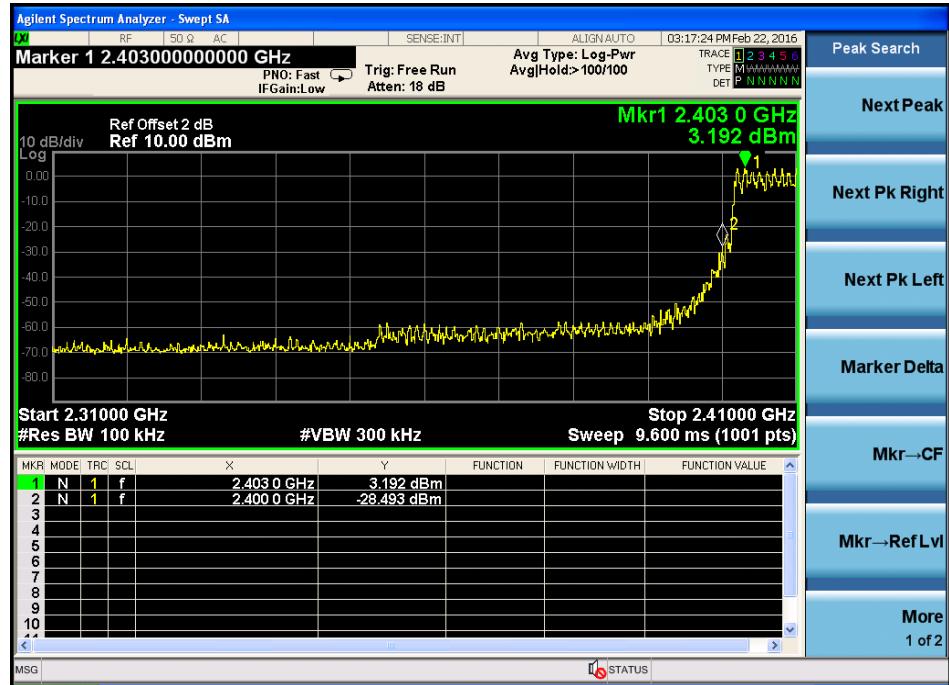


High

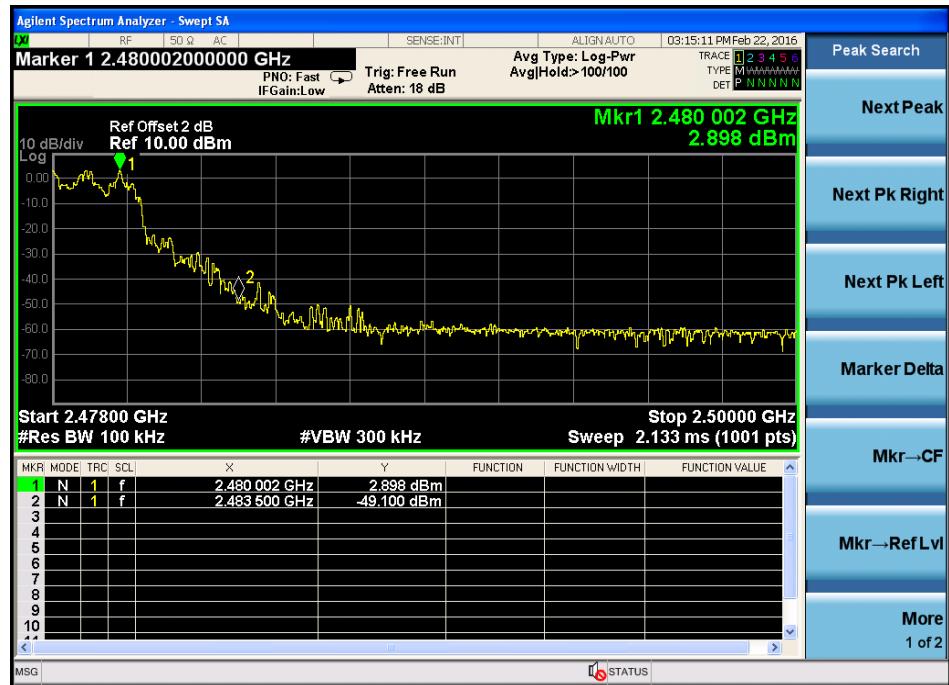


Hopping

Low

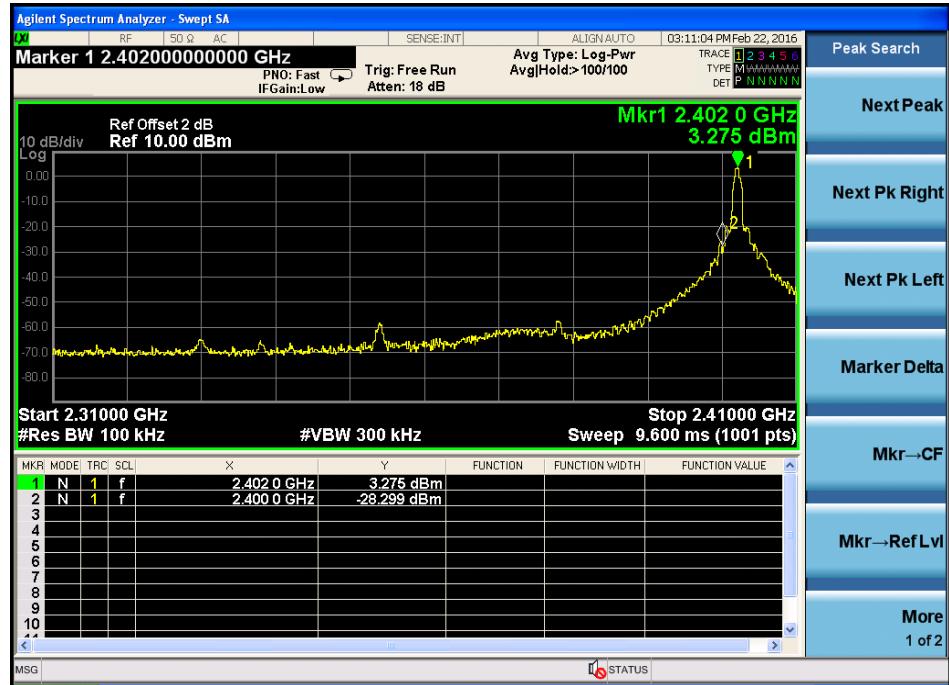


High



8- DPSK:

LOW

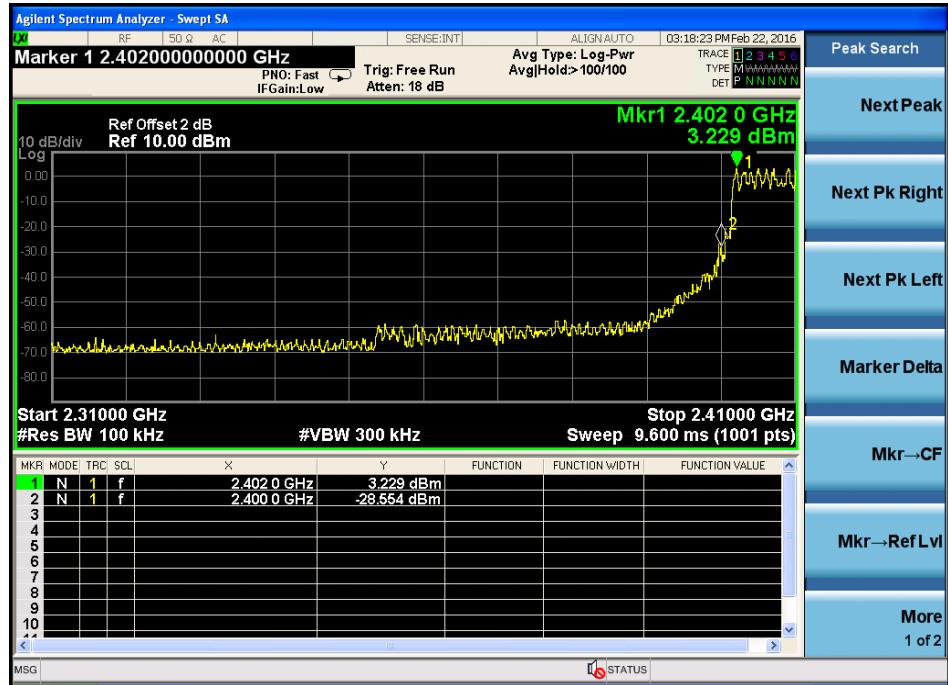


High



Hopping

Low

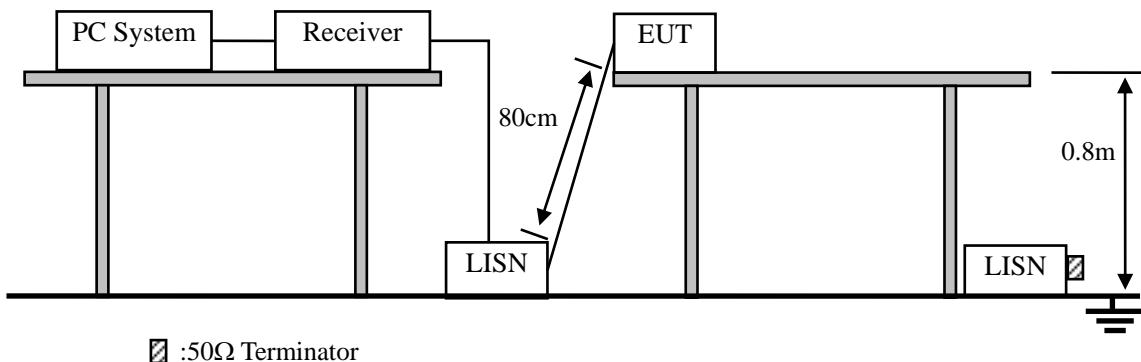


High



10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



10.2. Limit

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

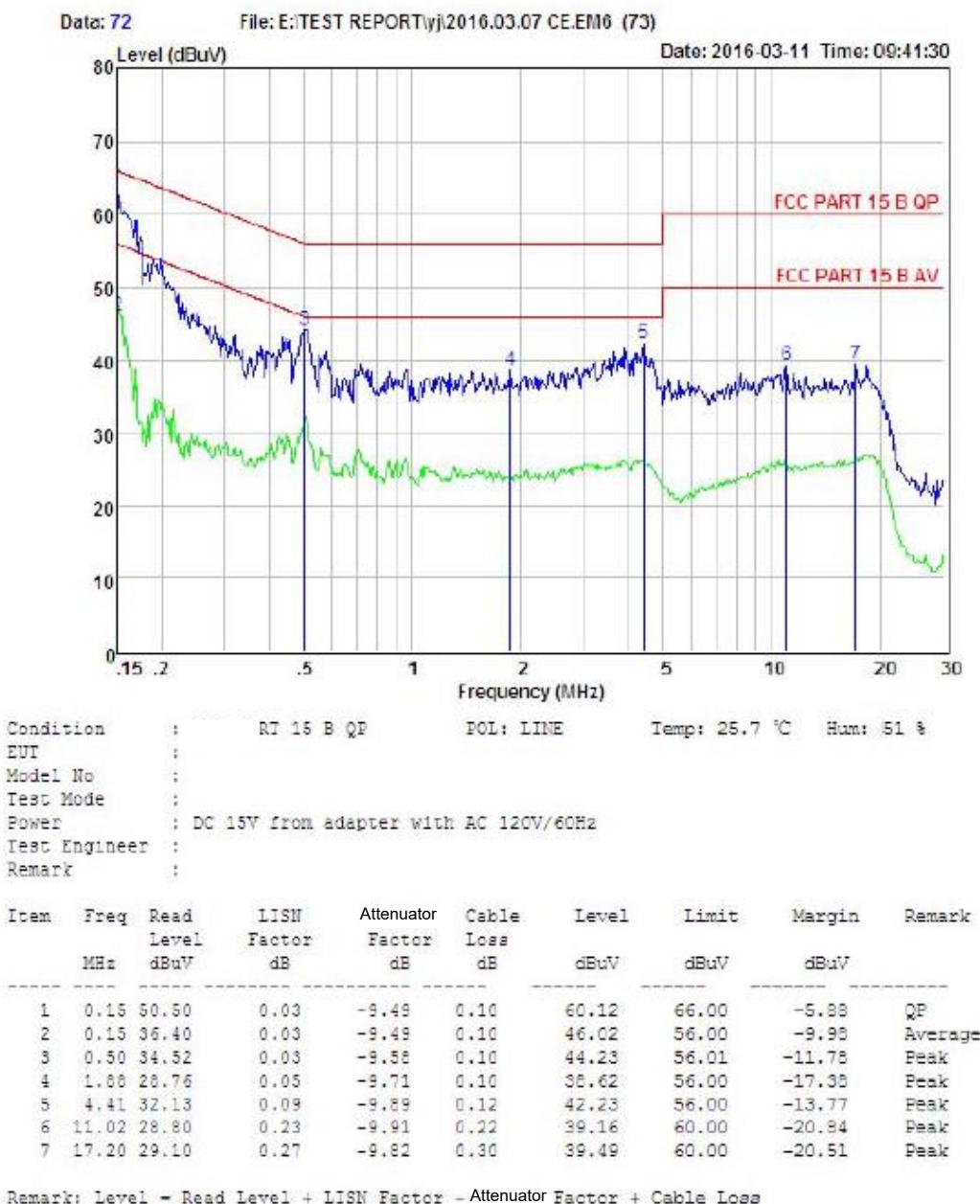
Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

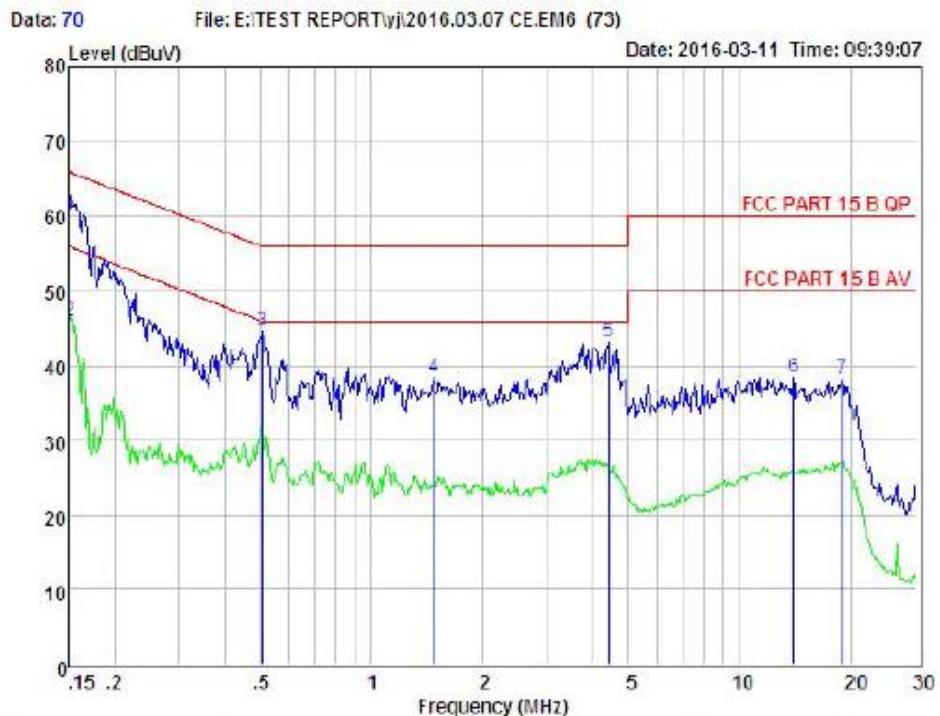
10.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

PASS. (See below detailed test data)





Condition : FCC PART 15 B QP POL: NEUTRAL Temp: 25.7 °C Hum: 51 %
EUT

Model No :

Test Mode :

Power : DC 15V from adapter with AC 120V/60Hz

Test Engineer :

Remark :

| Item | Freq | Read | LISN | Attenuator | Cable | Level | Limit | Margin | Remark |
|------|-------|-------|-------|------------|--------|-------|-------|--------|---------|
| | | | Level | Factor | Factor | Loss | dBuV | dBuV | dBuV |
| | MHz | dBuV | dB | dB | dB | | | | |
| 1 | 0.15 | 50.60 | 0.03 | -9.49 | 0.10 | 60.22 | 66.00 | -5.78 | QP |
| 2 | 0.15 | 36.20 | 0.03 | -9.49 | 0.10 | 45.82 | 56.00 | -10.18 | Average |
| 3 | 0.50 | 34.88 | 0.03 | -9.58 | 0.10 | 44.59 | 56.00 | -11.41 | Peak |
| 4 | 1.48 | 28.47 | 0.05 | -9.68 | 0.10 | 38.30 | 56.00 | -17.70 | Peak |
| 5 | 4.41 | 33.11 | 0.09 | -9.89 | 0.12 | 43.21 | 56.00 | -12.79 | Peak |
| 6 | 14.06 | 28.01 | 0.23 | -9.87 | 0.23 | 38.34 | 60.00 | -21.66 | Peak |
| 7 | 19.02 | 27.81 | 0.30 | -9.81 | 0.33 | 38.25 | 60.00 | -21.75 | Peak |

Remark: Level = Read Level + LISN Factor - Attenuator Factor + Cable Loss

Note1: If QP Result comply with AV limit, AV Result is deemed to comply with AV limit

11. Antenna Requirements

11.1. Limit

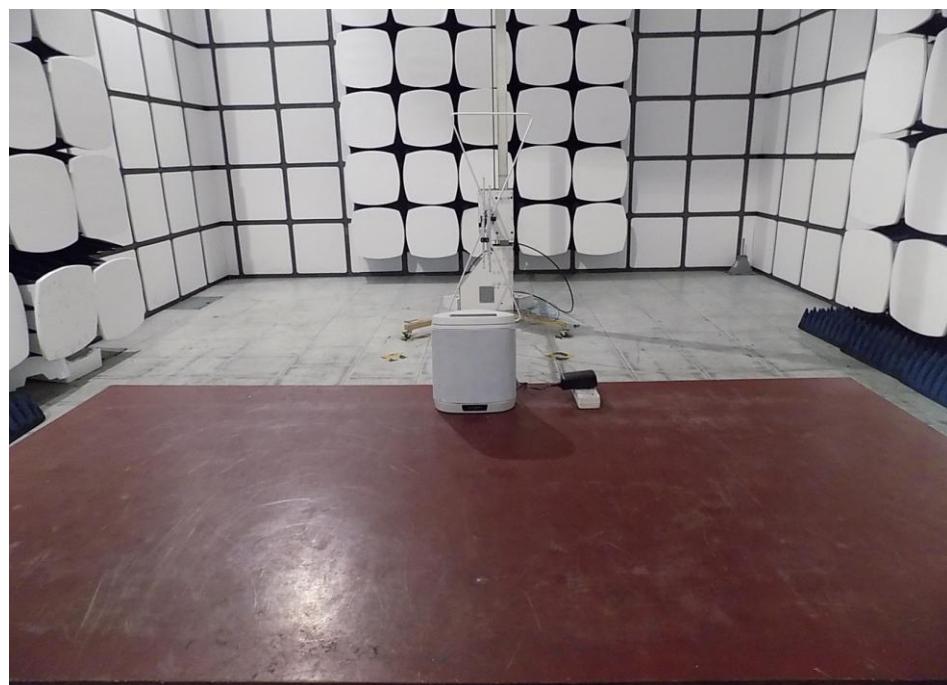
For intentional device, according to RSS-GEN, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to RSS-GEN, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

The antennas used for this product are PCB Antenna for Bluetooth, no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi .

12. Test setup photo

12.1. Photos of Radiated emission

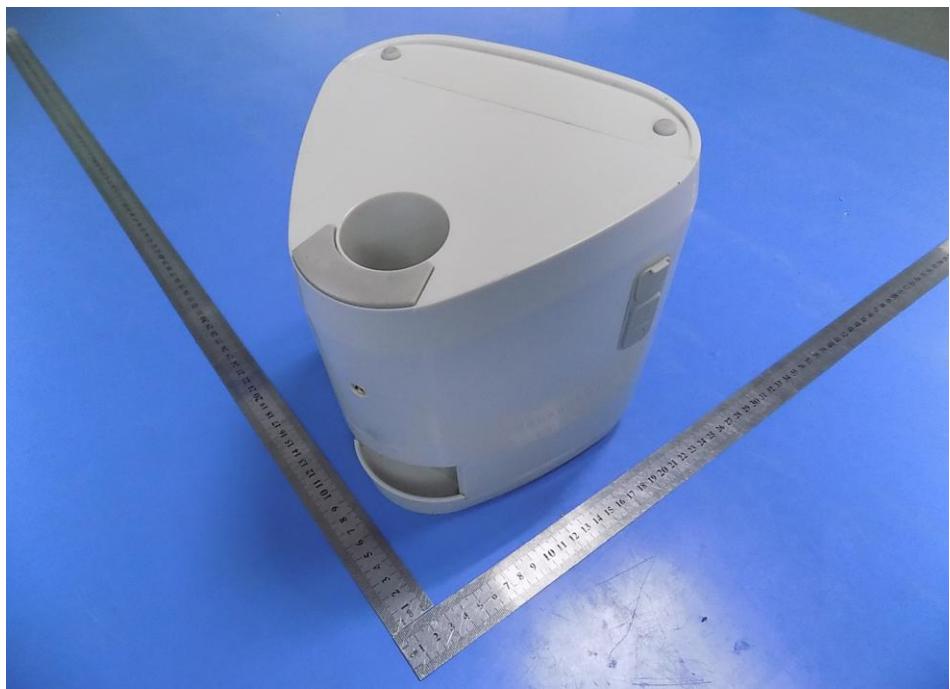
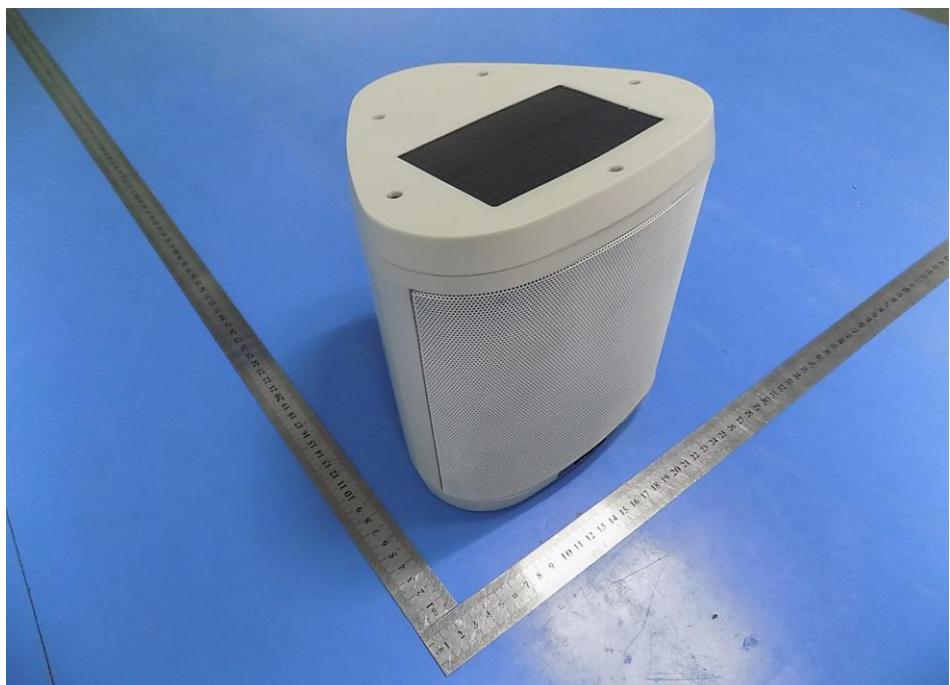


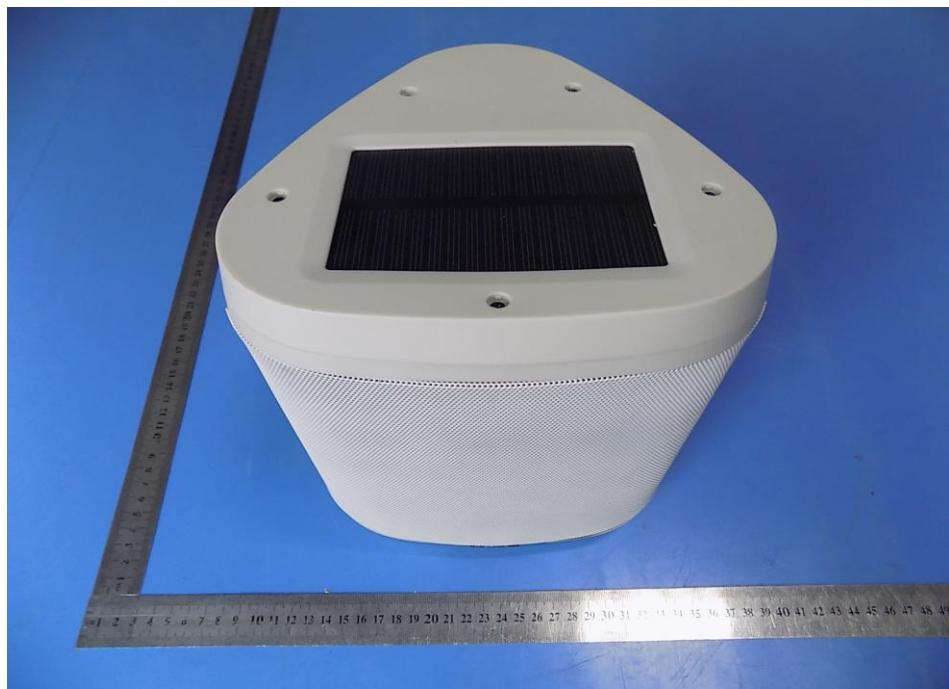
12.2.Photos of Conducted Emission test

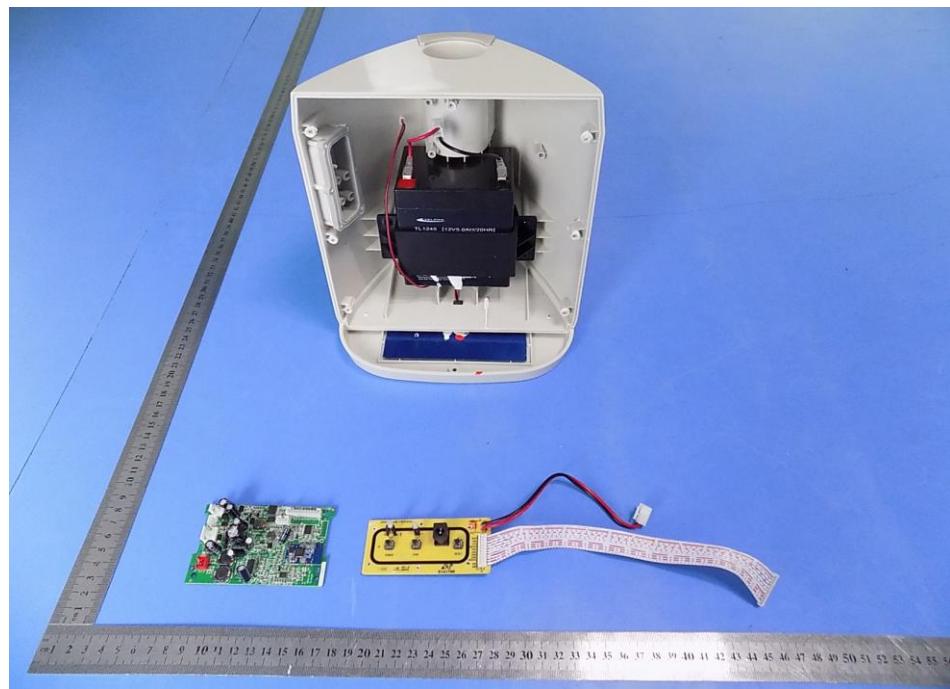
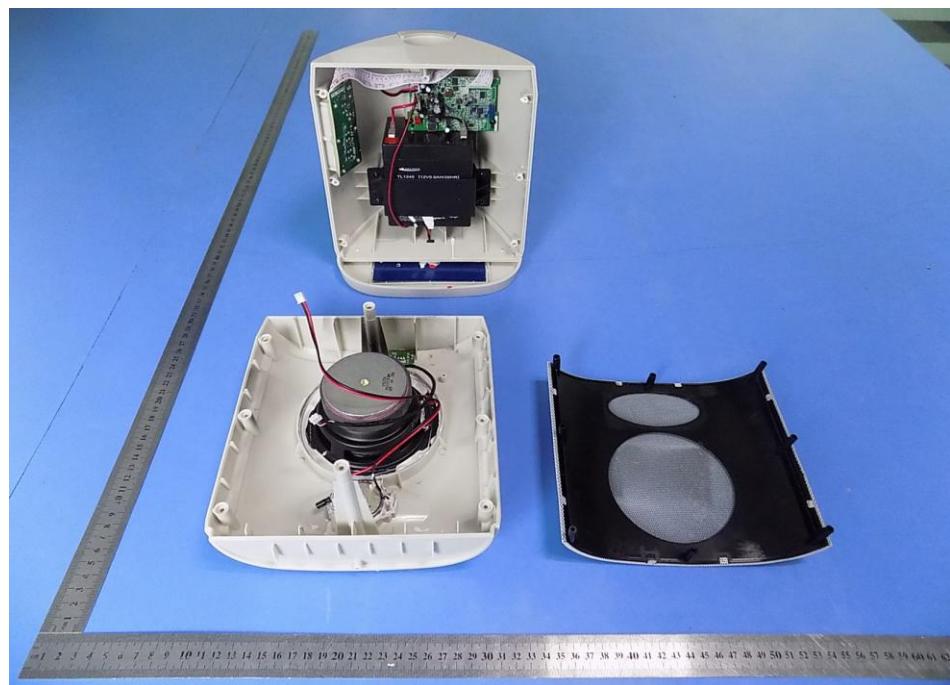


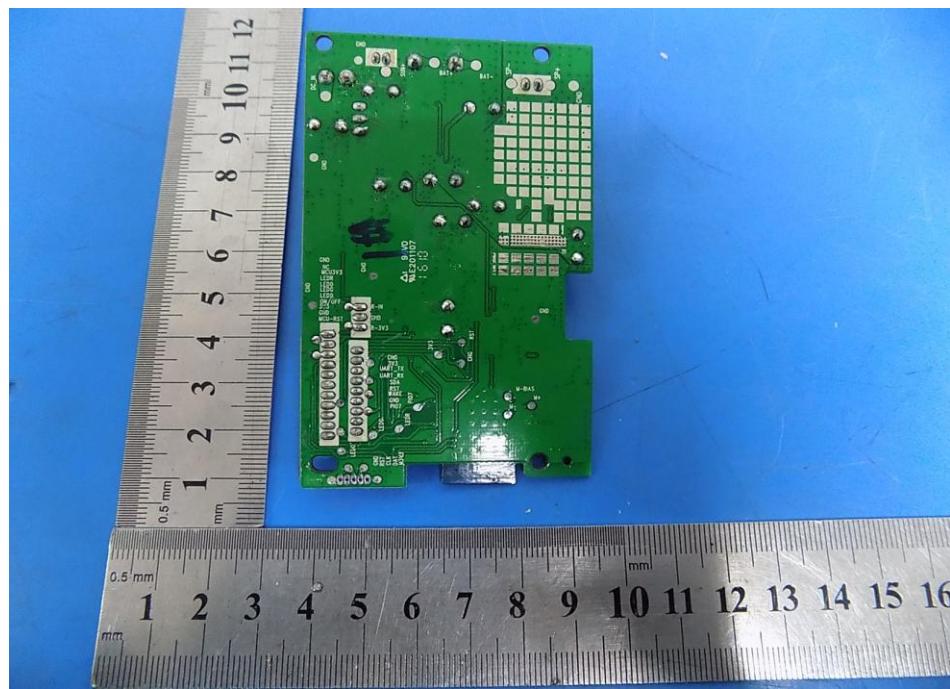
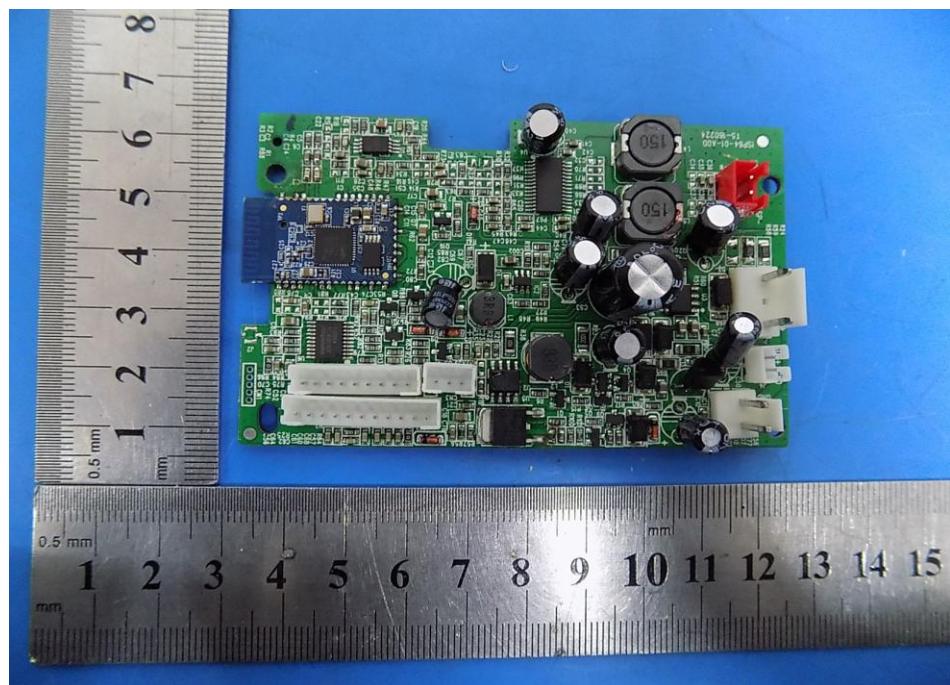
13.Photos of EUT

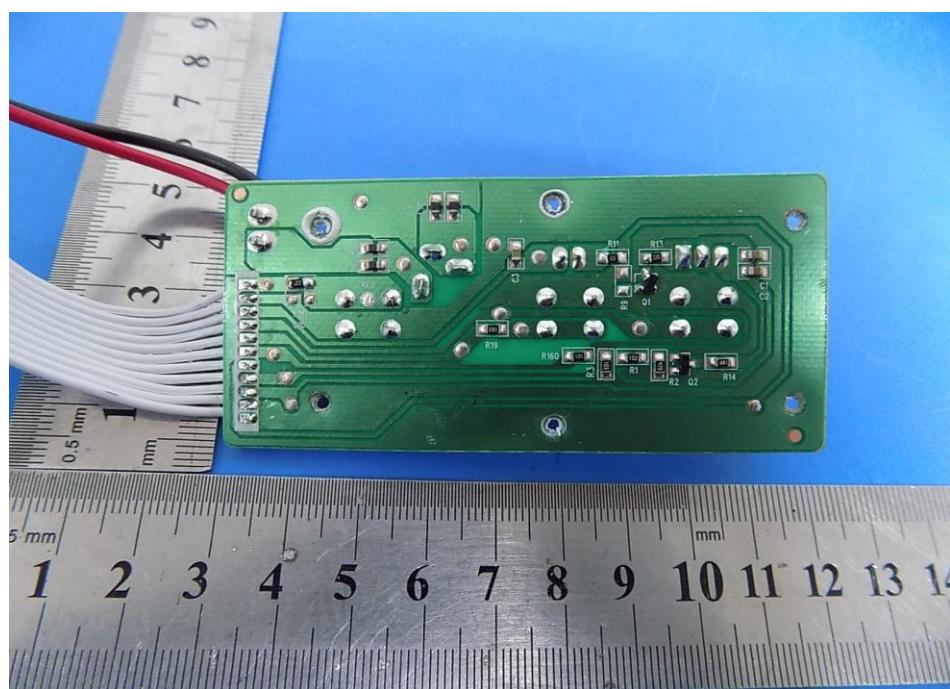
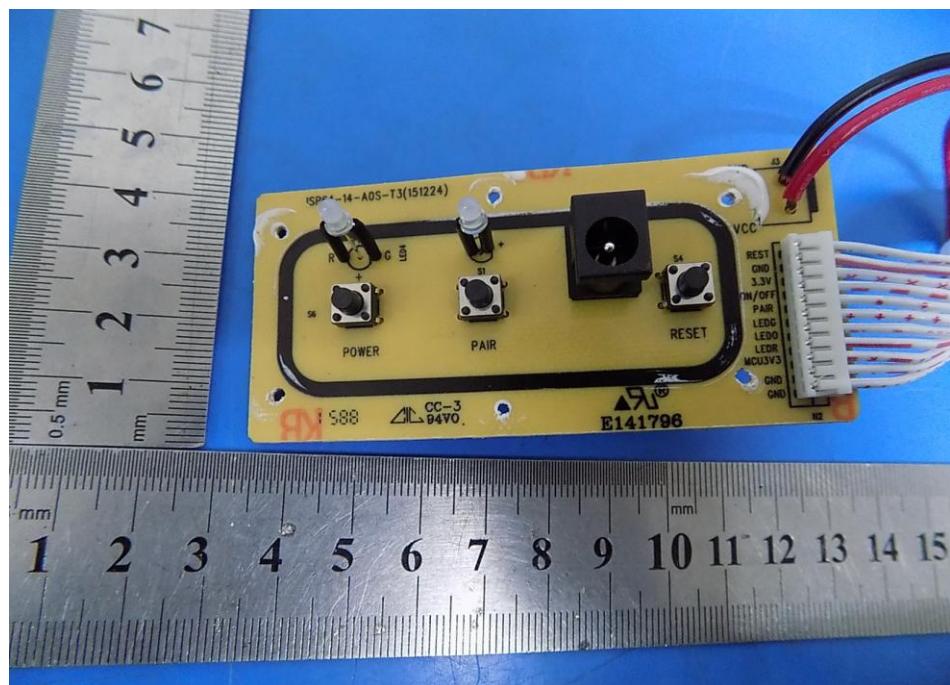


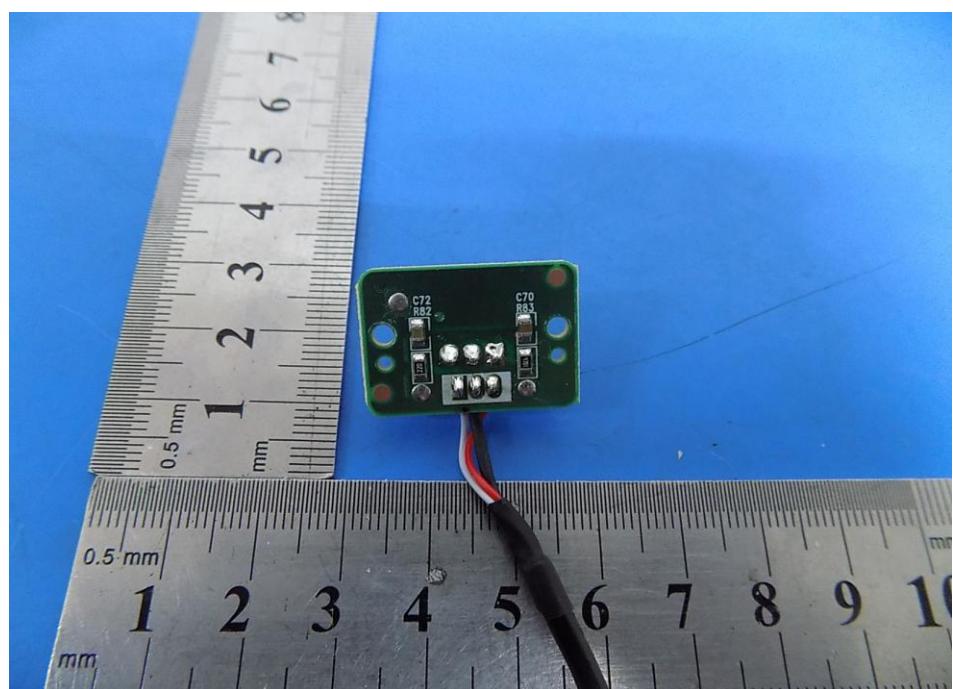
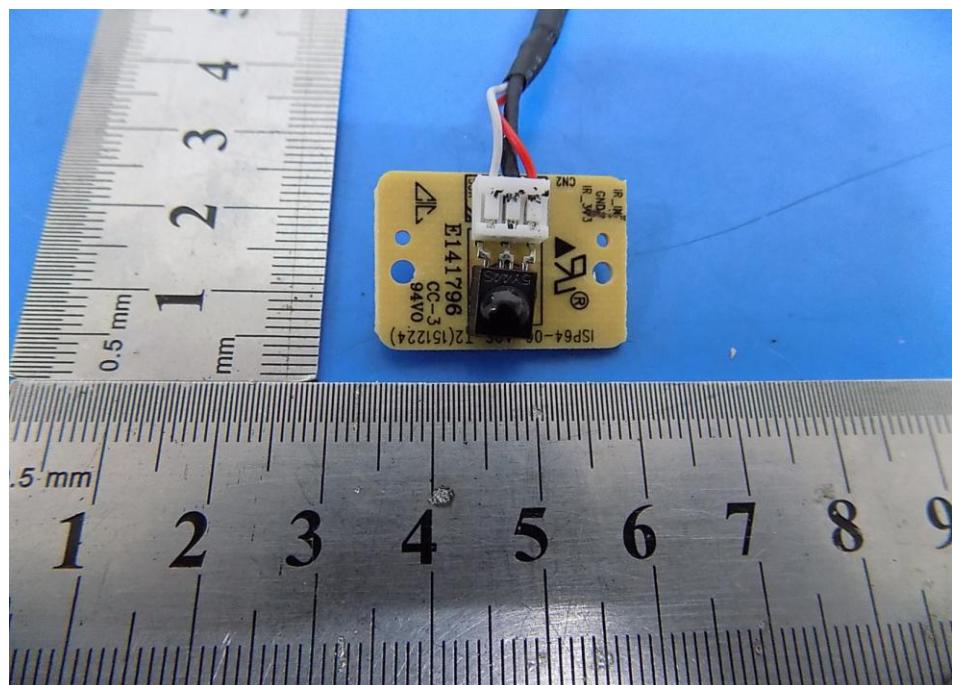


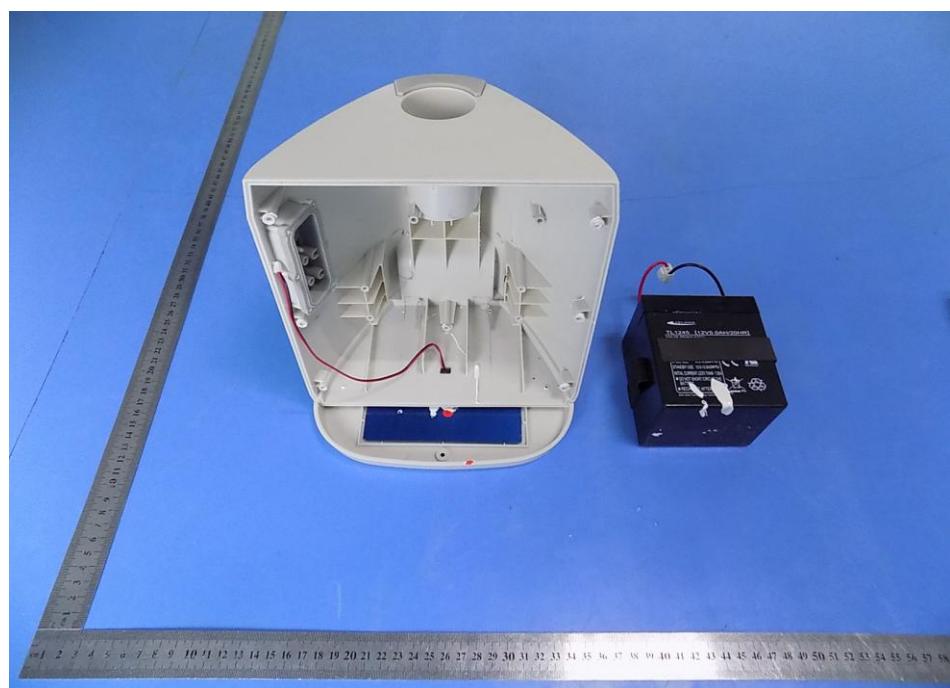












-----END OF THE REPORT-----