# FCC TEST REPORT

**Test report**
**On Behalf of**
**Guangzhou Saihong Electronics Technology co., LTD**
**For**
**Bluetooth Moving Headset**
**Model No.: AZ**

**FCC ID: 2AQLP-AZ02**

| | |
|---|---|
| **Prepared for :** | **Guangzhou Saihong Electronics Technology co., LTD**<br>**1539, 15/F New Asia International Electronic Digital City Xidi Second Road, Liwan District, Guangzhou, China.** |
| **Prepared By :** | **Shenzhen HUAK Testing Technology Co., Ltd.**<br>**1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China** |

| | |
|---|---|
| **Date of Test:** | **Jul. 05, 2018 ~ Jul. 12, 2018** |
| **Date of Report:** | **Jul. 12, 2018** |
| **Report Number:** | **HK180702358-E** |

# TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant's name** ..... : | Guangzhou Saihong Electronics Technology co., LTD |
| Address ..... : | 1539, 15/F New Asia International Electronic Digital City Xidi Second Road, Liwan District, Guangzhou, China. |
| **Manufacture's Name**..... : | Guangzhou Saihong Electronics Technology co., LTD |
| Address ..... : | 1539, 15/F New Asia International Electronic Digital City Xidi Second Road, Liwan District, Guangzhou, China. |

**Product description**

| | |
|---|---|
| Trade Mark: | N/A |
| Product name ..... : | Bluetooth Moving Headset |
| Model and/or type reference : | AZ |
| **Standards** ..... : | FCC Rules and Regulations Part 15 Subpart C Section 15.249<br>ANSI C63.10: 2013 |

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

| | |
|---|---|
| **Date of Test** ..... : | |
| Date (s) of performance of tests ..... : | Jul. 05, 2018 ~ Jul. 12, 2018 |
| Date of Issue ..... : | Jul. 12, 2018 |
| Test Result ..... : | **Pass** |

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

**Table of Contents** **Page**


1 . TEST SUMMARY 4

2 . GENERAL INFORMATION 5

2.1 GENERAL DESCRIPTION OF EUT 5

2.2 Operation of EUT during testing 6

2.3 DESCRIPTION OF TEST SETUP 7

2.4 MEASUREMENT INSTRUMENTS LIST 8

3 . CONDUCTED EMISSIONS TEST 9

3.1 Conducted Power Line Emission Limit 9

3.2 Test Setup 9

3.3 Test Procedure 9

3.4 Test Result 9

4 RADIATED EMISSION TEST 12

4.1 Radiation Limit 12

4.2 Test Setup 12

4.3 Test Procedure 13

4.4 Test Result 13

5 BAND EDGE 19

5.1 Limits 19

5.2 Test Procedure 19

5.3 Test Result 19

6 OCCUPIED BANDWIDTH MEASUREMENT 21

6.1 Test Setup 21

6.2 Test Procedure 21

6.3 Measurement Equipment Used 21

6.4 Test Result 21

7 ANTENNA REQUIREMENT 27

8 PHOTOGRAPH OF TEST 28

8.1 Radiated Emission 28

8.2 Conducted Emission 29

# 1. TEST SUMMARY

## 1.1 TEST PROCEDURES AND RESULTS

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

## 1.2 TEST FACILITY

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

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

## 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

| | |
|---|---|
| Equipment | Bluetooth Moving Headset |
| Model Name | AZ |
| Serial No | N/A |
| Model Difference | N/A |
| FCC ID | **2AQLP-AZ02** |
| Antenna Type | PCB Antenna |
| Antenna Gain | 0.5 dBi |
| BT Operation frequency | 2402-2480MHz |
| Number of Channels | 79CH |
| Modulation Type | GFSK, π/4DQPSK, 8DPSK |
| Power Source | DC3.7V From Battery or DC5V 0.5A From Micro USB |
| Power Rating | DC3.7V From Battery or DC5V 0.5A From Micro USB |

2.1.1 Carrier Frequency of Channels

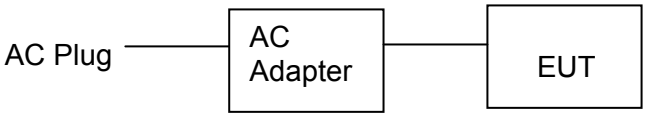
| Channel List | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00 | 2402 | 27 | 2429 | 54 | 2456 |
| 01 | 2403 | 28 | 2430 | 55 | 2457 |
| 02 | 2404 | 29 | 2431 | 56 | 2458 |
| 03 | 2405 | 30 | 2432 | 57 | 2459 |
| 04 | 2406 | 31 | 2433 | 58 | 2460 |
| 05 | 2407 | 32 | 2434 | 59 | 2461 |
| 06 | 2408 | 33 | 2435 | 60 | 2462 |
| 07 | 2409 | 34 | 2436 | 61 | 2463 |
| 08 | 2410 | 35 | 2437 | 62 | 2464 |
| 09 | 2411 | 36 | 2438 | 63 | 2465 |
| 10 | 2412 | 37 | 2439 | 64 | 2466 |
| 11 | 2413 | 38 | 2440 | 65 | 2467 |
| 12 | 2414 | 39 | 2441 | 66 | 2468 |
| 13 | 2415 | 40 | 2442 | 67 | 2469 |
| 14 | 2416 | 41 | 2443 | 68 | 2470 |
| 15 | 2417 | 42 | 2444 | 69 | 2471 |
| 16 | 2418 | 43 | 2445 | 70 | 2472 |
| 17 | 2419 | 44 | 2446 | 71 | 2473 |
| 18 | 2420 | 45 | 2447 | 72 | 2474 |
| 19 | 2421 | 46 | 2448 | 73 | 2475 |
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 | | |
| 26 | 2428 | 53 | 2455 | | |

2.2 Operation of EUT during testing

Operating Mode
The mode is used: **Transmitting mode**
Low Channel: 2402MHz
Middle Channel: 2441MHz
High Channel: 2480MHz

## 2.3 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and Radiation testing:




Operation of EUT during Above1GHz Radiation testing:

- Adapter information

  Model: HW-050500DFQ

  Input: 100-240V~, 50/60Hz, 0.5A

  Output: 5VDC, 0.5A

## 2.4 MEASUREMENT INSTRUMENTS LIST

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| 1. | L.I.S.N. Artificial Mains Network | R&S | ENV216 | HKE-002 | Dec. 28, 2017 | 1 Year |
| 2. | Receiver | R&S | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 3. | RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Dec. 28, 2017 | 1 Year |
| 4. | Spectrum analyzer | R&S | FSP40 | HKE-025 | Dec. 28, 2017 | 1 Year |
| 5. | Spectrum analyzer | Agilent | N9020A | HKE-048 | Dec. 28, 2017 | 1 Year |
| 6. | Preamplifier | Schwarzbeck | BBV 9743 | HKE-006 | Dec. 28, 2017 | 1 Year |
| 7. | EMI Test Receiver | Rohde & Schwarz | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 8. | Bilog Broadband Antenna | Schwarzbeck | VULB9163 | HKE-012 | Dec. 28, 2017 | 1 Year |
| 9. | Loop Antenna | Schwarzbeck | FMZB 1519 B | HKE-014 | Dec. 28, 2017 | 1 Year |
| 10. | Horn Antenna | Schewarzbeck | 9120D | HKE-013 | Dec. 28, 2017 | 1 Year |
| 11. | Pre-amplifier | EMCI | EMC051845 SE | HKE-015 | Dec. 28, 2017 | 1 Year |
| 12. | Pre-amplifier | Agilent | 83051A | HKE-016 | Dec. 28, 2017 | 1 Year |
| 13. | EMI Test Software EZ-EMC | Tonscend | JS1120-B Version | HKE-083 | Dec. 28, 2017 | N/A |
| 14. | Power Sensor | Agilent | E9300A | HKE-086 | Dec. 28, 2017 | 1 Year |
| 15. | Spectrum analyzer | Agilent | N9020A | HKE-048 | Dec. 28, 2017 | 1 Year |
| 16. | Signal generator | Agilent | N5182A | HKE-029 | Dec. 28, 2017 | 1 Year |
| 17. | Signal Generator | Agilent | 83630A | HKE-028 | Dec. 28, 2017 | 1 Year |
| 18. | Shielded room | Shiel Hong | 4*3*3 | HKE-039 | Dec. 28, 2017 | 3 Year |

# 3. CONDUCTED EMISSIONS TEST

## 3.1 Conducted Power Line Emission Limit

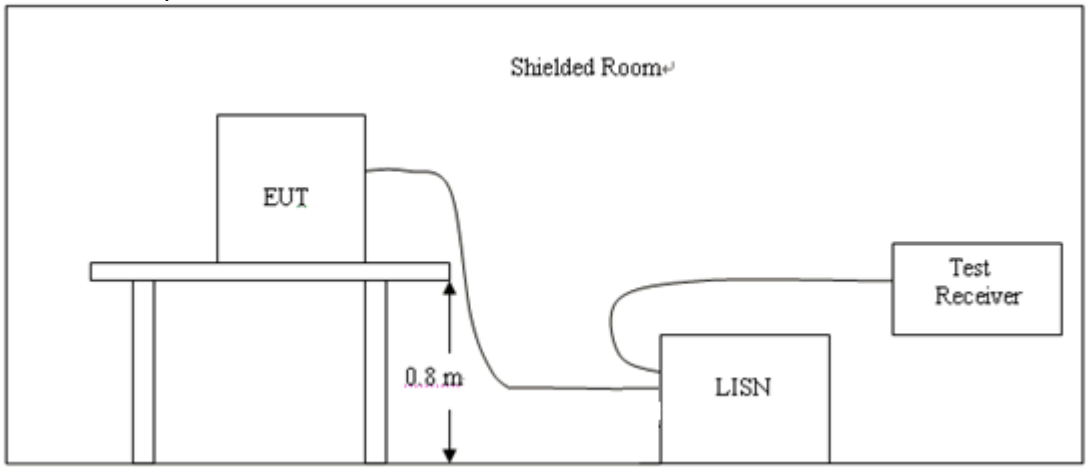
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

| Frequency (MHz) | Maximum RF Line Voltage (dBμV) | | | |
|---|---|---|---|---|
| | CLASS A | | CLASS B | |
| | Q.P. | Ave. | Q.P. | Ave. |
| 0.15 - 0.50 | 79 | 66 | 66-56* | 56-46* |
| 0.50 - 5.00 | 73 | 60 | 56 | 46 |
| 5.00 - 30.0 | 73 | 60 | 60 | 50 |

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

## 3.2 Test Setup




## 3.3 Test Procedure

1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.1 meters is used and is placed on the ground plane as per ANSI C63.10.
2, Support equipment, if needed, was placed as per ANSI C63.10.
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5, All support equipments received AC power from a second LISN, if any.
6, The EUT 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.

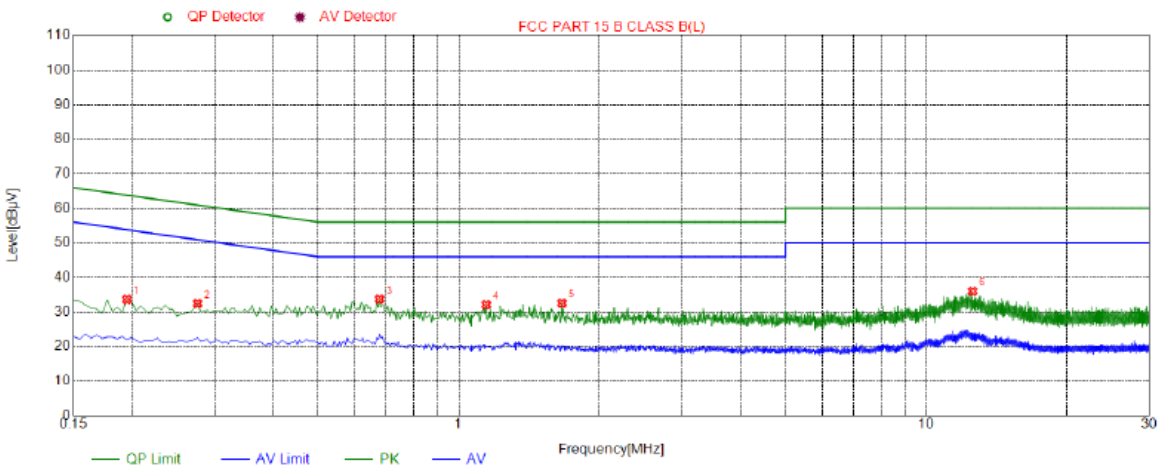
## 3.4 Test Result

PASS

All the test modes completed for test. only the worst result of 8DPSK High Channel was reported as below:

Test Specification: Line

## Test Graph

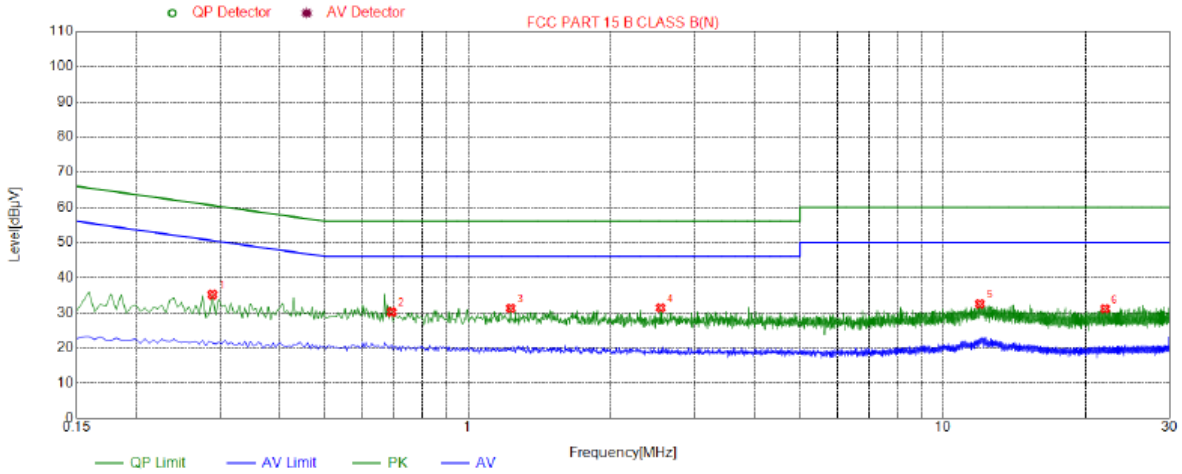



| NO. | Freq. [MHz] | Level [dBµV] | Factor [dB] | Limit [dBµV] | Margin [dB] | Detector |
|---|---|---|---|---|---|---|
| 1 | 0.1950 | 33.61 | 10.03 | 63.83 | 30.22 | PK |
| 2 | 0.2760 | 32.43 | 10.04 | 60.94 | 28.51 | PK |
| 3 | 0.6765 | 33.68 | 10.05 | 56.00 | 22.32 | PK |
| 4 | 1.1445 | 32.06 | 10.09 | 56.00 | 23.94 | PK |
| 5 | 1.6620 | 32.53 | 10.12 | 56.00 | 23.47 | PK |
| 6 | 12.5700 | 35.98 | 9.98 | 60.00 | 24.02 | PK |

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Test Specification: Neutral

## Test Graph




| NO. | Freq. [MHz] | Level [dBμV] | Factor [dB] | Limit [dBμV] | Margin [dB] | Detector |
|---|---|---|---|---|---|---|
| 1 | 0.2895 | 35.17 | 10.03 | 60.54 | 25.37 | PK |
| 2 | 0.6900 | 30.25 | 10.05 | 56.00 | 25.75 | PK |
| 3 | 1.2300 | 31.32 | 10.09 | 56.00 | 24.68 | PK |
| 4 | 2.5440 | 31.46 | 10.20 | 56.00 | 24.54 | PK |
| 5 | 11.9580 | 32.55 | 9.99 | 60.00 | 27.45 | PK |
| 6 | 21.9435 | 31.17 | 10.15 | 60.00 | 28.83 | PK |

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

# 4 RADIATED EMISSION TEST

## 4.1 Radiation Limit

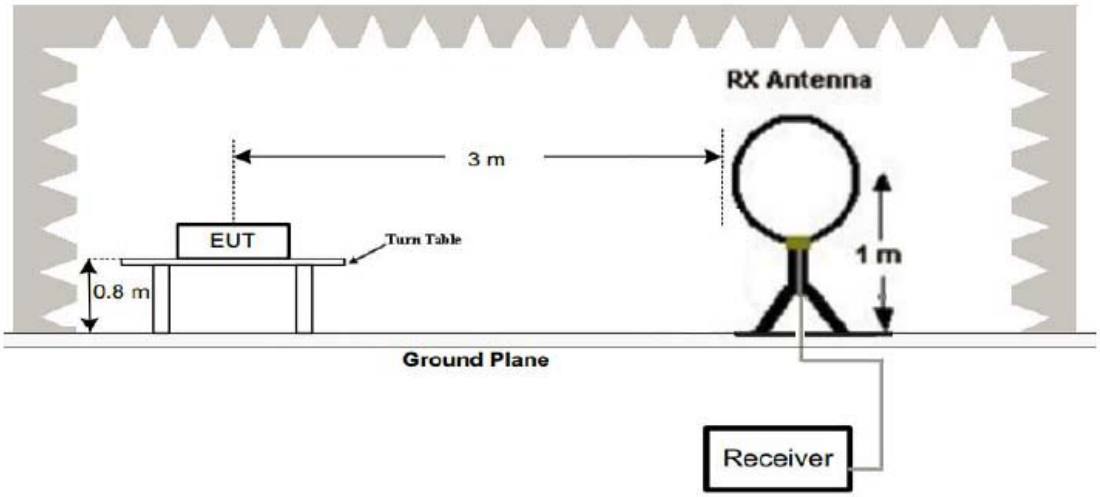
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m) | Radiated (μV/m) |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100 |
| 88-216 | 3 | 43.5 | 150 |
| 216-960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |

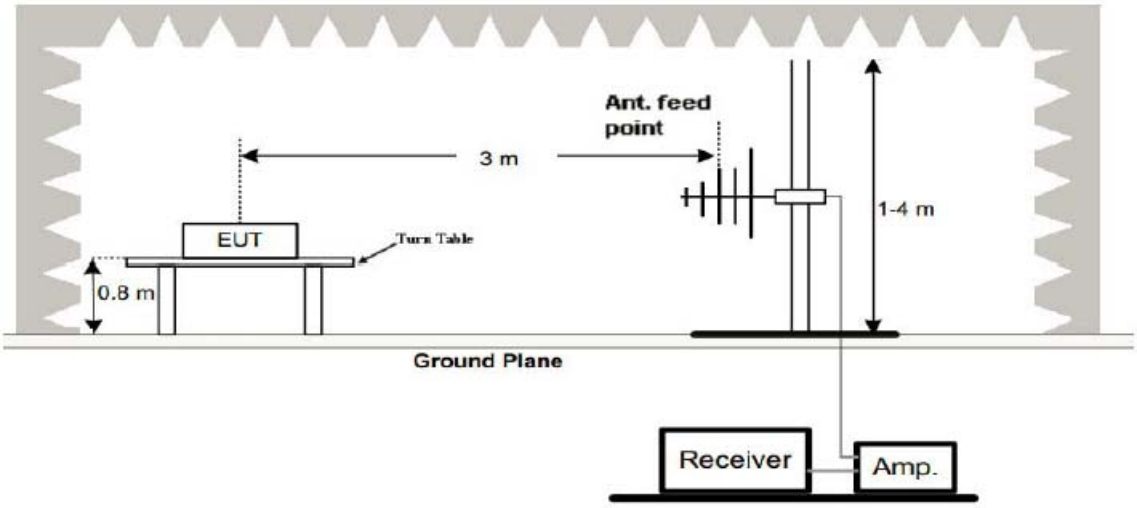
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

## 4.2 Test Setup

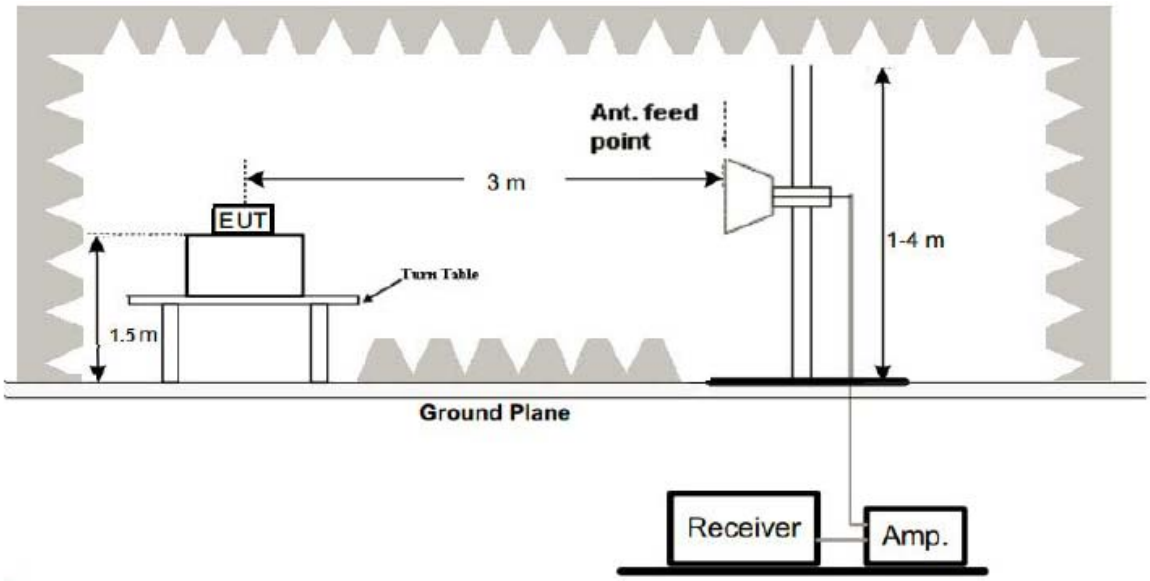
（1）Radiated Emission Test-Up Frequency Below 30MHz




（2）Radiated Emission Test-Up Frequency 30MHz~1GHz



（3）Radiated Emission Test-Up Frequency Above 1GHz




4.3 Test Procedure

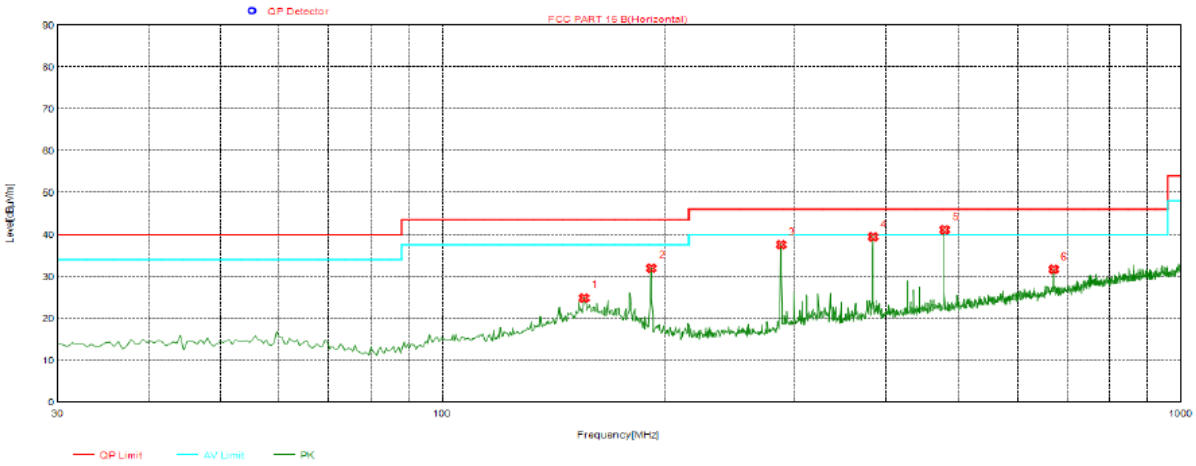
1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

PASS
All the test modes completed for test. only the worst result of 8DPSK Low Channel was reported as below:

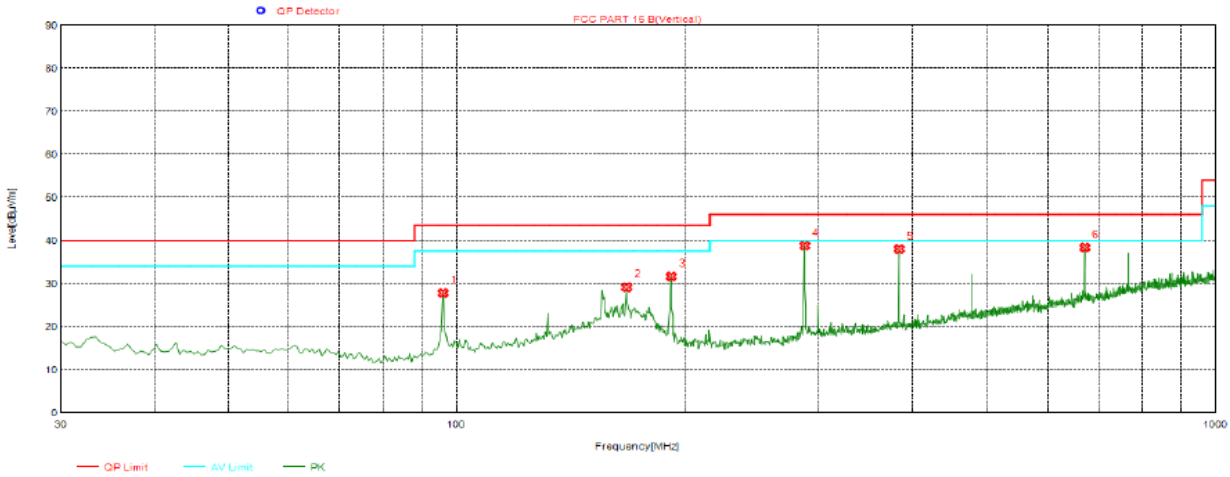
Below 1GHz Test Results:
Antenna polarity: H




| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 155.6150 | 24.82 | -9.96 | 43.50 | 18.68 | PK | 100 | 10 | Horizontal |
| 2 | 191.9900 | 31.95 | -14.64 | 43.50 | 11.55 | PK | 100 | 28 | Horizontal |
| 3 | 288.0200 | 37.57 | -13.46 | 46.00 | 8.43 | PK | 100 | 66 | Horizontal |
| 4 | 384.0500 | 39.46 | -10.99 | 46.00 | 6.54 | PK | 100 | 62 | Horizontal |
| 5 | 480.0800 | 41.15 | -8.41 | 46.00 | 4.85 | PK | 100 | 42 | Horizontal |
| 6 | 672.1400 | 31.69 | -4.20 | 46.00 | 14.31 | PK | 100 | 316 | Horizontal |

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Antenna polarity: V




| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dB] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 95.9600 | 27.77 | -16.81 | 43.50 | 15.73 | PK | 100 | 146 | Vertical |
| 2 | 167.7400 | 29.13 | -10.50 | 43.50 | 14.37 | PK | 100 | 350 | Vertical |
| 3 | 191.9900 | 31.64 | -14.64 | 43.50 | 11.86 | PK | 100 | 196 | Vertical |
| 4 | 288.0200 | 38.77 | -13.46 | 46.00 | 7.23 | PK | 100 | 121 | Vertical |
| 5 | 384.0500 | 38.01 | -10.99 | 46.00 | 7.99 | PK | 100 | 4 | Vertical |
| 6 | 672.1400 | 38.34 | -4.20 | 46.00 | 7.66 | PK | 100 | 50 | Vertical |

Remark: Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

Remark:
(1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Above 1 GHz Test Results:

CH Low (2402MHz)

Horizontal:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2402 | 112.52 | -5.81 | 106.71 | 114.00 | -7.29 | peak |
| 2402 | 86.89 | -5.81 | 81.08 | 94.00 | -12.92 | AVG |
| 4804 | 56.73 | -3.65 | 53.08 | 74.00 | -20.92 | peak |
| 4804 | 46.51 | -3.65 | 42.86 | 54.00 | -11.14 | AVG |
| 7206 | 56.94 | -0.95 | 55.99 | 74.00 | -18.01 | peak |
| 7206 | 42.15 | -0.95 | 41.20 | 54.00 | -12.80 | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Vertical:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2402 | 112.16 | -5.81 | 106.35 | 114.00 | -7.65 | peak |
| 2402 | 86.53 | -5.81 | 80.72 | 94.00 | -13.28 | AVG |
| 4804 | 56.45 | -3.65 | 52.80 | 74.00 | -21.20 | peak |
| 4804 | 46.21 | -3.65 | 42.56 | 54.00 | -11.44 | AVG |
| 7206 | 56.48 | -0.95 | 55.53 | 74.00 | -18.47 | peak |
| 7206 | 41.79 | -0.95 | 40.84 | 54.00 | -13.16 | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

CH Middle (2441MHz)

Horizontal:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2441.00 | 111.87 | -5.73 | 106.14 | 114.00 | -7.86 | peak |
| 2441.00 | 86.25 | -5.73 | 80.52 | 94.00 | -13.48 | AVG |
| 4882.00 | 56.18 | -3.54 | 52.64 | 74.00 | -21.36 | peak |
| 4882.00 | 46.25 | -3.54 | 42.71 | 54.00 | -11.29 | AVG |
| 7323.00 | 55.88 | -0.81 | 55.07 | 74.00 | -18.93 | peak |
| 7323.00 | 41.34 | -0.81 | 40.53 | 54.00 | -13.47 | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Vertical:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2441.00 | 111.45 | -5.73 | 105.72 | 114.00 | -8.28 | peak |
| 2441.00 | 85.88 | -5.73 | 80.15 | 94.00 | -13.85 | AVG |
| 4882.00 | 55.75 | -3.54 | 52.21 | 74.00 | -21.79 | peak |
| 4882.00 | 45.83 | -3.54 | 42.29 | 54.00 | -11.71 | AVG |
| 7323.00 | 55.64 | -0.81 | 54.83 | 74.00 | -19.17 | peak |
| 7323.00 | 41.07 | -0.81 | 40.26 | 54.00 | -13.74 | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

CH High (2480MHz)

Horizontal:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2480 | 110.79 | -5.63 | 105.16 | 114.00 | -8.84 | peak |
| 2480 | 85.43 | -5.63 | 79.80 | 94.00 | -14.20 | AVG |
| 4960 | 55.51 | -3.43 | 52.08 | 74.00 | -21.92 | peak |
| 4960 | 45.64 | -3.44 | 42.20 | 54.00 | -11.80 | AVG |
| 7440 | 55.37 | -0.77 | 54.60 | 74.00 | -19.40 | peak |
| 7440 | 40.58 | -0.77 | 39.81 | 54.00 | -14.19 | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Vertical:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2480 | 110.11 | -5.63 | 104.48 | 114.00 | -9.52 | peak |
| 2480 | 85.16 | -5.63 | 79.53 | 94.00 | -14.47 | AVG |
| 4960 | 55.24 | -3.43 | 51.81 | 74.00 | -22.19 | peak |
| 4960 | 45.39 | -3.44 | 41.95 | 54.00 | -12.05 | AVG |
| 7440 | 54.98 | -0.77 | 54.21 | 74.00 | -19.79 | peak |
| 7440 | 39.85 | -0.77 | 39.08 | 54.00 | -14.92 | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Remark：
(1) Measuring frequencies from 1 GHz to the 25 GHz。
(2) “F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency.
(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(4) Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak
detection at frequency above 1GHz.
(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.
(7)All modes of operation were investigated and the worst-case emissions are reported.

# 5 BAND EDGE

## 5.1 Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

## 5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

## 5.3 Test Result

**PASS**

All the test modes completed for test. The worst case of Band Edge is GFSK; the test data of this mode was reported.

Radiated Band Edge Test:

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case)

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2310.00 | 54.79 | -5.81 | 48.98 | 74 | -25.02 | peak |
| 2310.00 | / | -5.81 | / | 54 | / | AVG |
| 2390.00 | 52.63 | -5.84 | 46.79 | 74 | -27.21 | peak |
| 2390.00 | / | -5.84 | / | 54 | / | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Vertical:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2310.00 | 55.41 | -5.81 | 49.6 | 74 | -24.4 | peak |
| 2310.00 | / | -5.81 | / | 54 | / | AVG |
| 2390.00 | 53.38 | -5.84 | 47.54 | 74 | -26.46 | peak |
| 2390.00 | / | -5.84 | / | 54 | / | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case)

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2483.50 | 55.35 | -5.81 | 49.54 | 74 | -24.46 | peak |
| 2483.50 | / | -5.81 | / | 54 | / | AVG |
| 2500.00 | 52.24 | -6.06 | 46.18 | 74 | -27.82 | peak |
| 2500.00 | / | -6.06 | / | 54 | / | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

Vertical:

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2483.50 | 54.87 | -5.81 | 49.06 | 74 | -24.94 | peak |
| 2483.50 | / | -5.81 | / | 54 | / | AVG |
| 2500.00 | 52.53 | -6.06 | 46.47 | 74 | -27.53 | peak |
| 2500.00 | / | -6.06 | / | 54 | / | AVG |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |
| Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit. | | | | | | |

# 6 OCCUPIED BANDWIDTH MEASUREMENT

## 6.1 Test Setup

Same as Radiated Emission Measurement

## 6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on ANSI C63.10 section 6.9.2: RBW= 100KHz. VBW= 300 KHz, Span=2MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

## 6.3 Measurement Equipment Used

Same as Radiated Emission Measurement

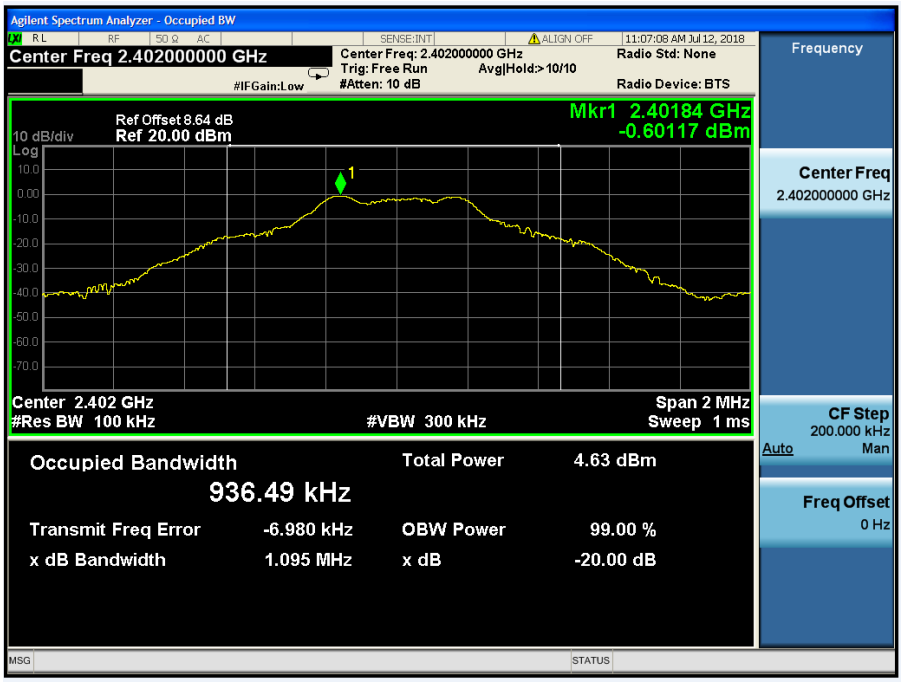
## 6.4 Test Result

**PASS**

| Test Mode | Frequency | 20dB Bandwidth (MHz) | Result |
|---|---|---|---|
| GFSK | 2402 MHz | 1.095 | **PASS** |
| | 2441 MHz | 1.098 | **PASS** |
| | 2480 MHz | 1.102 | **PASS** |
| π/4DQPSK | 2402 MHz | 1.278 | **PASS** |
| | 2441 MHz | 1.283 | **PASS** |
| | 2480 MHz | 1.267 | **PASS** |
| 8DPSK | 2402 MHz | 1.267 | **PASS** |
| | 2441 MHz | 1.275 | **PASS** |
| | 2480 MHz | 1.253 | **PASS** |

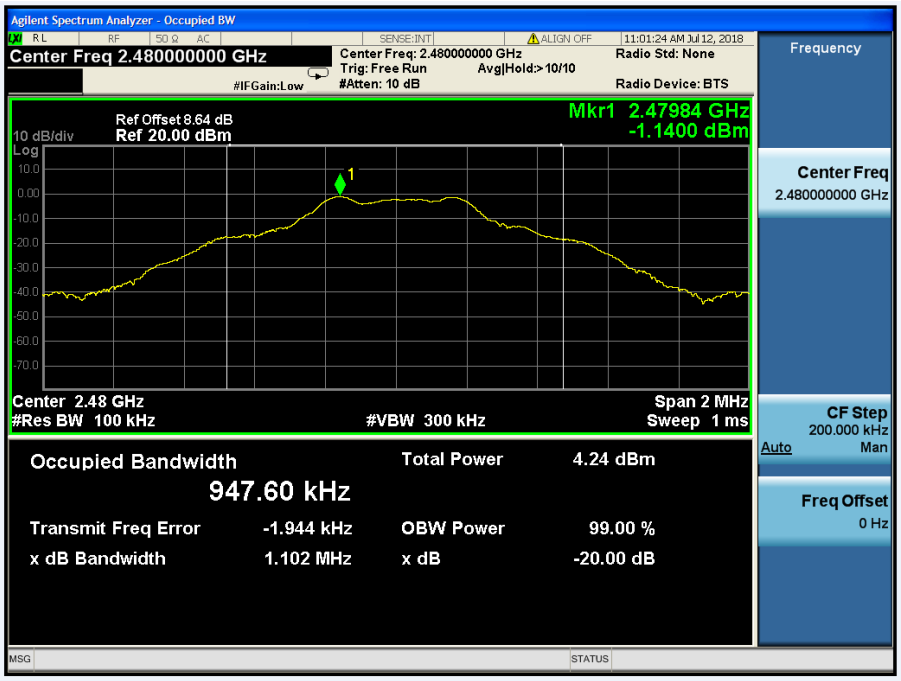
Test Mode: GFSK

CH: 2402MHz



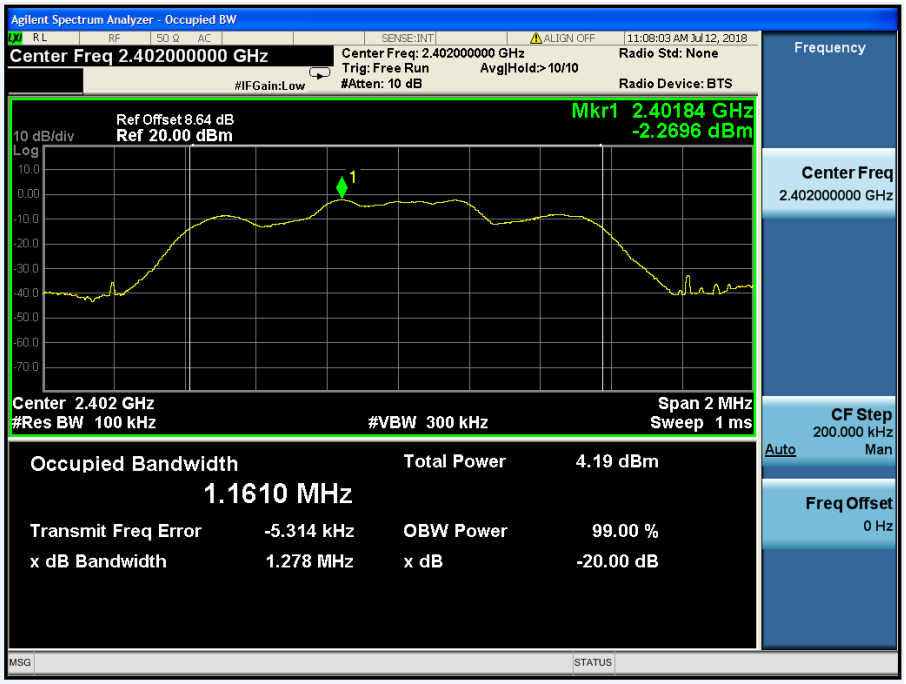

CH: 2441MHz

CH: 2480MHz

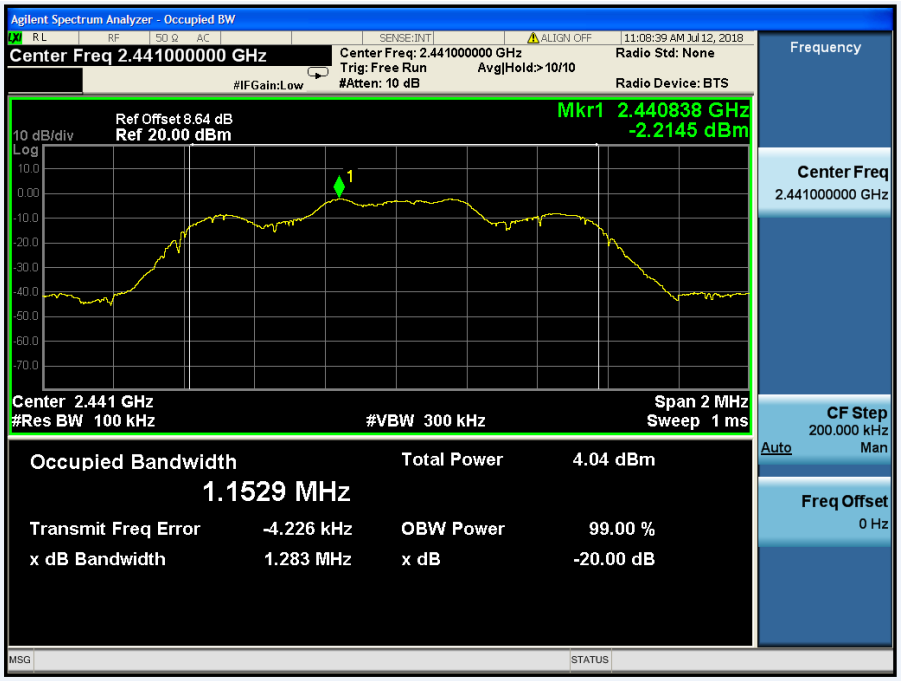



Test Mode: π /4DQPSK

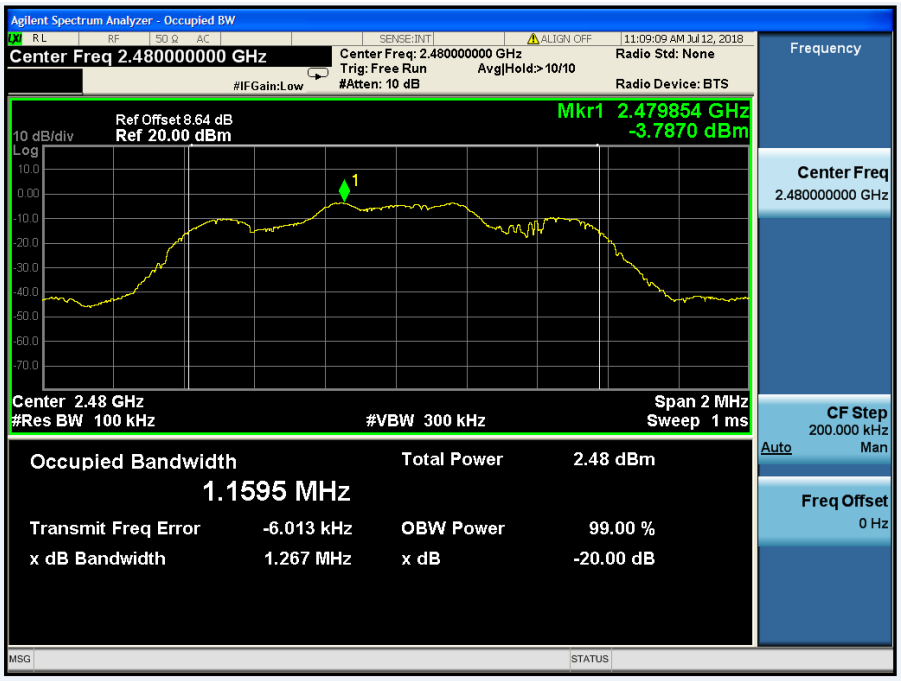
CH: 2402MHz



CH: 2441MHz

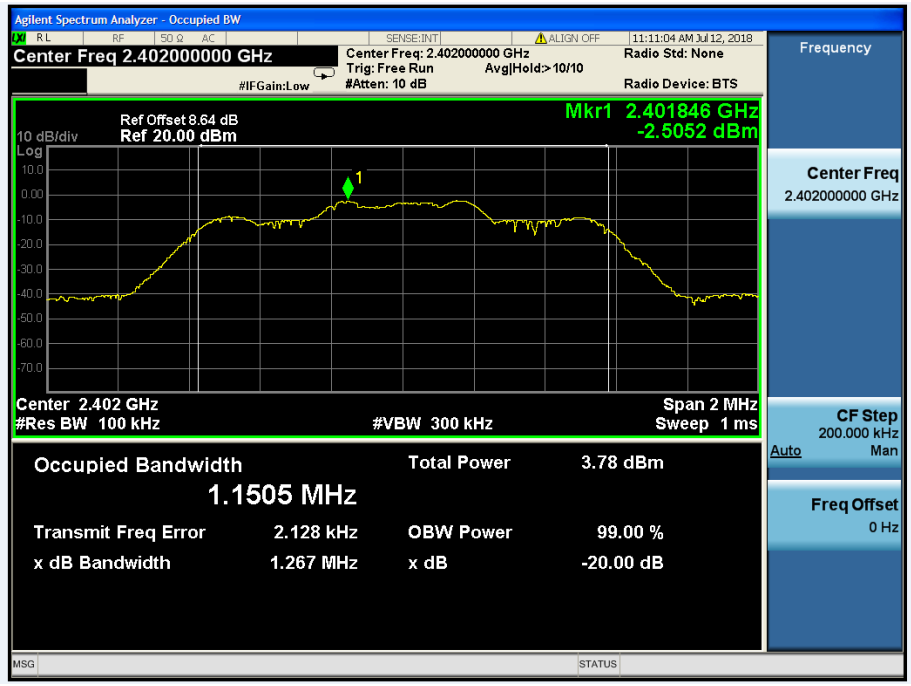



CH: 2480MHz

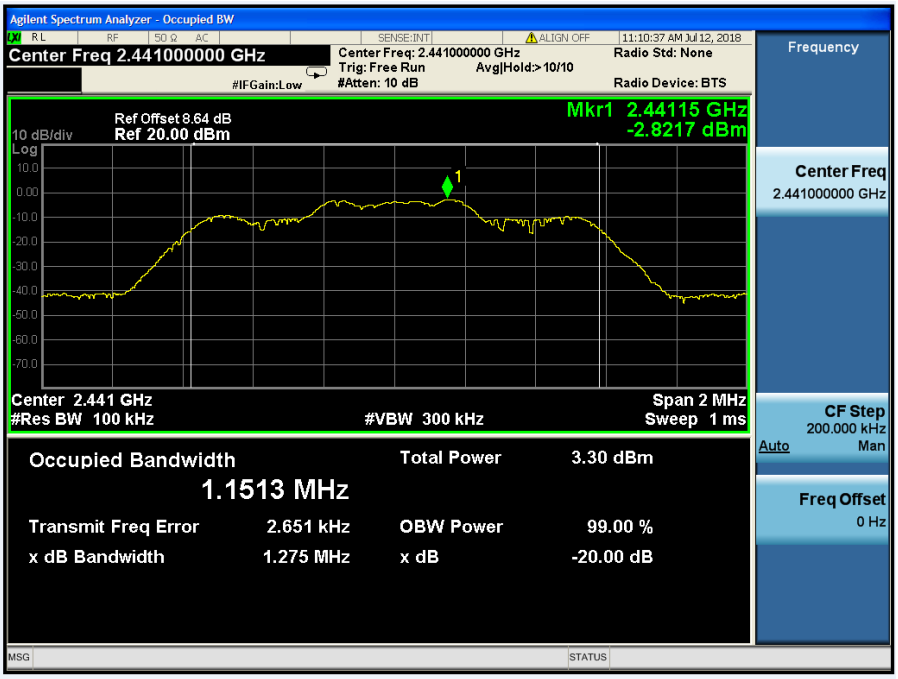


Test Mode: 8DPSK

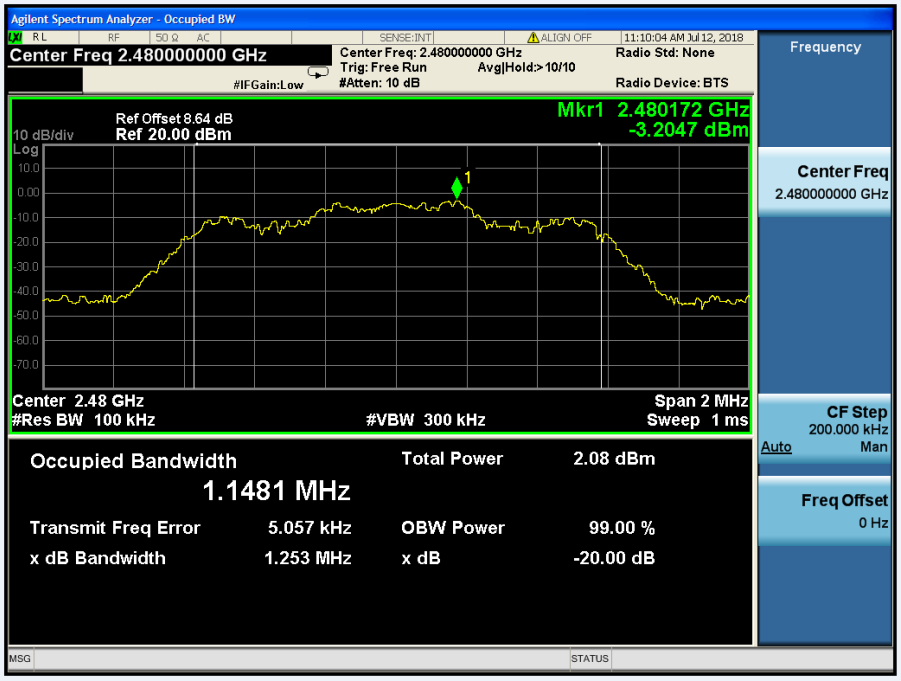
CH: 2402MHz




CH: 2441MHz



CH: 2480MHz


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
11:10:04 AM Jul 12, 2018
Frequency
Ref Offset 8.64 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.480172 GHz
-3.2047 dBm
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 2 MHz
Sweep 1 ms
Occupied Bandwidth
1.1481 MHz
Total Power 2.08 dBm
Transmit Freq Error 5.057 kHz
OBW Power 99.00 %
x dB Bandwidth 1.253 MHz
x dB -20.00 dB
Center Freq
2.480000000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

# 7 ANTENNA REQUIREMENT

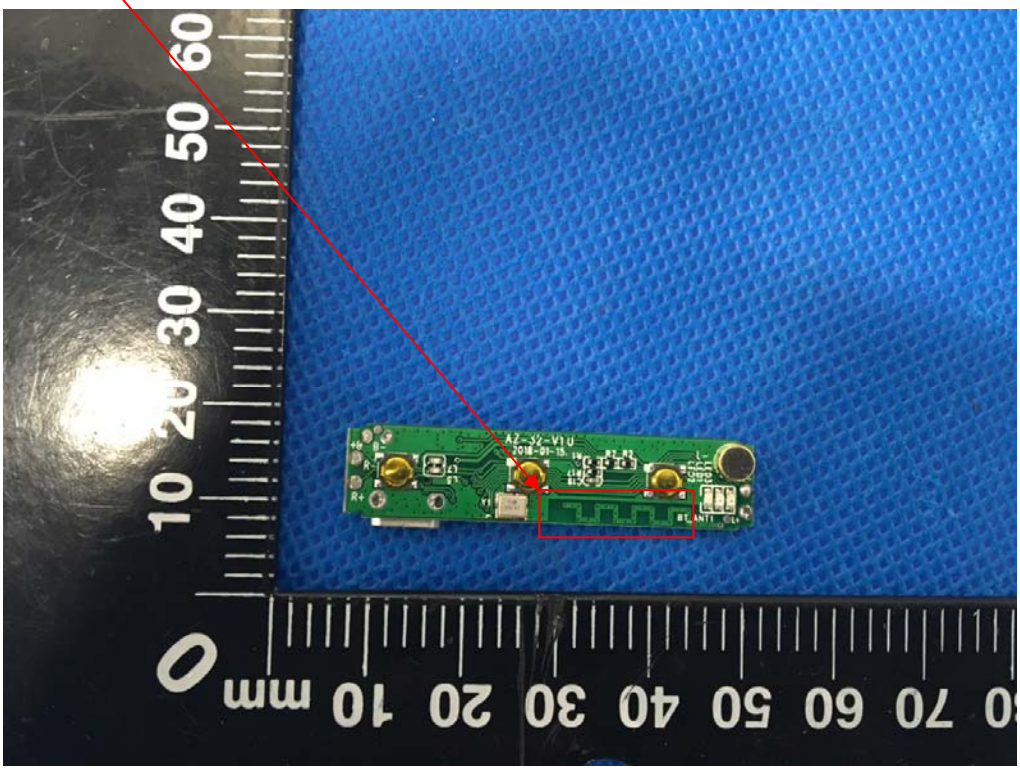
**Standard Applicable**

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. And according to FCC 47 CFR Section 15.249, 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.

**Antenna Connected Construction**

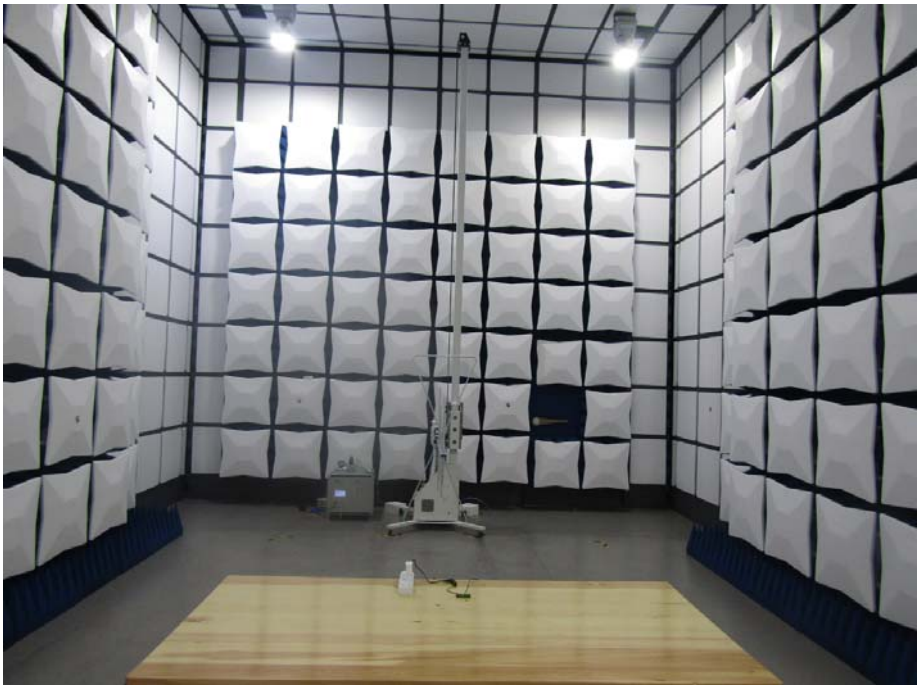
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0.5dBi.

ANTENNA



# 8 PHOTOGRAPH OF TEST

## 8.1 Radiated Emission



8.2 Conducted Emission