



FCC TEST REPORT

**Test report
On Behalf of
Shenzhen Grand Electronics Co.,ltd
For
bluetooth headset**

**Model No.: ProHT 87088, ProHT 87080, ProHT 87081,
ProHT 87082, ProHT 87083, ProHT 87084, ProHT 87085,
ProHT 87086, ProHT 87087, ProHT 87089, GBH-01, GBH-02,
GBH-03, GBH-05, GBH-06, GBH-08, GBH-09**

FCC ID: 2AHGB-PROHT87088

**Prepared for : Shenzhen Grand Electronics Co.,ltd
RM 301 , 3rd floor, Penghua industrial Park, Heping Road, Longhua district,
Shenzhen,China**

**Prepared By : Shenzhen HUAK Testing Technology Co., Ltd.
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**Date of Test: September. 25, 2016 ~ September. 29, 2016
Date of Report: September. 29, 2016
Report Number: HK1600921031-E**



TEST RESULT CERTIFICATION

Applicant's name : Shenzhen Grand Electronics Co.,ltd

Address : RM 301 , 3rd floor, Penghua industrial Park, Heping Road, Longhua district, Shenzhen,China

Manufacture's Name : Shenzhen Grand Electronics Co.,ltd

Address : RM 301 , 3rd floor, Penghua industrial Park, Heping Road, Longhua district, Shenzhen,China

Product description

Trade Mark: N/A

Product name : bluetooth headset

Model and/or type reference : ProHT 87088, ProHT 87080, ProHT 87081, ProHT 87082, ProHT 87083, ProHT 87084, ProHT 87085, ProHT 87086, ProHT 87087, ProHT 87089, GBH-01, GBH-02, GBH-03, GBH-05, GBH-06, GBH-08, GBH-09

Standards : FCC Rules and Regulations Part 15 Subpart C Section 15.249
ANSI C63.10: 2013

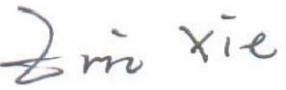
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Date of Test

Date (s) of performance of tests : **September. 25, 2016 ~ September. 29, 2016**

Date of Issue : **September. 29, 2016**

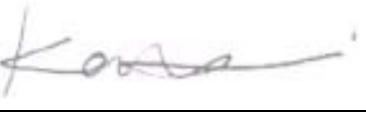
Test Result : **Pass**

Testing Engineer : 

(Eric Xie)

Technical Manager : 

(Dora Qin)

Authorized Signatory : 

(Kait Chen)



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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 : Dongguan Dongdian Testing Service Co., Ltd
Certificated by FCC, Registration No.: 270092
Address : No.17 Zongbu road 2, Songshan Lake Sci&Tech Park, DongGuan
City, Guangdong province,523808 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 headset |
| Model Name | ProHT 87088 |
| Serial Model | ProHT 87080, ProHT 87081, ProHT 87082, ProHT 87083, ProHT 87084, ProHT 87085, ProHT 87086, ProHT 87087, ProHT 87089, GBH-01, GBH-02, GBH-03, GBH-05, GBH-06, GBH-08, GBH-09 |
| Model Difference | All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: ProHT 87088. |
| FCC ID | 2AHGB-PROHT87088 |
| Antenna Type | PCB Antenna |
| Antenna Gain | 1.2 dBi |
| BT Operation frequency | 2402-2480MHz |
| Number of Channels | 79CH |
| Modulation Type | GFSK |
| Power Source | DC Voltage |
| Power Rating | DC 3.7V for battery or DC 5V form Adapter |



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**

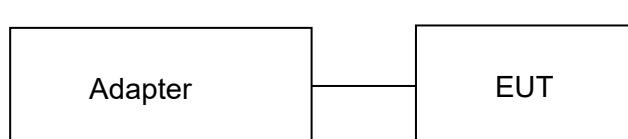
Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

2.3 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing:



Operation of EUT during radiation testing:





2.4 MEASUREMENT INSTRUMENTS LIST

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|----------------------------------|----------------------|----------------|---------------|---------------|---------------|
| 1. | EMI Receiver | Rohde & Schwarz | ESCI | 100627 | Feb. 19, 2016 | 1 Year |
| 2. | LISN | SchwarzBeck | NSLK 8126 | 8126377 | Feb. 19, 2016 | 1 Year |
| 3. | RF Switching Unit | Compliance Direction | RSU-M2 | 38303 | Feb. 19, 2016 | 1 Year |
| 4. | EMI Test Software ES-K1 | Rohde & Schwarz | N/A | N/A | N/A | N/A |
| 5. | EMI Test Receiver | Rohde & Schwarz | ESCI | 100627 | Feb. 19, 2016 | 1 Year |
| 6. | Trilog Broadband Antenna | Schwarzbeck | VULB9163 | VULB 9163-289 | Feb. 19, 2016 | 1 Year |
| 7. | Pre-amplifier | Compliance Direction | PAP-0203 | 22008 | Feb. 19, 2016 | 1 Year |
| 8. | EMI Test Software EZ-EMC | SHURPLE | N/A | N/A | N/A | N/A |
| 9. | EMI Receiver | Rohde & Schwarz | ESCI | 100627 | Feb. 19, 2016 | 1 Year |
| 10. | LISN | SchwarzBeck | NSLK 8126 | 8126377 | Feb. 19, 2016 | 1 Year |
| 11. | RF Switching Unit | Compliance Direction | RSU-M2 | 38303 | Feb. 19, 2016 | 1 Year |
| 12. | EMI Test Software ES-K1 | Rohde & Schwarz | N/A | N/A | N/A | N/A |
| 13. | EMI Receiver | Rohde & Schwarz | ESCI | 100627 | Feb. 19, 2016 | 1 Year |
| 14. | EMI Receiver | Rohde & Schwarz | ESCI | 100627 | Feb. 19, 2016 | 1 Year |
| 15. | LISN | SchwarzBeck | NSLK 8126 | 8126377 | Feb. 19, 2016 | 1 Year |
| 16. | RF Switching Unit | Compliance Direction | RSU-M2 | 38303 | Feb. 19, 2016 | 1 Year |
| 17. | EMI Test Software ES-K1 | Rohde & Schwarz | N/A | N/A | N/A | N/A |
| 18. | Power Meter | R&S | NRVD | SEL0069 | Feb. 19, 2016 | 1 Year |
| 19. | Power Sensor | R&S | URV5-Z2 | SEL0071 | Feb. 19, 2016 | 1 Year |
| 20. | Power Sensor | R&S | URV5-Z2 | SEL0072 | Feb. 19, 2016 | 1 Year |
| 21. | Software EMC32 | R&S | EMC32-S | SEL0082 | N/A | N/A |
| 22. | Log-periodic Antenna | Amplifier Reasearch | AProHT 8708880 | SEL0073 | N/A | N/A |
| 23. | Antenna Tripod | Amplifier Reasearch | TP1000A | SEL0074 | N/A | N/A |
| 24. | High Gain Horn Antenna(0.8-5GHz) | Amplifier Reasearch | AT4002A | SEL0075 | N/A | N/A |
| 25. | Spectrum analyzer | Agilent | N9020A | MY499110 048 | Feb. 19, 2016 | 1 Year |
| 26. | Spectrum analyzer | Agilent | E4407B | MY461843 26 | Feb. 19, 2016 | 1 Year |

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

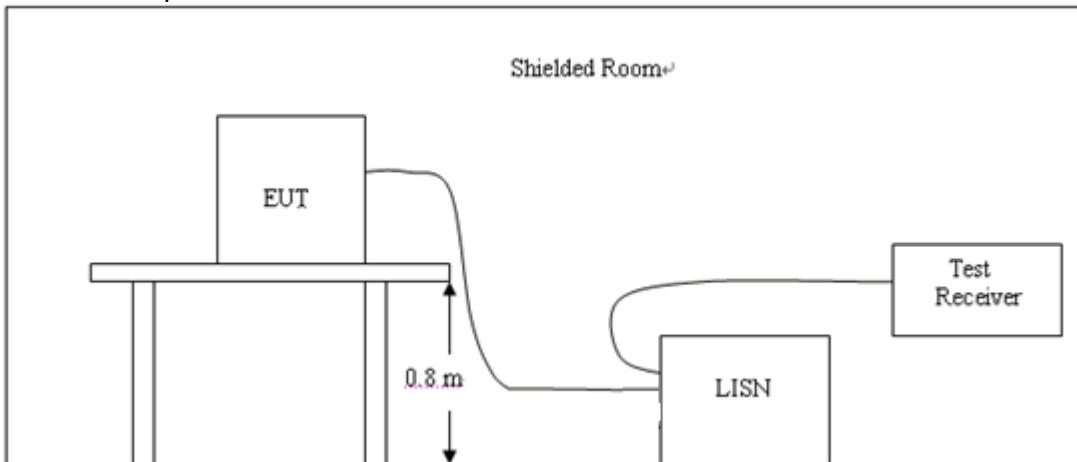
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

| Frequency (MHz) | Maximum RF Line Voltage (dB μ V) | | | |
|--------------------|--------------------------------------|------|---------|--------|
| | 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



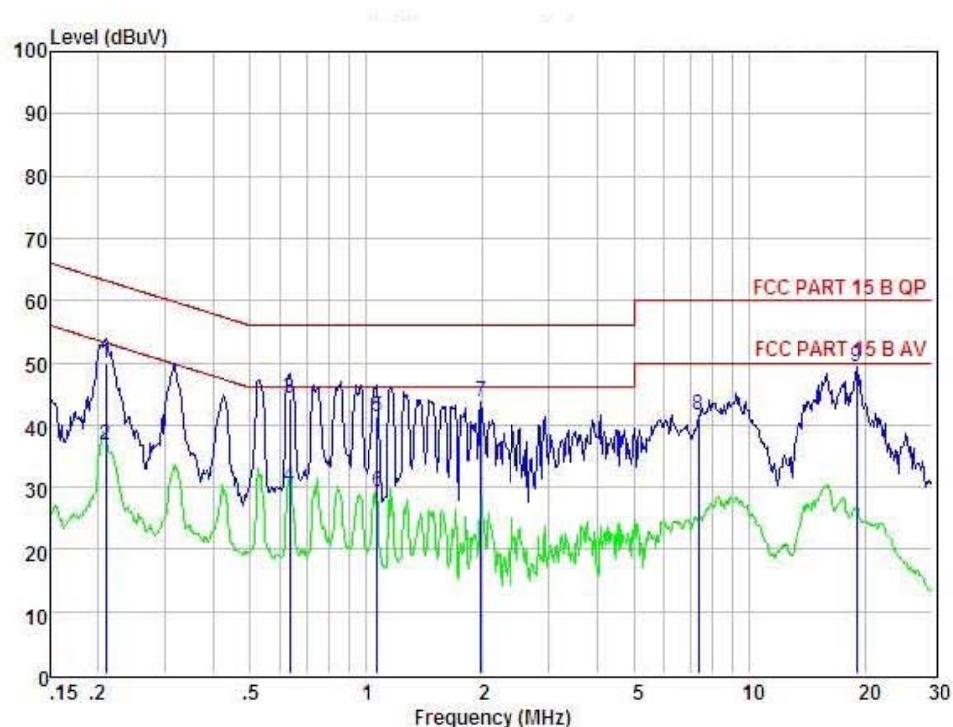
3.3 Test Procedure

- 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 0.8 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

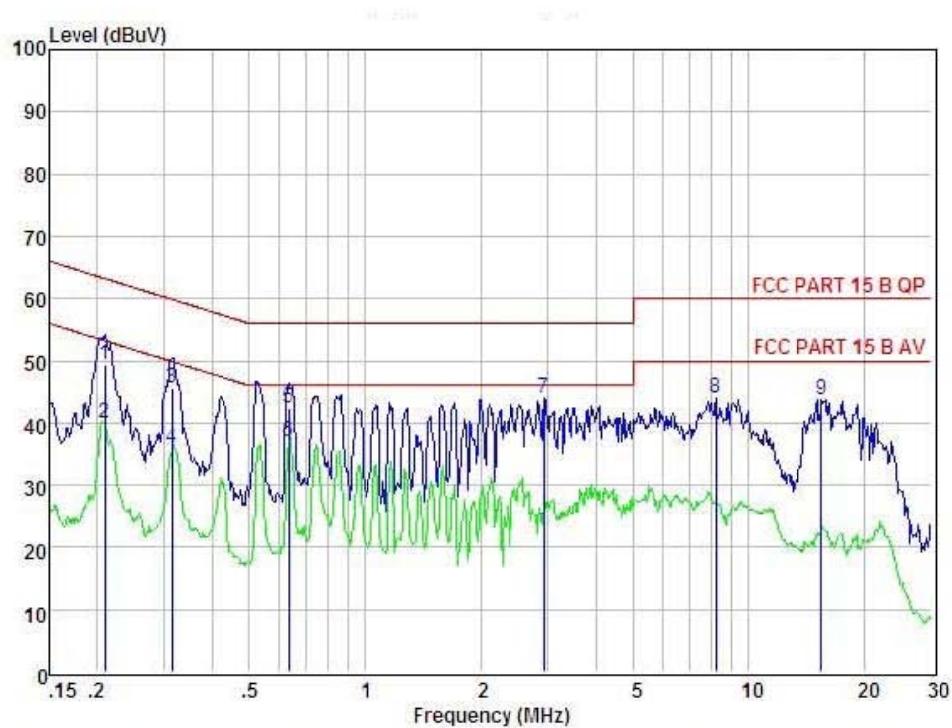
PASS

All the test modes completed for test. The worst case of Conducted Emission is CH 2402; the test data of this mode was reported.



| Condition : FCC PART 15 B QP | | | | POL: LINE | | Temp: 24 °C | Hum: 56 % | | |
|------------------------------|--------|------------|-------------|---------------|------------|-------------|-----------|--------|---------|
| Item | Freq | Read Level | LISN Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 0.211 | 40.13 | 0.03 | -9.52 | 0.10 | 49.78 | 63.18 | -13.40 | QP |
| 2 | 0.211 | 27.12 | 0.03 | -9.52 | 0.10 | 36.77 | 53.18 | -16.41 | Average |
| 3 | 0.634 | 34.40 | 0.03 | -9.59 | 0.10 | 44.12 | 56.00 | -11.88 | QP |
| 4 | 0.634 | 20.33 | 0.03 | -9.59 | 0.10 | 30.05 | 46.00 | -15.95 | Average |
| 5 | 1.071 | 31.56 | 0.04 | -9.64 | 0.10 | 41.34 | 56.00 | -14.66 | QP |
| 6 | 1.071 | 19.32 | 0.04 | -9.64 | 0.10 | 29.10 | 46.00 | -16.90 | Average |
| 7 | 1.991 | 33.73 | 0.06 | -9.72 | 0.10 | 43.61 | 56.00 | -12.39 | Peak |
| 8 | 7.368 | 31.34 | 0.13 | -9.96 | 0.15 | 41.58 | 60.00 | -18.42 | Peak |
| 9 | 19.021 | 38.76 | 0.30 | -9.81 | 0.33 | 49.20 | 60.00 | -10.80 | Peak |

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



| Condition : FCC PART 15 B QP | | | | POL: NEUTRAL | | Temp: 24 °C | Hum: 56 % | | |
|------------------------------|--------|------------|-------------|---------------|------------|-------------|-----------|--------|---------|
| Item | Freq | Read Level | LISN Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 0.211 | 39.58 | 0.03 | -9.52 | 0.10 | 49.23 | 63.18 | -13.95 | QP |
| 2 | 0.211 | 30.32 | 0.03 | -9.52 | 0.10 | 39.97 | 53.18 | -13.21 | Average |
| 3 | 0.313 | 35.77 | 0.03 | -9.56 | 0.10 | 45.46 | 59.88 | -14.42 | QP |
| 4 | 0.313 | 26.16 | 0.03 | -9.56 | 0.10 | 35.85 | 49.88 | -14.03 | Average |
| 5 | 0.634 | 32.57 | 0.03 | -9.59 | 0.10 | 42.29 | 56.00 | -13.71 | QP |
| 6 | 0.634 | 27.24 | 0.03 | -9.59 | 0.10 | 36.96 | 46.00 | -9.04 | Average |
| 7 | 2.931 | 34.05 | 0.07 | -9.79 | 0.12 | 44.03 | 56.00 | -11.97 | Peak |
| 8 | 8.235 | 33.67 | 0.14 | -9.96 | 0.16 | 43.93 | 60.00 | -16.07 | Peak |
| 9 | 15.552 | 33.39 | 0.25 | -9.84 | 0.25 | 43.73 | 60.00 | -16.27 | Peak |

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

4 RADIATED EMISSION TEST

4.1 Radiation Limit

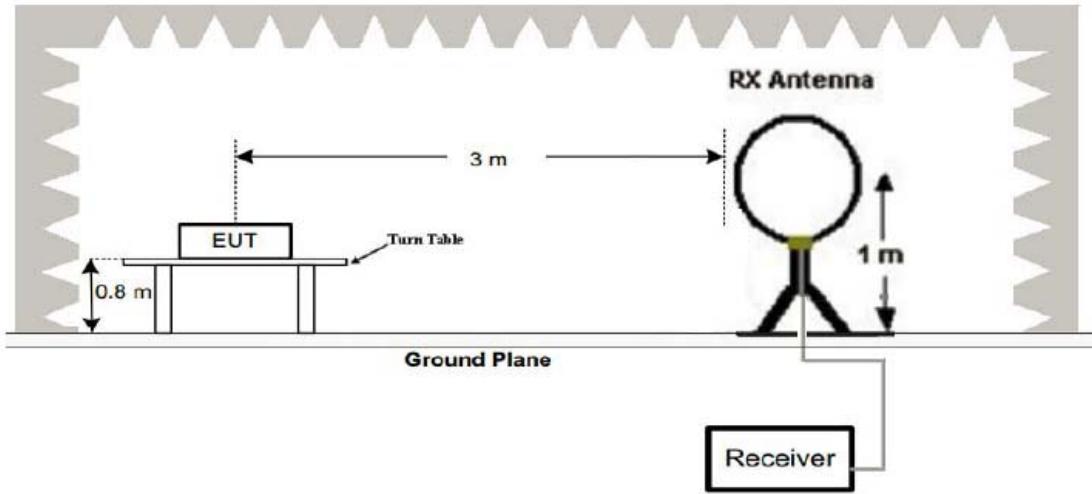
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency (MHz) | Distance (Meters) | Radiated (dB μ V/m) | Radiated (μ V/m) |
|-----------------|-------------------|-------------------------|-----------------------|
| 30-88 | 3 | 40 | 100 |
| 88-216 | 3 | 43.5 | 150 |
| 216-960 | 3 | 46 | 200 |
| Above 960 | 3 | 54 | 500 |

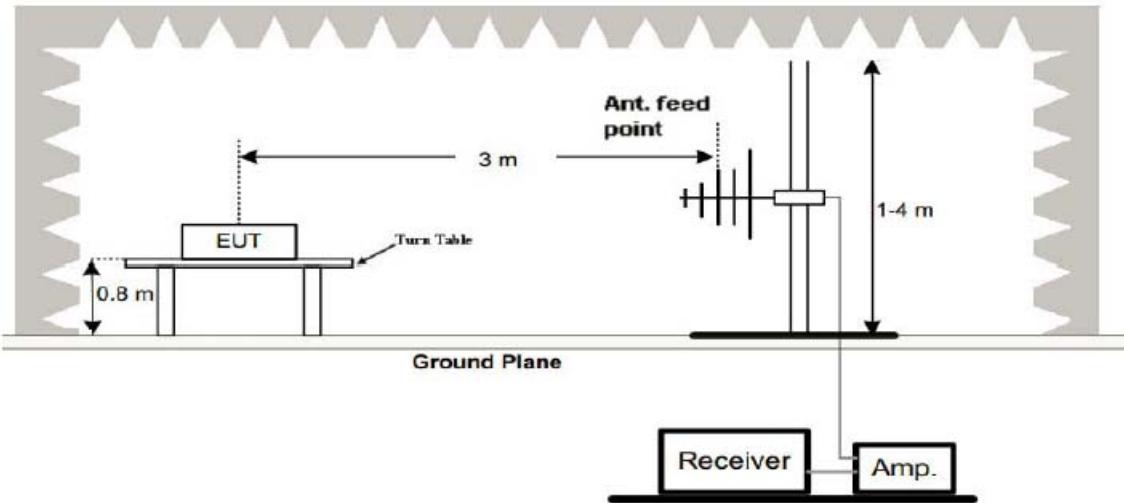
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

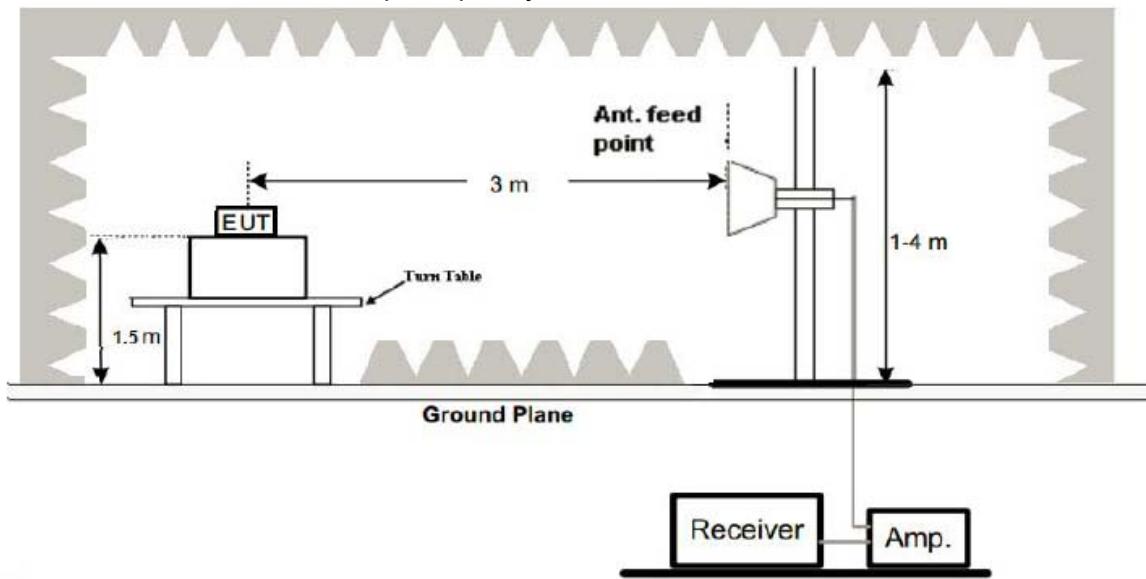
(1) Radiated Emission Test-Up Frequency Below 30MHz



(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

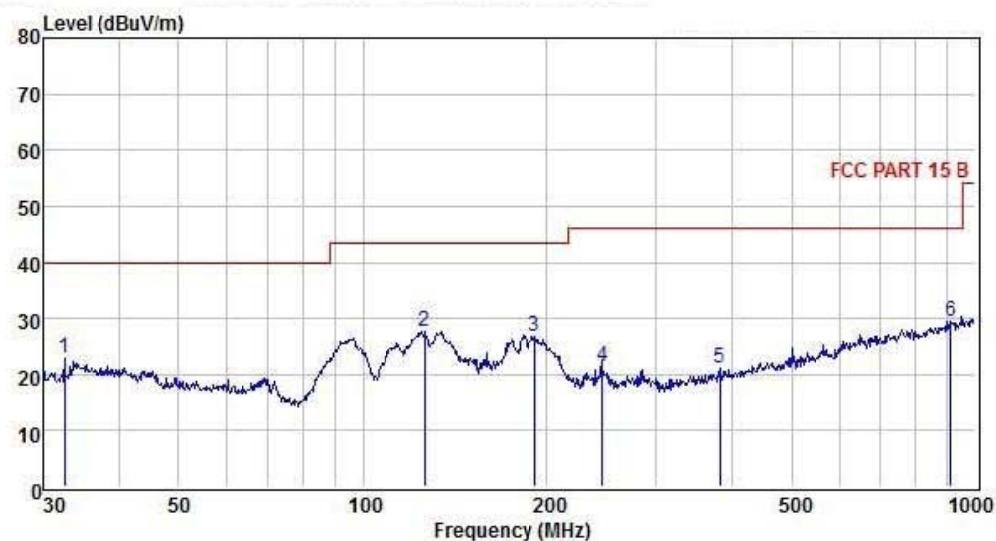
PASS

All the test modes completed for test. The worst case of Radiated Emission is CH 2402; the test data of this mode was reported.



Below 1GHz Test Results:

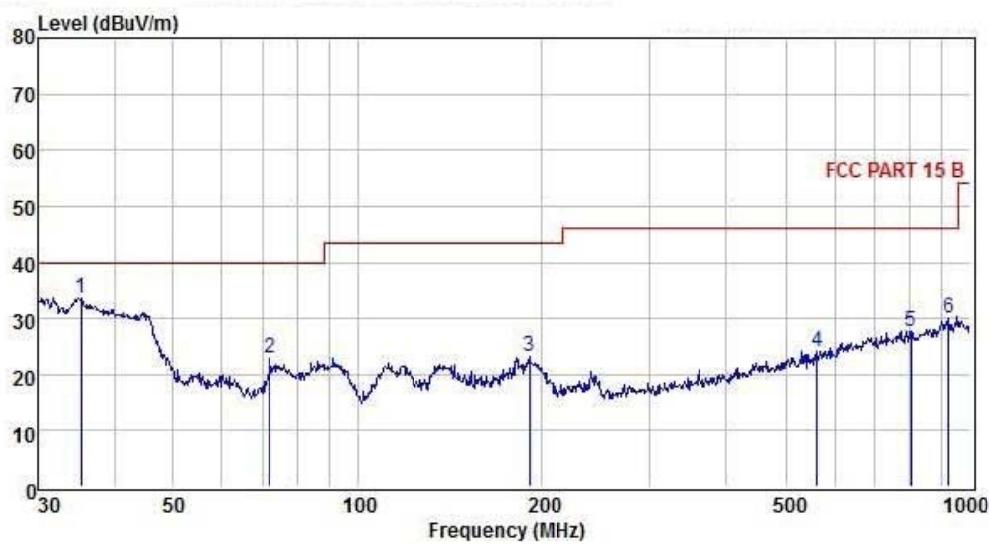
Antenna polarity: H



| Item | Freq MHz | Condition : FCC PART 15 B | | POL: HORIZONTAL | | Limit dBuV | Margin dBuV | Remark |
|------|-------------|---------------------------|-------------------------|------------------------|---------------------|---------------|----------------|-------------|
| | | Read Level dBuV | Antenna Factor dB | Preamp Factor dB | Cable Loss dB | | | |
| 1 | 32.52 | 9.62 | 13.28 | 0.00 | 0.11 | 23.01 | 40.00 | -16.99 Peak |
| 2 | 125.89 | 14.84 | 12.46 | 0.00 | 0.35 | 27.65 | 43.50 | -15.85 Peak |
| 3 | 190.41 | 15.87 | 10.47 | 0.00 | 0.46 | 26.80 | 43.50 | -16.70 Peak |
| 4 | 245.95 | 9.20 | 11.52 | 0.00 | 0.72 | 21.44 | 46.00 | -24.56 Peak |
| 5 | 382.59 | 5.73 | 14.45 | 0.00 | 0.92 | 21.10 | 46.00 | -24.90 Peak |
| 6 | 912.86 | 6.06 | 21.82 | 0.00 | 1.62 | 29.50 | 46.00 | -16.50 Peak |

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

Antenna polarity: V



Condition : FCC PART 15 B

POL: VERTICAL

| Item | Freq MHz | Read Level dBuV | Antenna Factor dB | Preamp Factor dB | Cable Loss dB | Level dBuV | Limit dBuV | Margin dBuV | Remark |
|------|-------------|-----------------------|-------------------------|------------------------|---------------------|---------------|---------------|----------------|--------|
| 1 | 35.25 | 20.15 | 13.39 | 0.00 | 0.13 | 33.67 | 40.00 | -6.33 | Peak |
| 2 | 71.83 | 12.23 | 10.51 | 0.00 | 0.19 | 22.93 | 40.00 | -17.07 | Peak |
| 3 | 190.41 | 12.25 | 10.47 | 0.00 | 0.46 | 23.18 | 43.50 | -20.32 | Peak |
| 4 | 562.66 | 5.28 | 17.60 | 0.00 | 1.34 | 24.22 | 46.00 | -21.78 | Peak |
| 5 | 801.79 | 5.46 | 20.71 | 0.00 | 1.60 | 27.77 | 46.00 | -18.23 | Peak |
| 6 | 922.52 | 6.61 | 21.94 | 0.00 | 1.43 | 29.98 | 46.00 | -16.02 | Peak |

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

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 | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|-----------|---------------|--------|----------------|----------------|--------|---------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | |
| 2402 | 112.21 | -5.84 | 106.37 | 114 | -7.63 | peak |
| 2402 | 86.70 | -5.84 | 80.86 | 94 | -13.14 | AVG |
| 4804 | 59.06 | -3.64 | 55.42 | 74 | -18.58 | peak |
| 4804 | 43.38 | -3.64 | 39.74 | 54 | -14.26 | AVG |
| 7206 | 54.21 | -0.95 | 53.26 | 74 | -20.74 | peak |
| 7206 | 39.76 | -0.95 | 38.81 | 54 | -15.19 | AVG |
| --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|-----------|---------------|--------|----------------|----------------|--------|---------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | |
| 2402 | 110.19 | -5.84 | 104.35 | 114 | -9.65 | peak |
| 2402 | 85.35 | -5.84 | 79.51 | 94 | -14.49 | AVG |
| 4804 | 56.97 | -3.64 | 53.33 | 74 | -20.67 | peak |
| 4804 | 42.30 | -3.64 | 38.66 | 54 | -15.34 | AVG |
| 7206 | 53.02 | -0.95 | 52.07 | 74 | -21.93 | peak |
| 7206 | 38.66 | -0.95 | 37.71 | 54 | -16.29 | AVG |
| --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



CH Middle (2441MHz)

Horizontal:

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Margin (dB) | Detector Type |
|--------------------|-------------------------------|----------------|-------------------------------------|--------------------------|----------------|---------------|
| 2441 | 111.14 | -5.71 | 105.43 | 114 | -8.57 | peak |
| 2441 | 85.45 | -5.71 | 79.74 | 94 | -14.26 | AVG |
| 4882 | 58.05 | -3.51 | 54.54 | 74 | -19.46 | peak |
| 4882 | 42.58 | -3.51 | 39.07 | 54 | -14.93 | AVG |
| 7323 | 52.14 | -0.82 | 51.32 | 74 | -22.68 | peak |
| 7323 | 37.77 | -0.82 | 36.95 | 54 | -17.05 | AVG |
| --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Margin (dB) | Detector Type |
|--------------------|-------------------------------|----------------|-------------------------------------|--------------------------|----------------|---------------|
| 2441 | 108.89 | -5.71 | 103.18 | 114 | -10.82 | peak |
| 2441 | 83.80 | -5.71 | 78.09 | 94 | -15.91 | AVG |
| 4882 | 56.25 | -3.51 | 52.74 | 74 | -21.26 | peak |
| 4882 | 40.78 | -3.51 | 37.27 | 54 | -16.73 | AVG |
| 7323 | 51.54 | -0.82 | 50.72 | 74 | -23.28 | peak |
| 7323 | 36.40 | -0.82 | 35.58 | 54 | -18.42 | AVG |
| --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



CH High (2480MHz)

Horizontal:

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|-----------|---------------|--------|----------------|----------------|--------|---------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | |
| 2480 | 109.40 | -5.65 | 103.75 | 114 | -10.25 | peak |
| 2480 | 83.81 | -5.65 | 78.16 | 94 | -15.84 | AVG |
| 4960 | 56.50 | -3.43 | 53.07 | 74 | -20.93 | peak |
| 4960 | 42.16 | -3.43 | 38.73 | 54 | -15.27 | AVG |
| 7440 | 51.44 | -0.75 | 50.69 | 74 | -23.31 | peak |
| 7440 | 36.26 | -0.75 | 35.51 | 54 | -18.49 | AVG |
| --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|-----------|---------------|--------|----------------|----------------|--------|---------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | |
| 2480 | 106.97 | -5.65 | 101.32 | 114 | -12.68 | peak |
| 2480 | 81.18 | -5.65 | 75.53 | 94 | -18.47 | AVG |
| 4960 | 57.28 | -3.43 | 53.85 | 74 | -20.15 | peak |
| 4960 | 41.90 | -3.43 | 38.47 | 54 | -15.53 | AVG |
| 7440 | 51.01 | -0.75 | 50.26 | 74 | -23.74 | peak |
| 7440 | 36.59 | -0.75 | 35.84 | 54 | -18.16 | 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.
- (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 73.16dB μ V/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dB μ V/m(PK Value) <54 dB μ V/m(AV Limit), the Average Detected not need to completed.



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

Radiated Band Edge Test:

Operation Mode: TX CH Low (2402MHz)

Horizontal

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|-----------|---------------|--------|----------------|----------------|--------|---------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | |
| 2390 | 52.25 | -5.81 | 46.44 | 74 | -27.56 | peak |
| 2390 | / | -5.81 | / | 54 | / | AVG |
| 2400 | 58.00 | -5.84 | 52.16 | 74 | -21.84 | peak |
| 2400 | / | -5.84 | / | 54 | / | AVG |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|-----------|---------------|--------|----------------|----------------|--------|---------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | |
| 2390 | 51.15 | -5.81 | 45.34 | 74 | -28.66 | peak |
| 2390 | / | -5.81 | / | 54 | / | AVG |
| 2400 | 57.41 | -5.84 | 51.57 | 74 | -22.43 | peak |
| 2400 | / | -5.84 | / | 54 | / | AVG |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2480MHz)
Horizontal

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Margin (dB) | Detector Type |
|--------------------|-------------------------------|----------------|-------------------------------------|--------------------------|----------------|---------------|
| 2483.5 | 52.62 | -5.65 | 46.97 | 74 | -27.03 | peak |
| 2483.5 | / | -5.65 | / | 54 | / | AVG |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Margin (dB) | Detector Type |
|--------------------|-------------------------------|----------------|-------------------------------------|--------------------------|----------------|---------------|
| 2483.5 | 51.40 | -5.65 | 45.75 | 74 | -28.25 | peak |
| 2483.5 | / | -5.65 | / | 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 FCC Part15 C Section 15.249(a): RBW= 30KHz. VBW= 100 KHz, Span=3MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

6.3 Measurement Equipment Used

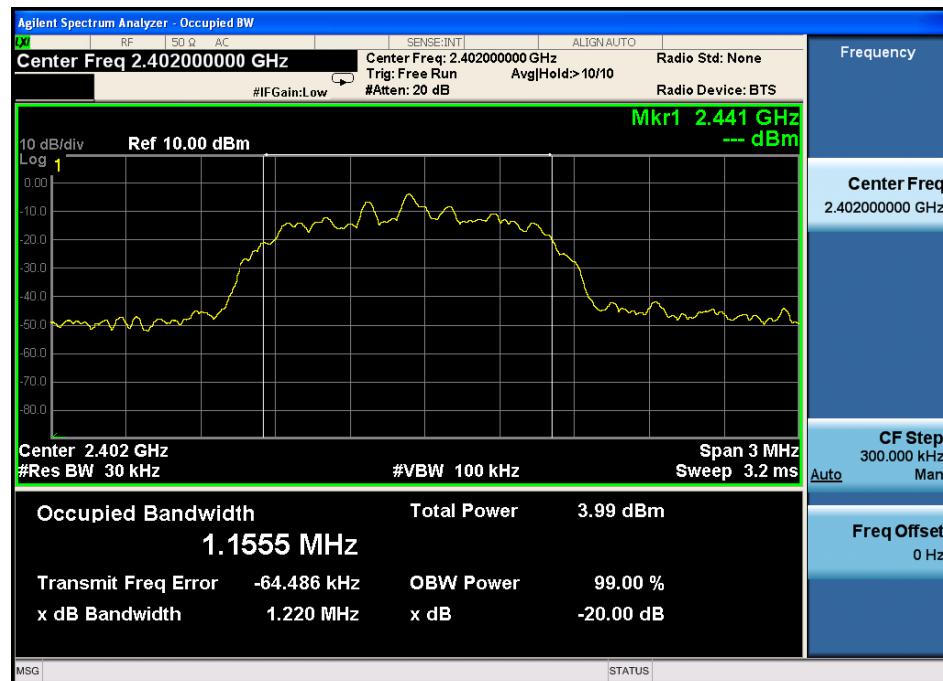
Same as Radiated Emission Measurement

6.4 Test Result

PASS

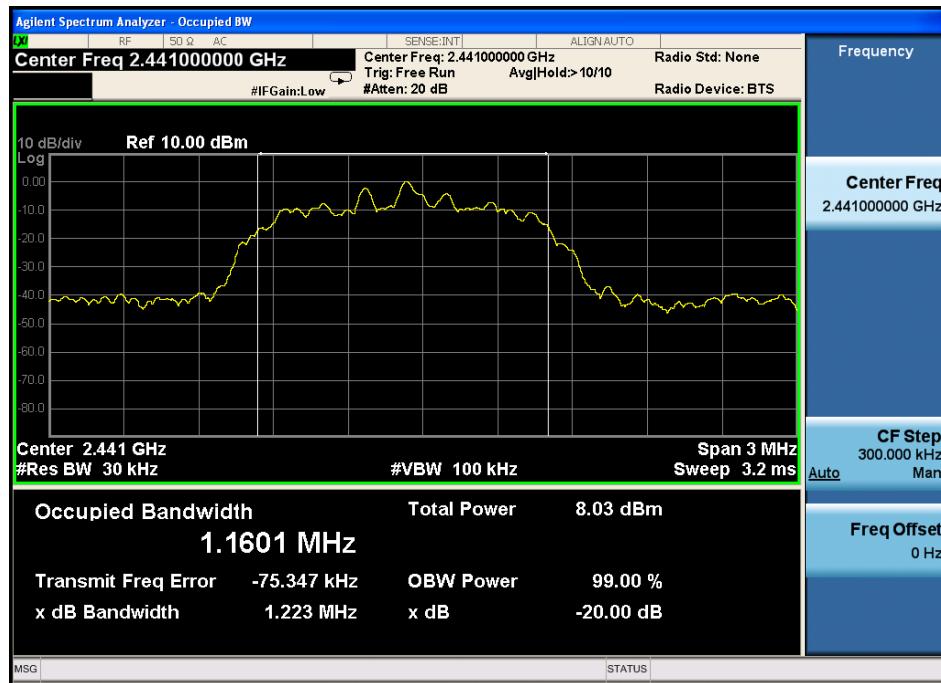
| Frequency | 20dB Bandwidth (MHz) | Result |
|-----------|----------------------|-------------|
| 2402 MHz | 1.220 | PASS |
| 2441 MHz | 1.223 | PASS |
| 2480 MHz | 1.222 | PASS |

CH: 2402MHz

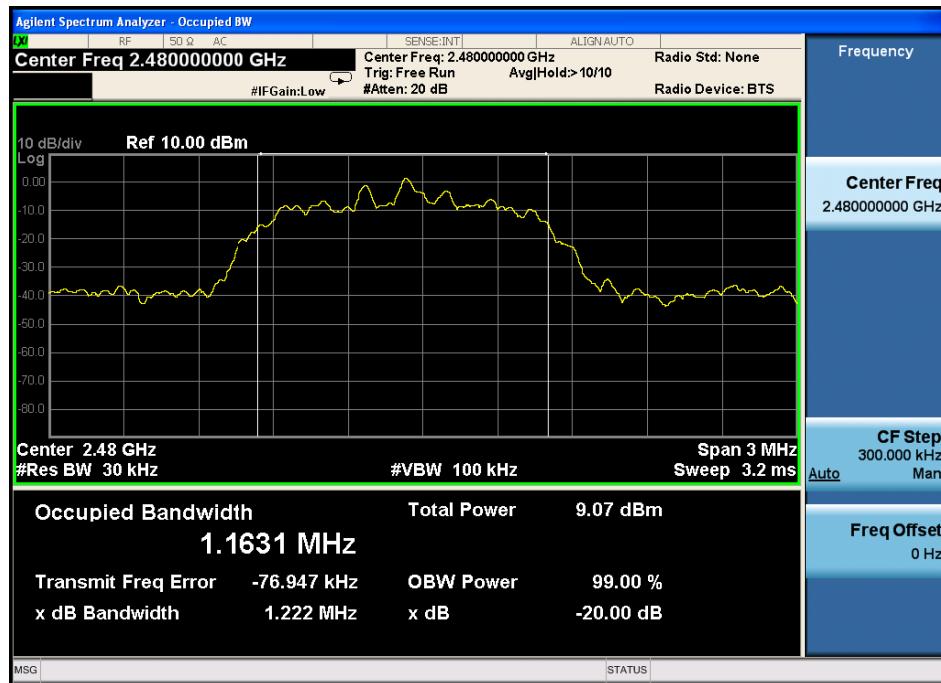




CH: 2441MHz



CH: 2480MHz





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.

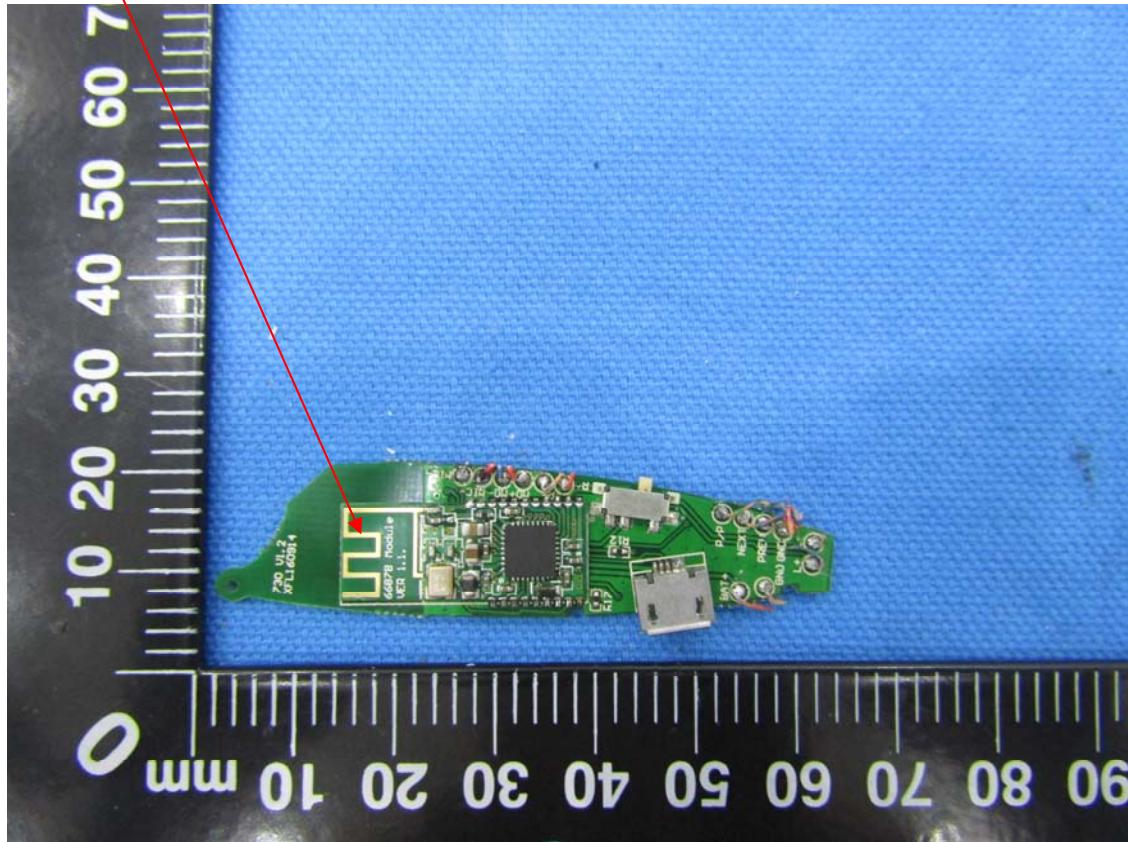
Refer to statement below for compliance.

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

Antenna Connected Construction

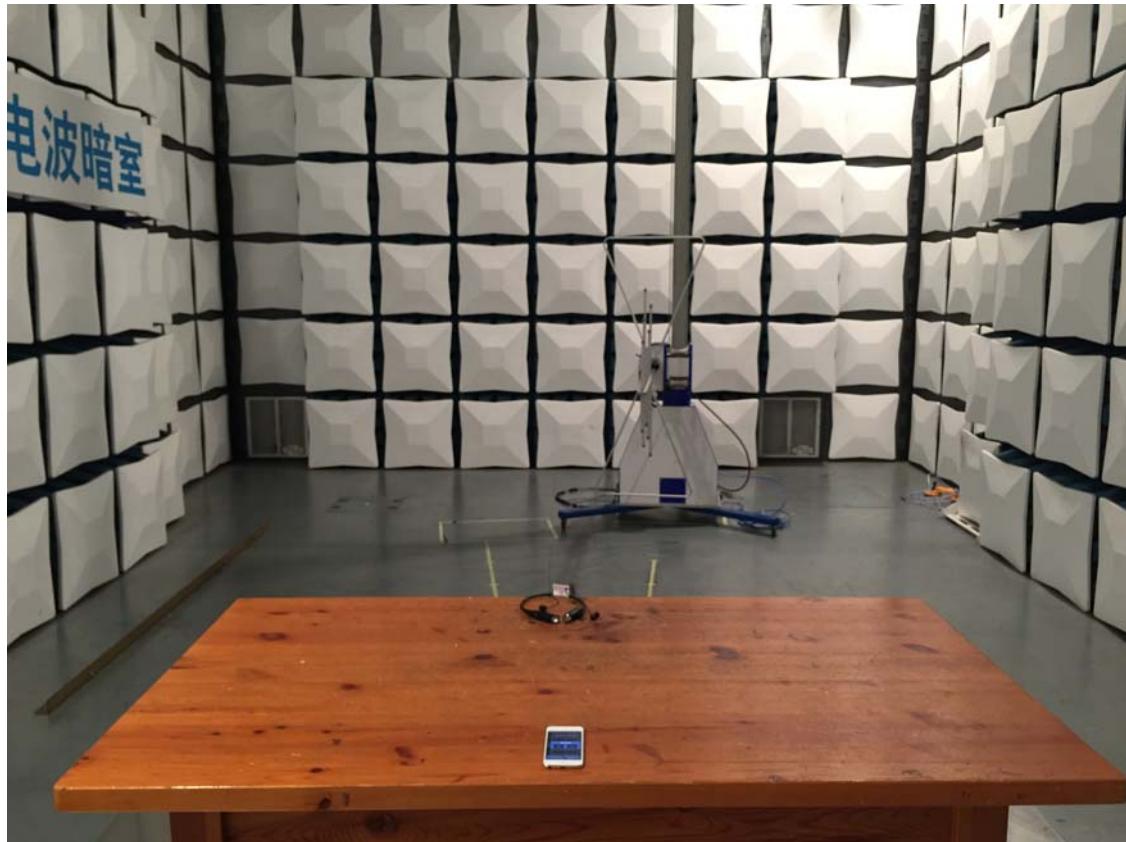
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 1.2dBi.

ANTENNA



8 PHOTOGRAPH OF TEST

8.1 Radiated Emission



8.2 Conducted Emission

