

# **FCC TEST REPORT**

## **FCC ID: B4OCC264BPA-S**

Product : Bluetooth LE Module

Model Name : CC264BPA-S, CC265BPA-S, CC26xBPA

Brand : GT-tronics

Report No. : PTC801181160622E-FC01

### **Prepared for**

GT-tronics HK Ltd  
Unit 10, 2/F., Block B, Tonic Industrial Center 19 Lam Hing Street,  
Kowloon Bay, Hong Kong

### **Prepared by**

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Dongcheng District, Dongguan, Guangdong, China

## TEST RESULT CERTIFICATION

Applicant's name : GT-tronics HK Ltd

Address : Unit10,2/F.,Block B,Tonic Industrial Center 19 Lam Hing Street, Kowloon Bay, Hong Kong

Manufacture's name : GT-tronics HK Limited

Address : B210, Tonic Industrial Center, 19 Lam Hing Street, Kowloon Bay, Hong Kong.

Product name : Bluetooth LE Module

Model name : CC264BPA-S, CC265BPA-S, CC26xBPA

Standards : FCC CFR47 Part 15 Section 15.247

Test procedure : ANSI C63.10:2013, KDB 558074 D01 DTS MEAS GUIDANCE V03R05

Test Date : Jun.22, 2016 ~ Jul.04, 2016

Date of Issue : Jul.05, 2016

Test Result : Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Testing Engineer

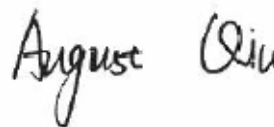
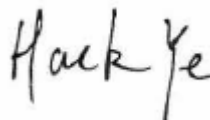
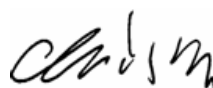
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Authorized Signatory

Chris Du



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## 2 Test Summary

| Test Items                     | Test Requirement                 | Result |
|--------------------------------|----------------------------------|--------|
| Conduct Emission               | 15.207                           | N/A    |
| Radiated Spurious Emissions    | 15.205(a)<br>15.209<br>15.247(d) | PASS   |
| Conducted Spurious Emission    | 15.247(d)                        | PASS   |
| Band edge                      | 15.247(d)<br>15.205(a)           | PASS   |
| 6dB Bandwidth                  | 15.247(a)(2)                     | PASS   |
| Maximum Peak Output Power      | 15.247(b)(1)                     | PASS   |
| Power Spectral Density         | 15.247(e)                        | PASS   |
| Antenna Requirement            | 15.203                           | PASS   |
| Remark:<br>N/A: Not Applicable |                                  |        |

### **3 General Information**

#### **3.1 General Description of E.U.T**

Product Name : Bluetooth LE Module

Model Name : CC264BPA-S, CC265BPA-S, CC26xBPA

Model Description : Only the model names are different

Bluetooth Version: : BLE4.2

Frequency Range: : 2402-2480MHz, 40 channels

Antenna installation: : PCB Print Antenna

Antenna Gain: : -0.30dBi

Type of Modulation : GFSK

The lowest oscillator: : 32.768kHz

Power supply : DC 3V power by battery



### 3.2 Channel List

| BLE         |                 |             |                 |             |                 |             |                 |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
| 0           | 2402            | 10          | 2422            | 20          | 2442            | 30          | 2462            |
| 1           | 2404            | 11          | 2424            | 21          | 2444            | 31          | 2464            |
| 2           | 2406            | 12          | 2426            | 22          | 2446            | 32          | 2466            |
| 3           | 2408            | 13          | 2428            | 23          | 2448            | 33          | 2468            |
| 4           | 2410            | 14          | 2430            | 24          | 2450            | 34          | 2470            |
| 5           | 2412            | 15          | 2432            | 25          | 2452            | 35          | 2472            |
| 6           | 2414            | 16          | 2434            | 26          | 2454            | 36          | 2474            |
| 7           | 2416            | 17          | 2436            | 27          | 2456            | 37          | 2476            |
| 8           | 2418            | 18          | 2438            | 28          | 2458            | 38          | 2478            |
| 9           | 2420            | 19          | 2440            | 29          | 2460            | 39          | 2480            |

### 3.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

| Modulation | Test mode    | Low channel | Middle channel | High channel |
|------------|--------------|-------------|----------------|--------------|
| GFSK(BLE)  | Transmitting | 2402MHz     | 2440MHz        | 2480MHz      |

### 3.4 Test Site

Dongguan Precise Testing Service Co., Ltd.

Building D,Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan,

Guangdong, China, Dongguan, 523129

China

FCC Registration Number: 371540

## 4 Equipment During Test

### 4.1 Equipments List

| RF Conducted Test   |                           |               |            |                                |                  |                  |                    |
|---------------------|---------------------------|---------------|------------|--------------------------------|------------------|------------------|--------------------|
| Item                | Kind of Equipment         | Manufacturer  | Type No.   | Serial No.                     | Last calibration | Calibrated until | Calibration period |
| 1                   | EMC Analyzer (9k~26.5GHz) | Agilent       | E4407B     | MY45109572                     | July 15, 2016    | July 14, 2017    | 1 year             |
| 2                   | EXA Signal Analyzer       | Keysight      | N9010A     | MY50520207<br>526B25MPB<br>W7X | July 15, 2016    | July 14, 2017    | 1 year             |
| 3                   | EMI Test Receiver         | R&S           | ESCI       | 101155                         | July 15, 2016    | July 14, 2017    | 1 year             |
| Radiated Emissions  |                           |               |            |                                |                  |                  |                    |
| Item                | Kind of Equipment         | Manufacturer  | Type No.   | Serial No.                     | Last calibration | Calibrated until | Calibration period |
| 1                   | EMI Test Receiver         | Rohde&Schwarz | ESCI       | 101417                         | July 15, 2016    | July 14, 2017    | 1 year             |
| 2                   | Trilog Broadband Antenna  | SCHWARZB ECK  | VULB9160   | 9160-3355                      | July 15, 2016    | July 14, 2017    | 1 year             |
| 3                   | Amplifier                 | EM            | EM-30180   | 060538                         | July 15, 2016    | July 14, 2017    | 1 year             |
| 4                   | Horn Antenna              | SCHWARZB ECK  | BBHA9120 D | 9120D-1246                     | July 15, 2016    | July 14, 2017    | 1 year             |
| 5                   | Coaxial Cable(below 1GHz) | LARGE         | CALB1      | -                              | July 15, 2016    | July 14, 2017    | 1 year             |
| 6                   | Coaxial Cable(above 1GHz) | LARGE         | CALB2      | -                              | July 15, 2016    | July 14, 2017    | 1 year             |
| Conducted Emissions |                           |               |            |                                |                  |                  |                    |
| Item                | Kind of Equipment         | Manufacturer  | Type No.   | Serial No.                     | Last calibration | Calibrated until | Calibration period |
| 1                   | EMI Test Receiver         | R&S           | ESCI       | 101155                         | July 15, 2016    | July 14, 2017    | 1 year             |
| 2                   | LISN                      | SCHWARZB ECK  | NSLK 8128  | 8128-289                       | July 15, 2016    | July 14, 2017    | 1 year             |
| 3                   | Cable                     | LARGE         | RF300      | -                              | July 15, 2016    | July 14, 2017    | 1 year             |



#### 4.2 Measurement Uncertainty

| Parameter                          | Uncertainty              |
|------------------------------------|--------------------------|
| RF output power, conducted         | $\pm 1.0\text{dB}$       |
| Power Spectral Density, conducted  | $\pm 2.2\text{dB}$       |
| Radio Frequency                    | $\pm 1 \times 10^{-6}$   |
| Bandwidth                          | $\pm 1.5 \times 10^{-6}$ |
| Time                               | $\pm 2\%$                |
| Duty Cycle                         | $\pm 2\%$                |
| Temperature                        | $\pm 1^\circ\text{C}$    |
| Humidity                           | $\pm 5\%$                |
| DC and low frequency voltages      | $\pm 3\%$                |
| Conducted Emissions (150kHz~30MHz) | $\pm 3.64\text{dB}$      |
| Radiated Emission(30MHz~1GHz)      | $\pm 5.03\text{dB}$      |
| Radiated Emission(1GHz~25GHz)      | $\pm 4.74\text{dB}$      |

## 5 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.209 & 15.247  
 Test Method: : ANSI C63.10:2013,KDB 558074 D01 DTS MEAS GUIDANCE V03R05  
 Test Result: : PASS  
 Measurement Distance: : 3m  
 Limit: : See the follow table

| Frequency (MHz) | Field Strength        |              | Field Strength Limit at 3m Measurement Dist |                                       |
|-----------------|-----------------------|--------------|---------------------------------------------|---------------------------------------|
|                 | uV/m                  | Distance (m) | uV/m                                        | dBuV/m                                |
| 0.009 ~ 0.490   | $2400/F(\text{kHz})$  | 300          | $10000 * 2400/F(\text{kHz})$                | $20\log^{(2400/F(\text{kHz}))} + 80$  |
| 0.490 ~ 1.705   | $24000/F(\text{kHz})$ | 30           | $100 * 24000/F(\text{kHz})$                 | $20\log^{(24000/F(\text{kHz}))} + 40$ |
| 1.705 ~ 30      | 30                    | 30           | $100 * 30$                                  | $20\log^{(30)} + 40$                  |
| 30 ~ 88         | 100                   | 3            | 100                                         | $20\log^{(100)}$                      |
| 88 ~ 216        | 150                   | 3            | 150                                         | $20\log^{(150)}$                      |
| 216 ~ 960       | 200                   | 3            | 200                                         | $20\log^{(200)}$                      |
| Above 960       | 500                   | 3            | 500                                         | $20\log^{(500)}$                      |

### 5.1 EUT Operation

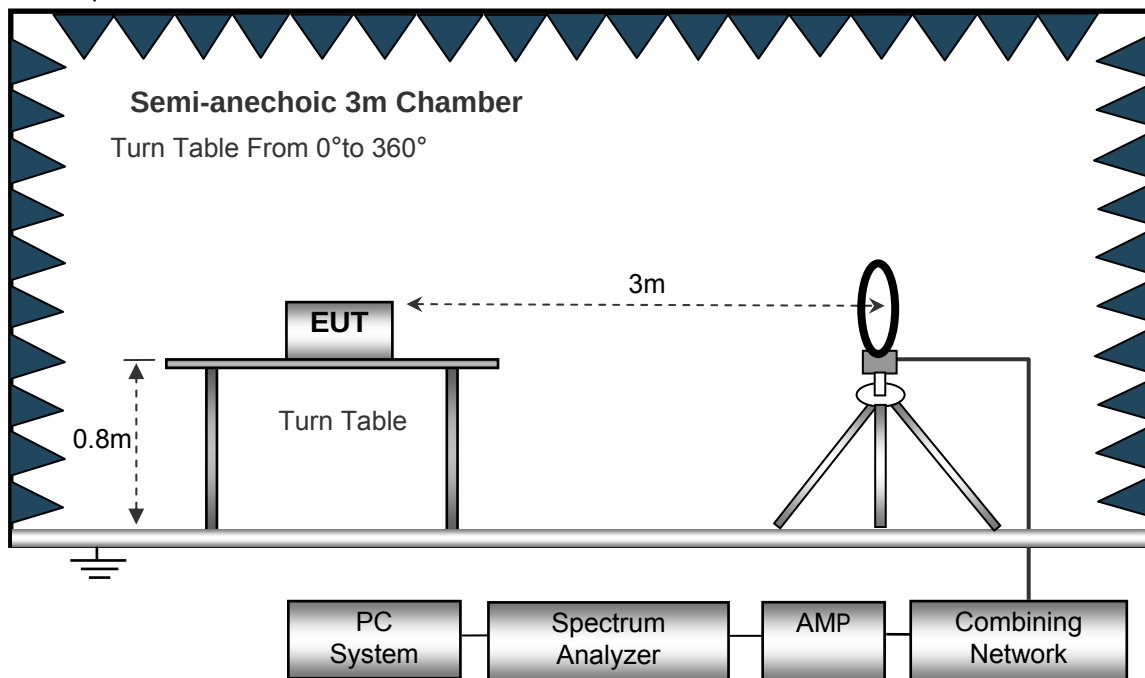
Operating Environment :

Temperature: : 23.5 °C  
 Humidity: : 51.1 % RH  
 Atmospheric Pressure: : 101.2kPa  
 EUT Operation : : Refer to section 3.3

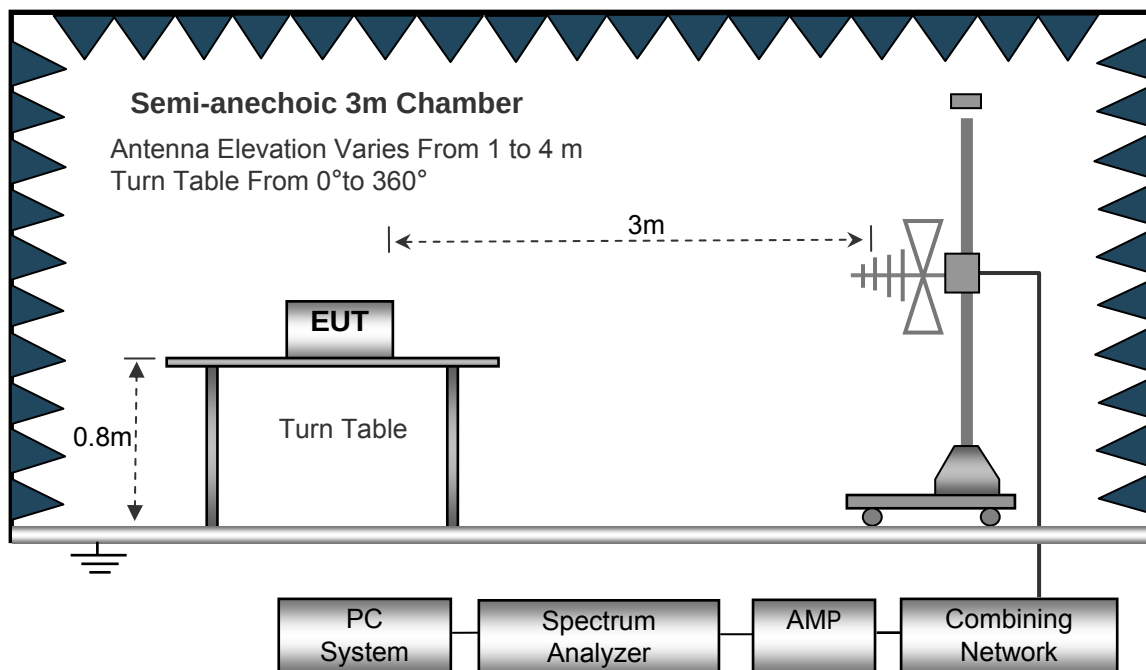
## 5.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

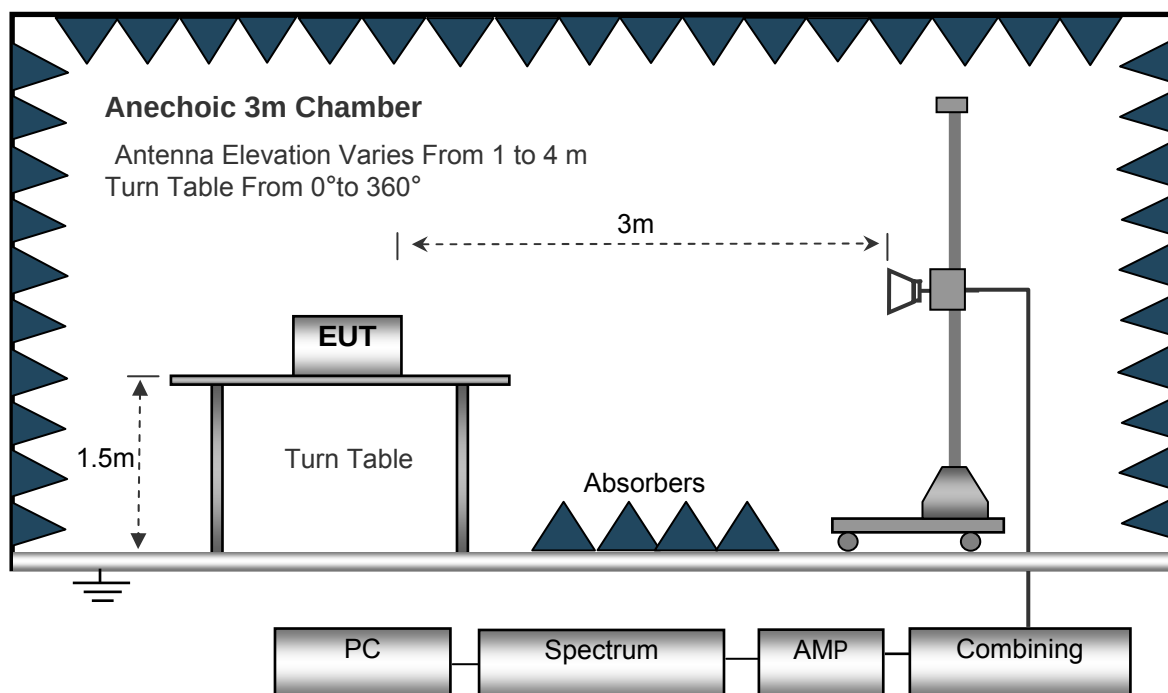
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 5.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto  
IF Bandwidth ..... 10kHz  
Video Bandwidth ..... 10kHz  
Resolution Bandwidth ..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto  
Detector ..... PK  
Resolution Bandwidth ..... 100kHz  
Video Bandwidth ..... 300kHz

Above 1GHz

Sweep Speed ..... Auto  
Detector ..... PK  
Resolution Bandwidth ..... 1MHz  
Video Bandwidth ..... 3MHz  
Detector ..... Ave.  
Resolution Bandwidth ..... 1MHz  
Video Bandwidth ..... 10Hz

#### **5.4 Test Procedure**

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
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 moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
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 radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

## 5.5 Summary of Test Results

Emission level = Receiver reading + ANT factor + cable loss – Preamp factor

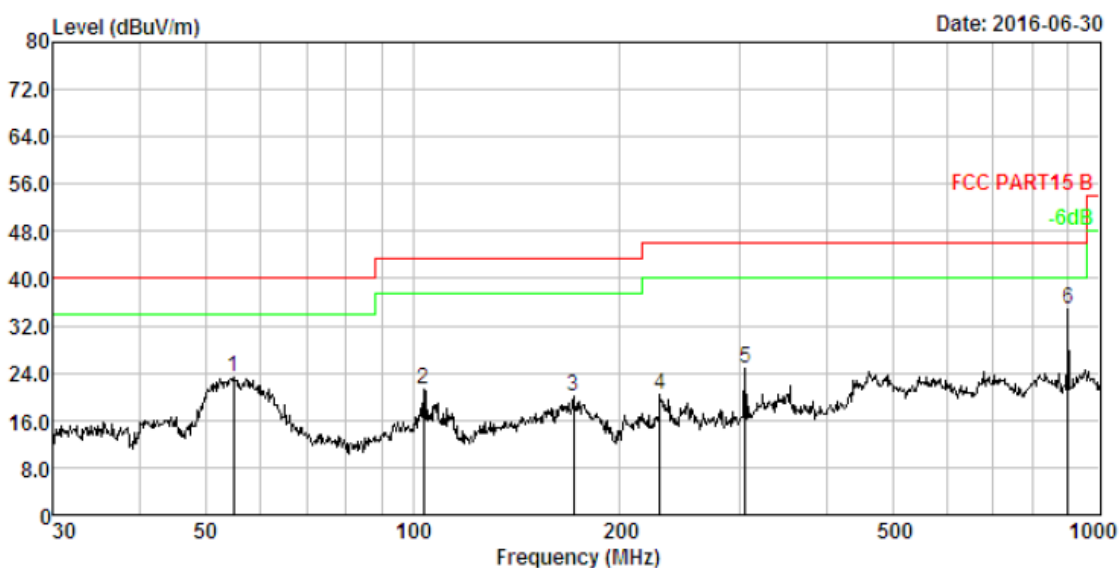
### Test Frequency: Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

### Test Frequency: 30MHz ~ 1GHz

All applicable test modes have been tested and only the worst case (BLE TX in middle channel) is recorded.

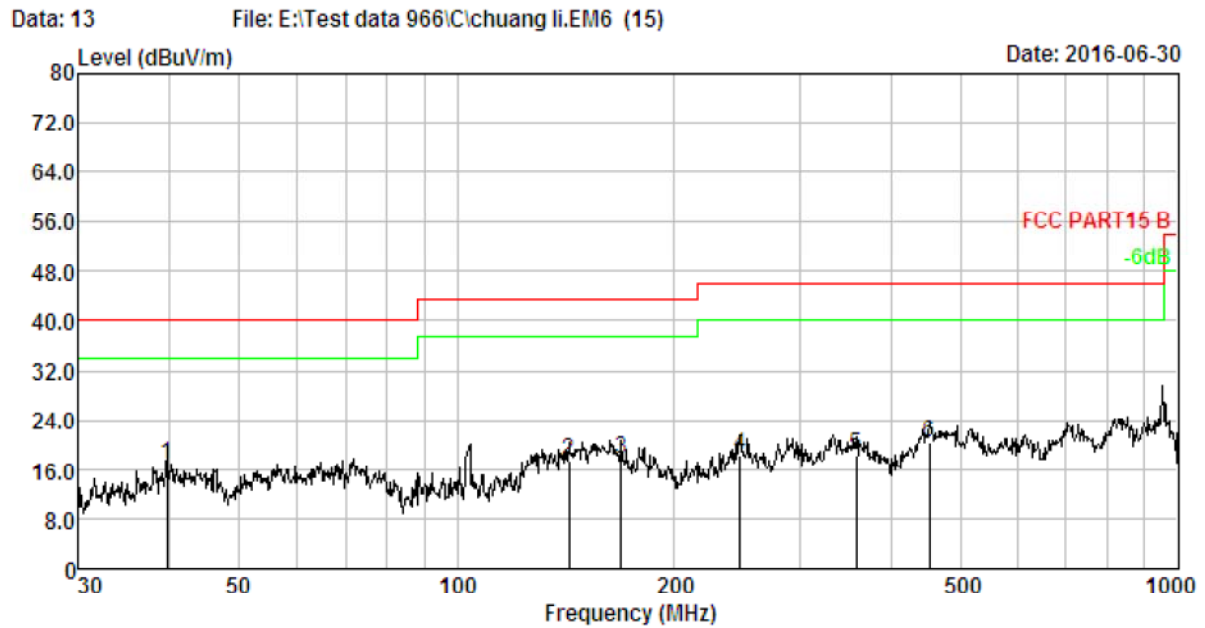
Antenna Polarization: Horizontal



| No. | Freq MHz | Cable Loss dB | ANT Factor dB/m | Receiver Reading dBuV | Preamp Factor dB | Emission Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark |
|-----|----------|---------------|-----------------|-----------------------|------------------|-----------------------|--------------|---------------|--------|
| 1.  | 54.835   | 1.60          | 11.91           | 39.87                 | 30.18            | 23.20                 | 40.00        | -16.80        | QP     |
| 2.  | 103.806  | 2.18          | 10.57           | 39.00                 | 30.40            | 21.35                 | 43.50        | -22.15        | QP     |
| 3.  | 171.393  | 2.63          | 13.20           | 34.68                 | 30.58            | 19.93                 | 43.50        | -23.57        | QP     |
| 4.  | 229.293  | 2.90          | 11.21           | 36.90                 | 30.68            | 20.33                 | 46.00        | -25.67        | QP     |
| 5.  | 304.610  | 3.15          | 13.30           | 39.07                 | 30.78            | 24.74                 | 46.00        | -21.26        | QP     |
| 6.  | 900.147  | 4.13          | 22.58           | 39.15                 | 31.15            | 34.71                 | 46.00        | -11.29        | QP     |



Antenna Polarization: Vertical



| No. | Freq<br>MHz | Cable<br>Loss<br>dB | ANT<br>Factor<br>dB/m | Receiver<br>Reading<br>dBuV | Preamp<br>Factor<br>dB | Emission<br>Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark |
|-----|-------------|---------------------|-----------------------|-----------------------------|------------------------|-----------------------------|-----------------|---------------------|--------|
| 1.  | 39.715      | 1.31                | 13.69                 | 31.77                       | 30.07                  | 16.70                       | 40.00           | -23.30              | QP     |
| 2.  | 142.824     | 2.47                | 13.52                 | 31.82                       | 30.51                  | 17.30                       | 43.50           | -26.20              | QP     |
| 3.  | 169.005     | 2.62                | 13.38                 | 32.21                       | 30.57                  | 17.64                       | 43.50           | -25.86              | QP     |
| 4.  | 246.815     | 2.96                | 11.86                 | 34.33                       | 30.70                  | 18.45                       | 46.00           | -27.55              | QP     |
| 5.  | 357.929     | 3.30                | 14.36                 | 31.41                       | 30.83                  | 18.24                       | 46.00           | -27.76              | QP     |
| 6.  | 452.720     | 3.51                | 16.40                 | 31.49                       | 30.91                  | 20.49                       | 46.00           | -25.51              | QP     |



Test Frequency: 1GHz ~ 18GHz

| Frequency                                                   | Receiver Reading | Detector    | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|-------------------------------------------------------------|------------------|-------------|------------------|---------------------|----------|--------|
| (MHz)                                                       | (dBμV)           | (PK/QP/Ave) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK(BLE) Low Channel                                       |                  |             |                  |                     |          |        |
| Harmonic & Spurious Emission                                |                  |             |                  |                     |          |        |
| 1184.32                                                     | 44.28            | PK          | -18.92           | 25.36               | 74.00    | -48.64 |
| 1184.32                                                     | 38.51            | Ave         | -18.92           | 19.59               | 54.00    | -34.41 |
| 4804.00                                                     | 49.38            | PK          | -1.06            | 48.32               | 74.00    | -25.68 |
| 4804.00                                                     | 42.68            | Ave         | -1.06            | 41.62               | 54.00    | -12.38 |
| 7206.00                                                     | 46.83            | PK          | 1.33             | 48.16               | 74.00    | -25.84 |
| 7206.00                                                     | 42.69            | Ave         | 1.33             | 44.02               | 54.00    | -9.98  |
| Restricted bands Emission                                   |                  |             |                  |                     |          |        |
| 2348.03                                                     | 45.02            | PK          | -13.19           | 31.83               | 74.00    | -42.17 |
| 2348.03                                                     | 39.30            | Ave         | -13.19           | 26.11               | 54.00    | -27.89 |
| 2379.65                                                     | 42.91            | PK          | -13.14           | 29.77               | 74.00    | -44.23 |
| 2379.65                                                     | 38.12            | Ave         | -13.14           | 24.98               | 54.00    | -29.02 |
| 2486.01                                                     | 42.47            | PK          | -13.08           | 29.39               | 74.00    | -44.61 |
| 2486.01                                                     | 40.29            | Ave         | -13.08           | 27.21               | 54.00    | -26.79 |
| Remark: Corrected Factor=ANT Factor + Cable Loss – Amp Gain |                  |             |                  |                     |          |        |



| Frequency                                                   | Receiver Reading | Detector    | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|-------------------------------------------------------------|------------------|-------------|------------------|---------------------|----------|--------|
| (MHz)                                                       | (dBμV)           | (PK/QP/Ave) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK(BLE) Middle Channel                                    |                  |             |                  |                     |          |        |
| Harmonic & Spurious Emission                                |                  |             |                  |                     |          |        |
| 1184.32                                                     | 45.54            | PK          | -18.92           | 26.62               | 74.00    | -47.38 |
| 1184.32                                                     | 39.02            | Ave         | -18.92           | 20.10               | 54.00    | -33.9  |
| 4880.00                                                     | 50.12            | PK          | -0.93            | 49.19               | 74.00    | -24.81 |
| 4880.00                                                     | 42.32            | Ave         | -0.93            | 41.39               | 54.00    | -12.61 |
| 7320.00                                                     | 46.72            | PK          | 1.67             | 48.39               | 74.00    | -25.61 |
| 7320.00                                                     | 42.09            | Ave         | 1.67             | 43.76               | 54.00    | -10.24 |
| Restricted bands Emission                                   |                  |             |                  |                     |          |        |
| 2339.48                                                     | 45.86            | PK          | -13.19           | 32.67               | 74.00    | -41.33 |
| 2339.48                                                     | 38.66            | Ave         | -13.19           | 25.47               | 54.00    | -28.53 |
| 2376.97                                                     | 43.06            | PK          | -13.14           | 29.92               | 74.00    | -44.08 |
| 2376.97                                                     | 37.60            | Ave         | -13.14           | 24.46               | 54.00    | -29.54 |
| 2495.22                                                     | 42.31            | PK          | -13.08           | 29.23               | 74.00    | -44.77 |
| 2495.22                                                     | 39.93            | Ave         | -13.08           | 26.85               | 54.00    | -27.15 |
| Remark: Corrected Factor=ANT Factor + Cable Loss – Amp Gain |                  |             |                  |                     |          |        |



| Frequency                                                   | Receiver Reading | Detector    | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|-------------------------------------------------------------|------------------|-------------|------------------|---------------------|----------|--------|
| (MHz)                                                       | (dBμV)           | (PK/QP/Ave) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK(BLE) High Channel                                      |                  |             |                  |                     |          |        |
| Harmonic & Spurious Emission                                |                  |             |                  |                     |          |        |
| 1184.32                                                     | 45.58            | PK          | -18.92           | 26.66               | 74.00    | -47.34 |
| 1184.32                                                     | 39.86            | Ave         | -18.92           | 20.94               | 54.00    | -33.06 |
| 4960.00                                                     | 50.55            | PK          | -0.87            | 49.68               | 74.00    | -24.32 |
| 4960.00                                                     | 42.10            | Ave         | -0.87            | 41.23               | 54.00    | -12.77 |
| 7440.00                                                     | 45.90            | PK          | 1.84             | 47.74               | 74.00    | -26.26 |
| 7440.00                                                     | 42.43            | Ave         | 1.84             | 44.27               | 54.00    | -9.73  |
| Restricted bands Emission                                   |                  |             |                  |                     |          |        |
| 2334.44                                                     | 45.96            | PK          | -13.19           | 32.77               | 74.00    | -41.23 |
| 2334.44                                                     | 39.50            | Ave         | -13.19           | 26.31               | 54.00    | -27.69 |
| 2376.54                                                     | 43.81            | PK          | -13.14           | 30.67               | 74.00    | -43.33 |
| 2376.54                                                     | 38.51            | Ave         | -13.14           | 25.37               | 54.00    | -28.63 |
| 2499.86                                                     | 41.65            | PK          | -13.08           | 28.57               | 74.00    | -45.43 |
| 2499.86                                                     | 40.60            | Ave         | -13.08           | 27.52               | 54.00    | -26.48 |
| Remark: Corrected Factor=ANT Factor + Cable Loss – Amp Gain |                  |             |                  |                     |          |        |

**Radiated band edge:**

| Frequency                                                                  | Receiver Reading | Detector    | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|----------------------------------------------------------------------------|------------------|-------------|------------------|---------------------|----------|--------|
| (MHz)                                                                      | (dBμV)           | (PK/QP/Ave) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK(BLE)                                                                  |                  |             |                  |                     |          |        |
| 2400.00                                                                    | 48.63            | PK          | -13.12           | 35.51               | 74.00    | -38.49 |
| 2400.00                                                                    | 41.15            | PK          | -13.12           | 28.03               | 74.00    | -45.97 |
| 2483.50                                                                    | 48.25            | PK          | -13.06           | 35.19               | 74.00    | -38.81 |
| 2483.50                                                                    | 43.88            | PK          | -13.06           | 30.82               | 74.00    | -43.18 |
| Remark: The PK value is below the AV limit, The AV value was not recorded. |                  |             |                  |                     |          |        |

**Test Frequency :Above 18GHz**

The measurements were more than 20 dB below the limit and not reported

Remark 1. The testing has been conformed to  $10 \times 2480 = 24800$  MHz.

2. All other emissions more than 30dB below the limit.

## 6 Conducted Spurious Emission

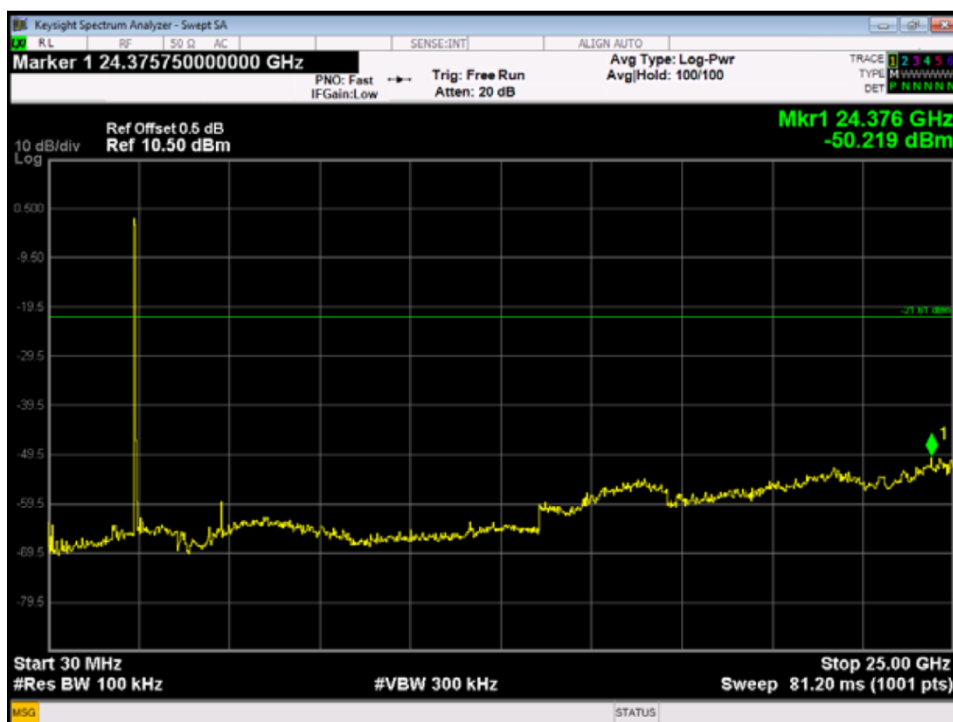
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement | : FCC CFR47 Part 15 Section 15.247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Test Method      | : ANSI C63.10:2013,KDB 558074 D01 DTS MEAS GUIDANCE V03R05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Test Limit       | : Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
| Test Result      | : PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### 6.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold

### 6.2 Test Result

BLE Low Channel



### BLE Middle Channel



### BLE High Channel



## 7 Band Edge Measurement

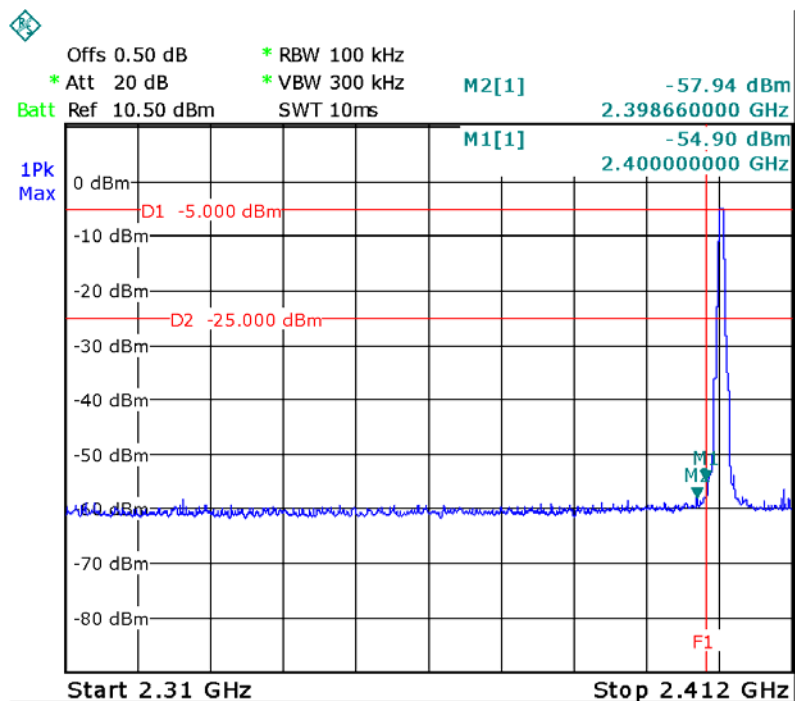
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement | : Section 15.247(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Test Method      | : ANSI C63.10:2013, KDB 558074 D01 DTS MEAS GUIDANCE V03R05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Test Limit       | : Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
| Test Mode        | : Refer to section 3.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### 7.1 Test Procedure

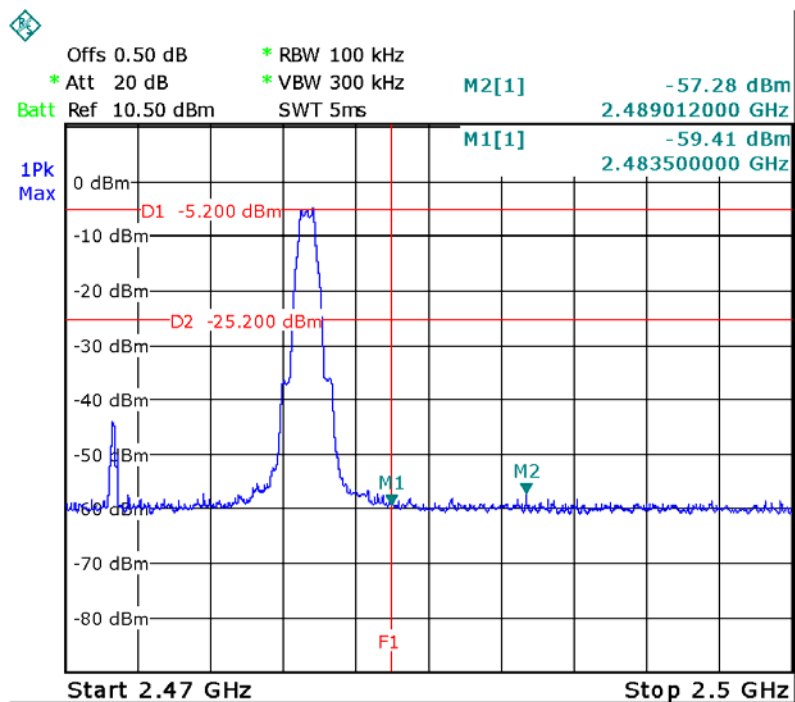
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
  2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
- Detector function = peak, Trace = max hold

## 7.2 Test Result

GFSK Band edge-left side



GFSK Band edge-right side



## 8 6dB Bandwidth Measurement

|                  |                                                                                                                                                                             |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement | : FCC CFR47 Part 15 Section 15.247                                                                                                                                          |
| Test Method      | : ANSI C63.10:2013, KDB 558074 D01 DTS MEAS GUIDANCE V03R05                                                                                                                 |
| Test Limit       | Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |
| Test Mode        | : Refer to section 3.3                                                                                                                                                      |

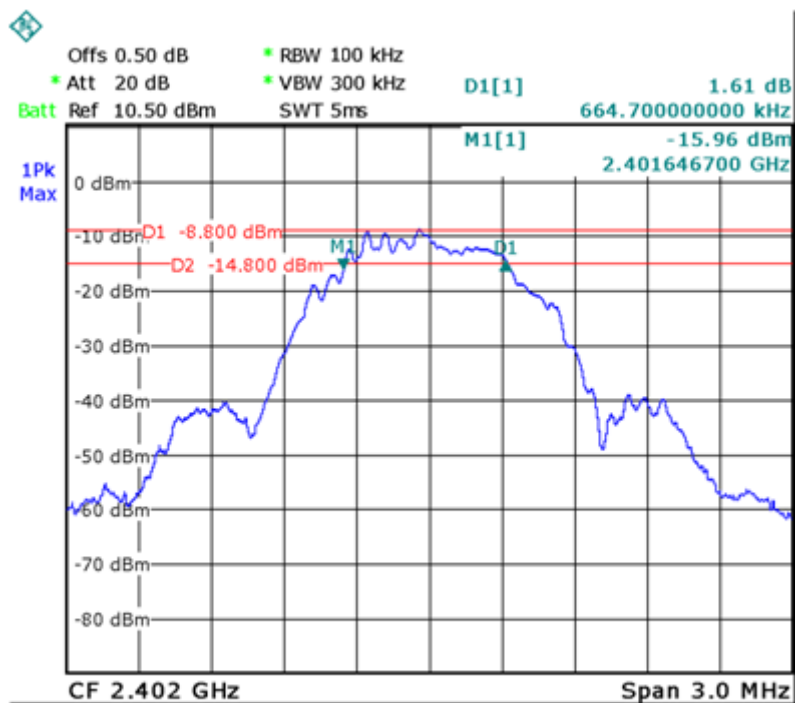
### 8.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: For BLE, RBW = 100 kHz, VBW = 300kHz

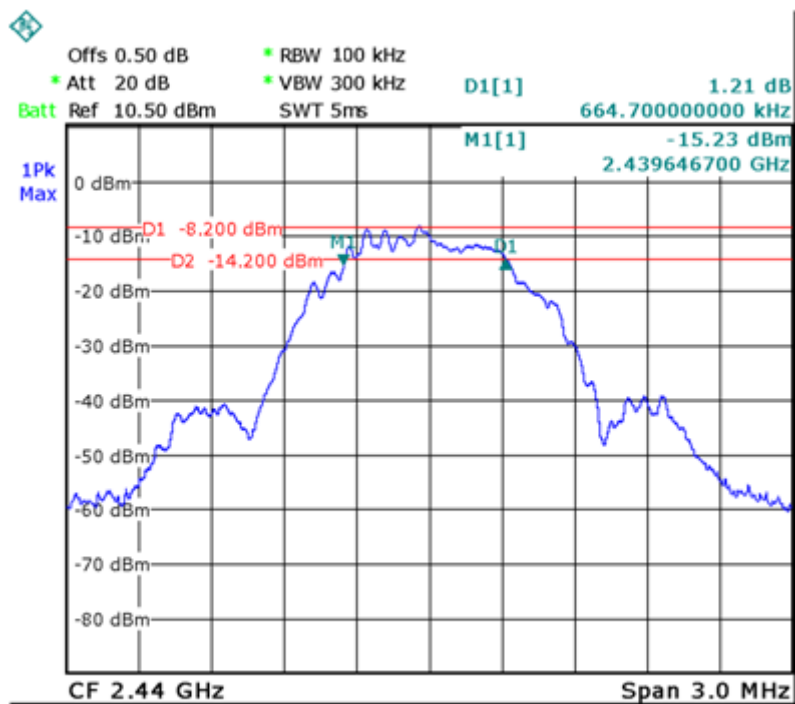
### 8.2 Test Result

| Modulation | Bandwidth(MHz) |                |              | Limit   |
|------------|----------------|----------------|--------------|---------|
|            | Low Channel    | Middle Channel | High Channel |         |
| GFSK(BLE)  | 0.665          | 0.665          | 0.665        | ≥500kHz |

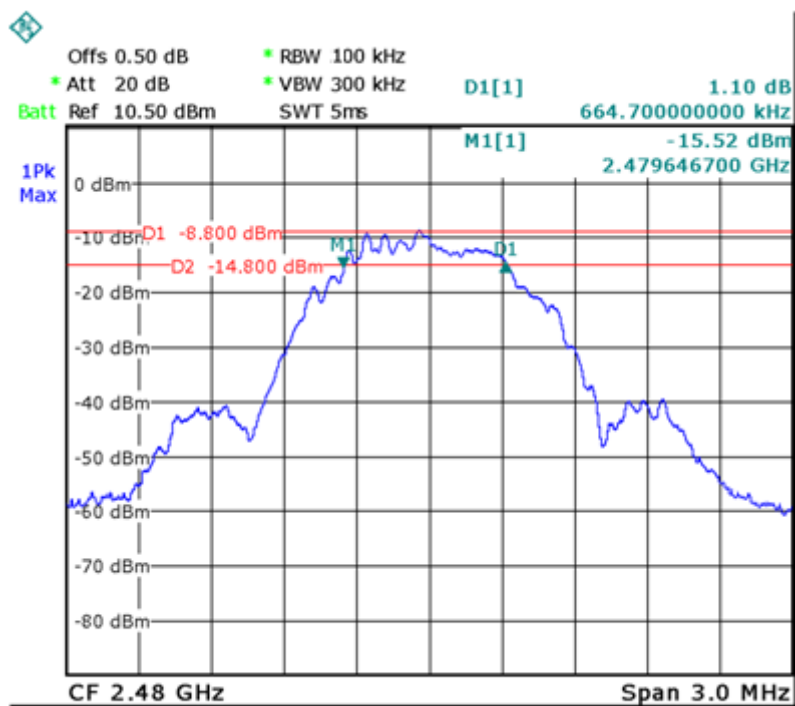
### GFSK(BLE) Low Channel



### GFSK(BLE) Middle Channel



GFSK(BLE) High Channel



## 9 Maximum Peak Output Power

|                  |                                                                                                                                                                                                                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement | : FCC CFR47 Part 15 Section 15.247                                                                                                                                                                                                                                                            |
| Test Method      | : ANSI C63.10:2013, KDB 558074 D01 DTS MEAS GUIDANCE V03R05                                                                                                                                                                                                                                   |
| Test Limit       | : Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. |
| Test Mode        | : Refer to section 3.3                                                                                                                                                                                                                                                                        |

### 9.1 Test Procedure

KDB 558074 D01 DTS Meas Guidance V03R05

section 9.1.1 (For BLE)

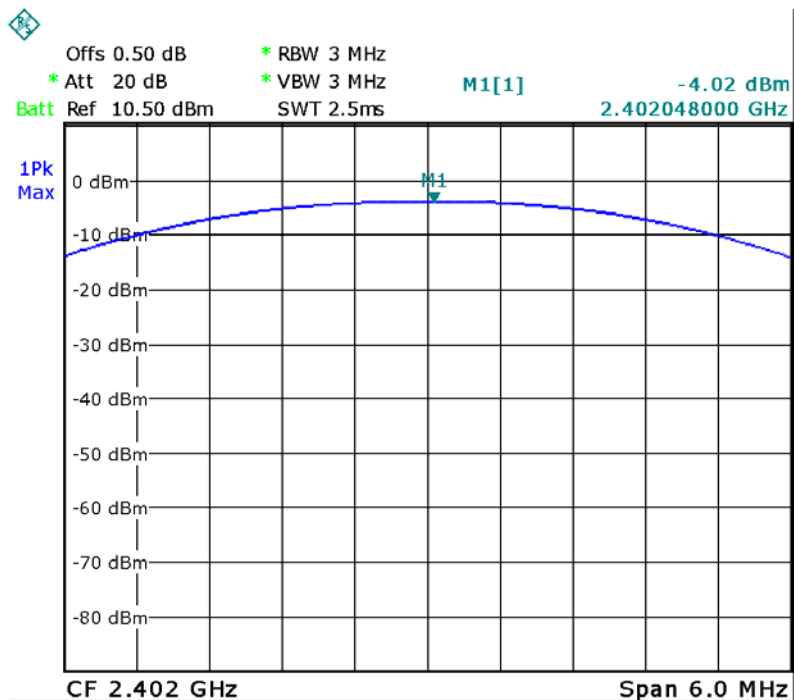
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the RBW  $\geq$  DTS bandwidth.
- b) Set VBW  $\geq$  3 RBW.
- c) Set span  $\geq$  3 x RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

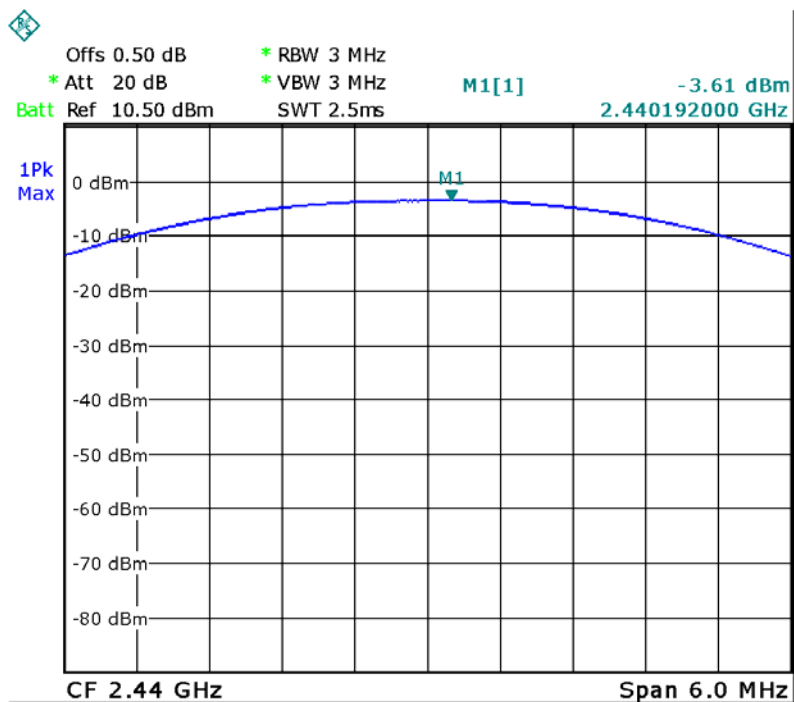
### 9.2 Test Result

| Modulation | Maximum Peak Output Power (dBm) |                |              | Limit     |
|------------|---------------------------------|----------------|--------------|-----------|
|            | Low Channel                     | Middle Channel | High Channel |           |
| GFSK(BLE)  | -4.02                           | -3.61          | -4.15        | 1W(30dBm) |

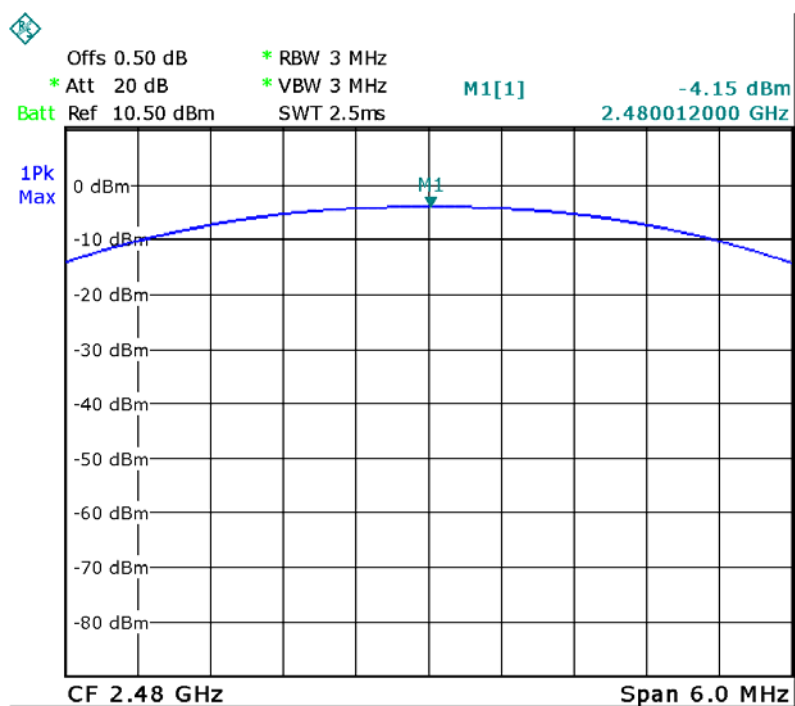
### GFSK(BLE) Low Channel



### GFSK(BLE) Middle Channel



GFSK(BLE) High Channel



## 10 Power Spectral density

|                  |                                                                                                                                                                                                                                                                                                                                |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement | : FCC CFR47 Part 15 Section 15.247                                                                                                                                                                                                                                                                                             |
| Test Method      | : ANSI C63.10:2013, KDB 558074 D01 DTS MEAS GUIDANCE V03R05                                                                                                                                                                                                                                                                    |
| Test Limit       | : Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. |
| Test Mode        | : Refer to section 3.3                                                                                                                                                                                                                                                                                                         |

### 10.1 Test Procedure

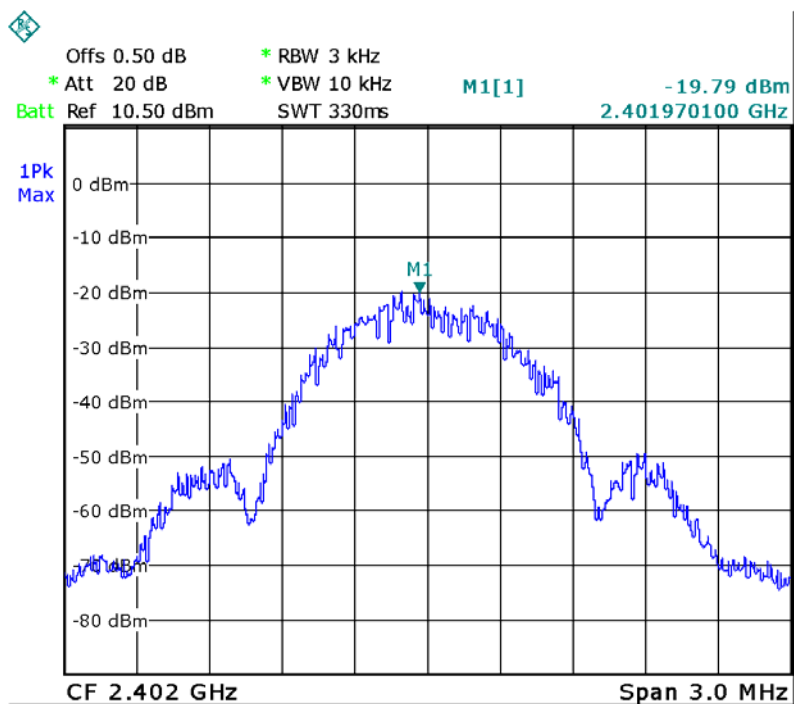
KDB 558074 D01 DTS Meas Guidance V03R05

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

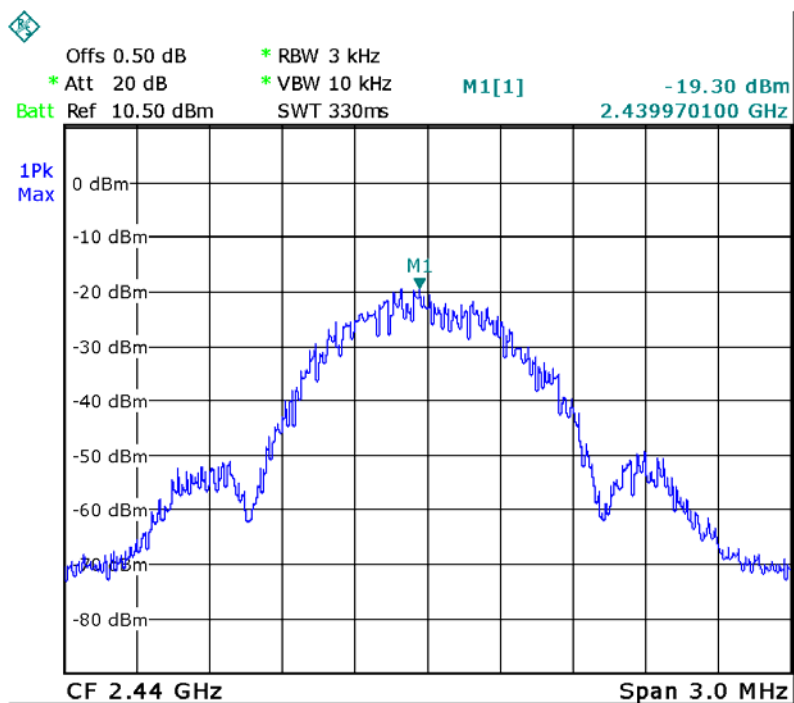
### 10.2 Test Result

| Modulation | Power Spectral density ( dBm/3kHz ) |                |              | Limit     |
|------------|-------------------------------------|----------------|--------------|-----------|
|            | Low Channel                         | Middle Channel | High Channel |           |
| GFSK(BLE)  | -19.79                              | -19.30         | -19.75       | 8dBm/3kHz |

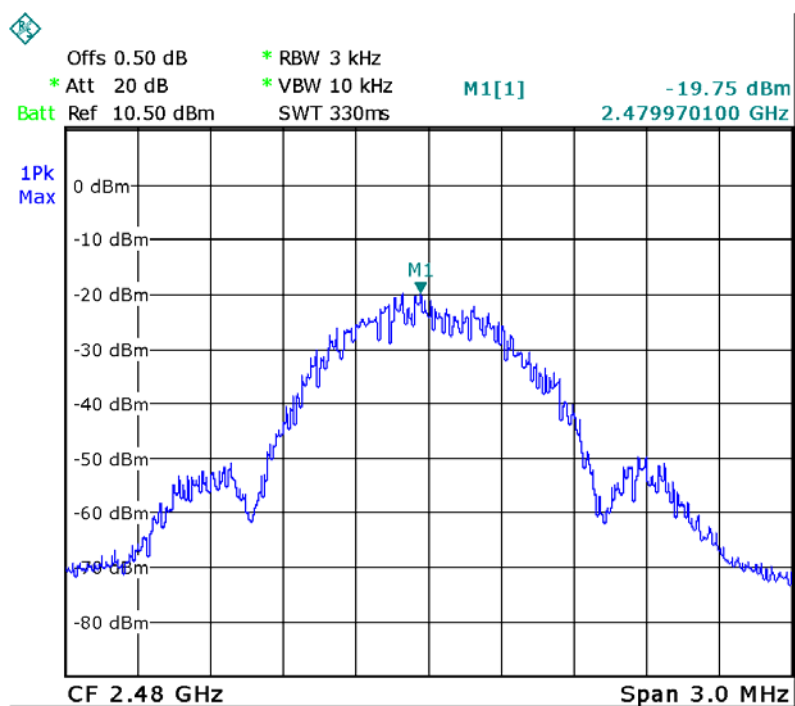
### GFSK(BLE) Low Channel



### GFSK(BLE) Middle Channel



GFSK(BLE) High Channel



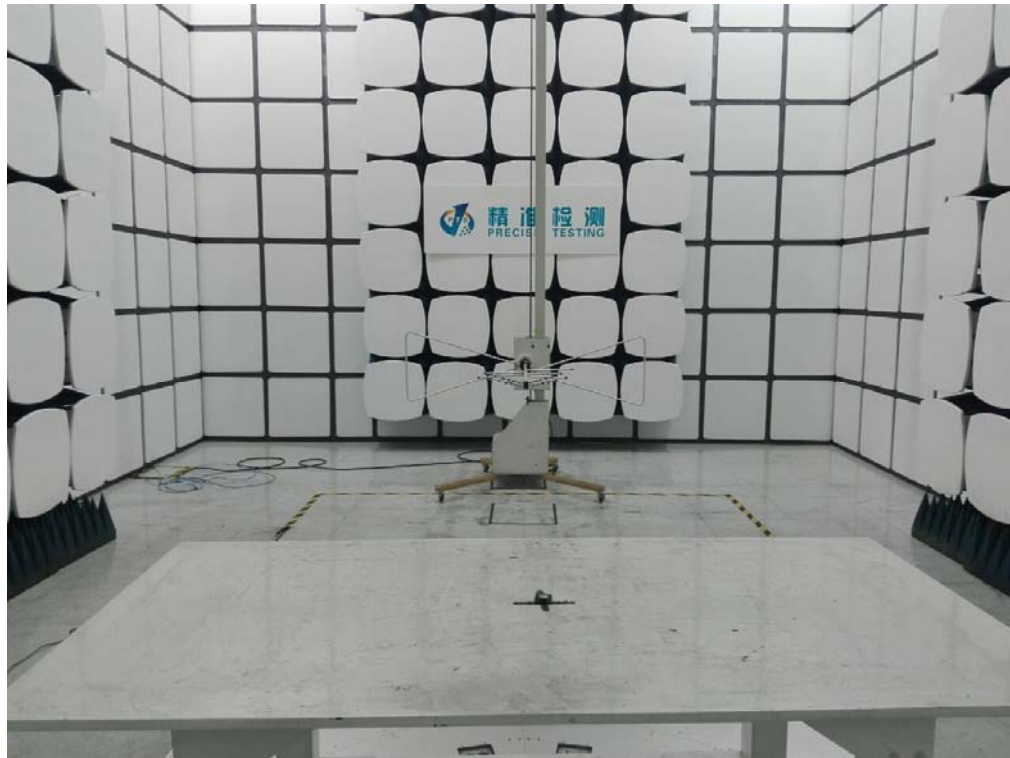


## **11 Antenna Requirement**

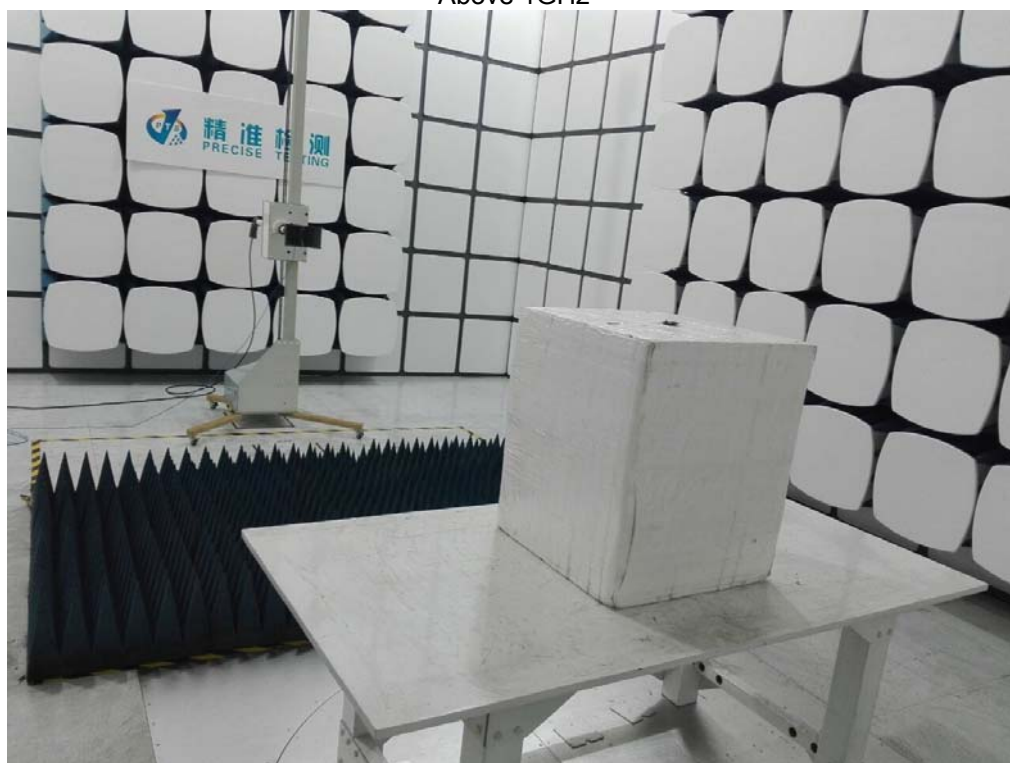
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an PCB print antenna which meet the requirement of this section.

## 12 Test Setup

### Radiated Spurious Emissions From 30MHz-1000MHz

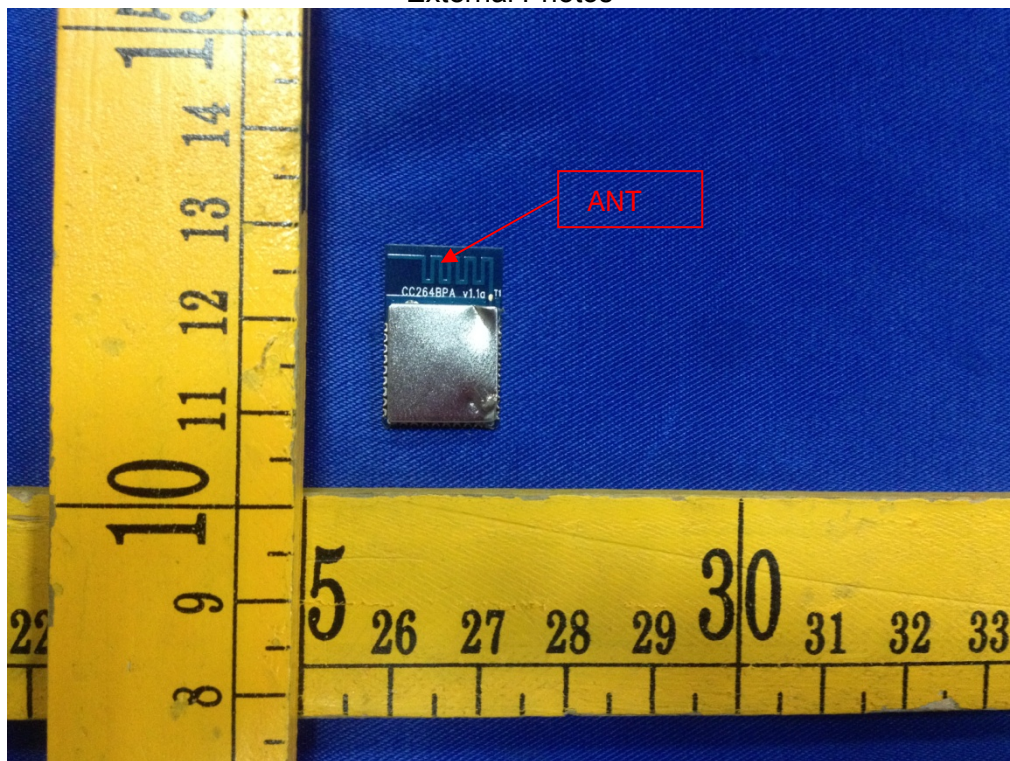
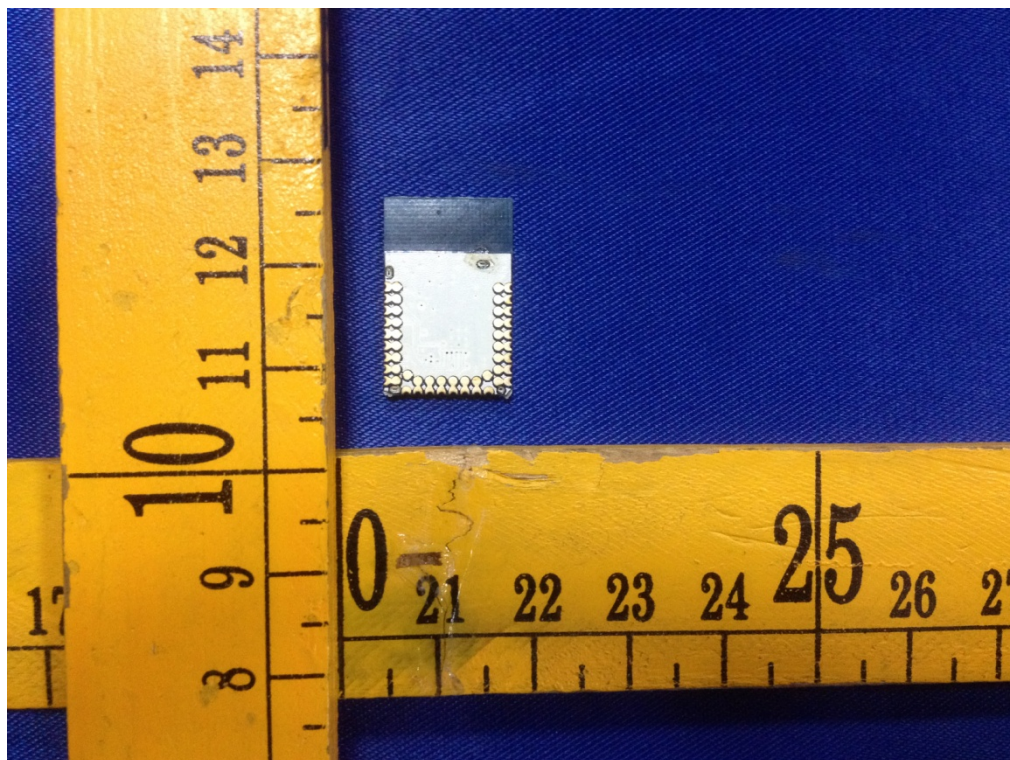


Above 1GHz

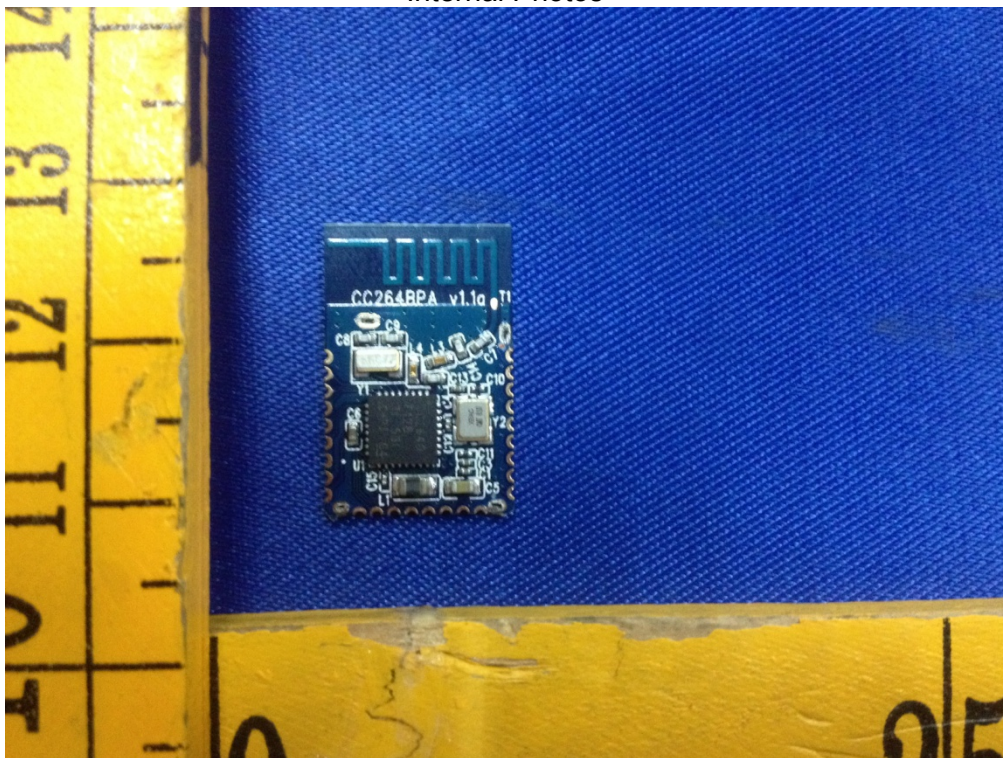
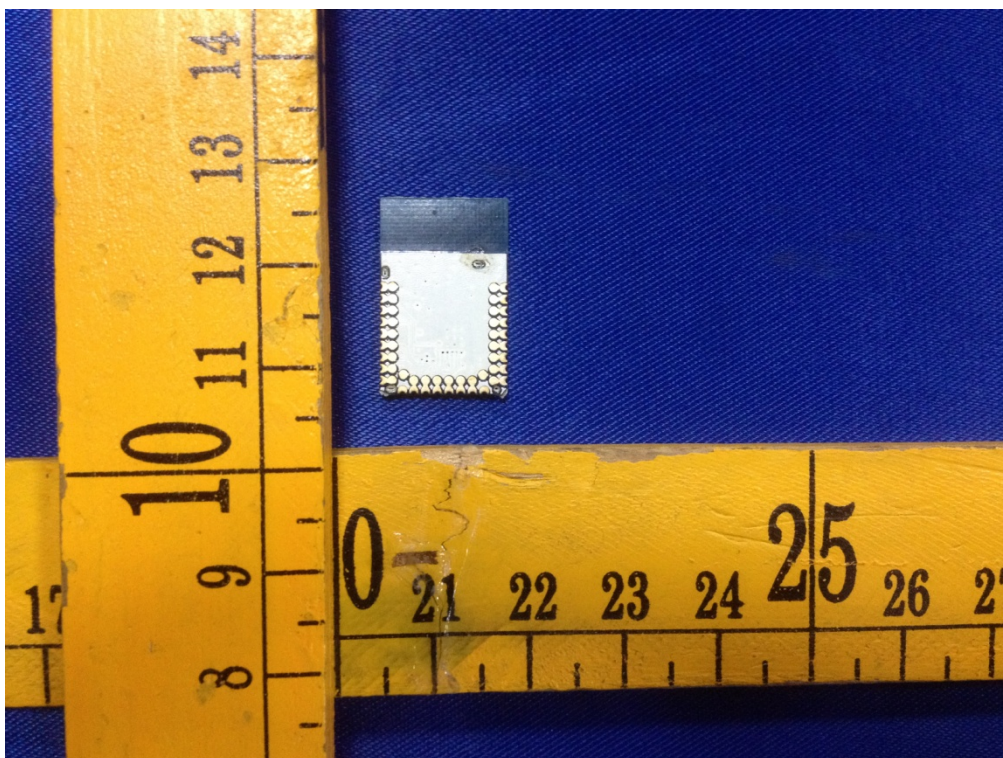


## 13 EUT Photos

### External Photos



Internal Photos



\*\*\*\*\*THE END REPORT\*\*\*\*\*