

# **FCC Test Report**

Report No.: AGC03285201001FE02

FCC ID : 2AMW0FSC-BT806

APPLICATION PURPOSE : Original Equipment

**PRODUCT DESIGNATION**: Bluetooth module

**BRAND NAME**: Feasycom

**MODEL NAME** : FSC-BT806

**APPLICANT**: Shenzhen Feasycom Technology Co., LTD

**DATE OF ISSUE** : Nov. 05,2020

**STANDARD(S)** : FCC Part 15.247

**REPORT VERSION**: V1.0

# Attestation of Global Compliance (Shenzhen) Co., Ltd



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#### REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/ /	Nov. 05,2020	Valid	Initial Release

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#### 1. VERIFICATION OF COMPLIANCE

Shenzhen Feasycom Technology Co., LTD				
Room 2004A,20th Floor, Huichao Technology Building, Jinhai Road, Xixiang, Baoan District, Shenzhen, China				
Shenzhen Feasycom Technology Co., LTD				
Room 2004A,20th Floor, Huichao Technology Building, Jinhai Road, Xixiang, Baoan District, Shenzhen, China				
Shenzhen Feasycom Technology Co., LTD				
Room 2004A,20th Floor, Huichao Technology Building, Jinhai Road, Xixiang, Baoan District, Shenzhen, China				
Bluetooth module				
Feasycom				
FSC-BT806				
Oct. 22,2020 to Nov. 05,2020				
No any deviation from the test method				
Normal				
Pass				
AGCRT-US-BLE/RF				

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.247.

Prepared By	Sky dong	
CC C	Sky Dong (Project Engineer)	Nov. 05,2020
Reviewed By	Max Zhang	
No co	Max Zhang (Reviewer)	Nov. 05,2020
Approved By	Formercies	
	Forrest Lei (Authorized Officer)	Nov. 05,2020

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#### 2. GENERAL INFORMATION

#### 2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Bluetooth module". It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz				
RF Output Power	9.340dBm (Max)				
Bluetooth Version	V 5.0				
Modulation	BLE ⊠GFSK 1Mbps □GFSK 2Mbps				
Number of channels	40 Channel				
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)				
Antenna Gain	2dBi				
Hardware Version	V1.1				
Software Version	V1.1.1				
Power Supply DC 3.3V					

#### 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency	
\G <sup>O</sup> - G	0	2402 MHz	
		2404 MHz	
2400~2483.5MHz	10: 00		
NO GO	38	2478 MHz	
	39	2480 MHz	

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# 2.3. RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: 2AMWOFSC-BT806** filing to comply with the FCC Part 15.247 requirements.

#### 2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

#### 2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

#### 2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

#### 2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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#### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, Uc = ±0.8 dB
- Uncertainty of RF power density, conducted,  $Uc = \pm 2.6 \text{ dB}$
- Uncertainty of spurious emissions, conducted, Uc = ±2.7 dB
   Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %

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#### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION			
1	Low channel TX			
2	Middle channel TX			
3	High channel TX			

#### Note:

- 1. Only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

Software Setting

Feat Commands

Feat Commands

Fact Commands

Fact Arguments

Facket Type

Fack

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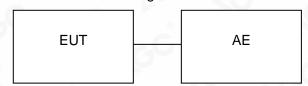


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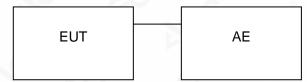
#### 5. SYSTEM TEST CONFIGURATION

#### **5.1. CONFIGURATION OF TESTED SYSTEM**

Radiated Emission Configure:



Conducted Emission Configure:



#### **5.2. EQUIPMENT USED IN TESTED SYSTEM**

Item	Equipment Model No.		ID or Specification	Remark	
1	Bluetooth module	FSC-BT806	2AMWOFSC-BT806	EUT	
2	PC	161301-01	N/A	AE	
3	PC adapter		N/A	AE	
4	control board	EPS-35-3.3	DC 3.3V	AE	

#### **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	FCC RULES DESCRIPTION OF TEST	
15.247 (b)(3)	Peak Output Power	Compliant
15.247 (a)(2)	6 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.247 (e)	Maximum Conducted Output Power Density	Compliant
15.209	Radiated Emission	Compliant
15.207	Conducted Emission	Compliant

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#### 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China		
Designation Number	CN1259		
FCC Test Firm Registration Number	975832		
A2LA Cert. No.	5054.02		
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA		

#### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

#### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	N/A	N/A
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03,2020	Sep. 02,2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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#### 7. PEAK OUTPUT POWER

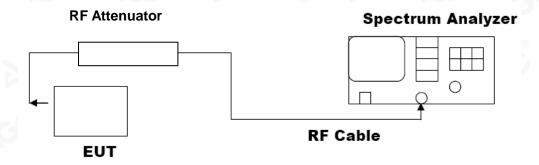
#### 7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW ≥ DTS bandwidth
- 3. VBW≥3\*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

# 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP



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#### 7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION						
2.402	8.253	30	Pass			
2.440	9.024	30	Pass			
2.480	9.340	30	Pass			

CH<sub>0</sub>



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#### **CH39**



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#### 8. 6 DB BANDWIDTH

#### **8.1. MEASUREMENT PROCEDURE**

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW ≥ 3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

#### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

#### **8.3. LIMITS AND MEASUREMENT RESULTS**

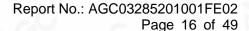
LIMITS AND MEASUREMENT RESULT						
A	Applicable Limits					
Applicable Limits	Test Data	(kHz)	Criteria			
0	Low Channel	711.7	PASS			
>500KHZ	Middle Channel	705.2	PASS			
	High Channel	701.3	PASS			

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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#### 9. CONDUCTED SPURIOUS EMISSION

#### 9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

## 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

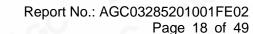
#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT						
A soulis able 1 insite	Measurement Result					
Applicable Limits	Test Data	Criteria				
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS				

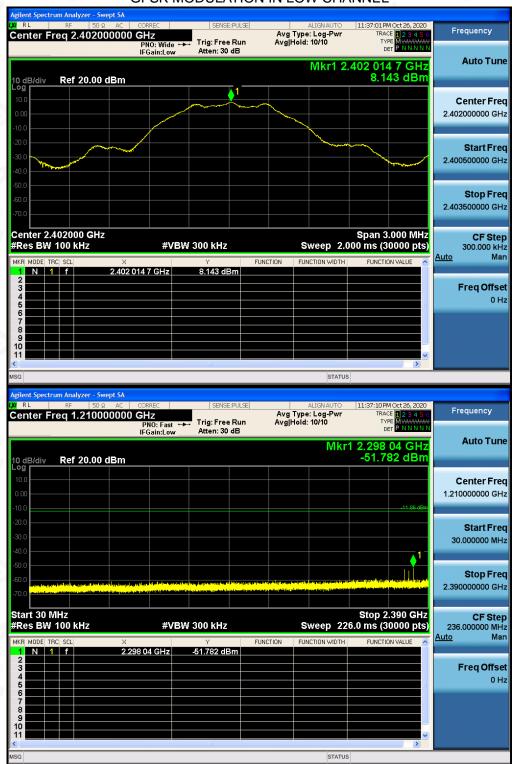
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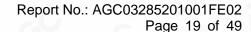


#### TEST RESULT FOR ENTIRE FREQUENCY RANGE

GFSK MODULATION IN LOW CHANNEL



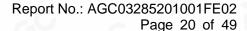
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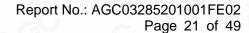




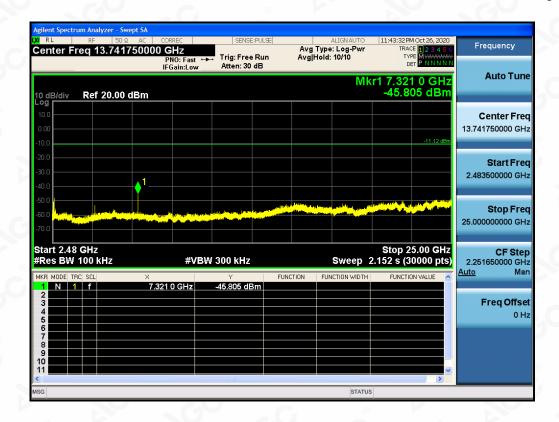
#### GFSK MODULATION IN MIDDLE CHANNEL



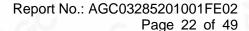
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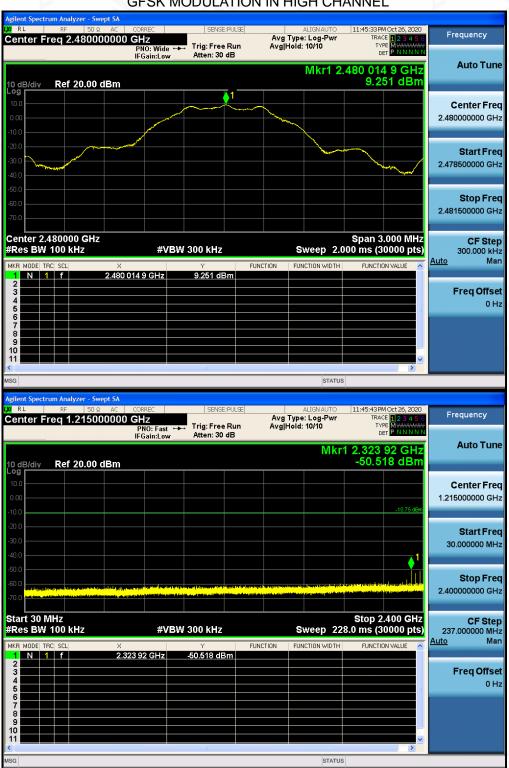


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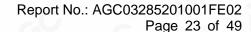




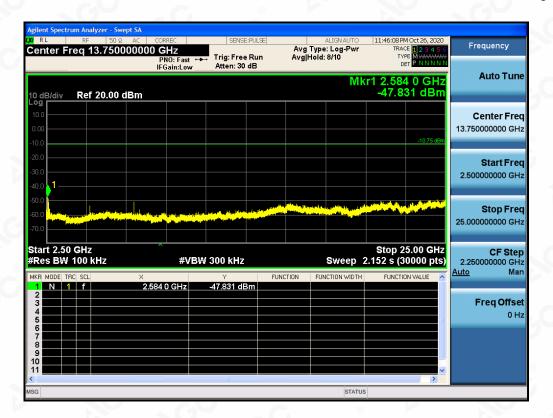
#### GFSK MODULATION IN HIGH CHANNEL



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Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

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#### **TEST RESULT FOR BAND EDGE**

GFSK MODULATION IN LOW CHANNEL



#### GFSK MODULATION IN HIGH CHANNEL



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#### 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

#### 10.1. MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set the SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

## 10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 7.2.

#### 10.3. MEASUREMENT EQUIPMENT USED

Refer to Section 6.

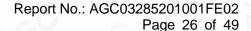
#### 10.4. LIMITS AND MEASUREMENT RESULT

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result	
Low Channel	-7.201	8	Pass	
Middle Channel	-6.599	8	Pass	
High Channel	-6.411	8	Pass	

# TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



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TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



#### TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



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#### 11. RADIATED EMISSION

#### 11.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

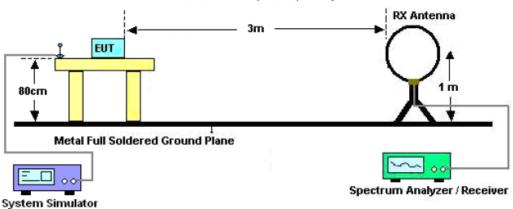
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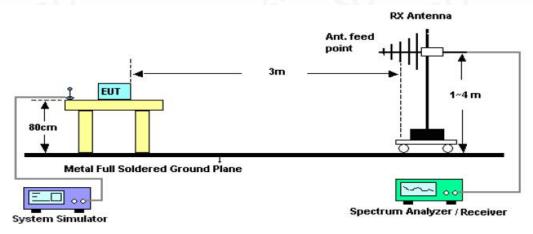


#### 11.2. TEST SETUP

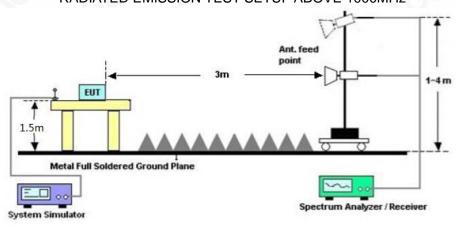
#### Radiated Emission Test-Setup Frequency Below 30MHz



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



#### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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#### 11.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)		
0.009~0.490	2400/F(kHz)	300		
0.490~1.705	24000/F(kHz)	30		
1.705~30.0	30	30		
30~88	100	3		
88~216	150	3		
216~960	200	3		
Above 960	500	3		

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

#### 11.4. TEST RESULT

#### **RADIATED EMISSION BELOW 30MHz**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

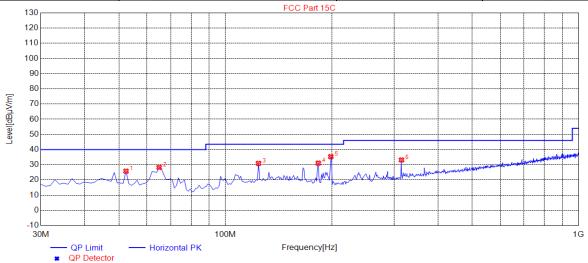
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#### **RADIATED EMISSION BELOW 1GHZ**

EUT	Bluetooth module	Model Name	FSC-BT806
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	52.3100	25.80	11.49	40.00	14.20	100	332	Horizontal
2	64.9200	28.28	10.09	40.00	11.72	100	78	Horizontal
3	124.090	30.91	13.75	43.50	12.59	100	360	Horizontal
4	183.260	31.09	12.83	43.50	12.41	100	141	Horizontal
5	198.780	35.36	12.11	43.50	8.14	100	327	Horizontal
6	315.180	33.18	16.48	46.00	12.82	100	181	Horizontal

**RESULT: PASS** 

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