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FCC TEST REPORT

Report No.....:	AB25060071FW02
FCC ID.....:	2BQJD-6INCHES
Applicant.....:	Wuhan Shenma Fuyun Technology Co., Ltd.
Address..... :	Room 1803, 18th Floor, Hecheng Center Office Building, No. 260 Xiongchu Avenue, Hongshan District, Wuhan City, Hubei Province
Manufacturer.....:	Shenzhen Xingan Technology Co., Ltd.
Address.....:	Room 401, Office Building, No. 7, Jinlong 4th Road, Baolong Community, Baolong Street, Longgang District, Shenzhen
Product Name.....:	MicroHuman Holographic Cabin
TradeMark.....:	MicroHuman
Test Model.....:	6 inches
Additional Model(s).....:	/
Standard.....:	FCC 47 CFR Part 15 Subpart C (Part 15.247)
Date of Receipt..... :	2025.06.24
Date of Test Date..... :	2025.06.25 - 2025.07.04
Date of Issue..... :	2025.07.04
Test Result..... :	**Pass**

Compiled by: (Printed Name + Signature)	Huaijie Li	Huaijie Li
Supervised by: (Printed Name + Signature)	Jay Liu	jay liu
Approved by: (Printed Name + Signature)	Mic Cheng	Mic Cheng

Testing Laboratory Name..... :	Aibo Standard Technology (Shenzhen) Co., Ltd.
Address..... :	101, Building B, Tuori New Energy Industrial Park, High-tech Park, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, China

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FCC TEST REPORT

Test Report No.: AB25060071FW02	2025.07.04 Date of issue

EUT.....	:	MicroHuman Holographic Cabin
Test Model.....	:	6 inches
Applicant.....	:	Wuhan Shenma Fuyun Technology Co., Ltd.
Address.....	:	Room 1803, 18th Floor, Hecheng Center Office Building, No. 260 Xiongchu Avenue, Hongshan District, Wuhan City, Hubei Province
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	:	Shenzhen Xingan Technology Co., Ltd.
Address.....	:	Room 401, Office Building, No. 7, Jinlong 4th Road, Baolong Community, Baolong Street, Longgang District, Shenzhen
Telephone.....	:	/
Fax.....	:	/
Factory.....	:	Shenzhen Xingan Technology Co., Ltd.
Address.....	:	Room 401, Office Building, No. 7, Jinlong 4th Road, Baolong Community, Baolong Street, Longgang District, Shenzhen
Telephone.....	:	/
Fax.....	:	/

Test Result	Positive

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

REPORT VERSION

Version No.	Issue Date	Description
01	2025.07.04	Initial Issue

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1. GENERAL INFORMATION

1.1. GENERAL DESCRIPTION OF EUT

Product Name:	MicroHuman Holographic Cabin	
TradeMark:	MicroHuman	
Test Model:	6 inches	
Additional Model(s):	/	
Model Difference:	/	
Hardware Version:	1.0	
Software Version:	1.0	
Power Supply:	AC 120V/60Hz, DC 12V 3A	
EUT Supports Function: (Provided by the customer)	2.4GHz ISM Bands:	Bluetooth V5.4
Test Sample(s) Number:	AB25060071-01 (Engineer Sample) AB25060071-02 (Normal Sample)	
Radio Specification Subject to this Report		
Bluetooth Version:	Bluetooth BDR + EDR	
Frequency Range:	2402MHz~2480MHz	
Modulation Type:	GFSK, π/4 DQPSK, 8DPSK	
Channel Spacing:	1MHz	
Channel Number(s):	79	
Antenna Type:	Internal Antenna	
Antenna Gain:	1.85dBi (Max.)	

1.2. DESCRIPTION OF SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	Supplied by
AC/DC Adapter	N/A	ZXD-1230	N/A	Applicant

1.3. DESCRIPTION OF EXTERNAL I/O

I/O Port Description	Quantity	Cable
N/A	N/A	N/A

1.4. GENERAL DESCRIPTION OF APPLIED STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247 - Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10-2013 - American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

KDB 558074 D01 15.247 Meas Guidance v05r02 - Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices operating under Section 15.247 Of the FCC Rules.

1.5. DESCRIPTION OF TEST FACILITY

Test Lab: Aibo Standard Technology (Shenzhen) Co., Ltd.

Address: 101, Building B, Tuori New Energy Industrial Park, High-tech Park, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, China
Tel.: +(86) 0755 85250797
E-mail: aibonorm@aibonorm.com
Website: www.aibonorm.com

The test facility is recognized, certified, or accredited by the following organizations:

A2LA-Lab Certificate No.: 7514.01

Aibo Standard Technology (Shenzhen) Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1411
Test Firm Registration Number: 567066
Aibo Standard Technology (Shenzhen) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromaanetic emission measurement.

ISED Wireless Device Testing Laboratories

ISED#:33924
CAB identifier: CN0185
Aibo Standard Technology (Shenzhen) Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

1.6. MEASUREMENT UNCERTAINTY

The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Items	Measurement Uncertainty
Power Line Conducted Emission (9kHz~150kHz)	±3.62dB
Power Line Conducted Emission (150kHz~30MHz)	±3.38dB
Radiated Emission (9kHz~30MHz)	±3.10dB
Radiated Emission (30MHz~1GHz)	±4.90dB
Radiated Emission (1GHz~18GHz)	±3.88dB
Radiated Emission (8GHz~40GHz)	±5.32dB
RF Conducted Power	±0.57dB
Conducted Spurious Emissions	±1.60dB
RF Frequency	$\pm 6.0 \times 10^{-7}$

Note: All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

1.7. ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	+15°C ~ +35°C
Lative Humidity	20 % ~ 75 %
Air Pressure	98KPa ~ 101KPa

1.8. DESCRIPTION OF TEST MODES

Operation Frequency List	
Channel Number	Frequency (MHz)
00	**2402**
01	2403
⋮	⋮
38	2440
39	**2441**
40	2442
⋮	⋮
77	2479
78	**2480**

For portable device, radiated emission was verified over X, Y, Z Axis, and shown the worst case in this report. The following operating modes were applied for the related test items. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data packets and antenna ports (if EUT with antenna diversity architecture), only the result of the worst case was recorded in the report.

List of Test Modes	
Test Mode(s)	Description
TM1	Keep the EUT works in continuously transmitting mode (non-hopping) with GFSK Modulation
TM2	Keep the EUT works in continuously transmitting mode (non-hopping) with π/4DQPSK Modulation
TM3	Keep the EUT works in continuously transmitting mode (non-hopping) with 8DPSK Modulation
TM4	Keep the EUT works in continuously transmitting mode (hopping) with GFSK Modulation
TM5	Keep the EUT works in continuously transmitting mode (hopping) with π/4DQPSK Modulation
TM6	Keep the EUT works in continuously transmitting mode (hopping) with 8DPSK Modulation

Power setting during the test:

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Test Software Version	V1.0		
Frequency	2402MHz	2441MHz	2480MHz
RF Power Parameter(s)	Default	Default	Default

2. SUMMARY OF TEST RESULT

FCC 47 CFR Part 15 Subpart C Test Cases			
FCC Rule	**Description of Test Item(s)**	**Result**	**Test Engineer**
Part 15.203	Antenna Requirement	Pass	Jacey Fu
Part 15.247(b)(1)	Maximum Peak Conducted Output Power	Pass	Jacey Fu
Part 15.247(a)(1)	20dB Bandwidth	Pass	Jacey Fu
Part 15.247(a)(1)	Carrier Frequencies Separation	Pass	Jacey Fu
Part 15.247(a)(1)(iii)	Number of Hopping Channel	Pass	Jacey Fu
Part 15.247(a)(1)(iii)	Time Of Occupancy (Dwell Time)	Pass	Jacey Fu
Part 15.247(d)	Conducted Spurious Emissions and Conducted Band Edges Measurement	Pass	Jacey Fu
Part 15.205, 15.209, 15.247(d)	Radiated Emissions and Radiated Band Edges Measurement	Pass	Jacey Fu
Part 15.207	Power Line Conducted Emissions	Pass	Jacey Fu
Part 15.247(i)	RF Exposure (see the RF Exposure Report)	Pass	Jacey Fu

3. MEASUREMENT INSTRUMENTS LIST

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	Loop Antenna	Schwarzbeck	FMZB 1519	1519-025	02/19/2025	02/18/2026
2	Power Amplifier	HZEMC	HPA-9K0133	HYPA23029	02/19/2025	02/18/2026
3	Broadband Antenna	Schwarzbeck	VULB 9168	01763	02/19/2025	02/18/2026
4	Attenuator	PRM	ATT50-6-3	ATT50-6-3	01/20/2025	01/19/2026
5	Spectrum Analyzer	R&S	FSV40-N	101365	01/20/2025	01/19/2026
6	Horn Antenna	Schwarzbeck	BBHA 9120 D	02786	02/19/2025	02/18/2026
7	Horn Antenna	Schwarzbeck	ZLB7-18-40G-77	072410839	02/19/2025	02/18/2026
8	Power Amplifier	HZEMC	PA0118-43	HYPA23030	02/19/2025	02/18/2026
9	Power Amplifier	HZEMC	PA01840-45	HYPA23031	02/19/2025	02/18/2026
10	EMI Test Receiver	R&S	ESCI	101196	01/20/2025	01/19/2026
11	LISN	R&S	ENV216	102374	01/20/2025	01/19/2026
12	Pulse Limiter	Schwarzbeck	ESH3-Z2	0357.8810.54	01/20/2025	01/19/2026
13	MXA Signal Analyzer	Keysight	N9020A	MY52091389	01/20/2025	01/19/2026
14	Power Sensor	Agilent	U2021XA	MY54110007	01/31/2025	01/30/2026
15	Power Sensor	Agilent	U2021XA	MY54110009	01/31/2025	01/30/2026
16	MXG Vector Signal Generator	Agilent	N5182A	MY47070153	01/20/2025	01/19/2026
17	Analog Signal Source	Keysight	N5173B	MY60403029	01/20/2025	01/19/2026
18	Vector Signal Generator	R&S	SMCV100B	106103	01/20/2025	01/19/2026
19	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	118780	01/20/2025	01/19/2026
20	DC POWER SUPPLY	MAISHENG	MT-305DS	2021040016	02/28/2025	02/27/2026
21	Const Temp. & Humidity Chamber	GRT	GR-HWX-150L	GR25010601	01/20/2025	01/19/2026

Test Software		
Software name	Model	Version
Conducted Emission Measurement Software	FASLAB	V4.1
Radiated Emission Measurement Software	FASLAB	V4.1
Bluetooth and WIFI Test System	MTS 8310	V3.0.0.0

4. ANTENNA REQUIREMENT

1) Standard Requirement

15.203 requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2) Conclusion

Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 1.85dBi (Max.). It complies with the standard requirement.

5. PSEUDORANDOM FREQUENCY HOPPING SEQUENCE

For 47 CFR Part 15C section 15.247(a)(1),(g),(h) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hop-ping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

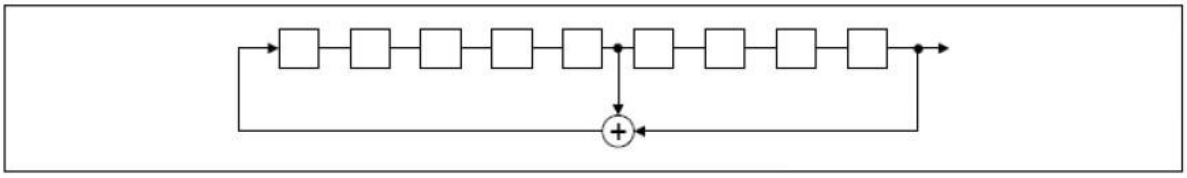
EUT Pseudorandom Frequency Hopping Sequence Requirement

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

a) Number of shift register stages: 9

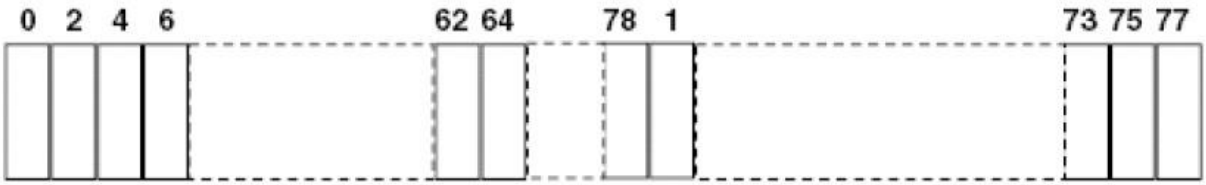
b) Length of pseudo-random sequence: 29 -1 = 511 bits

c) Longest sequence of zeros: 8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver has input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

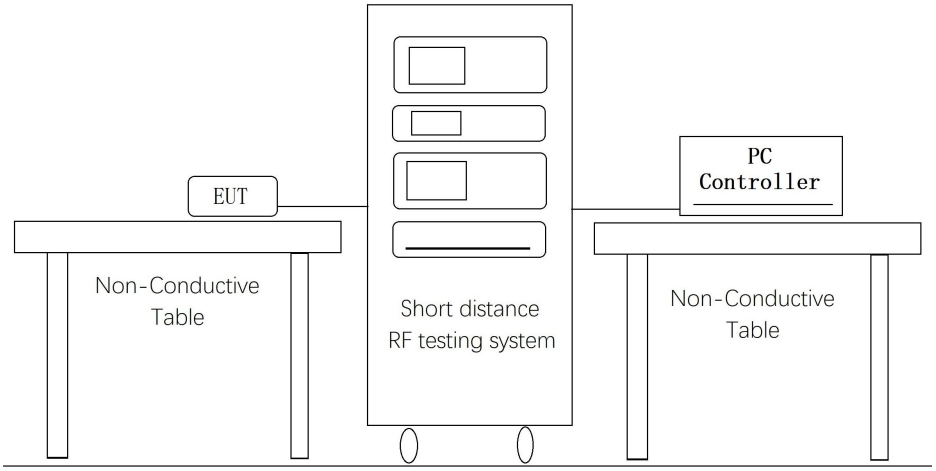
6. CONDUCTED OUTPUT POWER

6.1. LIMIT

According to 15.247(b)(1). For frequency hopping systems operating in the 2400–2483.5MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5MHz band: 0.125watts.

6.2. TEST SETUP

Using a Spectrum Analyzer for Testing:



6.3. TEST PROCEDURE

Using a Spectrum Analyzer for Testing:

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

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20dB bandwidth, centered on a hopping channel.
2) RBW > 20dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

e) A plot of the test results and setup description shall be included in the test report.

6.4. TEST RESULT

Pass.

Please refer to the Appendix B for Bluetooth (BDR/EDR) RF Conducted Test Data.

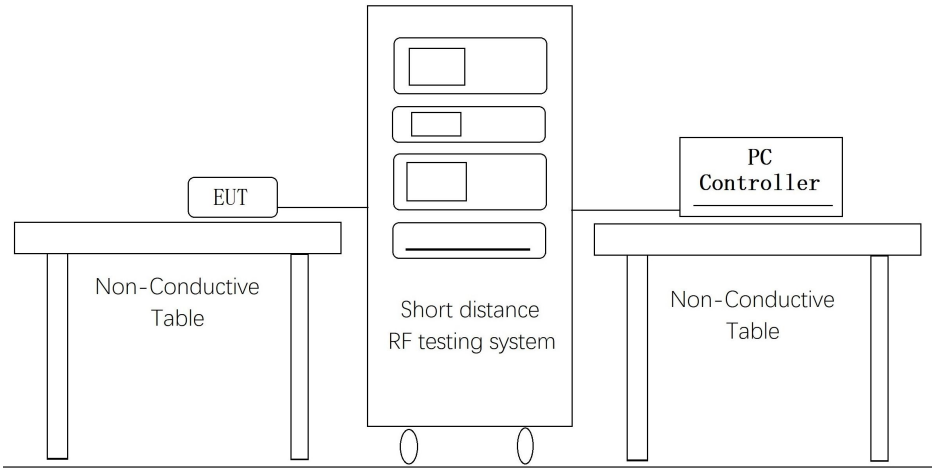
Note: The test results including the cable lose.

7. 20DB BANDWIDTH AND OCCUPIED BANDWIDTH

7.1. LIMIT

None; for reporting purposes only.

7.2. TEST SETUP



7.3. TEST PROCEDURE

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

Use the following spectrum analyzer settings:

For 20dB Bandwidth Measurement:

a) Span = approximately 2 to 5 times the OBW, centered on a hopping channel.

b) RBW = 1% to 5% of the OBW.

c) VBW ≥ 3 x RBW

d) Sweep = auto;

e) Detector function = peak

f) Trace = max hold

g) All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

For 99% Occupied Bandwidth Measurement:

a) Span = approximately 1.5 to 5 times the OBW, centered on a hopping channel.

b) RBW = 1% to 5% of the OBW.

c) VBW ≥ 3 x RBW

d) Sweep = auto;

e) Detector function = peak

f) Trace = max hold

g) Use the 99% power bandwidth function of the instrument to measure the Occupied Bandwidth and recoded.

7.4. TEST RESULT

Please refer to the Appendix B for Bluetooth (BDR/EDR) RF Conducted Test Data.

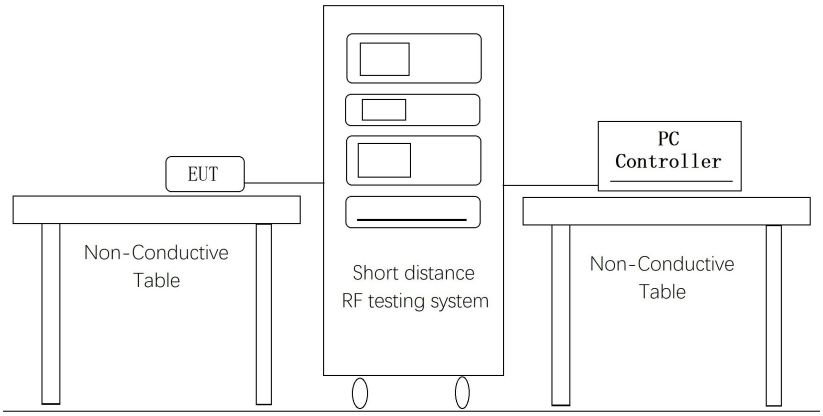
8. CARRIER FREQUENCIES SEPARATION

8.1. LIMIT

According to 15.247(a)(1), Frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

8.2. TEST SETUP



8.3. TEST PROCEDURE

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

Use the following spectrum analyzer settings:

a) Span: Wide enough to capture the peaks of two adjacent channels.

b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.

c) Video (or average) bandwidth (VBW) ≥ RBW.

d) Sweep: Auto.

e) Detector function: Peak.

f) Trace: Max hold.

g) Allow the trace to stabilize.

h) Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

8.4. TEST RESULT

Pass.

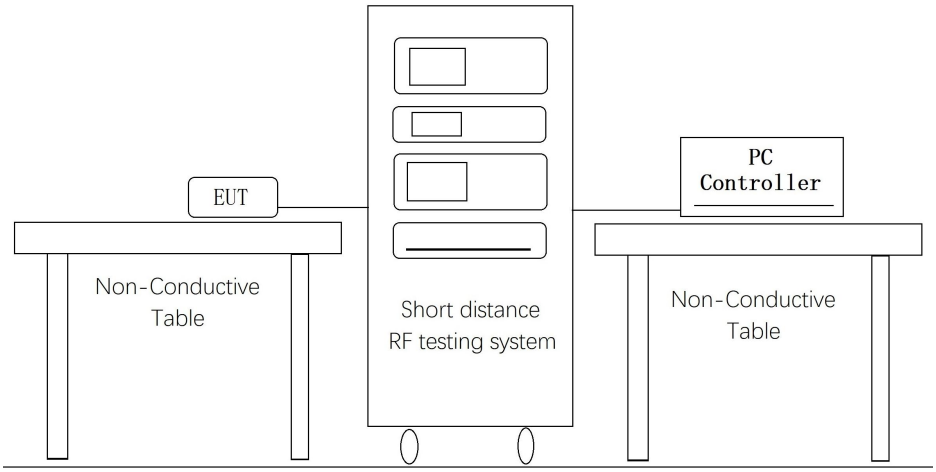
Please refer to the Appendix B for Bluetooth (BDR/EDR) RF Conducted Test Data.

9. NUMBER OF HOPPING CHANNEL

9.1. LIMIT

According to 15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 non-overlapping channels.

9.2. TEST SETUP



9.3. TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:
a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW < 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.

9.4. TEST RESULT

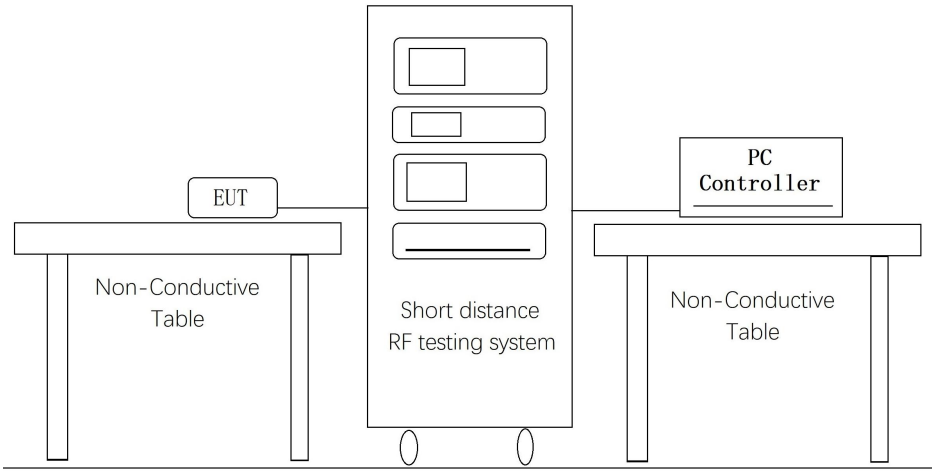
Pass.
Please refer to the Appendix B for Bluetooth (BDR/EDR) RF Conducted Test Data.

10. TIME OF OCCUPANCY (DWELL TIME)

10.1. LIMIT

According to 15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

10.2. TEST SETUP



10.3. TEST PROCEDURE

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

Use the following spectrum analyzer settings:

a) Set center frequency of Spectrum Analyzer = operating frequency. Spectrum Setting: RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak.

b) Use video trigger with the trigger level set to enable triggering only on full pulses.

c) Sweep Time is more than once pulse time.

d) Set the center frequency on any frequency would be measure and set the frequency span to zero span.

e) Measure the maximum time duration of one single pulse.

f) Set the EUT for packet transmitting.

g) Measure the maximum time duration of one single pulse.

h) The EUT was set to the Hopping Mode for Dwell Time Test.

10.4. TEST RESULT

Pass.

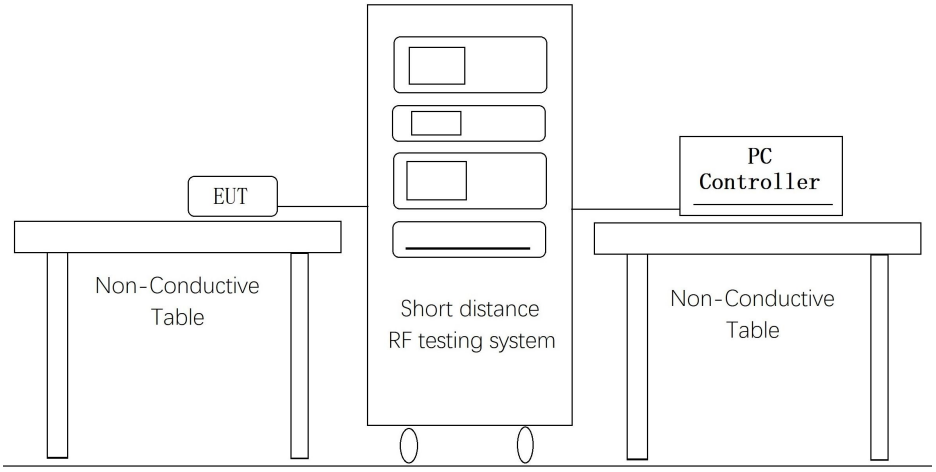
Please refer to the Appendix B for Bluetooth (BDR/EDR) RF Conducted Test Data.

11. CONDUCTED SPURIOUS EMISSIONS AND CONDUCTED BAND EDGES MEASUREMENT

11.1. LIMIT

According to §15.247(d), In any 100kHz 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 20dB below that in the 100kHz 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 30dB instead of 20dB. 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)).

11.2. TEST SETUP



11.3. TEST PROCEDURE

a) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
b) Set the spectrum analyzer to any one measured frequency within its operating range.
c) Set RBW = 100kHz, VBW = 300kHz, Sweep = Auto, Detector = Peak.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level.
e) Set a convenient frequency span including 100 kHz bandwidth from band edge. Measure the emission and marking the edge frequency.
f) Measure the spurious emissions with frequency range from 9kHz to 26.5GHz.

11.4. TEST RESULT

Pass.

Please refer to the Appendix B for Bluetooth (BDR/EDR) RF Conducted Test Data.

12. RADIATED EMISSIONS AND RADIATED BAND EDGES MEASUREMENT

12.1. LIMIT

According to §15.247(d), 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)).

Limits of Spurious Emissions				
Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz~0.490MHz	2400/F(kHz)	---	---	300
0.490MHz~1.705MHz	24000/F(kHz)	---	---	30
1.705MHz~30MHz	30	---	---	30
30MHz~88MHz	100	40.0	Quasi-peak	3
88MHz~216MHz	150	43.5	Quasi-peak	3
216MHz~960MHz	200	46.0	Quasi-peak	3
960MHz~1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Remark:

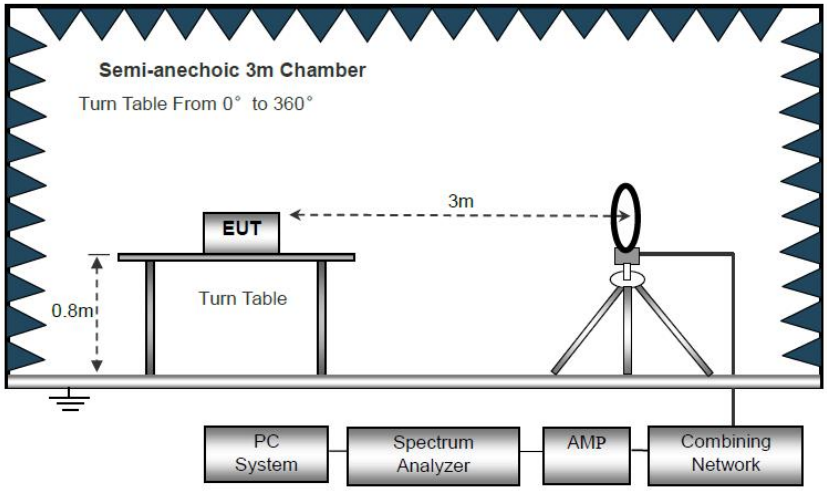
a) The lower limit shall apply at the transition frequencies.

b) Emission level (dBuV/m) = 20*log Emission level (uV/m).

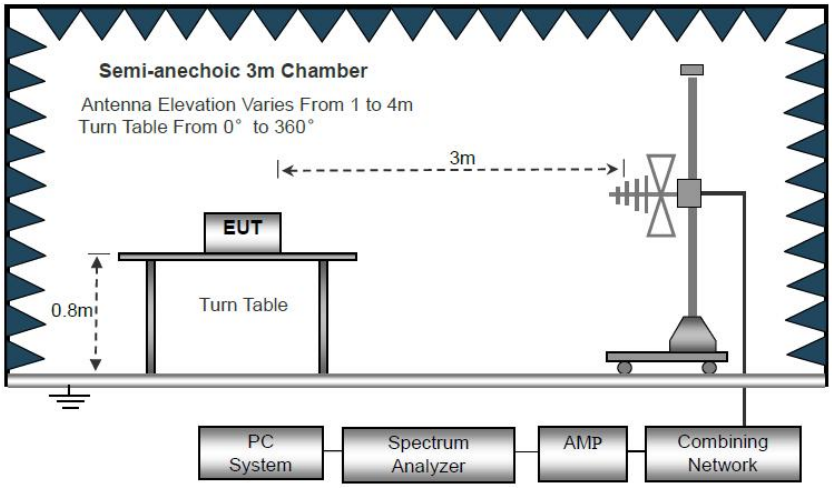
c) For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

d) Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

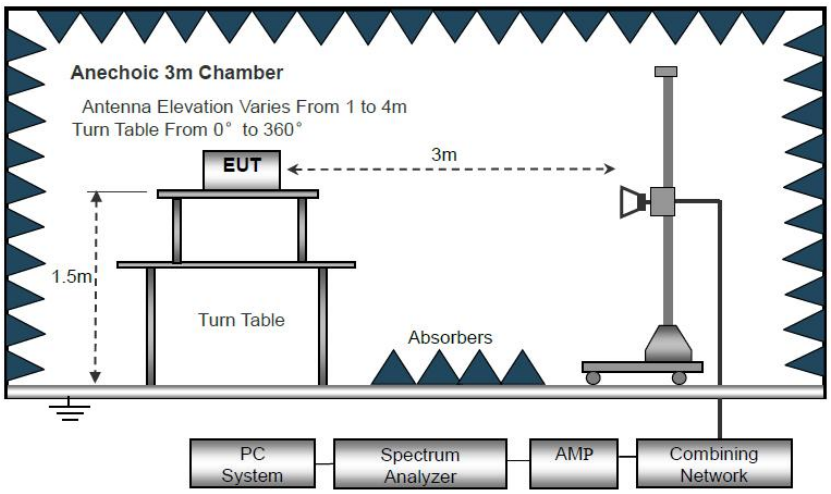
12.2. TEST SETUP



Block Diagram of Radiated Emission Below 30MHz



Block Diagram of Radiated Emission From 30MHz to 1GHz



Block Diagram of Radiated Emission Above 1GHz

12.3. TEST PROCEDURE

a) Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
b) Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0 degree to 360 degree to acquire the highest emissions from EUT.
c) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
d) Repeat above procedures until all frequency measurements have been completed.
e) Radiated emission test frequency band from 9KHz to 25GHz.
f) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and record the worst case in this report.
g) The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz~30MHz	Active Loop Antenna	3
30MHz~1GHz	Bilog Antenna	3
1GHz~18GHz	Horn Antenna	3
18GHz~25GHz	Horn Anternna	1

h) Setting test receiver/spectrum as following table states:

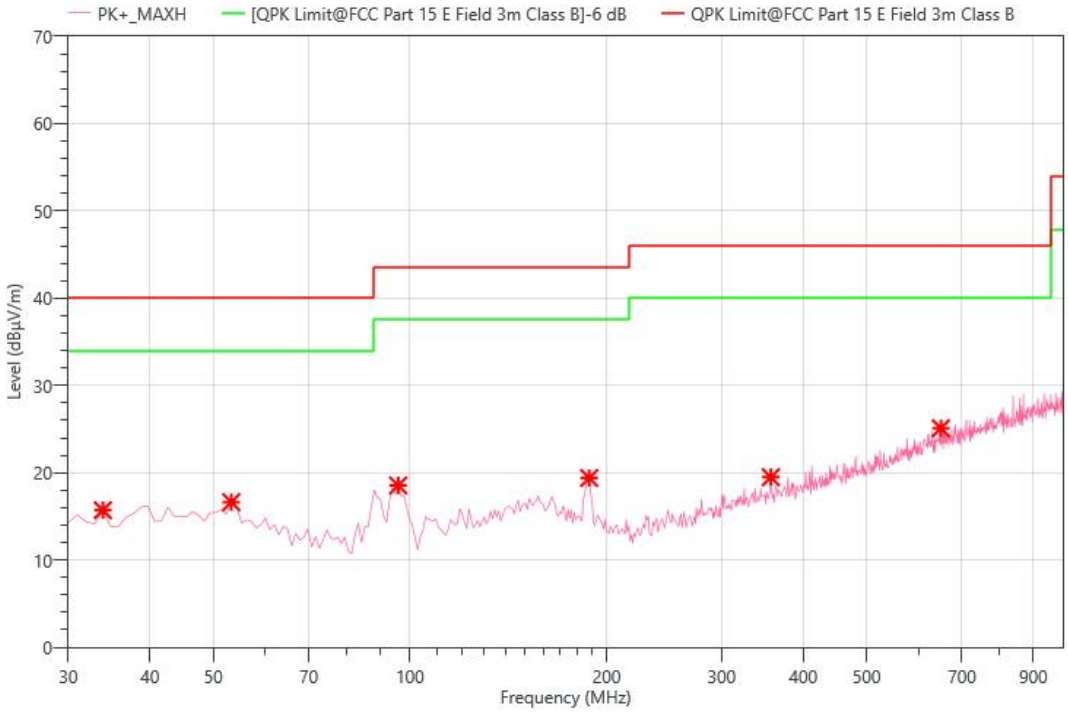
Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz~150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz~30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz~1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz~40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

12.4. TEST RESULT

Pass.

Remark:
a) Pre-scan all modes and recorded the worst case in this report.
b) Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and the emission levels from 9kHz to 30MHz are attenuated 20dB below the limit and not recorded in report.
c) All of the DH5, 2DH5 and 3DH5 modes have been tested, the EUT complied with the FCC Part 15.209 standard limit for a wireless device, and with the worst case DH5 2402 MHz as below:

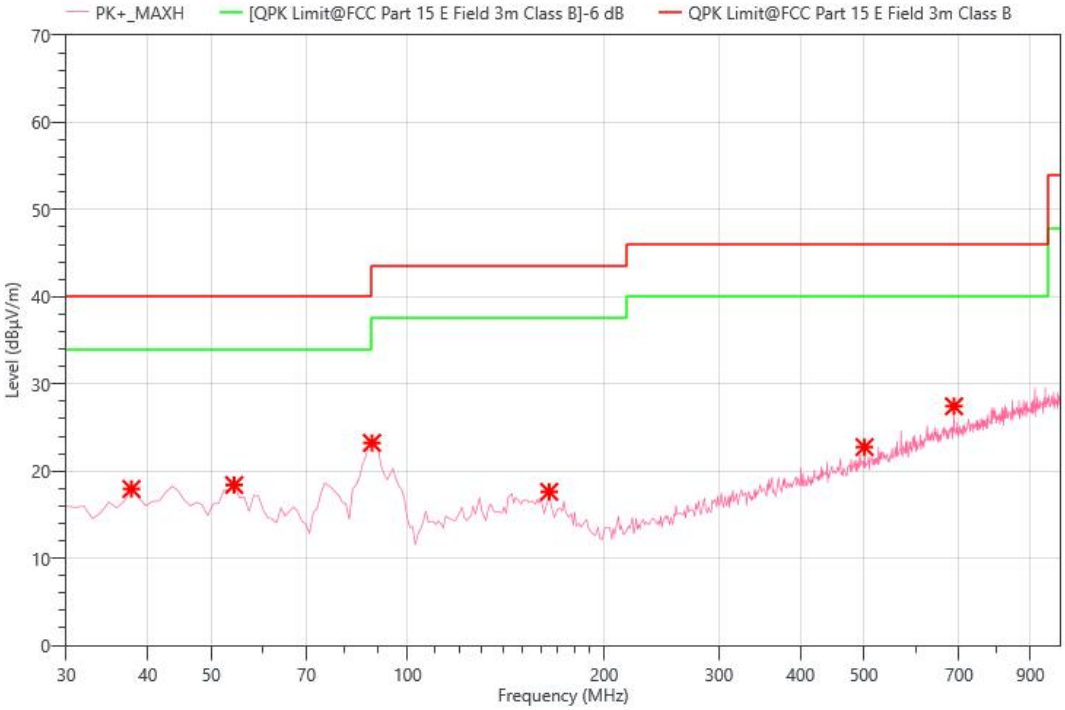
Radiated Emission Test Data (30MHz to 1GHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Worst Test Mode:	TM1(GFSK_2402MHz)	Polarity:	Horizontal



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	33.880	29.37	-13.66	15.71	40.00	24.29	PK+	H
2	53.280	30.20	-13.57	16.63	40.00	23.37	PK+	H
3	95.960	35.22	-16.68	18.54	43.50	24.96	PK+	H
4	188.110	34.47	-15.07	19.40	43.50	24.10	PK+	H
5	356.890	30.31	-10.82	19.49	46.00	26.51	PK+	H
6	649.830	29.46	-4.37	25.09	46.00	20.91	PK+	H

Remark:
Emission Level = Reading + Factor;
Factor = Antenna Factor + Cable Loss – Pre-amplifier;
Margin= Emission Level - Limit.

Radiated Emission Test Data (30MHz to 1GHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Worst Test Mode:	TM1(GFSK_2402MHz)	Polarity:	Vertical



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	37.760	31.09	-13.15	17.94	40.00	22.06	PK+	V
2	54.250	31.98	-13.58	18.40	40.00	21.60	PK+	V
3	88.200	40.44	-17.21	23.23	43.50	20.27	PK+	V
4	164.830	29.99	-12.37	17.62	43.50	25.88	PK+	V
5	501.420	30.32	-7.57	22.75	46.00	23.25	PK+	V
6	687.660	31.33	-3.89	27.44	46.00	18.56	PK+	V

Remark:
Emission Level = Reading + Factor;
Factor = Antenna Factor + Cable Loss – Pre-amplifier;
Margin= Emission Level - Limit.

Radiated Emission Test Data (Above 1GHz)							
Environmental Conditions		24.6℃, 53.4% RH		Test Engineer		Jacey Fu	
Lowest Channel (Worst Case: GFSK_2402MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
4804	61.44	-6.95	54.49	74	-19.51	PEAK	H
4804	51.22	-6.95	44.27	54	-9.73	AVG	H
7206	60.15	-3.27	56.88	74	-17.12	PEAK	H
7206	47.11	-3.27	43.84	54	-10.16	AVG	H
4804	59.98	-6.35	53.63	74	-20.37	PEAK	V
4804	49.52	-6.35	43.17	54	-10.83	AVG	V
7206	58.52	-1.27	57.25	74	-16.75	PEAK	V
7206	39.23	-1.27	37.96	54	-16.04	AVG	V
Middle Channel (Worst Case: GFSK_2441MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
4880	70.44	-8.29	62.15	74	-11.85	PEAK	H
4880	51.32	-8.29	43.03	54	-10.97	AVG	H
7320	56.61	-1.19	55.42	74	-18.58	PEAK	H
7320	52.35	-1.19	51.16	54	-2.84	AVG	H
4880	54.9	-7.91	46.99	74	-27.01	PEAK	V
4880	45.07	-7.91	37.16	54	-16.84	AVG	V
7320	57.45	-3.34	54.11	74	-19.89	PEAK	V
7320	45.71	-3.34	42.37	54	-11.63	AVG	V
Highest Channel (Worst Case: GFSK_2480MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
4960	62.07	-6.55	55.52	74	-18.48	PEAK	H
4960	53.54	-6.55	46.99	54	-7.01	AVG	H
7440	47.09	-2	45.09	74	-28.91	PEAK	H
7440	36.85	-2	34.85	54	-19.15	AVG	H
4960	62.85	-7.32	55.53	74	-18.47	PEAK	V
4960	44.41	-7.32	37.09	54	-16.91	AVG	V
7440	52.89	-1.33	51.56	74	-22.44	PEAK	V
7440	39.89	-1.33	38.56	54	-15.44	AVG	V

Remark:
Emission Level = Reading + Factor;
Factor = Antenna Factor + Cable Loss – Pre-amplifier;
Margin= Emission Level - Limit.

Radiated Band Edges Test Data							
Environmental Conditions		24.6℃, 53.4% RH		Test Engineer		Jacey Fu	
Lowest Channel (Worst Case: GFSK_2402MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
2310	57.52	-13.61	47.29	74	-26.71	PEAK	H
2310	43.4	-13.61	31.03	54	-22.97	AVG	H
2390	59.63	-13.48	44.64	74	-29.36	PEAK	H
2390	42.65	-13.48	25.77	54	-28.23	AVG	H
2400	64.77	-13.4	54.8	74	-19.2	PEAK	H
2400	50.83	-13.4	37.23	54	-16.77	AVG	H
2310	57.1	-13.61	42.02	74	-31.98	PEAK	V
2310	45.76	-13.61	33.56	54	-20.44	AVG	V
2390	63.44	-13.48	50.68	74	-23.32	PEAK	V
2390	38.44	-13.48	26.78	54	-27.22	AVG	V
2400	60.22	-13.4	45.18	74	-28.82	PEAK	V
2400	44.91	-13.4	29.24	54	-24.76	AVG	V
Highest Channel (Worst Case: GFSK_2480MHz)							
Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (PEAK/AVG)	Polar (H/V)
2483.5	68.6	-13.36	56.62	74	-17.38	PEAK	H
2483.5	46.74	-13.36	38.03	54	-15.97	AVG	H
2500	59.31	-12.45	44.81	74	-29.19	PEAK	H
2500	42.82	-12.45	28.84	54	-25.16	AVG	H
2483.5	63.47	-13.36	46.82	74	-27.18	PEAK	V
2483.5	50.29	-13.36	38.7	54	-15.3	AVG	V
2500	59.18	-12.45	50.63	74	-23.37	PEAK	V
2500	41.31	-12.45	31.39	54	-22.61	AVG	V

Remark:
Emission Level = Reading + Factor;
Factor = Antenna Factor + Cable Loss – Pre-amplifier;
Margin= Emission Level - Limit.

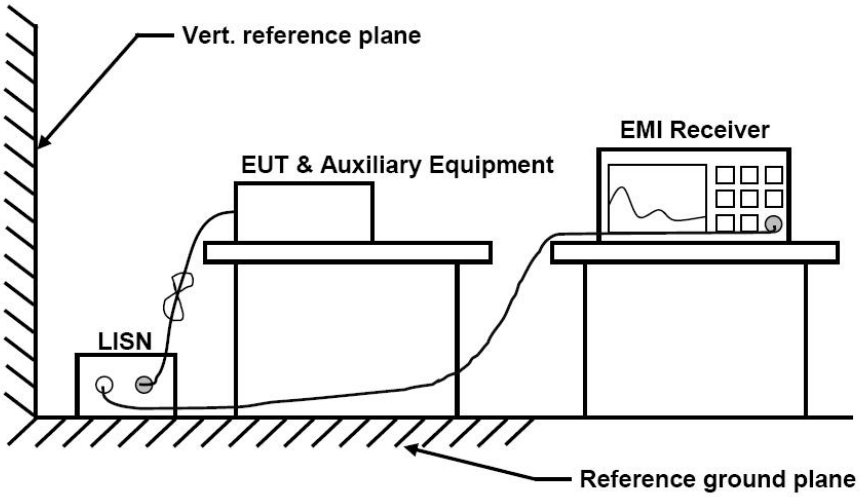
13. POWER LINE CONDUCTED EMISSIONS

13.1. LIMIT

According to the rule FCC Part 15.207, Conducted emissions limit, the limit for a wireless device as below:

Frequency Range (MHz)	Conducted emissions (dBuV)	
	Quasi-peak	Average
0.15~0.5	66 to 56	56 to 46
0.5~5	56	46
5~30	60	50
Remark: a) The lower limit shall apply at the transition frequencies. b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50MHz.		

13.2. TEST SETUP



13.3. TEST PROCEDURE

Test frequency range :150KHz-30MHz

a) The mains terminal disturbance voltage test was conducted in a shielded room.

b) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

c) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

d) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from

the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

e) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

13.4. TEST RESULT

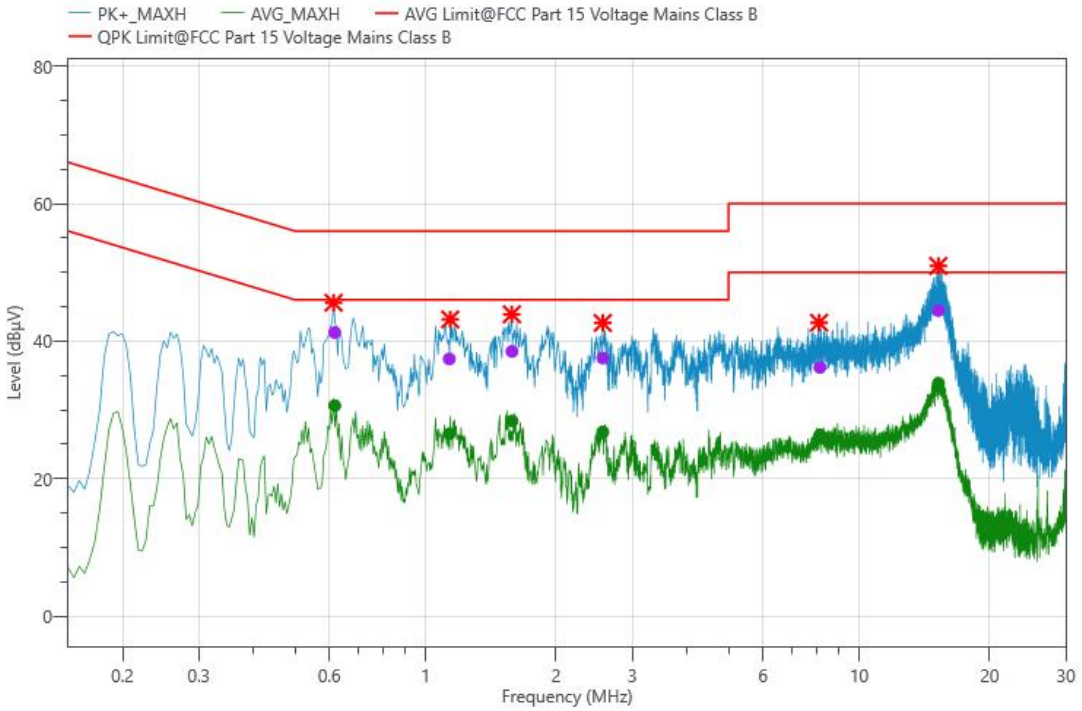
Pass.

Remark:

a) AC Power line conducted emissions pre-test both at AC 120V/60Hz and AC 240V/50Hz modes, recorded worst case.

b) Worst-case mode and channel used for 150KHz~30MHz power line conducted emissions was determined to be GFSK 2402MHz mode .

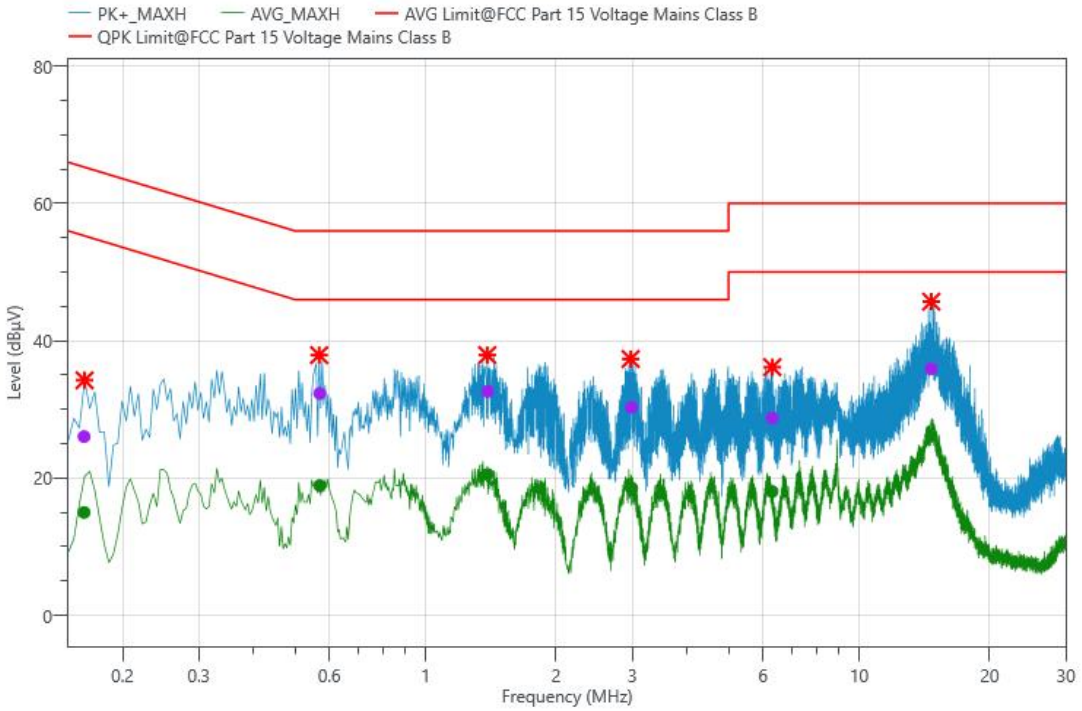
Test Plots and Data of Conducted Emissions (Worst Case: GFSK_2402MHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Test Voltage:	AC 120V/60Hz	Test Power Line:	Live



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	PE
1	0.617	31.25	10	41.25	56.00	14.75	QPK	L1	GND
2	0.617	20.61	10	30.61	46.00	15.39	AVG	L1	GND
3	1.134	27.39	10.01	37.40	56.00	18.60	QPK	L1	GND
4	1.134	16.51	10.01	26.52	46.00	19.48	AVG	L1	GND
5	1.582	28.48	10.02	38.50	56.00	17.50	QPK	L1	GND
6	1.582	18.36	10.02	28.38	46.00	17.62	AVG	L1	GND
7	2.563	27.50	10.03	37.53	56.00	18.47	QPK	L1	GND
8	2.563	16.74	10.03	26.77	46.00	19.23	AVG	L1	GND
9	8.120	25.53	10.64	36.17	60.00	23.83	QPK	L1	GND
10	8.120	15.71	10.64	26.35	50.00	23.65	AVG	L1	GND
11	15.239	30.80	13.64	44.44	60.00	15.56	QPK	L1	GND
12	15.239	20.22	13.64	33.86	50.00	16.14	AVG	L1	GND

Remark:
Emission Level = Reading + Correct Factor;
Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Attenuation Factor
Margin= Emission Level - Limit.

Test Plots and Data of Conducted Emissions (Worst Case: GFSK_2402MHz)			
Environmental Conditions	24.6℃, 53.4% RH	Test Engineer	Jacey Fu
Test Voltage:	AC 120V/60Hz	Test Power Line:	Neutral



No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	PE
1	0.163	16.06	9.99	26.05	65.31	39.26	QPK	N	GND
2	0.163	5.01	9.99	15.00	55.31	40.31	AVG	N	GND
3	0.570	22.34	9.99	32.33	56.00	23.67	QPK	N	GND
4	0.570	8.93	9.99	18.92	46.00	27.08	AVG	N	GND
5	1.390	22.61	10.01	32.62	56.00	23.38	QPK	N	GND
6	1.390	10.53	10.01	20.54	46.00	25.46	AVG	N	GND
7	2.986	20.26	10.04	30.30	56.00	25.70	QPK	N	GND
8	2.986	8.51	10.04	18.55	46.00	27.45	AVG	N	GND
9	6.297	18.65	10.09	28.74	60.00	31.26	QPK	N	GND
10	6.297	7.96	10.09	18.05	50.00	31.95	AVG	N	GND
11	14.661	22.42	13.49	35.91	60.00	24.09	QPK	N	GND
12	14.661	12.63	13.49	26.12	50.00	23.88	AVG	N	GND

Remark:
Emission Level = Reading + Correct Factor;
Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Attenuation Factor
Margin= Emission Level - Limit.

14. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files for Test Setup Photos of the EUT.

15. EXTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

16. INTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

**********THE END**********