


<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>CN20B0HZ 001</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	168292414	Seite 1 von 25 <i>Page 1 of 25</i>	
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	2020-11-26		
<b>Auftraggeber:</b> <i>Client:</i>	<b>Magnum Brands Ltd</b> Unit L, Braintree Industrial Estate, Braintree Road HA4 0EJ, Ruislip London, United Kingdom				
<b>Prüfgegenstand:</b> <i>Test item:</i>	True Wireless Earphones				
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	TWSEBWHV2PRM, TWSEBBKV2PRM, TWSEBWHV2PRM-FOB, TWSEBBKV2PRM-FOB, WD-PM03 (Trademark: Primark)				
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	FCC approval				
<b>Prüfgrundlage:</b> <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart B Section 15.107 CFR47 FCC Part 15: Subpart B Section 15.109				
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2020-11-26	Please refer to photo documents			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A002954830-001				
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2020-11-26 - 2020-12-23				
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass				
<b>geprüft von:</b> <i>tested by:</i>	 Ryan G. H. Yang	<b>genehmigt von:</b> <i>authorized by:</i>	 Winnie Hou		
<b>Datum:</b> <i>Date:</i>	2021-01-14	<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2021-01-14		
<b>Stellung / Position</b>	Assistant Project Manager	<b>Stellung / Position</b>	Technical Certifier		
<b>Sonstiges / Other:</b>	FCC ID: 2AXUXTWSEBV2				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
Legend:	1 = very good P(ass) = passed a.m. test specifications(s)	2 = good F(ail) = failed a.m. test specifications(s)	3 = satisfactory F(ail) = failed a.m. test specifications(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>					
<i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

v05

## **Test Summary**

**5.1.1 ANTENNA REQUIREMENT***RESULT: Pass***5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER***RESULT: Pass***5.1.3 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH***RESULT: Pass***5.1.4 RADIATED SPURIOUS EMISSION***RESULT: Pass***5.1.5 20dB BANDWIDTH***RESULT: Pass***5.1.6 CARRIER FREQUENCY SEPARATION***RESULT: Pass***5.1.7 NUMBER OF HOPPING FREQUENCY***RESULT: Pass***5.1.8 TIME OF OCCUPANCY***RESULT: Pass***5.1.9 CONDUCTED EMISSION ON AC MAINS***RESULT: Pass***5.1.10 RADIATED EMISSION***RESULT: Pass*

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# 1 General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of Bluetooth(BDR and EDR)

Appendix C: Test Results of Part 15B

## 2 Test Sites

### 2.1 Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

FCC accredited testing laboratory: CN1260

ISED wireless device testing laboratory: 25069

### 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**
**TÜV Rheinland (Shenzhen) Co., Ltd.**

<b>Unwanted Emission Testing (TS9975)</b>				
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Cal. until</b>
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
Signal Analyzer	R&S	FSV 40	101439	2021-08-10
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2021-08-10
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Amplifier	R&S	SCU-18F	180070	2021-08-10
Amplifier	R&S	SCU40A	100475	2021-09-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2021-09-02
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06

<b>Conducted Emission</b>				
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Cal. Until</b>
EMI Test Receiver	R&S	ESR3	102680	2021-05-19
Artificial Mains Network	R&S	ENV216	101445	2021-05-19
<b>Radiated Emission</b>				
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Cal. Until</b>
Horn Antenna	R&S	HF907	102706	2022-08-07
Preamplifier	FIT	SCU-18F	180077	2021-08-16
Active magnetic loop antenna	SCHWARZBECK	FMZB1519B	00080	2021-08-20
Trilog-Broadband antenna	SCHWARZBECK	VULB9168	0945	2021-12-08

## 2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

<b>Parameter</b>	<b>Uncertainty</b>
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	$\pm 2.5$ dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	$\pm 6$ dB
Radiated Emission of Receiver, valid up to 26.5 GHz	$\pm 6$ dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	$\pm 3.70$ dB / $\pm 3.30$ dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	$\pm 4.52$ dB
Radiated Emission (3m SAC), above 1000MHz	$\pm 4.37$ dB
Temperature	$\pm 1$ °C
Humidity	$\pm 5$ %
Voltage (DC)	$\pm 1$ %
Voltage (AC, <10kHz)	$\pm 2$ %

## 2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

## 2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

### 3 General Product Information

#### 3.1 Product Function and Intended Use

The products are Wireless Earphones which consists of a left earphone, a right earphone and a charging case, both of left and right earphones support Bluetooth 5.0 technology.

According to the declaration of the applicant, the left earphone and right earphone are identical except the antenna position, and all models are totally identical except mode number.

For details refer to the User Manual, Technical Description and Circuit Diagram.

#### 3.2 Ratings and System Details

**Table 2: Technical Specification of EUT**

General Information of EUT	Value
Kind of Equipment	True Wireless Earphones
Type Designation	TWSEBWHV2PRM, TWSEBBKV2PRM, TWSEBWHV2PRM-FOB, TWSEBBKV2PRM-FOB, WD-PM03
Trademark	Primark
FCC ID	2AXUXTWSEBV2
Operating Voltage	DC 3.7V@40mAh via internal battery for earphone DC 3.7V@200mAh via internal battery for charging case DC 5.0V via micro USB port for charging case
Testing Voltage	Fully charged battery for Part 15C AC 120V@60Hz for Part 15B
Battery of Earphone	Model: JD501012 DC 3.7V@40mAh li-ion battery
Battery of Charging Case	Model: JD 502030 DC 3.7V@200mAh li-ion battery
Technical Specification of Bluetooth (BR/EDR)	
Operating Frequency	2400 MHz to 2483.5 MHz
Type of Modulation	GFSK, (π/4)DQPSK, 8DPSK
Channel Number	79 channels
Channel Separation	1MHz
Antenna Type	Internal antenna
Antenna Gain	1.75 dBi

**Table 3: Operating Frequencies/Channels of EUT**

Operating Mode	Description
Bluetooth®	<input checked="" type="checkbox"/> BDR/EDR $f_c = 2402 + k$ MHz, where $k = 0 \sim 78$ <input type="checkbox"/> Low Energy $f_c = 2402 + k*2$ MHz, where $k = 0 \sim 39$



**Table 4: Frequency Hopping Information**

Technical Specification	Description
Hopping Range	Hereby we declare that the frequency range of this device is: 2402-2480MHz. This is according the Bluetooth Core Specification V5.0 + EDR for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04-E).
Hopping Sequence	Example of a 79 hopping sequence in data mode:  33,04,21,44,23,42,53,46,55,48,40,59,72,29,76,31,08,73,07,75,09,45,60,39,58,13,47,11,77,52,35,50,65,54,67,56,69,62,71,64, 7,25,27,66,57,70,74,61,78,63,10,41,05,43,15,44,64,68,02,70,06,01,51,03,55,05,03,66,53,49,36,47,
Receiver input bandwidth	<p>The input bandwidth of the receiver is 1MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master.</p> <p>Additionally the type of connection is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.</p> <p>Repeating of a packer has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case.</p> <p>That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.</p>

### 3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth transmitting mode (for earphone)
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- B. On, Transmitting on Hopping channel (for earphone)
- C. On, Bluetooth connecting mode (for earphone)
- D. On, Charging mode (for earphone)
- E. On, Charging mode (for charging case)
- F. Off

### **3.4 Noise Generating and Noise Suppressing Parts**

Refer to Circuit Diagram for further details.

### **3.5 Submitted Documents**

- ID Label and Location Info

- User Manual

## 4 Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

**Radio Spectrum:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

According to clause 3.1, all conducted tests were performed on model TWSEBWHV2PRM(right earphone) and the radiated tests were performed on model TWSEBWHV2PRM(left and right earphone) in this report.

Pre-test the product in transmitting mode in different modulation types with different data packages, reported the worst case on BDR(DH5) and EDR(3DH5) mode.

Note: When the EUT is charged, other functions cannot be used.

**Table 5: List of Frequencies under Test**

<input checked="" type="checkbox"/> Bluetooth				
Operation mode	Frequencies under Test (MHz)			Power Level setting (dBm)
	CH <sub>Low</sub>	CH <sub>Mid</sub>	CH <sub>High</sub>	
<input checked="" type="checkbox"/> BDR/EDR	2402.0	2441.0	2480.0	10.0

### 4.3 Special Accessories and Auxiliary Equipment

Table 6: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	T480	PF-16A6N8	N/A
AD/DC adapter	Huawei	HW-050200C02	N/A	Input: 100-240V, 50/60Hz, 0.6A Output: 5V@2A

### 4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

## 4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

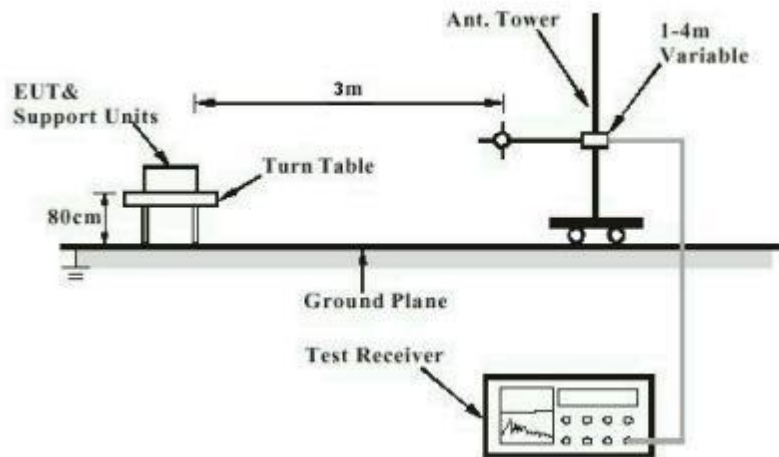


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

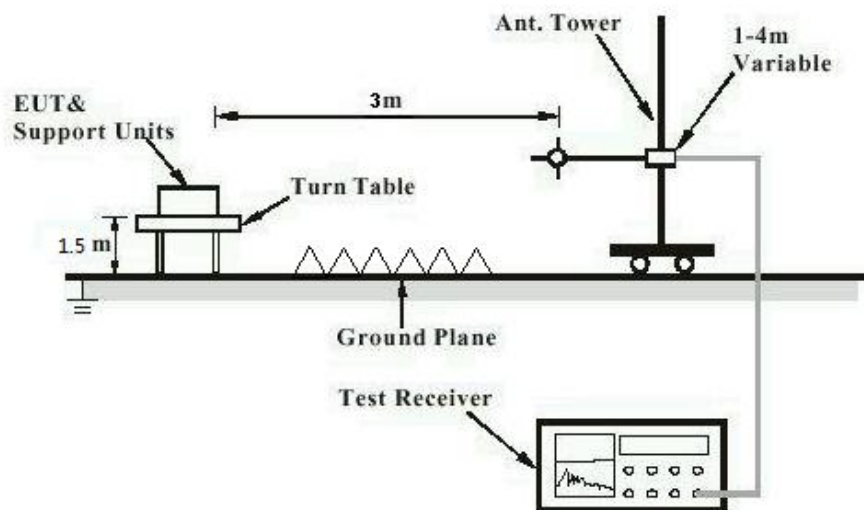


Diagram of Measurement Configuration for Mains Conduction Measurement

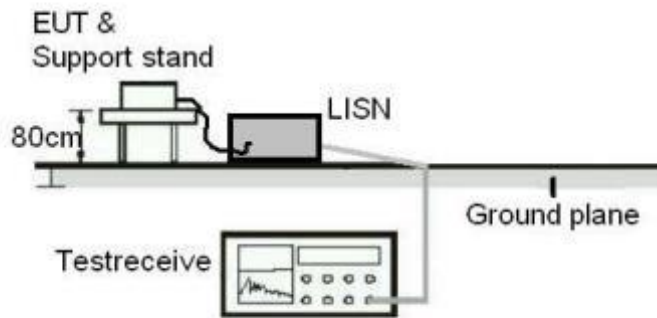
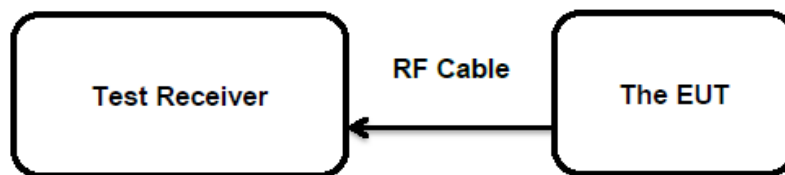


Diagram of Measurement Configuration for Conducted Transmitter Measurement



## 5 Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

**RESULT:**

**Pass**

**Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 1.75 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

### 5.1.2 Maximum Peak Conducted Output Power

**RESULT:**
**Pass**
**Test Specification**

Test standard : FCC Part 15.247(b)(1)  
 Basic standard : ANSI C63.10: 2013  
 Limits : DSS < 0.125 Watts  
 Kind of test site : Shielded Room

**Test Setup**

Date of testing : 2020-12-17  
 Input voltage : Fully charged battery  
 Operation mode : A  
 Test channel : Low / Middle / High  
 Ambient temperature : 25 °C  
 Relative humidity : 56 %  
 Atmospheric pressure : 101 kPa

**Table 7: Test Result of Maximum Peak Conducted Output Power**

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
GFSK	2402.0	-2.90	0.0005	< 0.125
	2441.0	-2.80	0.0005	
	2480.0	-3.60	0.0004	
<b>Maximum Measured Value</b>		-2.80	0.0005	

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
8DPSK	2402.0	-3.10	0.0005	< 0.125
	2441.0	-2.70	0.0005	
	2480.0	-3.50	0.0004	
<b>Maximum Measured Value</b>		-2.70	0.0005	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 1.75 dBi,  
 The Maximum peak conducted output power (e.i.r.p.)= $P_{(\text{Peak power})} + G$ , which is far below the 4 W



### 5.1.3 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d)
Basic standard	: ANSI C63.10: 2013
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2020-12-17
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

### 5.1.4 Radiated Spurious Emission

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d) & FCC Part 15.205
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	: 3m Semi-anechoic Chamber

**Test Setup**

Date of testing	: Refer to test result
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 22 °C
Relative humidity	: 54 %
Atmospheric pressure	: 101 kPa

**Remark:**

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

### 5.1.5 20dB Bandwidth

**RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.247(a)(1)  
Basic standard : ANSI C63.10: 2013  
Kind of test site : Shielded Room

**Test Setup**

Date of testing : 2020-12-17  
Input voltage : Fully charged battery  
Operation mode : A  
Test channel : Low / Middle / High  
Ambient temperature : 25 °C  
Relative humidity : 56 %  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

### 5.1.6 Carrier Frequency Separation

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(a)(1)
Basic standard	: ANSI C63.10: 2013
Limits	: $\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth, whichever is greater
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2020-12-17
Input voltage	: Fully charged battery
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

### 5.1.7 Number of Hopping Frequency

**RESULT:****Pass****Test Specification**

Test standard : FCC part 15.247(a)(1)(iii)  
Basic standard : ANSI C63.10: 2013  
Limits :  $\geq 15$  non-overlapping channels  
Kind of test site : Shielded Room

**Test Setup**

Date of testing : 2020-12-17  
Input voltage : Fully charged battery  
Operation mode : B  
Ambient temperature : 25 °C  
Relative humidity : 56 %  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

### 5.1.8 Time of Occupancy

**RESULT:****Pass****Test Specification**

Test standard	: FCC part 15.247(a)(1)(iii)
Basic standard	: ANSI C63.10: 2013
Limits	: < 0.4s
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2020-12-17
Input voltage	: Fully charged battery
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Note:

Dwell time = Pulse width x Number of channels in Period

Period = 0.4 (seconds/ channel) x 79 (channel) = 31.6 seconds

For the measurement records, refer to the appendix B.

### 5.1.9 Conducted Emission on AC Mains

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.107(a)
Basic standard	: ANSI C63.4: 2014
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.107(a)
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2020-12-16
Input voltage	: AC 120V@60Hz
Operation mode	: D, E
Earthing	: Not connected
Ambient temperature	: 22 °C
Relative humidity	: 64 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix C.

## 5.1.10 Radiated Emission

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.109(a)
Basic standard	: ANSI C63.4: 2014
Frequency range	: 30 - 6000MHz
Classification	: Class B
Limits	: FCC Part 15.109(a)
Kind of test site	: 3m Semi-anechoic Chamber

**Test Setup**

Date of testing	: 2020-12-17
Input voltage	: AC 120V@60Hz
Operation mode	: D, E
Earthing	: Not connected
Ambient temperature	: 24 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix C.



## 6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

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