

Prüfbericht-Nr.: <i>Test report No.:</i>	50082040 001	Auftrags-Nr.: <i>Order No.:</i>	164086861	Seite 1 von 26 Page 1 of 26
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	632551	Auftragsdatum: <i>Order date.:</i>	01.03.2017	
Auftraggeber: <i>Client:</i>	THUMBS UP(UK) LTD Unit L, Braintree Industrial Estate, Braintree Road HA4 0EJ, Ruislip, LONDON, United Kingdom			
Prüfgegenstand: <i>Test item:</i>	Platinum Bluetooth Speaker			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	BTSPKA8MSPRM, BTSPKA8TGPRM			
Auftrags-inhalt: <i>Order content:</i>	FCC Approval			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15.247 CFR47 FCC Part 15.207 CFR47 FCC Part 15.209 CFR47 FCC Part 2.1093			
Wareneingangsdatum: <i>Date of receipt:</i>	01.03.2017	Please refer to photo documents		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000520523-002 A000520523-003			
Prüfzeitraum: <i>Testing period:</i>	01.03.2017 - 14.04.2017			
Ort der Prüfung: <i>Place of testing:</i>	Shenzhen Accurate Technology Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
 26.04.2017 Yinghua Suo / Assistant Project Manager		 26.04.2017 Owen Tian / Technical Certifier		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
Sonstiges / Other:				
FCC ID: 2AHHEBTSPKA8PRM.				
All the identification no. are identical in the hardware and electrical aspects with each other serving as marketing strategy.				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>		
*Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested				
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. <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>				

V04

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

6.1.1 Electromagnetic Fields

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: Test Results of Bluetooth 2.1+ EDR of Conducted Testing

Appendix B: Test Results of Bluetooth 2.1+ EDR of Radiated Emission and AC Conducted Emission

2 Test Sites

2.1 Test Facilities

Shenzhen Accurate Technology Co., Ltd.

F1, Bldg. A, Changyuan New Meterial Port, Keyuan Rd., Science & Industry Park Nanshan District,
Shenzhen 518057, P.R. China

FCC Registration No.: 752051

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Shenzhen Accurate Technology Co., Ltd.

Kind of Equipment	Manufacturer	Type	S/N	Last Cal.	Cal. Interval
Spurious emission and Radiated emission					
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	2017-01-07	1 Year
Test Receiver	Rohde&Schwarz	ESCS30	100307	2017-01-07	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	2017-01-10	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	2017-01-10	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	2017-01-10	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	2017-01-10	1 Year
RF Switching Unit+PreAMP	Compliance Direction	RSU-M2	38322	2017-01-07	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU11835 40-01	3791	2017-01-07	1 Year
Radio Test Suite					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101495	2017-01-07	1 Year
Conducted Emission					
Test Receiver	Rohde & Schwarz	ESCS30	100307	2017-01-07	1 Year
L.I.S.N.	Schwarzbeck	NLSK8126	8126431	2017-01-07	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100815	2017-01-07	1 Year
50Ω Coaxial Switch	Anritsu Corp	MP59B	6200283933	2017-01-07	1 Year

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

Item		Extended Uncertainty
Conducted Emission		± 2.96 dB
Radiated Emission (9kHz-30MHz)	Field strength (dBµV/m)	U=3.78dB, k=2, σ=95%
Radiated Emission (30-1000MHz)	Field strength (dBµV/m)	U=4.27dB, k=2, σ=95%
Radiated Emission (above 1000MHz)	Field strength (dBµV/m)	U=4.96dB, k=2, σ=95%
Occupied Channel Bandwidth		±5.0 %
RF Output Power, Conducted		±1.5 dB
Power Spectral Density, Conducted		±3.0 dB
Unwanted Emission, Conducted		±3.0 dB
Duty Cycle		±5.0 %

2.6 Location of Original Data

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

2.7 Status of Facility Used for Testing

The Shenzhen Accurate Technology Co., Ltd. Test facility located at F1, Bldg. A, Changyuan New Material Port, Keyuan Rd., Science & Industry Park Nanshan District, Shenzhen 518057, P.R. 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 equipment under test (EUT) is a Platinum Bluetooth Speaker with Bluetooth 2.1+EDR function operating in 2402-2480MHz with channel spacing 1MHz. The EUT is powered by USB port DC 5.0V or rechargeable battery DC 3.7V. This report is for Bluetooth function.

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

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Platinum Bluetooth Speaker
Type Designation	BTSPKA8MSPRM, BTSPKA8TGPRM
FCC ID	2AHHEBTSPKA8PRM
Operating Frequency	2402 - 2480 MHz
Operating Voltage	DC 3.7V rechargeable battery
Testing Voltage	DC 3.7V rechargeable battery or charged by USB port
Type of Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Channel Number	BDR & EDR mode:79 channels
Channel Separation	BDR & EDR mode:1MHz
Wireless Technology	Bluetooth 2.1+ EDR
Antenna Type	Integral Antenna
Max. Antenna Gain	0 dBi

Table 3: RF Channel and Frequency of Bluetooth

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	2402.00	20	2422.00	40	2442.00	60	2462.00
01	2403.00	21	2423.00	41	2443.00	61	2463.00
02	2404.00	22	2424.00	42	2444.00	62	2464.00
03	2405.00	23	2425.00	43	2445.00	63	2465.00
04	2406.00	24	2426.00	44	2446.00	64	2466.00
05	2407.00	25	2427.00	45	2447.00	65	2467.00
06	2408.00	26	2428.00	46	2448.00	66	2468.00
07	2409.00	27	2429.00	47	2449.00	67	2469.00
08	2410.00	28	2430.00	48	2450.00	68	2470.00
09	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	78	2480.00
19	2421.00	39	2441.00	59	2461.00	--	--

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 V2.1 + EDR for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests.
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	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. 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. 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. That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth transmitting mode (BDR & EDR mode)
 - a) Low Channel
 - b) Middle Channel
 - c) High Channel
- B. On, Transmitting on Hopping channel
- C. On, Bluetooth connecting mode

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|-------------------------|----------------------------------|
| - Application Form | - FCC/IC Label and Location Info |
| - Block Diagram | - Photo Document |
| - Schematics | - User Manual |
| - Technical Description | |

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 testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Note
Notebook	Lenovo	4290-RT8	R9-FW93G	--
iPhone 5C	Apple	A1526	--	--
Adapter	ME	G051B-050200B-1	--	Input: 100-240V, 50/60Hz, 0.25A; 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)

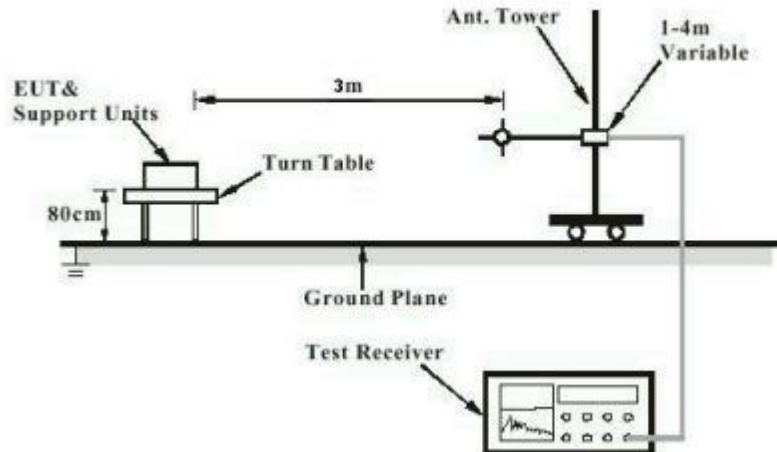


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

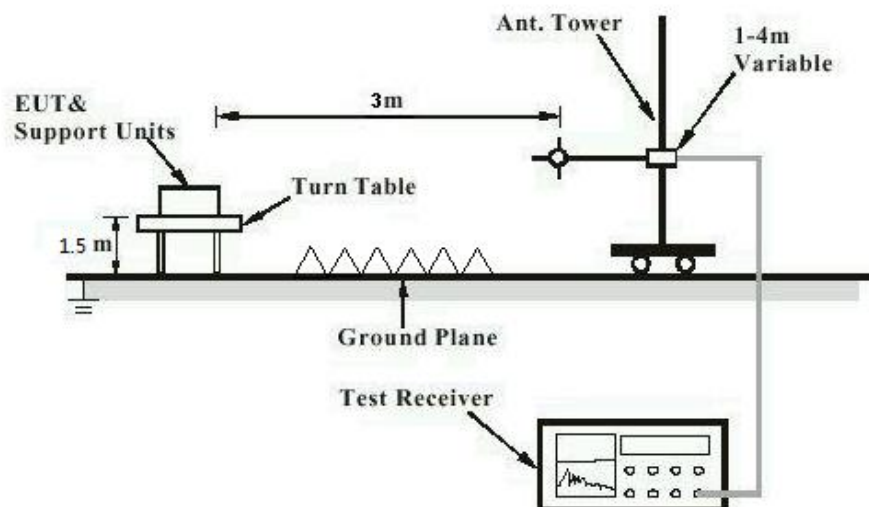


Diagram of Measurement Configuration for Mains Conduction Measurement

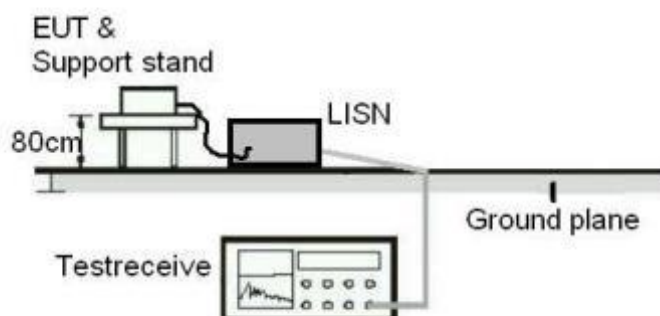
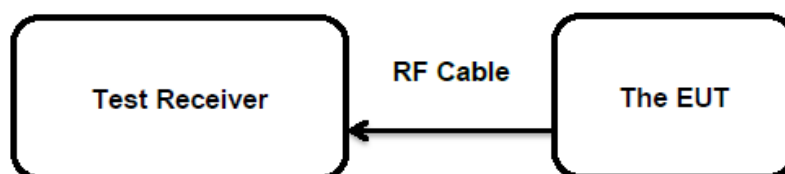


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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 integral antenna, the directional gain of antenna is 0dBi, 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)&(3)
Basic standard	: ANSI C63.10: 2013
Limits	: < 0.125 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 08.04.2017
Input voltage	: DC 3.7V fully charged lithium battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Table 6: Test Result of Maximum Peak Conducted Output Power

Test Mode	Channel Frequency (MHz)	Measured Peak Output Power		Limit (W)
		(dBm)	(W)	
BDR	2402	-0.72	0.0008	< 0.125
	2441	-1.62	0.0007	
	2480	-2.51	0.0006	
EDR	2402	-2.53	0.0006	< 0.125
	2441	-1.62	0.0007	
	2480	-0.75	0.0008	
Maximum Measured Value		-0.72	0.0008	/

Note: The cable loss 1.0 dB is taken into account in results.

This testing was carried out on all operation modes, but only the worst case was presented in this report.

For the measurement records, refer to the appendix A.

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);

Kind of test site : Shielded Room

Test Setup

Date of testing : 08.04.2017
Input voltage : DC 3.7V fully charged lithium 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 following test plot, and compliance is achieved as well.

For the measurement records, refer to the appendix A.

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	: 08.04.2017 - 12.04.2017
Input voltage	: DC 3.7V fully charged lithium battery or Charged by USB Port of adapter with input: 120V/60Hz
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 23 °C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

Remark:

During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions. After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation shown in the test set-up photos.

Pre-test the EUT in continuous transmitting with different data packet. Compliance test in continuous transmitting mode with BDR as the worst case was found and reported.

Testing was carried out within frequency range 9kHz to the tenth harmonics.

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 : 06.04.2017
Input voltage : DC 3.7V fully charged lithium 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 20dB Bandwidth

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
BDR	2402	1085	723	Within the Frequency band 2400~2483.5MHz
	2441	1081	721	
	2480	1025	683	
EDR	2402	1337	891	
	2441	1363	909	
	2480	1337	891	
Maximum Measured Value		1363	909	

For the measurement records, refer to the appendix A.

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	: 06.04.2017
Input voltage	: DC 3.7V fully charged lithium battery
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Table 8: Test Result of Carrier Frequency Separation

Channel	Channel Frequency (MHz)	Measured Channel Separation (KHz)	Limit (kHz)	Result
Low Channel	2402	1003	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
Adjacency Channel	2403			
Middle Channel	2441	1003		Pass
Adjacency Channel	2442			
High Channel	2480	1003		Pass
Adjacency Channel	2479			

Note:

The limit is maximum $2/3$ of the 20 dB bandwidth: 909 KHz.

For the measurement records, refer to the appendix A.

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 : ≥ 15 non-overlapping channels
Kind of test site : Shielded Room

Test Setup

Date of testing : 06.04.2017
Input voltage : DC 3.7V fully charged lithium battery
Operation mode : B
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

Table 9: Test Result of Number of Hopping Frequency

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2402 to 2480 MHz	79	≥ 15	Pass

For the measurement records, refer to the appendix A.

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	: 06.04.2017
Input voltage	: DC 3.7V fully charged lithium battery
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Table 10: Test Result of Time of Occupancy

Test Mode	Test Channel	Data Packet	Pulse width (ms)	Measured Dwell time(s)	Limit (s)
BDR mode	2402	DH1	0.45	172.35	< 0.4s
		DH3	1.68	299.04	
		DH5	2.96	328.56	
	2441	DH1	0.45	171.90	
		DH3	1.68	294.00	
		DH5	2.96	325.60	
	2480	DH1	0.45	171.00	
		DH3	1.74	306.24	
		DH5	3.04	331.36	
EDR mode	2402	3DH1	0.46	174.80	
		3DH3	1.68	297.36	
		3DH5	3.00	330.00	
	2441	3DH1	0.38	144.78	
		3DH3	1.74	304.50	
		3DH5	2.98	333.76	
	2480	3DH1	0.38	144.40	
		3DH3	1.75	308.00	
		3DH5	3.04	331.36	
Maximum Measured Value			3.04	331.36	

Note:

Dwell time = Pulse width x (Hopping rate / Number of channels) x Period

Period = 0.4 x 79 (channel) = 31.6 seconds

This testing was carried out on all operation modes, but only the worst case was presented in this report.

For the measurement records, refer to the appendix A.

5.1.9 Conducted Emission on AC Mains

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

Test standard	: FCC Part 15.207(a)
Basic standard	: ANSI C63.10: 2013
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.207(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 08.04.2017
Input voltage	: AC 120V/60Hz
Operation mode	: C
Earthing	: Not connected
Ambient temperature	: 23°C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

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

Test standard : CFR47 FCC Part 2.1093
Limit : FCC KDB Publication 447498 v06

Measurement Record:

The minimum distance for the EUT is less than 5mm.

The maximum specified e.i.r.p.: -0.72 dBm = 0.8 mW

Antenna Gain: 0dBi

According to KDB 447498 D01 v06 4.3.1 a)

Exempted Power for this Bluetooth device: 9.5mW, hence the EUT is compliance with the RF exposure.

7 Photographs of the Test Set-Up

Photograph 1: Set-up for Radiated Spurious Emission up to 1GHz

Please refer to the attached setup photos.

Photograph 2: Set-up for Radiated Spurious Emission above 1GHz

Please refer to the attached setup photos.

Photograph 3: Set-up for Conducted Emission on AC Mains

Please refer to the attached setup photos.

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