

Produkte Products

Seite 1 von 15 Prüfbericht - Nr.: 14030955 001 Page 1 of 15 Test Report No.: Auftraggeber: **BlueAnt Wireless** Client: Level 4, Building 1 658 Church St, Richmond VIC 3121 Richmond Australia Stereo Bluetooth Streamer Gegenstand der Prüfung: Test Item: Bezeichnung: Ribbon Serien-Nr.: Engineering sample Identification: Serial No .: Wareneingangs-Nr.: 00120822047-001 Eingangsdatum: 22.08.2012 Receipt No .: Date of Receipt: Zustand des Prüfgegenstandes bei Anlieferung: Test sample(s) is/are not damaged and Condition of test item at delivery: suitable for testing. Prüfort: Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong Testing Location: TUV Rheinland Hong Kong Ltd. 8/F., First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong Prüfgrundlage: FCC Part 15 Subpart C Test Specification: ANSI C63,4-2003 CISPR 22:1997 Prüfergebnis: Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben Test Results: genannter Prüfgrundlage. The above mentioned product was tested and passed. Prüflaboratorium: TÜV Rheinland Hong Kong Ltd. 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong Testing Laboratory: geprüft/ tested by: kontrolliert/ reviewed by: Joey Leung Sharon Li 26.09.2012 Test Engineer 26.09.2012 Section Manager Datum Name/Stellung Unterschrift Datum Name/Stellung Unterschrift Date Name/Position Signature Name/Position Date Signature FCCID: VHFBLUEANTRB Sonstiges: Other Aspects Abkürzungen: P(ass) entspricht Prüfgrundlage Abbreviations: P(ass) passed F(ail) entspricht nicht Prüfgrundlage failed F(ail) N/A nicht anwendbar not applicable N/A N/T nicht getestet

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. This test report 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 safety mark on this or similar products.





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# **Product information**

# **Manufacturers declarations**

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK
Number of channels	79
Channel separation	1 MHz
Type of antenna	Integral antenna
Antenna gain (dBi)	2
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	No
Nominal voltage	V <sub>nor</sub> : 3.7V
Independent Operation Modes	Page scan
	Inquiry scan
	Connection state - ACL Link
	Connection state - SCO Link

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#### Product function and intended use

The test item is a Stereo Bluetooth Streamer based on the Bluetooth technology.

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, 79 RF channels spaced 1MHz apart are defined.

The channel is represented by a pseudo-random hopping sequence through the 79 channels. The channel is divided into time slots, with a nominal slot length of  $625\mu s$ , where each slot corresponds to different RF hop frequencies. The nominal hop rate is 1600 hops/s. The symbol rate on the channel is 1 Ms/s.

The USB connector is for charging only, no data exchange supported.

#### Submitted documents

Circuit Diagram Block Diagram Bill of material User Manual Label Artwork

#### Remark

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases.

## Special accessories and auxiliary equipment

### Additional accessory used for testing

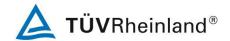
The product has been tested together with the following additional accessory:

 AC/DC Power adaptor Model number: SSC-5W-05 050050 Input: 100-240VAC, 50/60Hz, 0.2A

Output: 5VDC 500mA

2) USB Cable, 0.5m

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# **List of Test and Measurement Instruments**

# Hong Kong Productivity Council (Registration number: 90656)

## **Radiated Emission**

Equipment used	Manufacturer	Model No.	S/N	Due Date
Semi-anechoic Chamber	Frankonia	Nil	Nil	25-May-13
Test Receiver	R&S	ESU40	100190	26-May-13
Bi-conical Antenna	R&S	HK116	100242	05-May-13
Log Periodic Antenna	R&S	HL223	841516/020	06-May-13
Coaxial cable 50ohm	Rosenberger	RTK081-05S- 05S-10m	LA2-001- 10M / 001	15-Nov-13
Microwave amplifer 0.5- 26.5GHz, 25dB gain	HP	83017A	3950M00241	03-Oct-13
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	28-Oct-13
Horn Antenna	EMCO	3115	9002-3351	11-May-13
Active Loop Antenna	EMCO	6502	9107-2651	19-Apr-13
FSP 30 Spectrum Analyser	R&S	FSP 30	100007	16-Sep-13

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# Results FCC Part 15 - Subpart C

Subclause 15.203 – Antenna Information

**Pass** 

**Requirement:** No antenna other than that furnished by the responsible party shall be used with the

device

**Results:** Permanent attached antenna

Verdict: Pass

Subclause 15.204 - Antenna Information

**Pass** 

**Requirement:** Provide information for every antenna proposed for the use with the EUT

**Results:** a) Antenna type: Integral antenna

b) Manufacturer and model no: N.A. c) Gain with reference to an isotropic radiator: 2 dBi

Verdict: Pass

### Subclause 15.207 - Disturbance Voltage on AC Mains

**Pass** 

Test Port: AC mains input port of the adaptor

Applied Voltage: 120VAC

Adaptor Model: Please refer to page 4

Mode of operation: Charging + Music playing mode

#### Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBμV	Average dBμV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0.15 0.5	0.166	36.2	22.5	66 - 56	56 - 46	Pass
0,15 – 0,5	0.298	32.4	20.1	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found			56	46	Pass
> 5 - 30	No peak found			60	50	Pass

## **Neutral measurement**

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBμV	Average dBμV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 - 0,5	0.190	33.8	24.3	66 - 56	56 - 46	Pass
0,15 - 0,5	0.302	31.9	29.0	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found			56	46	Pass
> 5 - 30	No peak found			60	50	Pass

Results: The radio frequency voltage that is conducted back onto the AC power line on any

frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits.

For test Results plots refer to Appendix 1, page 2-3.

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Subclause 15.247 (a)(1) – Carrier Frequency Separation

**Pass** 

**Requirement:** Frequency hopping systems shall have hopping channel carrier frequencies separated

by a minimum of 25kHz or the 2/3\*20dB bandwidth of the hopping channel, whichever is

greater.

Test Specification: FCC Part 15 Subpart A - Subclause 15.31

Mode of operation: Tx mode (hopping on), GFSK Port of testing: Temporary antenna port

Detector : Peak

RBW/VBW : 100 kHz / 300 kHz

Supply voltage : 3.7VDC, internal battery has been activiate

Temperature : 23°C Humidity : 50%

**Results:** Pre-scan has been conducted to determine the worst-case mode from all possible

combinations between available modulations and packet types.

The centre frequencies of the hopping channels are separated by more than the

2/3\*20dB bandwidth. For test Results plots refer to Appendix 1, page 4.

Verdict: Pass

Subclause 15.247 (a)(1)(iii) - Number of hopping channels

**Pass** 

**Requirement:** Frequency hopping systems operating in the 2400MHz-2483.5MHz bands shall use at

least 15 hopping frequencies.

Test Specification: FCC Part 15 Subpart A - Subclause 15.31

Mode of operation: Tx mode (hopping on), GFSK Port of testing: Temporary antenna port

Detector : Peak

RBW/VBW : 1 MHz / 3 MHz

Supply voltage : 3.7VDC, internal battery has been activiate

Temperature : 23°C Humidity : 50%

**Results:** The total number of hopping frequencies is more than 15. For test Results plots refer to

Appendix 1, page 5.

Verdict: Pass

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### Subclause 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)

**Pass** 

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 Requirement:

> 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

emploved.

Test Specification: FCC Part 15 Subpart A – Subclause 15.31

Mode of operation: Tx mode (hopping on), DH5 packet

: Temporary antenna port Port of testing

Detector : Peak

RBW/VBW : 1 MHz / 3 MHz

Supply voltage : 3.7VDC, internal battery has been activiate

Temperature : 23ºC Humidity : 50%

**Results:** Time period calculation =  $0.4 \times 79 = 31.6s$ 

Dwell time =  $64 \times 2.912 \times 10^{-3} = 186.368 \times 10^{-3} \text{ s}$ 

 $<= 400 \times 10^{-3} \text{ s}$ 

For test protocols please refer to Appendix 1, page 6.

**Verdict: Pass** 

#### Subclause 15.247 (a) - 20 dB Bandwidth

**Pass** 

Requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 2/3\*20dB bandwidth of the hopping channel, whichever is

greater.

Test Specification: FCC Part 15 Subpart A - Subclause 15.31 Mode of operation: Tx mode (2402MHz, 2441MHz, 2480MHz)

: Temporary antenna port Port of testing

Detector : Peak

RBW/VBW : 30 kHz / 100 kHz

Supply voltage : 3.7VDC, internal battery has been activiate

Temperature : 23ºC Humidity : 50%

Results: Pre-scan has been conducted to determine the worst-case mode from all possible

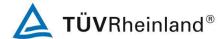
combinations between available modulations and packet types.

For test protocols refer to Appendix 1, page 7-8.

#### **GFSK Modulation**

Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.470	0.486	0.956
2441	0.474	0.486	0.960
2480	0.468	0.480	0.948

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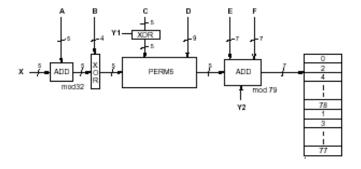
### Subclause 15.247 (a) - Hopping Sequence

**Pass** 

Requirement: The hopping sequence is generated and provided with an example.

## Hopping sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto the hop frequencies.



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Example d	lata:							
Hop sequen	ce {k} f	or CON	NECTIO	ON STA	TE:			
CLK start: 0:								
ULAP: 0x00								
#ticks:	00 02	04 06	08 0a	0c 0e	10 12	14 16	18 1a	1c 1e
0x0000010:	08 66	10 70	12 19	14 23	16 01	   18 05	20.33	22 37
0x0000030:								
0x0000050:					•	•	•	
0x0000070:								
0x0000090:								
0x00000b0:								
0x00000d0:								
0x00000f0:								
0x0000110:	01 51	03 55	05 04	07 08	72 57	74 61	76 10	78 14
0x0000130:	09 59	11 63	13 12	15 16	17 65	19 69	21 18	23 22
0x0000150:	33 67	35 71	37 20	39 24	25 73	27 77	29 26	31 30
0x0000170:	41 75	43 00	45 28	47 32	17 02	21 04	19 34	23 36
0x0000190:	33 06	37 08	35 38	39 40	25 10	29 12	27 42	31 44
0x00001b0:	41 14	45 16	43 46	47 48	49 18	53 20	51 50	55 52
0x00001d0:	65 22	69 24	67 54	71 56	57 26	61 28	59 58	63 60
0x00001f0:	73 30	77 32	75 62	00 64	49 34	51 42	57 66	59 74
0x0000210:	53 36	55 44	61 68	63 76	65 50	67 58	73 03	75 11
0x0000230:	69 52	71 60	77 05	00 13	02 38	04 46	10 70	12 78
0x0000250:								
0x0000270:					•	•	•	
0x0000290:								
0x00002b0:								
0x00002d0:					•	•	•	
0x00002f0:					•	•	•	
0x0000310:								
0x0000330:								
0x0000350:								
0x0000370:								
0x0000390:								
0x00003b0:								
0x00003d0:								
0x00003f0:	29 65	33 02	45 18	49 34	19 04	21 08	23 20	25 24

## Subclause 15.247 (a) – Equal Hopping Frequency Use

**Pass** 

Requirement: Each of the transmitter's hopping channels is used equally on average.

Equal hopping frequency use

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

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### Subclause 15.247 (a) - Receiver Input Bandwidth

**Pass** 

Requirement:

The associated receiver(s) complies with the requirement that its input bandwidth matches

the bandwidth of the transmitted signal.

Receiver input bandwidth

The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz.

The receiver bandwidth was verified during Bluetooth RF conformance testing.

### Subclause 15.247 (a) - Receiver Hopping Capability

**Pass** 

Requirement:

The associated receiver has the ability to shift frequencies in synchronisation with the

transmitted signals.

Receiver hopping Capability

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

## Subclause 15.247 (b)(1) - Peak Output Power

**Pass** 

Test Specification: FCC Part 15 Subpart A - Subclause 15.31 Mode of operation: Tx mode (2402MHz, 2441MHz, 2480MHz)

Port of testing

: Temporary antenna port

Detector

: Peak

RBW/VBW

: 3 MHz / 10 MHz

Supply voltage

: 3.7VDC, internal battery has been activiate

Temperature Humidity

: 23ºC : 50%

Requirement:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at

least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band:

0.125 Watts.

Results:

For test protocols please refer to Appendix 1, page 9-10.

## **GFSK Modulation**

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	6.05	0.00	6.050	1 / 30.0	Pass
2441	7.24	0.00	7.240	1 / 30.0	Pass
2480	7.00	0.00	7.000	1 / 30.0	Pass

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Subclause 15.247	(d) – Band edge compliance of conducted emissions Pass
Mode of operation Port of testing Detector RBW/VBW Supply voltage Temperature	: FCC Part 15 Subpart A – Subclause 15.31 : Tx mode (2402MHz, 2480MHz), GFSK : Temporary antenna port : Peak : 100 kHz / 300 kHz : 3.7VDC, internal battery has been activiate : 23°C : 50%
Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.  There is no peak found outside any 100 kHz bandwidth of the operating frequency band. For test protocols refer to Appendix 1, page 11-12.

Subclause 15.205	- Band edge compliance of radiated emissions	Pass
Mode of operation Port of testing Detector RBW/VBW Supply voltage Temperature	: FCC Part 15 Subpart A – Subclause 15.31 : Tx mode (2402MHz, 2480MHz), GFSK : Temporary antenna port : Peak : 1 MHz / 1 MHz : 3.7VDC, internal battery has been activiate : 23°C : 50%	
Requirement:	Radiated emissions which fall in the restricted bans, as defined in 15.205 comply with the radiated emission limits specified in 15.209(a).	(a), must also
Results:	There is no peak found in the restricted bands. For test protocols refer to page 13-20.	Appendix 1,

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## Subclause 15.247 (d) - Spurious Conducted Emissions

**Pass** 

Test Specification: FCC Part 15 Subpart A – Subclause 15.31

Mode of operation: Tx mode (2402MHz, 2441MHz, 2480MHz), GFSK

Port of testing : Temporary antenna port

Detector : Peak

RBW/VBW : 100 kHz / 300 kHz

Supply voltage : 3.7VDC, internal battery has been activiate

Temperature : 23 °C Humidity : 50 %

Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or

digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on

either an RF conducted or a radiated measurement.

**Results:** Pre-scan has been conducted to determine the worst-case mode from all possible

combinations between available modulations and packet types.

There is no peak found outside any 100kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(d). For test protocols refer to Appendix 1, page 21-22.

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	4800	-51.03	5.66	-56.69	Pass
2441	5500	-49.54	5.75	-55.29	Pass
2480	5200	-49.43	7.30	-56.73	Pass

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Subclause 15.247	(c) – Spurious	Radiated Emissions	Pass	
Mode of operation Port of testing Detector RBW/VBW	: ANSI C63.4 – 2003 : Tx mode (2402MHz, 2441MHz, 2480MHz), GFSK : Enclosure : Peak : 100 kHz / 300 kHz for f < 1 GHz 1 MHz / 3 MHz for f > 1 GHz : 3.7VDC, internal battery has been activiate : 23°C : 50%			
Requirement:	level of the des bands, as defin	pandwidth outside the frequency bar ired power. In addition, radiated emi- ed in section15.205(a), must also co in section 15.205(c).	ssions which fall in the restricted	
Results:	combinations b  All three transm	een conducted to determine the wor etween available modulations and p nit frequency modes comply with the s no spurious found below 30MHz.	acket types.	
Tx frequency 2402	MHz	Vertical Polarization		
Free MH:	•	Level dBuV/m	Limit/ Detector dBuV/m	
636.0	08	32.60	46.0 / QP	
4804.0	032	50.20	74.0 / PK	
4804.0	006	35.70	54.0 / AV	
Tx frequency 2402	MHz	Horizontal Polarization		
Free	9	Level	Limit/ Detector	
MH		dBuV/m	dBuV/m	
636.0	02	42.00	46.0 / QP	
4804.3		46.64	74.0 / PK	
4804.0	006	33.07	54.0 / AV	
Tx frequency 2441	MHz	Vertical Polarization		
Free	9	Level	Limit/ Detector	
MH	Z	dBuV/m	dBuV/m	
647.9		33.50	46.0 / QP	
4882.2		51.82	74.0 / PK	
4882.0	019	36.46	54.0 / AV	
Tx frequency 2441	MHz	Horizontal Polarization		
Free	9	Level	Limit/ Detector	
MH		dBuV/m	dBuV/m	
664.0	02	40.50	46.0 / QP	
4882.5	516	48.35	74.0 / PK	
4882.0	003	34.58	54.0 / AV	
Tx frequency 2480MHz		Vertical Polarization		

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Freq	Level	Limit/ Detector
MHz	dBuV/m	dBuV/m
639.999	34.50	46.0 / QP
4959.583	50.48	74.0 / PK
4959.920	36.28	54.0 / AV
Tx frequency 2480MHz	Horizontal Polarization	
Freq	Level	Limit/ Detector
MHz	dBuV/m	dBuV/m
651.999	42.60	46.0 / QP
4959.599	48.83	74.0 / PK
4959.984	34.18	54.0 / AV

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