SGS-CSTC Standards Technical Services Co., Ltd.

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SAR Evaluation Report

Application No.:	SZEM1302000884RF
Applicant:	BITwave Pte Ltd
Manufacturer:	BITwave Pte Ltd
Product Name:	Helmet Communicator
Model No.(EUT):	HBC200
Add Model No.:	HBC230, HBC220, HBC100 PLUS, HBC120 PLUS, HBC130 PLUS
FCC ID:	NMC-HBC200
Standards:	47 CFR Part 1.1307(2012)
	47 CFR Part 2.1093 (2012)
	KDB447498D01 v05r01
Date of Receipt:	2012-09-12
Date of Test:	2012-09-17 to 2013-02-20
Date of Issue:	2013-09-03
Test Result :	**PASS***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

2 Contents

3 General Information

3.1 Client Information

Applicant:	BITwave Pte Ltd
Address of Applicant:	159 Sin Ming Road #04-05 Amtech Bldg Singapore 575625
Manufacturer:	BITwave Pte Ltd
Address of Manufacturer:	159 Sin Ming Road #04-05 Amtech Bldg Singapore 575625

3.2 General Description of EUT

Product Name:	Helmet Communicator	
Model No.:	HBC200, HBC230, HBC220, HBC100 PLUS, HBC120 PLUS, HBC130 PLUS (Only the model HBC200 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models. Only different on their outer decoration and model name.)	
Trade Mark:	UClear	
Operation Frequency:	2402MHz~2480MHz	
Bluetooth Version:	V2.1+EDR	
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)	
Modulation Type:	GFSK, π/4DQPSK, 8DPSK	
Number of Channel:	79	
Hopping Channel Type:	Adaptive Frequency Hopping systems	
Test Power Grade:	255,19 (manufacturer declare)	
Test Software of EUT:	CSR blue suite (manufacturer declare)	
Sample Type:	Portable production	
Antenna Type:	Integral	
Antenna Gain:	0dBi	
Power Supply:	AC Adapter:	AC/DC ADAPTOR MODEL NO: SKB0500500PU INPUT:AC 100-240V, 50-60Hz 300mA OUTPUT:5V ⎓ 500mA
	Battery:	DC 3.7V 560mAh " STK582540"
Test Voltage:	AC 120V/60Hz	

3.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

3.4 Test Facility

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

- **CNAS (No. CNAS L2929)**

  CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **VCCI**

  The 3m Semi-anechoic chamber, Full-anechoic Chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197, G-416, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

  SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

- **Industry Canada (IC)**

  Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

3.5 Deviation from Standards

None.

3.6 Abnormalities from Standard Conditions

None.

3.7 Other Information Requested by the Customer

None.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

According to KDB447498D01 v05r01 General RF Exposure Guidance

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

4.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison.

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

4.1.3 EUT RF Exposure

The Peak and Average Conducted Power of EUT as below table

Mode		Peak Conducted Power(dBm)			Average Conducted Power(dBm)		
Band	Channel	GFSK	π/4DQPSK	8DPSK	GFSK	π/4DQPSK	8DPSK
BT 2.45GHz	0	11.41	13.76	13.93	10.64	10.61	10.53
	39	12.53	14.86	15.06	11.85	11.60	11.47
	78	13.40	15.50	15.65	**12.79**	12.43	12.29

The output power setting of EUT is set in the factory and followed the max average level in below:
Tune-up : BT 12dBm(-2,+2) dB

so the max.power of channel is 14dBm=25.12mW

From a KDB inquiry,the PBA Tracking Number is 284026,the appropriate min. test separation distance is 20mm

Per KDB447498 D01v05r01,we can get [(25.12mW/20mm)*√2.480GHz] =2.0≤3.0

So the SAR test is not required.