

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2303000307AT
Applicant: GUANGZHOU HEYGEARS IMC. INC
Address of Applicant: BLOCK B2, 501 601, ENTERPRISE ACCELERATOR, KAIFA DISTRICT, GUANGZHOU, GUANGDONG, CHINA
Manufacturer: The same as applicant
Address of Manufacturer: The same as applicant
Factory: The same as applicant
Address of Factory: The same as applicant
Equipment Under Test (EUT):
EUT Name: UltraCraft Rapid Production System
Model No.: UltraCraft Reflex
Trade Mark: HEYGEARS
Standard(s) : 47 CFR Part 1.1310
KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt: 2023-03-23
Date of Evaluation: 2023-04-03 to 2023-05-18
Date of Issue: 2023-06-14

Evaluation Result:

Pass*

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

Ricky Liu

Ricky Liu
Manager



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Revision Record			
Version	Report No.	Date	Remark
01	GZCR230300030704	2023-06-14	Original

Authorized for issue by:			
		Jim Li	
		Jim Li/Project Engineer	
		Vico Cui	
		Vico Cui/Reviewer	



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2 Evaluation Summary

Item	Standard	Method	Requirement	Result
RF Exposure	KDB447498 D01 General RF Exposure Guidance v06	KDB447498 D01 General RF Exposure Guidance v06	47 CFR Part 1.1310	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

3 Contents

	Page
1 Cover Page	1
2 Evaluation Summary.....	3
3 Contents.....	4
4 General Information	5
4.1 Details of E.U.T.	5
4.2 Evaluating Location	5
4.3 Facility	6
4.4 Deviation from Standards.....	6
4.5 Abnormalities from Standard Conditions	6
5 Technical Requirements Specification	7
5.1 General Description of Applied Standards	7
5.2 RF Exposure Evaluation.....	7
5.2.1 Limit & Test Method	7
5.2.2 Conclusion	8
6 EUT Constructional Details (EUT Photos)	9



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4 General Information

4.1 Details of E.U.T.

Power supply: AC 100-240VAC, 50/60Hz,
Cable(s): AC mains, 3 wires, 2.0m, unshielded.
RJ45 Port x1
USB Port x1
4 Pin DC output Port x1(Reserved only, function not developed)
RF character(s): Refer to report GZCR230300030702 for 2.4G Wi-Fi.
Refer to report GZCR230300030703 for 13.56MHz NFC.

4.2 Evaluating Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059
No tests were sub-contracted.



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4.3 Facility

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

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.4 Deviation from Standards

None

4.5 Abnormalities from Standard Conditions

None



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5 Technical Requirements Specification

5.1 General Description of Applied Standards

KDB447498D01 General RF Exposure Guidance v06

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.

5.2 RF Exposure Evaluation

5.2.1 Limit & Test Method

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * P_i * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

P_i = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



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5.2.2 Conclusion

Normal use condition for Distance between antenna and body:	≥ 20 cm declared by applicant
Antenna Gain(max):	4.66 dBi for 2.4G Wi-Fi antenna.

Antenna Gain:	4.66 dBi
For 2.4 GHz Wi-Fi	

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11B						
2412	2.924152378	13.05	20.18	0.01174	1	Complies
2442	2.924152378	13	19.95	0.01161	1	Complies
2462	2.924152378	12.75	18.84	0.01096	1	Complies
11G						
2412	2.924152378	12.91	19.54	0.01137	1	Complies
2442	2.924152378	12.85	19.28	0.01121	1	Complies
2462	2.924152378	12.63	18.32	0.01066	1	Complies
11N20						
2412	2.924152378	13.31	21.43	0.01247	1	Complies
2442	2.924152378	13.26	21.18	0.01232	1	Complies
2462	2.924152378	13.1	20.42	0.01188	1	Complies
11N40						
2422	2.924152378	13.56	22.70	0.01320	1	Complies
2442	2.924152378	13.54	22.59	0.01314	1	Complies
2452	2.924152378	13.38	21.78	0.01267	1	Complies

For 13.56MHz

Frequency (MHz)	E-field* (dBuV/m)@3m	E-field (dBuV/m)@0.2m	E-field (V/m)@0.2m	Limit of E-field (V/m)	Test Result
13.56	62.39	109.4337	0.2963	60.77	Complies *

E-field (dBuV/m @0.2m) = E-field (dBuV/m @3m) + 40log(3/0.2)= 109.4337 dBuV/m @0.2m (f<30MHz)

E-field (V/m) = 10^[E-field (dBuV/m) /20] × 10⁻⁶=0.2963 V/m@0.2m*

2.4G Wi-Fi and 13.56MHz can transmit simultaneously, so the maximum rate of MPE is 0.0132/1 + 0.2963/60.77 =0.0132+0.00487 = 0.01807 <1.

The EUT meet the Exemption Limits for Routine Evaluation – SAR Evaluation, so no SAR evaluation is required for the EUT.

Note: Refer to report No. GZCR230300030702 & GZCR230300030703 for EUT test Max Conducted Peak Output Power & E-field value.



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6 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2303000307AT

- End of the Report -



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