

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2209001150AT
Applicant: BLUE FROG ROBOTICS
Address of Applicant: 10 rue Mercoeur, 75011 Paris, FRANCE
Manufacturer: OMWAVE
Address of Manufacturer: 5 rue Barbès, 92120 Montrouge, FRANCE
Factory: OMWAVE
Address of Factory: 36 Avenue Salvador Allende, Batiment D - Village Mykonos, 60000 Beauvais, FRANCE

Equipment Under Test (EUT):
EUT Name: Buddy the Robot
Model No.: B01-US
Trade Mark: BLUE FROG ROBOTICS
Standard(s) : 47 CFR Part 1.1310
 KDB447498 D01 General RF Exposure Guidance v06

Date of Receipt: 2022-09-15
Date of Evaluation: 2022-11-07 to 2022-12-25
Date of Issue: 2023-04-27

Evaluation Result:

Pass*

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

Ricky Liu

Ricky Liu
Manager

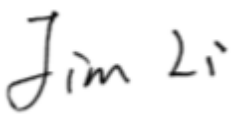


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Revision Record			
Version	Report No.	Date	Remark
01	GZCR220900115006	2023-04-27	Original

Authorized for issue by:			
			
		Jim Li/Project Engineer	
			
		Ricky Liu/Reviewer	



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2 Evaluation Summary

Radio Spectrum Technical Requirement				
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.

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4 General Information

4.1 Details of E.U.T.

Power supply: AC/DC SWITCHING ADAPTER
 MODEL NO.: GST90A19
 INPUT:100-240VAC, 50/60Hz, 1.3A
 OUTPUT:19V, 4.74A, 90W Max

Cable(s): AC input cable, 3 wires, 1.8m, unshielded.
 DC output cable, 2 wires, 1.2m, with ferrite bead.
 USB Port for debugging.
 SIM Slot Port x 1.

RF character(s): Refer to report GZCR220900115002 for BT BLE details.
 Refer to report GZCR220900115003 for BT Classic details.
 Refer to report GZCR220900115004 for 2.4G Wi-Fi details.
 Refer to report GZCR220900115005 for 5G Wi-Fi details.

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

KDB447498 D01 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.

5.2.2 Conclusion

Normal use condition for Distance between antenna and body:	≥ 20cm declared by applicant
Antenna Gain(Max):	1.0 dBi declared by applicant for 2.4G Wi-Fi. 2.6 dBi declared by applicant for 5G Wi-Fi. 1.5 dBi declared by applicant for 600-698MHz 1.6 dBi declared by applicant for 698-960MHz 3.1 dBi declared by applicant for 1710-2400MHz 1.7 dBi declared by applicant for 2500-2700MHz.

Verify EIRP with new antenna.

Band	Frequency (MHz)	Operating Mode	Max Conducted Power (dBm)	New Antenna Gain (dBi)	New EIRP* (dBm)	New EIRP (W)	EIRP Limit (W)	Result
LTE Band 2	1850-1910	QPSK	23.14	3.10	26.24	0.421	2	PASS
LTE Band 4	1710-1755	QPSK	23.25	3.10	26.35	0.432	1	PASS
LTE Band 5	824-849	QPSK	22.77	1.60	24.37	0.274	7	PASS
LTE Band 7	2500-2570	QPSK	23.53	1.70	25.23	0.333	2	PASS
LTE Band 12	699-716	QPSK	22.86	1.60	24.46	0.279	3	PASS
LTE Band 13	777-787	QPSK	22.79	1.60	24.39	0.275	3	PASS
LTE Band 14	788-798	QPSK	22.83	1.60	24.43	0.277	3	PASS
LTE Band 17	704-716	QPSK	22.83	1.60	24.43	0.277	3	PASS
LTE Band 25	1850-1915	QPSK	23.49	3.10	26.59	0.456	2	PASS
LTE Band 26	814-849	QPSK	22.80	1.60	24.40	0.275	7	PASS
LTE Band 41	2496-2690	QPSK	23.33	1.70	25.03	0.318	2	PASS
LTE Band 66	1710-1780	QPSK	23.18	3.10	26.28	0.425	1	PASS
LTE Band 71	663-698	QPSK	23.21	1.50	24.71	0.296	3	PASS
WCDMA II	1850-1910	RMC 12.2K	22.86	3.10	25.96	0.394	2	PASS
WCDMA IV	1710-1755	RMC 12.2K	22.42	3.10	25.52	0.356	1	PASS
WCDMA V	824-849	RMC 12.2K	22.83	1.60	24.43	0.277	7	PASS

Based on KDB 178919 D01 Permissive Change Policy v06 clause II.B the Antenna changes still compliance the applicable maximum ERP/EIRP rules, additional authorization for the product is not required.

*New EIRP= Max Conducted Power + New Antenna Gain

For 2.4G/5G Wi-Fi, BT EDR+LE, Cell 3/4G.

Band	Frequency (MHz)	Operating Mode	Antenna Gain (dBi)	Tune-up Power (dBm)	Tune-up Power (mW)	Power Density (mw/cm ²)	Limit (mw/cm ²)	Result
LTE Band 2	1850-1910	QPSK	3.10	23.5	223.87	0.0909	1.00	PASS
LTE Band 4	1710-1755	QPSK	3.10	23.5	223.87	0.0909	1.00	PASS
LTE Band 5	824-849	QPSK	1.60	23.0	199.53	0.0574	0.55	PASS
LTE Band 7	2500-2570	QPSK	1.70	24.0	251.19	0.0739	1.00	PASS
LTE Band 12	699-716	QPSK	1.60	23.0	199.53	0.0574	0.47	PASS
LTE Band 13	777-787	QPSK	1.60	23.0	199.53	0.0574	0.52	PASS
LTE Band 14	788-798	QPSK	1.60	23.0	199.53	0.0574	0.53	PASS
LTE Band 17	704-716	QPSK	1.60	23.0	199.53	0.0574	0.47	PASS
LTE Band 25	1850-1915	QPSK	3.10	23.5	223.87	0.0909	1.00	PASS
LTE Band 26	814-849	QPSK	1.60	23.0	199.53	0.0574	0.54	PASS
LTE Band 41	2496-2690	QPSK	1.70	23.5	223.87	0.0659	1.00	PASS
LTE Band 66	1710-1780	QPSK	3.10	23.5	223.87	0.0909	1.00	PASS
LTE Band 71	663-698	QPSK	1.50	23.5	316.23	0.0629	0.44	PASS
WCDMA II	1850-1910	RMC 12.2K	3.10	23.0	199.53	0.0810	1.00	PASS
WCDMA IV	1710-1755	RMC 12.2K	3.10	22.5	177.83	0.0722	1.00	PASS
WCDMA V	824-849	RMC 12.2K	1.60	23.0	199.53	0.0574	0.55	PASS
2.4G Wi-Fi	2412-2462	11b	1.00	19.5	89.13	0.0223	1.00	PASS
5G Wi-Fi	5180-5240	11a	2.60	14.0	25.12	0.0091	1.00	PASS
5G Wi-Fi	5260-5320	11a	2.60	13.5	22.39	0.0081	1.00	PASS
5G Wi-Fi	5500-5700	11a	2.60	14.0	25.12	0.0091	1.00	PASS
5G Wi-Fi	5745-5805	11a	2.60	14.0	25.12	0.0091	1.00	PASS
BT EDR	2402-2480	GFSK	1.00	12.0	15.85	0.0040	1.00	PASS
BT LE (1M)	2402-2480	1M	1.00	2.00	1.58	0.0004	1.00	PASS
BT LE (2M)	2402-2480	2M	1.00	2.00	1.58	0.0004	1.00	PASS

Note:

Refer to report No. RF190522W005-1, RF190522W005-2, RF190522W005-3, RF190522W005-4, RF190522W005-5, RF190522W005-6, RF190522W005-7 & RF190522W005-8 for EUT test Max Conducted Peak Output Power value.

The product support 2.4G WIFI or 5G Wi-Fi & BT EDR/LE & 3/4G simultaneous transmission.

So, the Max. sum of the MPE ratios for all wireless function is:

$$0.0223/1 + 0.0004/1 + 0.0739/1 = 0.0223 + 0.0004 + 0.0739 = 0.0966 < 1.0$$

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



6 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2209001150AT

- End of the Report -