

RF Exposure Evaluation Report

Product : robosen Elite Optimus prime
Trade mark : robosen
Model/Type reference : HR30,HR30-BC,HR30-SA
Serial Number : N/A
Report Number : EED32O80493202
FCC ID : 2ATNWOP30T
Date of Issue : Jul. 26, 2022
: 47 CFR Part 1.1307
Test Standards : 47 CFR Part 2.1093
: KDB447498D01 General RF Exposure Guidance v06
Test result : PASS

Prepared for:

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2 Version

Version No.	Date	Description
00	Jul. 26, 2022	Original

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4 General Information

4.1 Client Information

Applicant:	Robosen Robotics (ShenZhen) Co., Ltd
Address of Applicant:	A3703, Bldg 11, Shenzhen Bay ECO-Tech Park, No.16, Gaoxin South Science and Tech Rd., Nanshan Dist. Shenzhen, Guangdong, China
Manufacturer:	Robosen Robotics (ShenZhen) Co., Ltd
Address of Manufacturer:	A3703, Bldg 11, Shenzhen Bay ECO-Tech Park, No.16, Gaoxin South Science and Tech Rd., Nanshan Dist. Shenzhen, Guangdong, China
Factory:	Dongguan Wirear Electronics Limited.
Address of Factory:	No. 7, Yihong Road, Changtang Industrial Zone, Yantian Village, Fenggang Town, Dongguan City, Guangdong Province, China

4.2 General Description of EUT

Product Name:	robosen Elite Optimus prime
Model No.:	HR30,HR30-BC,HR30-SA
Test model No.:	HR30
Trade mark:	robosen
EUT Supports Radios application:	Bluetooth 5.0 dual mode: 2402-2480MHz

4.3 Product Specification subjective to this standard

Frequency Range:	2402-2480MHz	
Modulation Type:	GFSK	
Test Power Grade:	Default	
Antenna Type	PCB Antenna	
Antenna Gain	-0.8dBi	
Power Supply:	Adapter1:	model: GFD18-1261000U input: 100-240V~50/60Hz, 1.0A Max output: 12.6V, 1A
	Adapter2:	model: ZL-012BL1261000US01 input: 100-240V~50/60Hz, 0.5A Max output: 12.6V, 1000mA
	Jiayang Battery:	Li-polymer 11.1V, 650mAh, 7.215Wh *2
	Penghui Battery:	Li-polymer 11.1V, 600mAh, 6.66Wh *2
Test Voltage:	DC 11.1V	
Max Conducted Peak Output Power:	1dBm	
	The Max Conducted Peak Output Power data refer to the report EED32O80493201	
Sample Received Date:	Apr. 25, 2022	
Sample tested Date:	Apr. 25, 2022 to Jul. 08, 2022	
Remark:		

Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

Model No.: HR30,HR30-BC,HR30-SA

Only the model HR30 was tested, and only the model name is different between the models,representing different shell colors and customers,and its circuit principle,safety structure and key elements.The devices are the same,and the difference does not affect product safety and electromagnetic compatibility.

The battery of the product has two manufacturers, manufacturer Jiayang and manufacturer Penghui respectively,both batteries were tested.

4.4 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

5.2 Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

BLE:

Test Mode	Antenna	Channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
					(dBm)	(mW)
BLE_1M	Ant1	2402	0.91	0 ± 1.00	1.00	1.259
		2440	0.98	0 ± 1.00	1.00	1.259
		2480	0.82	0 ± 1.00	1.00	1.259
BLE_2M	Ant1	2402	0.89	0 ± 1.00	1.00	1.259
		2440	1	0 ± 1.00	1.00	1.259
		2480	0.83	0 ± 1.00	1.00	1.259

Worst case:

Maximum tune-up Power(dBm)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1	1.259	0.832	20	0.0002	1

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.

*** End of Report ***