



RF EXPOSURE Test Report

Report No.: MTi220530014-06E4

Date of issue: 2022-09-20

Applicant: Robosen Robotics (ShenZhen) Co., Ltd.

Product name: robosen AI base

Model(s): ZNJD

FCC ID: 2ATNWZNJDT1

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.com>

Instructions

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TEST RESULT CERTIFICATION	
Applicant:	Robosen Robotics (ShenZhen) Co., Ltd.
Address:	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:	A3703, Bldg 11, Shenzhen Bay ECO-Tech Park, No.16,Gaoxin South Science and Tech Rd., Nanshan Dist., Shenzhen, Guangdong, China
Factory:	Dongguan Jonter Digital Co., Ltd.
Address:	Building 1, No. 5, Daguizi East Street, Tangjiao Village, Chashan Town, Dongguan, China
Product description	
Product name.....	robosen AI base
Trademark	robosen
Model Name	ZNJD
Serial Model	N/A
Standards.....	N/A
Test procedure	KDB 447498 D01 v06 FCC Part 2.1091
Date of Test	
Date (s) of performance of tests	2022-08-26 ~ 2022-09-20
Test Result.....	Pass

Testing Engineer

:

Cindy Qin

(Cindy Qin)

Technical Manager

:

Leon Chen

(Leon Chen)

Authorized Signatory

:

Tom Xue

(Tom Xue)



RF EXPOSURE EVALUATION

According to FCC 1.1310: 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 §1.1307(b)

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 Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*300/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

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

Where

P_d = Power density in mW/cm²

P_{out} = output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π = 3.1415926

R = distance between observation point and center of the radiator in cm (20cm)

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

Measurement Result

BT/BLE:

Operation Frequency: 2402-2480MHz,

Power density limited: 1mW/ cm²

2.4GWiFi:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,

802.11n HT40: 2422-2452MHz,

Power density limited: 1mW/ cm²

Antenna Type: Chip Antenna;

Antenna gain: 2.85dBi

R=20cm

$mW=10^{(dBm/10)}$

antenna gain Numeric= $10^{(dBi/10)}=10^{(2.85/10)}=1.93$

BR+EDR:

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	6.30	6±1	7	5.012	2.85	1.93	0.0019	1
2441		6.73	6±1	7	5.012	2.85	1.93	0.0019	1
2480		6.24	6±1	7	5.012	2.85	1.93	0.0019	1
2402	π/4-DQPSK	5.99	6±1	7	5.012	2.85	1.93	0.0019	1
2441		6.46	6±1	7	5.012	2.85	1.93	0.0019	1
2480		5.92	6±1	7	5.012	2.85	1.93	0.0019	1
2402	8DPSK	5.96	6±1	7	5.012	2.85	1.93	0.0019	1
2441		6.36	6±1	7	5.012	2.85	1.93	0.0019	1
2480		5.94	6±1	7	5.012	2.85	1.93	0.0019	1



BLE:

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(dBm)	(dBm)	(mW)	(dBi)	Numeric
2402	GFSK	-1.86	(-1)±1	0	1.000	2.85	1.93	0.0004	1
2440		-1.36	(-1)±1	0	1.000	2.85	1.93	0.0004	1
2480		-1.76	(-1)±1	0	1.000	2.85	1.93	0.0004	1

2.4GWiFi :

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna	Evaluation result at 20cm	Power density Limits	
				tune-up power					Gain
				(dBm)	(dBm)	(dBm)	(mW)	Numeric	
				Ant A	Ant A	Ant A	Ant A	Ant A	Ant A
2412	802.11b	18.63	18±1	19	79.433	1.93	0.03050	1	
2437		18.95	18±1	19	79.433	1.93	0.03050	1	
2462		18.02	18±1	19	79.433	1.93	0.03050	1	
2412	802.11g	16.81	16±1	17	50.119	1.93	0.01924	1	
2437		16.67	16±1	17	50.119	1.93	0.01924	1	
2462		15.82	16±1	17	50.119	1.93	0.01924	1	
2412	802.11n H20	16.7	16±1	17	50.119	1.93	0.01924	1	
2437		16.77	16±1	17	50.119	1.93	0.01924	1	
2462		15.98	16±1	17	50.119	1.93	0.01924	1	
2422	802.11n H40	15.31	16±1	17	50.119	1.93	0.01924	1	
2437		15.1	16±1	17	50.119	1.93	0.01924	1	
2452		15.45	16±1	17	50.119	1.93	0.01924	1	

Conclusion:

Bluetooth and WIFI can transmit simultaneously.

Ratio=0.0019/1+0.03050/1=0.0324 < 1

No SAR is required.

----END OF REPORT----