



RF EXPOSURE Test Report

Report No.: MTi220322010-01E5

Date of issue: 2022-07-04

Applicant: SHENZHEN POWEROAK NEWENER CO., LTD

Product name: Portable Power Station

Model(s): AC500

FCC ID: 2AYT3-AC500

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.com>



Instructions

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TEST RESULT CERTIFICATION	
Applicant's name	SHENZHEN POWEROAK NEWENER CO., LTD
Address	19th floor, Tower 1, Kaidaer Building, Tongsha Road No.168, XiLi Town, Nanshan District, Shenzhen, China
Manufacturer's Name	SHENZHEN POWEROAK NEWENER CO., LTD
Address	19th floor, Tower 1, Kaidaer Building, Tongsha Road No.168, XiLi Town, Nanshan District, Shenzhen, China
Product description	
Product name	Portable Power Station
Trademark	BLUETTI
Model Name	AC500
Serial Model	N/A
Standards	N/A
Test procedure	KDB 447498 D01 v06
Date of Test	
Date (s) of performance of tests	2022-06-28 ~ 2022-07-04
Test Result	Pass

Testing Engineer

:

David. Lee

(David Lee)

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	*900/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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

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: PCB Antenna;

WIFI antenna gain: 3.76dBi

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(3.42/10)}=2.20$

BR+EDR:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	6.66	6±1	7	5.012	3.76	2.38	0.0024	1
2441		8.97	9±1	10	10.000	3.76	2.38	0.0047	1
2480		10.92	10±1	11	12.589	3.76	2.38	0.0060	1
2402	π/4-DQPSK	8.51	9±1	10	10.000	3.76	2.38	0.0047	1
2441		11.05	11±1	12	15.849	3.76	2.38	0.0075	1
2480		13.18	13±1	14	25.119	3.76	2.38	0.0119	1
2402	8DPSK	8.96	9±1	10	10.000	3.76	2.38	0.0047	1
2441		11.48	11±1	12	15.849	3.76	2.38	0.0075	1
2480		13.52	13±1	14	25.119	3.76	2.38	0.0119	1



BLE:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	5.89	6±1	7	5.012	3.76	2.38	0.0024	1
2440		8.64	9±1	10	10.000	3.76	2.38	0.0047	1
2480		10.66	10±1	11	12.589	3.76	2.38	0.0060	1

2.4GWiFi :

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	Numeric		
		Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	
2412	802.11b	13.27	14±1	15	31.623	2.38	0.01497	1
2437		14.25	14±1	15	31.623	2.38	0.01497	1
2462		17.24	17±1	18	63.096	2.38	0.02987	1
2412	802.11g	11.58	12±1	13	19.953	2.38	0.00945	1
2437		12.85	12±1	13	19.953	2.38	0.00945	1
2462		15.56	16±1	17	50.119	2.38	0.02373	1
2412	802.11n H20	11.39	12±1	13	19.953	2.38	0.00945	1
2437		12.6	12±1	13	19.953	2.38	0.00945	1
2462		15.34	16±1	17	50.119	2.38	0.02373	1
2422	802.11n H40	11.3	12±1	13	19.953	2.38	0.00945	1
2437		12.18	12±1	13	19.953	2.38	0.00945	1
2452		13.12	13±1	14	25.119	2.38	0.01189	1

Conclusion:

The device can transmitter simultaneously.



Simultaneous transmission condition

WWAN Band	The MPE ratio
Wi-Fi 2.4G	0.02987
BLE	0.0060
BT	0.0119
WPT	0.3467

Note:

The WPT test data please find in MTi220322010-01E6 test report.

The MPE ratio=Mac Test Result/Limit Value

So the simultaneous transmitting antenna pairs as below:

$\sum$ of MPE ratio=Wi-Fi 2.4G+BT+WPT=0.02987+0.0119+0.3467=0.38847<1

$\sum$ of MPE ratio=Wi-Fi 2.4G+BLE+WPT=0.02987+0.0060+0.3467=0.38257<1

----END OF REPORT----