

## RF Exposure Evaluation Report

### 1. Product Information

FCC ID:	2ABXM-E201001
Product Name	Portable Power Station
Model Number	E201001,B104201
Power Supply	Input: AC input:90V~140V 50Hz/60Hz 15A Max; DC input:11V~50V 10A 400W Max (Solar MPPT Charging) 12V/24V 10A 240W Max(Car Charging); USB C:5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A(99W); Output: AC output: 120V 60Hz 2000W; DC output: USB C:5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A(99W); USB A:5V 3.1A; DC(5521):12V 10A Max; Car outlet:12V 10A Max; Wireless output:5V 1A/9V 1.12A(10W) B104201: Input: DC(XT60):46.8V 20A Max; USB C:5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A(99W); Output: USB C: 5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A (99W)
Modulation Type	CW (Continuous Wave)
Frequency Range	115~205 KHz
WPT Operation Frequency	146.8 KHz
Antenna Type	Coil Antenna
Maximum Rated Power of WPT	10W
Exposure category	General population
EUT Type	Production Unit
Device Type	Mobile Device

### 2. Evaluation Method

- Per KDB 680106 D01 Section 3. RF Exposure Requirements;
- Consumer wireless power transfer devices approved under Part 18 in some cases have to demonstrate compliance with RF exposure requirements. The potential for exposure must be assessed according to the operating configurations of the wireless system and the exposure conditions of users and bystanders. RF exposure must be evaluated with the client device(s) being charged by the primary at maximum output power. The RF exposure requirements must be determined in conjunction with the device operating characteristics, according to the mobile and portable exposure requirements in Section 2.1091 and Section 2.1093 of the rules. SAR and MPE limits do not cover the frequency range for wireless power transfer applications which operate

below 100 kHz and 300 kHz respectively; therefore, RF exposure compliance needs to be determined with respect to 1.1307 (c) and (d) of the FCC rules.

- Based on the design and implementation of the power transfer application, it must be clearly identified if mobile or portable RF exposure conditions apply. Devices that are installed to provide separation of at least 20 cm from users and bystanders may qualify for mobile exposure conditions. For some conditions where users and bystanders may be exposed at closer than 20 cm, section 2.1091(d) (4) of the rules may apply.
- For devices designed for typical desktop applications, such as wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. A KDB inquiry is required to determine the applicable exposure limits below 100 kHz
- Portable exposure conditions from 100 kHz to 6 GHz are determined with respect to SAR requirements. Existing SAR systems and test procedures are generally intended for measurements above 100 MHz. While numerical modeling can be an alternative, the constraints of substantial computational resources at low frequencies could introduce further limitations. Under these circumstances, including operations below 100 kHz, the Commission may consider a combination of analytical analysis, field strength, radiated and conducted power measurements, in conjunction with some limited numerical modeling to assess compliance.
- Depending on the operating frequency, existing SAR and MPE measurement procedures may be adapted to evaluate wireless power transfer devices for compliance with respect to mobile or portable exposure conditions. If the grantee or its test lab have any questions regarding RF exposure evaluation they should contact the FCC Laboratory with sufficient system operating configuration details to determine if RF exposure evaluation is necessary and, if required, how to apply specific test procedures. Below 100 MHz, when SAR testing is required and the device is operating at close proximity to persons, information on device design, implementation, operating configurations, exposure conditions of users and bystanders are needed to determine the evaluation and testing requirements. In addition, the influence of nearby objects may also need consideration according to the wireless power transfer system implementation; for example, the effects of placing the device, its coils or radiating elements on or near metallic surfaces

### 3. Evaluation Limit

#### 3.1 Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 680106 D01 RF Exposure Wireless Charging Apps v03](#): RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications

[FCC CFR 47 part 1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part 2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

#### 3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6

300-1,500	/	/	f/300	6
1,500-100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
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 <sup>2</sup>	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

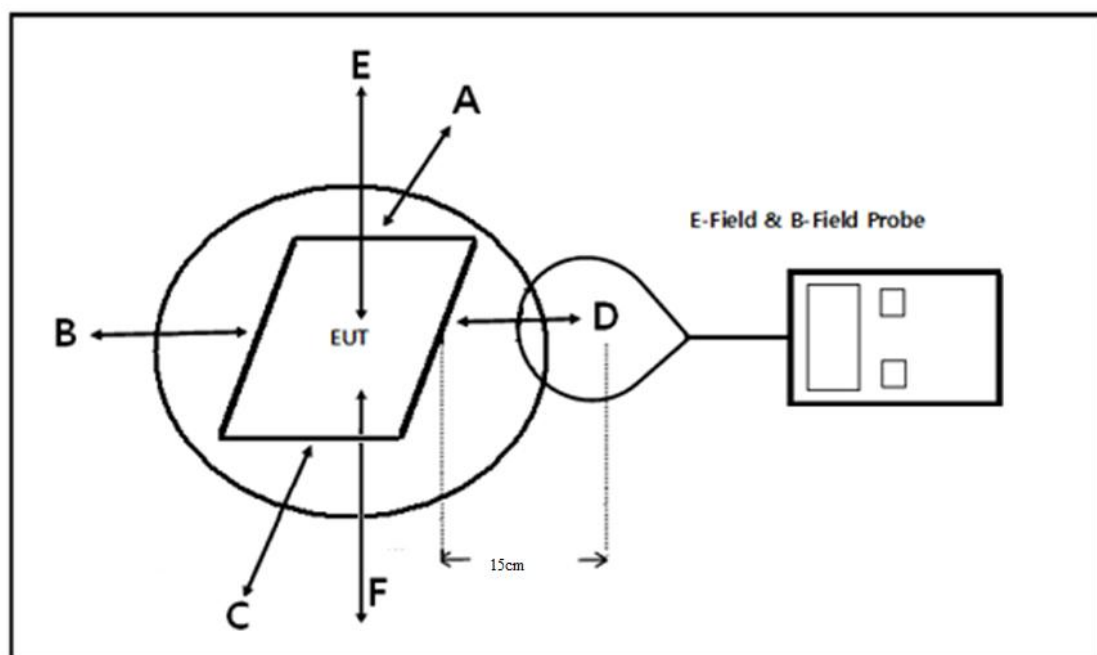
\*=Plane-wave equivalent power density

According to FCC KDB 680106 D01 Section 3. RF Exposure Requirements clause 3 the Emission-Limits in the frequency range from 100 KHz to 300 KHz should be assessed versus the limits at 300 KHz in Table 1 of CFR 47 – Section1.310 as following (measured distance shall be 15cm from the center of the probe to the edge of the device):

	E-filed	H-filed	B-filed
Frequency	V/m	A/m	uT
0.3 MHz – 3.0 MHz	614	1.63	2.0
3.0 MHz – 30 MHz	824/f (=27.5 <sub>30MHz</sub> )	2.19/f (=0.073 <sub>30MHz</sub> )	--

A KDB inquire was required to determine/confirm the applicable limits below 100 KHz.

#### 4. Test Setup Diagram



## 5. Test Equipment

Equipment	Manufacturer	Model	Serial no.	Calibrated date	Calibrated Due
Probe FHP	Narda	2300/90.10	M-1511	2021.11.19	2022.11.18
Exposure Level Tester	Narda	ELT-400	O-0098	2021.11.19	2022.11.18

## 6. Measurement Procedure

1. The RF exposure test was performed in anechoic chamber.
2. The measurement probe was placed at test distance (15 cm) which is between the edge of the charger and the geometric center of probe.
3. The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E) were completed.
4. The EUT was measured according the dictates of KDB 680106 D01v03.

## 7. Equipment Approval Considerations

The EUT does comply with item 5.2 of KDB 680106 D01v03 as follows table;

Requirements of KDB 680106 D01	Yes / No	Description
Power transfer frequency is less than 1 MHz	Yes	The device operate in the frequency range 115.0 KHz - 205.0 KHz
Output power from each primary coil is less than 15 watts	Yes	The maximum output power of the primary coil is 10W.
The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.	Yes	The transfer system includes one primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.
Client device is placed directly in contact with the transmitter.	Yes	Client device is placed directly in contact with the transmitter.
Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	Yes	On the normal use this EUT only support mobile exposure condition.
The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	Yes	Meet 50% of the MPE limit. See test results below.

## 8. RF Exposure Evaluation Results

### 8.1 Wireless Charge Evaluation - H field Strength

Test Conditions	Description	Exposure conditions	
TM1	AC/DC Adapter+EUT + load (Battery Status: <1%)	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable	Record
TM2	AC/DC Adapter+EUT + load (Battery Status: <50%)	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable	Record
TM3	AC/DC Adapter+EUT + load (Battery Status: 100%)	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable	Record
Note: All test modes were pre-tested, but we only recorded the worst case in this report.			

## H-Field Strength at all sides of the EUT

Operate mode	Charging Battery Level	Measured Distance (cm)	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)				FCC H-Field Strength Limits (A/m)
				Test Position A	Test Position B	Test Position C	Test Position D	
TM1	1%	15	0.1468	0.103	0.095	0.013	0.103	0.815
TM2	50%	15	0.1468	0.101	0.091	0.015	0.102	0.815
TM3	99%	15	0.1468	0.095	0.088	0.009	0.099	0.815

Operate mode	Charging Battery Level	Measured Distance (cm)	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)	FCC H-Field Strength Limits (A/m)
				Test Position E	
TM1	1%	20	0.1468	0.085	0.815
TM2	50%	20	0.1468	0.079	0.815
TM3	99%	20	0.1468	0.081	0.815

## E-Field Strength at all sides of the EUT

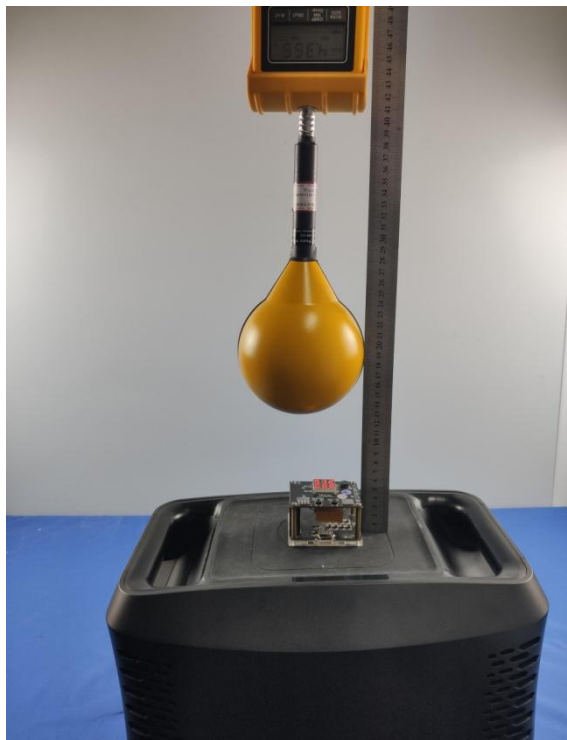
Operate mode	Charging Battery Level	Measured Distance (cm)	Frequency Range (MHz)	Measured H-Field Strength Values (V/m)				FCC H-Field Strength Limits (V/m)
				Test Position A	Test Position B	Test Position C	Test Position D	
TM1	1%	15	0.1468	14.692	13.861	3.586	14.162	307
TM2	50%	15	0.1468	14.558	13.587	3.751	13.562	307
TM3	99%	15	0.1468	12.308	11.954	3.682	12.957	307

Operate mode	Charging Battery Level	Measured Distance (cm)	Frequency Range (MHz)	Measured H-Field Strength Values (V/m)	FCC H-Field Strength Limits (V/m)
				Test Position E	
TM1	1%	20	0.1468	12.581	307
TM2	50%	20	0.1468	13.027	307
TM3	99%	20	0.1468	11.443	307

According KDB 680106 D01v03, the EUT is compliant with the 50% of the MPE limits.

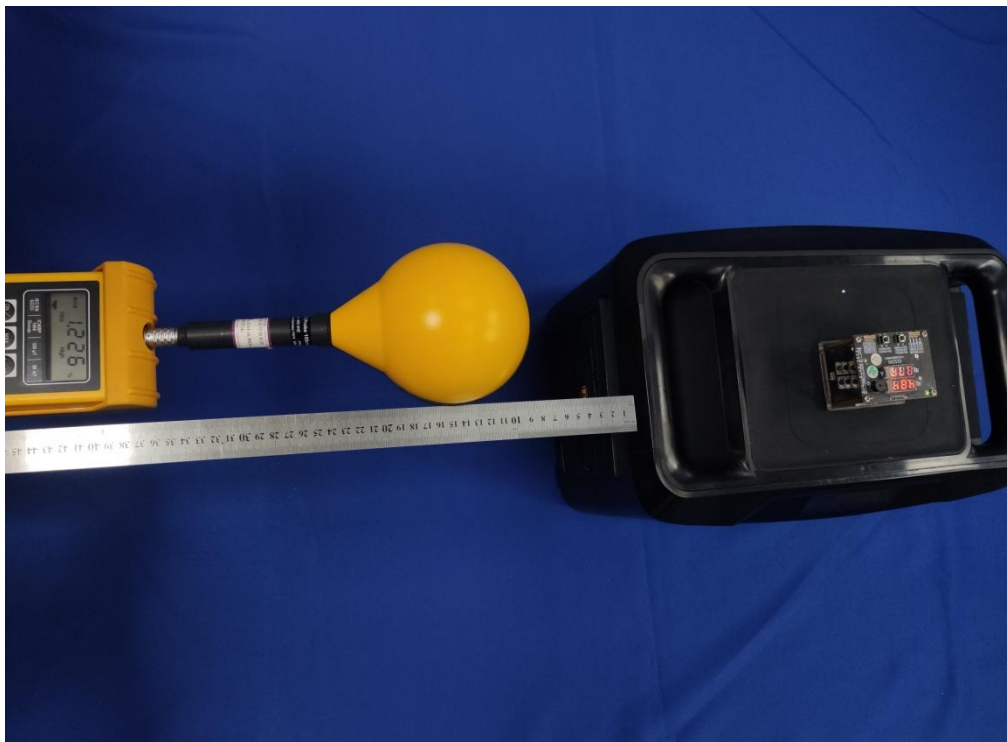
## 9. Test Setup Photos

### 9.1 Test Position E-Exposure photo from surface -Top



**9.2 Test Position A-Exposure photo from side edge surface-Rear****9.3 Test Position B-Exposure photo from side edge surface-Left**



**9.4 Test Position C-Exposure photo from side edge surface-Front****9.5 Test Position D-Exposure photo from side edge surface-Right**

## 10. Conclusion

A minimum safety distance of 20cm to the antenna is required when the device is charging a smart phone. The detected emissions are below the limitations according FCC KDB 680106 and confirmed by the FCC according to KDB Inquire.

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