

TEST REPORT	
Report Number :	90099-23-72-23-PP002
Date of issue :	2023-02-28
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Factory's name	DONGGUAN ARUN INDUSTRIAL CO.,LTD
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Standard(s) :	FCC Part 1(1.1310) and Part 2(2.1091) KDB 680106 D01 RF Exposure Wireless Charging App v03r01
Test item description :	Portable Power Station
Trade Mark :	OSCAL
Model/Type reference :	PowerMax 700
FCC ID :	2A98M-POWERMAX700
Date of receipt of test item:	2022-11-15
Date (s) of performance of test :	2022-11-15 - 2022-12-28
Summary of Test Results :	Pass
The Summary of Test Results based on a technical opinion belongs to the standard(s).	
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1. SUMMARY OF TEST RESULT

EMISSION		
Description of Test Item	Standard & Limits	Results
MPE	FCC Part 1(1.1310) and Part 2(2.1091) KDB 680106 D01 RF Exposure Wireless Charging App v03r01	Pass
Note: N/A is an abbreviation for Not Applicable.		

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product Name	Portable Power Station
Trade Name	OSCAL
Model Name	PowerMax 700
Model Differences	N/A
Test Model	PowerMax 700
Operation frequency	110-205KHz
Modulation Type	FSK
Antenna Type	Inductive Loop antenna with 10 turns.
Wireless Charging	15W
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

2.2. Description of test modes

All the test modes were carried out with the EUT in normal operation, the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

	Mode	TEST MODE DESCRIPTION
	1.	Stand-by mode
	2.	Charging
	3	Wireless Charging
Note:		
1. All test modes were pre - tested, but we only recorded the worst case in this report.		

2.3. Description of Support Device

No.	Equipment	Trade name	Model	S/N	Input/ Output
1.	ADAPTER	/	GM152-2400500-D	/	Input:100-240~50/60Hz 2.5A Output: 24V5A
2.	Xiaomi	/	Mi11	6F7DFA8A	50W MAX.
3.					
4.					

2.4. Description of Test Facility

Test Item	Uncertainty
Occupied Channel Bandwidth	: $\pm 2.3\%$
Conducted Emission Uncertainty	: 3.08dB
Radiated Emission Uncertainty	: 3.60dB (30M~1GHz)
	3.46dB(0.009MHz~30MHz)
(3m Chamber)	4.48dB (1~6GHz)

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For MPE Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input checked="" type="checkbox"/>	E-Field Probe(100kHz-3GHz)	WG	AC-0013	2244/90.20	May 08, 2022	1 Year
<input checked="" type="checkbox"/>	Exposure Level Tester	WG	EMR-20	2244/20	May 08, 2022	1 Year

4. RF EXPOSURE

4.1. Measuring Standard

FCC Part 1(1.1310) and Part 2(2.1091)

4.2. Requirments

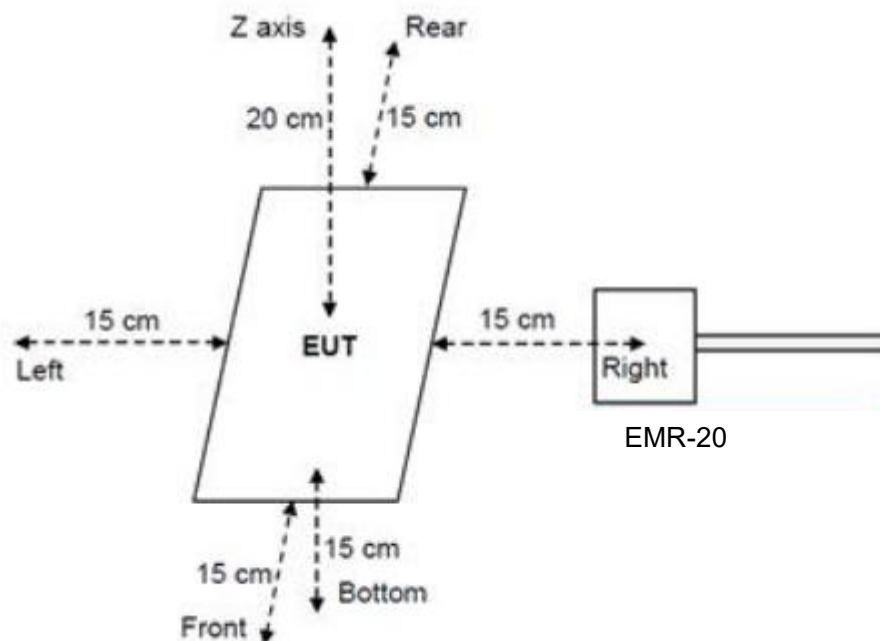
Three different categories of transmitters are defined by the FCC in OET Bulletin 65. These categories are fixed installation, mobile, and portable and are defined as follows:

- o Fixed Installations: fixed location means that the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location. Additionally, distance to humans from the antenna is maintained to at least 2 meters.
- o Mobile Devices: a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located, such as a wireless modem operating in a laptop computer, are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR §2.1091.
- o Portable Devices: a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Portable device requirements are found in Section 2.1093 of the FCC's Rules (47 CFR§2.1093). The FCC also categorizes the use of the device as based upon the user's awareness and ability to exercise control over his or her exposure. The two categories defined are Occupational/ Controlled Exposure and General Population/Uncontrolled Exposure. These two categories are defined as follows:
 - Occupational/Controlled Exposure: In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.
 - General Population/Uncontrolled Exposure: The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

4.3. Test configuration

- 1, The field strength of both E-field and H-field was measured at 15cm(the 15 cm measured from the center of the probe(s) to the edge of the device) using the equipment list above for determining compliance with the MPE requirements of FCC Part 1.1310.
- 2, The RF power density was measured at 3 different charge conditions: min load, mid load, max load.
- 3, Maximum E-field and H-field measurements were made 15cm from each side of the EUT. Along the side of the EUT and still 15cm away from the edge of the EUT, the field probes were positioned at the location where there is maximum field strength. The maximum E-field and H-field is reported below.
- 4, This device uses a wireless charging circuit for power transfer operating at the frequency of 115 – 205kHz. Thus, the 300kHz limits were used: E-field Limit = 614 (V/m); H-field limit = 1.63 (A/m).
5. The EUT were measured according to the dictates of KDB 680106D01v03

4.4. Block Diagram of Test Setup



4.5. Limits

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

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

4.6. Measuring Results

Result:

- a) Power transfer frequency is less than 1 Mhz.
 Yes, The device operates in the frequency 110Khz-205khz.
- b) Output power from each primary coil is less than or equal to 15watts.
 Yes, The maximum output power of the primary coil is Max 15W≤15W.
- c) 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 including a charging system with only single primary coils is to detect and allow only between individual of coils.
- d) Client device is placed directly in contact with the transmitter.
 Yes, Client device is placed directly in contact with the transmitter.
- e) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
 Yes, Mobile exposure condition only.
- f) 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.
 The EUT H-field strengths at 15 cm surrounding the device and 20 cm above the top surface are less than 50% the MPE limit.

TEST Data:

Test Mode: Mode 3.1(100% Load)

Electric Field Emissions		
Test Position	Measure Value (V/m)	Limit(V/m)
Top	4.35	614
Left	4.31	614
Right	4.29	614
Rear	4.26	614
Front	4.22	614
Bottom	4.19	614
Magnetic Field Emissions		
Test Position	Measure Value (A/m)	Limit(A/m)
Top	0.0857	1.63
Left	0.0851	1.63
Right	0.0843	1.63
Rear	0.0840	1.63
Front	0.0845	1.63
Bottom	0.0841	1.63

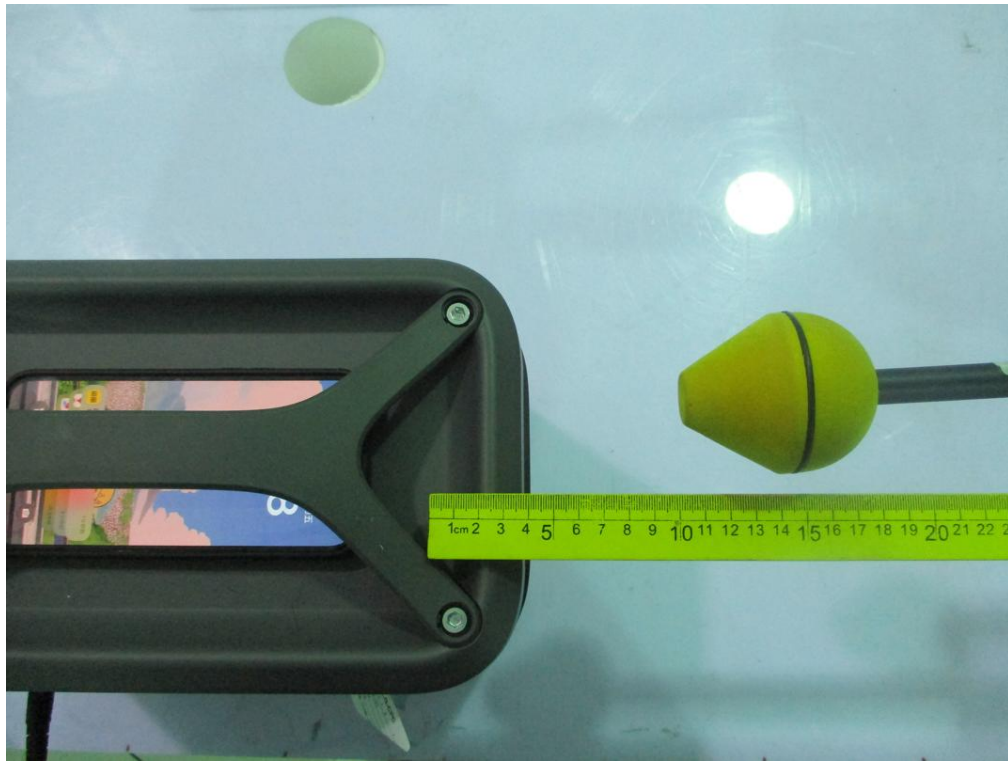
Test Mode: Mode 3.1(50% Load)

Electric Field Emissions		
Test Position	Measure Value (V/m)	Limit(V/m)
Top	4.21	614
Left	4.18	614
Right	4.15	614
Rear	4.11	614
Front	4.07	614
Bottom	4.03	614
Magnetic Field Emissions		
Test Position	Measure Value (A/m)	Limit(A/m)
Top	0.0743	1.63
Left	0.0739	1.63
Right	0.0733	1.63
Rear	0.0730	1.63
Front	0.0728	1.63
Bottom	0.0721	1.63

Test Mode: Mode 3.1(10% Load)

Electric Field Emissions		
Test Position	Measure Value (V/m)	Limit(V/m)
Top	3.75	614
Left	3.70	614
Right	3.65	614
Rear	3.61	614
Front	3.57	614
Bottom	3.52	614
Magnetic Field Emissions		
Test Position	Measure Value (A/m)	Limit(A/m)
Top	0.0343	1.63
Left	0.0338	1.63
Right	0.0331	1.63
Rear	0.0324	1.63
Front	0.0320	1.63
Bottom	0.0311	1.63

Testing photo



THE END