



RF Exposure Evaluation Report

1 Product Information

FCC ID:	2A4LH-PN-W32
Product Name:	2 in 1 Wireless Power Bank
Model Number:	PN-W32
Power Supply:	Capacity 10000mAh Micro Input : 5V/2.4A Type-C Input : 5V/2.4A Type-C Output: 5V/3A USB-A Output:5V/3A Wireless Output for Watch: 2.5W Wireless Output for Phone: 5W
Frequency Range:	110-205 KHz
Antenna Type:	Coil Antenna
Hardware version	V1.0
Software version	V1.0
Accessories	Watch: SE2 Mobile phone: OPPO A96 Adapter: PD-014
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Portable Device



2 Evaluation Method

Per KDB 680106 D01v03r01 Section 3. RF Exposure Requirements;

- 1) 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.
- 2) 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.
- 3) 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
- 4) 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.
- 5) 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.
- 6) According to April 2018 TCB Workshop, No need to report E-field measurements. Only H-field required.



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.

680106 D01 RF Exposure Wireless Charging Apps v03r01: RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications

FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.

FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

FCC CFR 47 part 18.107: Industrial, Scientific, and Medical Equipment

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 ²)	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 ²	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 ²)	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 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

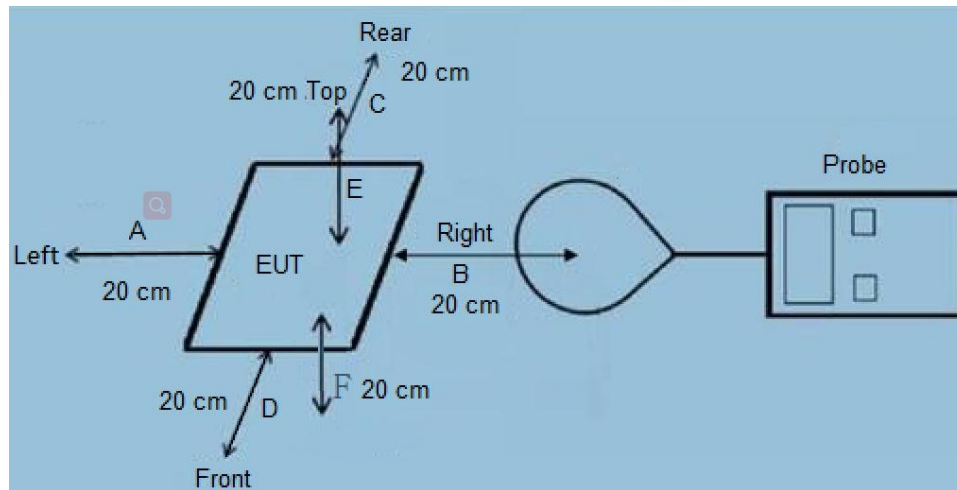
According to FCC 680106 D01 RF Exposure Wireless Charging Apps v03r01 Section 3. RF Exposure Requirements clause 3 the Emission-Limits in the frequency range from 100 KHz to 300 KHz should be assessed versus the limits at 300 KHz in Table 1 of CFR 47 – Section 1.310 as following (measured distance shall be 15cm from the center of the probe to the edge of the device):

	E-Field	*/*	B-Field
Frequency	V/m	A/m	uT
0.3 MHz – 3.0 MHz	614	1.613	2.0
3.0 MHz – 30 MHz	824/f (=27.5 _{30MHz})	2.19/f (=0.073 _{30MHz})	--

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



4 Test Setup



5 Test Instruments list

Test Equipment	Manufacturer	Model No.	SN.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
Exposure Level Tester	Narda	ELT-400	N-0231	June. 25 2022	June. 24 2023
Magnetic field probe 100cm ²	Narda	ELT probe 100cm ²	M0675	June. 25 2022	June. 24 2023
Isotropic Electric field probe	Narda	EP-601	611WX70332	June. 25 2022	June. 24 2023

6 Measurement Procedure

- The RF exposure test was performed on 360 degree turn table in anechoic chamber.
- The measurement probe was placed at test distance (0-20 cm, in 2 cm maximum increment) which is between the edge of the charger and the geometric center of probe.
- The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E, F) were completed.
- The EUT were measured according to the dictates of 680106 D01 RF Exposure Wireless Charging Apps v03r01



7 Equipment Approval Considerations

The EUT does comply with item 5.2 of 680106 D01 RF Exposure Wireless Charging Apps v03r01 as follows table;

Requirements of 680106 D01 RF Exposure Wireless Charging Apps v03r01	Yes / No	Description
Power transfer frequency is less than 1 MHz	Yes	The device operate in the frequency range 110.0 KHz - 205 KHz
Output power from each primary coil is less than 15 watts	Yes	The maximum output power of the primary coil is 5W for phone and 2.5W for watch.
The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.	Yes	The device have two coils, and them pairs may be powered on at the same time.
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).	No	portable exposure conditions
The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.	Yes	The EUT 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.

In all other cases, unless excluded above, an RF exposure evaluation report must be reviewed and accepted through a KDB or PBA inquiry to enable authorization of the equipment. When evaluation is required to show compliance; for example, using field strength, power density, SAR measurements or computational modeling etc., the specific authorization requirements will be determined based on the results of the RF exposure evaluation.



8 H field Strength

Test Modes:	Description	
Mode 1	AC/DC Adapter + EUT + Mobile Phone + Watch	Pre-tested
Mode 2	AC/DC Adapter+ EUT + Mobile Phone	Pre-tested
Mode 3	AC/DC Adapter+ EUT + + Watch	Pre-tested
Mode 4	EUT + Mobile Phone(Battery Status: ≤1%)	Pre-tested
Mode 5	EUT + Mobile Phone (Battery Status: =50%)	Pre-tested
Mode 6	EUT + Mobile Phone (Battery Status: ≥95%)	Pre-tested
Mode 7	EUT + Watch(Battery Status: ≤1%)	Pre-tested
Mode 8	EUT + Watch(Battery Status: =50%)	Pre-tested
Mode 9	EUT + Watch(Battery Status: ≥95%)	Pre-tested
Mode 10	EUT + Mobile Phone + Watch(Battery Status: ≤1%)	Record
Mode 11	EUT + Mobile Phone + Watch(Battery Status: =50%)	Record
Mode 12	EUT + Mobile Phone + Watch(Battery Status: ≥95%)	Record
Note: All test modes were pre-tested, but we only recorded the worst case in this report.		

Charging Battery Level	measuring distance (cm)	Measured H-Field Strength Values (A/m)						FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
		Test Position A	Test Position B	Test Position C	Test Position D	Test Position E	Test Position F		
1%	0	0.679	0.679	0.747	0.724	0.747	0.715	0.815	1.63
50%	0	0.710	0.734	0.719	0.671	0.711	0.694	0.815	1.63
99%	0	0.735	0.691	0.681	0.750	0.749	0.735	0.815	1.63
1%	2	0.750	0.729	0.737	0.663	0.690	0.724	0.815	1.63
50%	2	0.748	0.660	0.689	0.653	0.715	0.665	0.815	1.63
99%	2	0.696	0.674	0.655	0.704	0.729	0.700	0.815	1.63
1%	4	0.666	0.744	0.664	0.710	0.667	0.685	0.815	1.63
50%	4	0.726	0.687	0.690	0.672	0.675	0.732	0.815	1.63
99%	4	0.666	0.682	0.699	0.741	0.699	0.746	0.815	1.63
1%	6	0.703	0.685	0.750	0.710	0.682	0.667	0.815	1.63
50%	6	0.682	0.742	0.726	0.650	0.688	0.733	0.815	1.63
99%	6	0.723	0.722	0.707	0.692	0.696	0.695	0.815	1.63



Charging Battery Level	measuring distance (cm)	Measured H-Field Strength Values (A/m)						FCC E-Field Strength 50% Limits (A/m)	FCC E-Field Strength Limits (A/m)
		Test Position A	Test Position B	Test Position C	Test Position D	Test Position E	Test Position F		
1%	8	0.564	0.595	0.593	0.555	0.551	0.629	0.815	1.63
50%	8	0.556	0.579	0.605	0.618	0.649	0.579	0.815	1.63
99%	8	0.581	0.553	0.629	0.554	0.597	0.559	0.815	1.63
1%	10	0.620	0.621	0.595	0.643	0.623	0.593	0.815	1.63
50%	10	0.598	0.604	0.567	0.601	0.621	0.626	0.815	1.63
99%	10	0.629	0.598	0.619	0.552	0.614	0.589	0.815	1.63
1%	12	0.541	0.505	0.521	0.506	0.527	0.525	0.815	1.63
50%	12	0.505	0.512	0.543	0.500	0.518	0.520	0.815	1.63
99%	12	0.482	0.521	0.465	0.531	0.499	0.452	0.815	1.63
1%	14	0.469	0.503	0.456	0.463	0.521	0.450	0.815	1.63
50%	14	0.535	0.483	0.457	0.493	0.515	0.516	0.815	1.63
99%	14	0.450	0.510	0.503	0.483	0.542	0.521	0.815	1.63
1%	16	0.402	0.389	0.439	0.364	0.367	0.395	0.815	1.63
50%	16	0.422	0.374	0.363	0.377	0.355	0.440	0.815	1.63
99%	16	0.374	0.412	0.443	0.448	0.370	0.351	0.815	1.63
1%	18	0.411	0.437	0.433	0.403	0.447	0.434	0.815	1.63
50%	18	0.414	0.369	0.407	0.365	0.432	0.430	0.815	1.63
99%	18	0.379	0.353	0.376	0.389	0.414	0.402	0.815	1.63
1%	20	0.236	0.239	0.296	0.249	0.249	0.266	0.815	1.63
50%	20	0.280	0.257	0.243	0.264	0.260	0.277	0.815	1.63
99%	20	0.247	0.244	0.291	0.289	0.276	0.261	0.815	1.63



Charging Battery Level	measuring distance (cm)	Measured E-Field Strength Values (V/m)						FCC E-Field Strength 50% Limits (V/m)	FCC E-Field Strength Limits (V/m)
		Test Position A	Test Position B	Test Position C	Test Position D	Test Position E	Test Position F		
1%	0	288	295	294	277	296	250	307	614
50%	0	283	296	288	292	286	251	307	614
99%	0	294	276	290	272	291	256	307	614
1%	2	293	293	270	270	270	248	307	614
50%	2	283	294	298	271	294	255	307	614
99%	2	297	272	298	296	284	253	307	614
1%	4	242	254	268	245	244	245	307	614
50%	4	244	247	264	270	264	253	307	614
99%	4	256	257	242	244	263	246	307	614
1%	6	262	258	260	250	249	223	307	614
50%	6	247	251	249	256	251	231	307	614
99%	6	244	262	252	259	250	205	307	614
1%	8	239	200	222	217	232	235	307	614
50%	8	200	232	239	218	212	224	307	614
99%	8	205	212	231	227	204	209	307	614



Charging Battery Level	measuring distance (cm)	Measured E-Field Strength Values (V/m)						FCC E-Field Strength 50% Limits (V/m)	FCC E-Field Strength Limits (V/m)
		Test Position A	Test Position B	Test Position C	Test Position D	Test Position E	Test Position F		
1%	10	201	214	210	234	213	208	307	614
50%	10	230	234	217	222	221	206	307	614
99%	10	211	229	240	210	222	140	307	614
1%	12	177	179	205	197	172	135	307	614
50%	12	193	204	188	171	187	143	307	614
99%	12	204	191	198	204	171	145	307	614
1%	14	190	193	195	183	192	142	307	614
50%	14	200	178	180	180	182	131	307	614
99%	14	181	201	195	196	174	131	307	614
1%	16	160	157	177	160	174	133	307	614
50%	16	177	169	155	169	166	142	307	614
99%	16	164	156	168	178	174	139	307	614
1%	18	147	150	149	149	135	114	307	614
50%	18	144	144	144	143	153	102	307	614
99%	18	139	141	136	143	141	109	307	614
1%	20	122	124	131	129	130	112	307	614
50%	20	127	120	129	123	125	116	307	614
99%	20	131	130	126	122	129	118	307	614

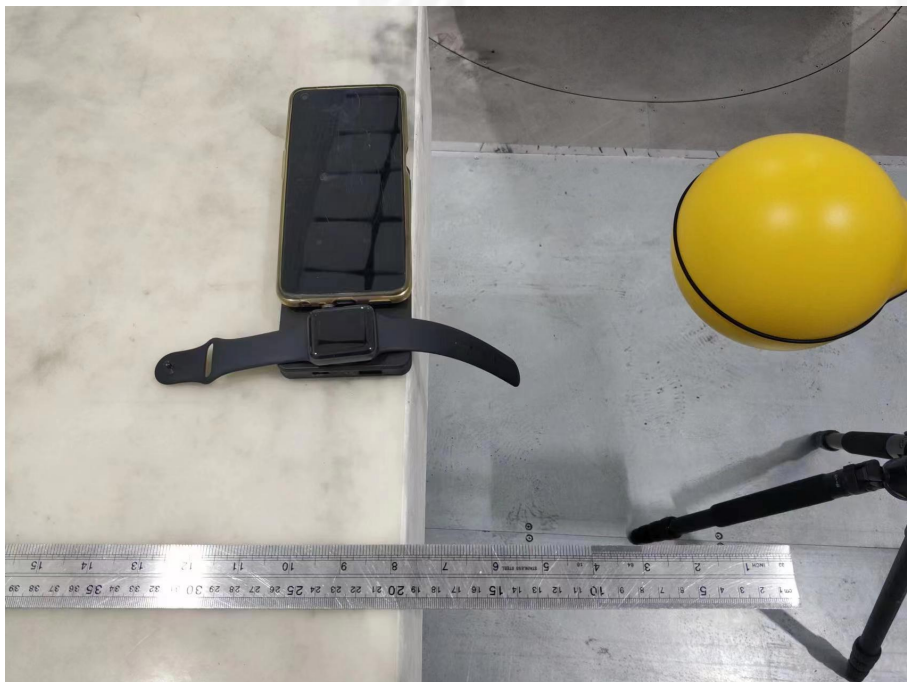


9 Test Set-up Photo

Test Position A (0cm)



Test Position A (20cm)

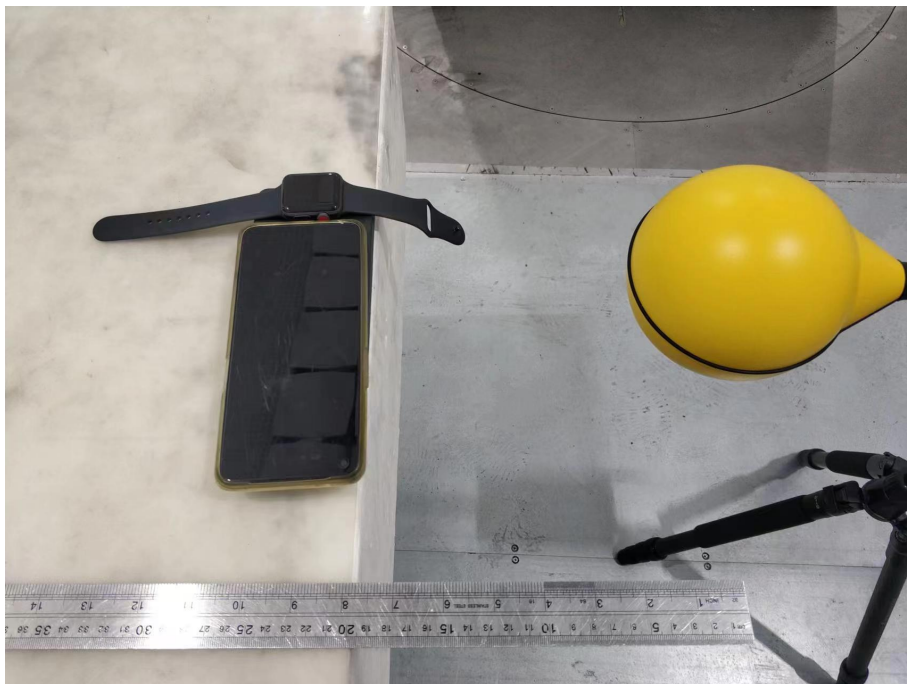




Test Position B (0cm)



Test Position B (20cm)

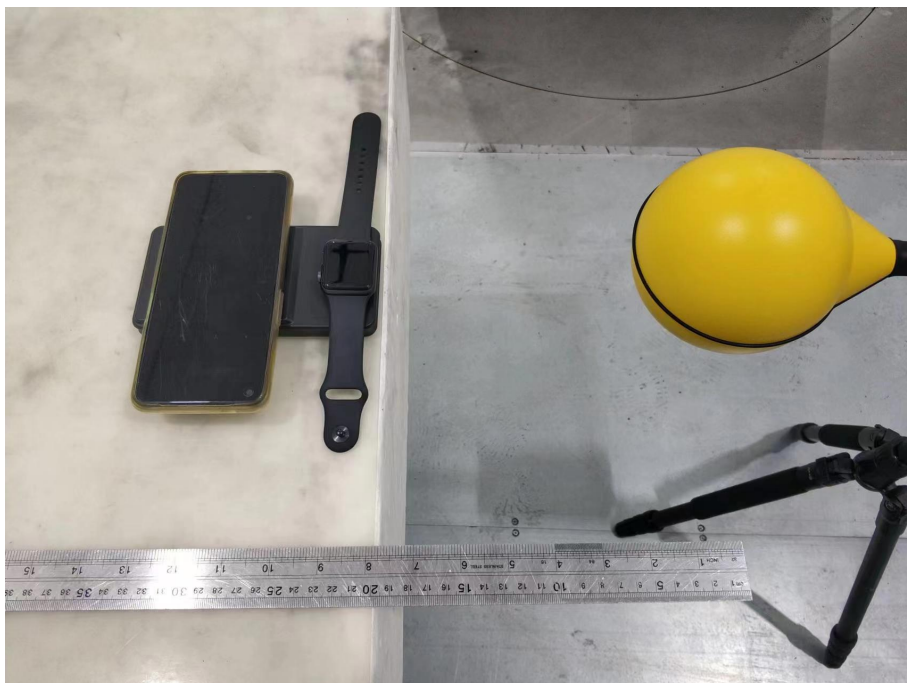




Test Position C (0cm)



Test Position C (20cm)

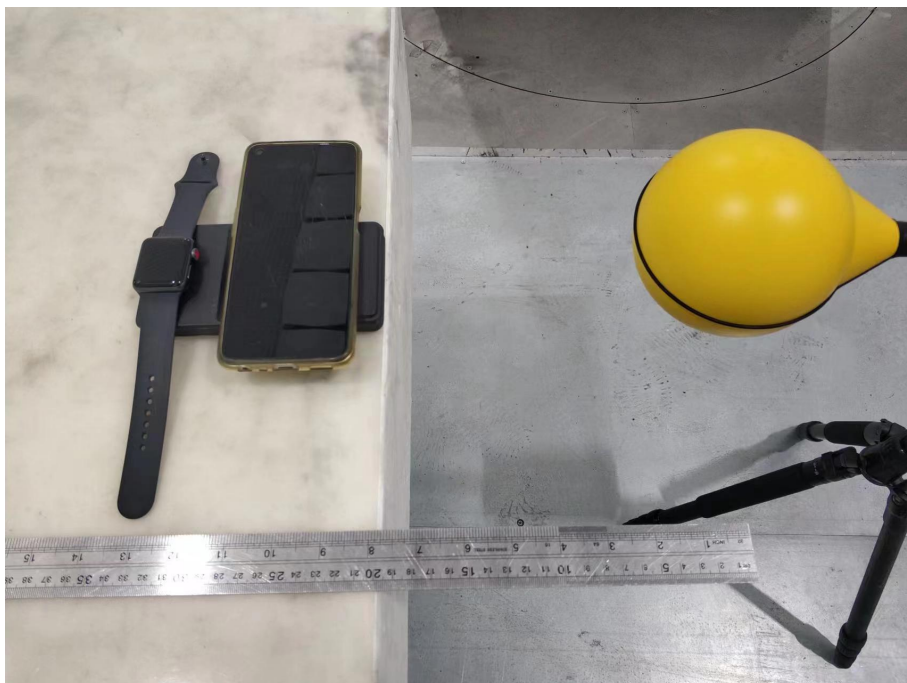




Test Position D (0cm)

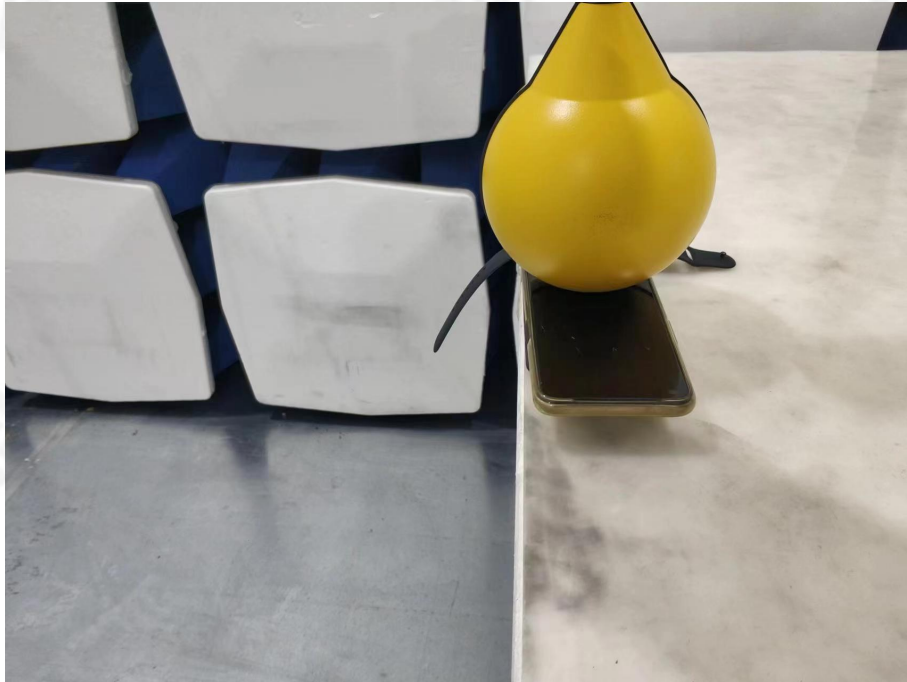


Test Position D (20cm)





Test Position E (0cm)

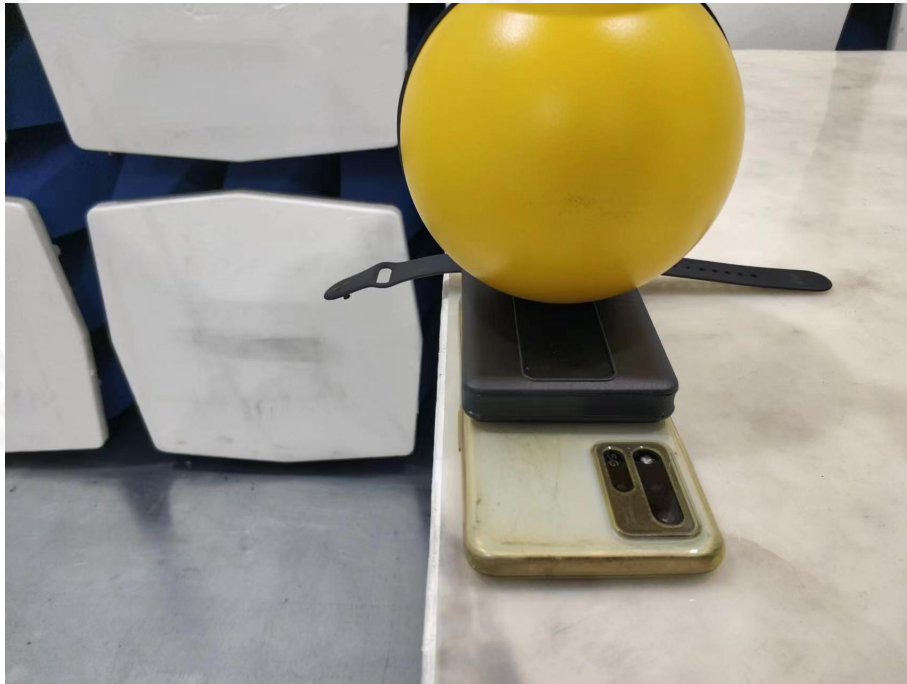


Test Position E (20cm)

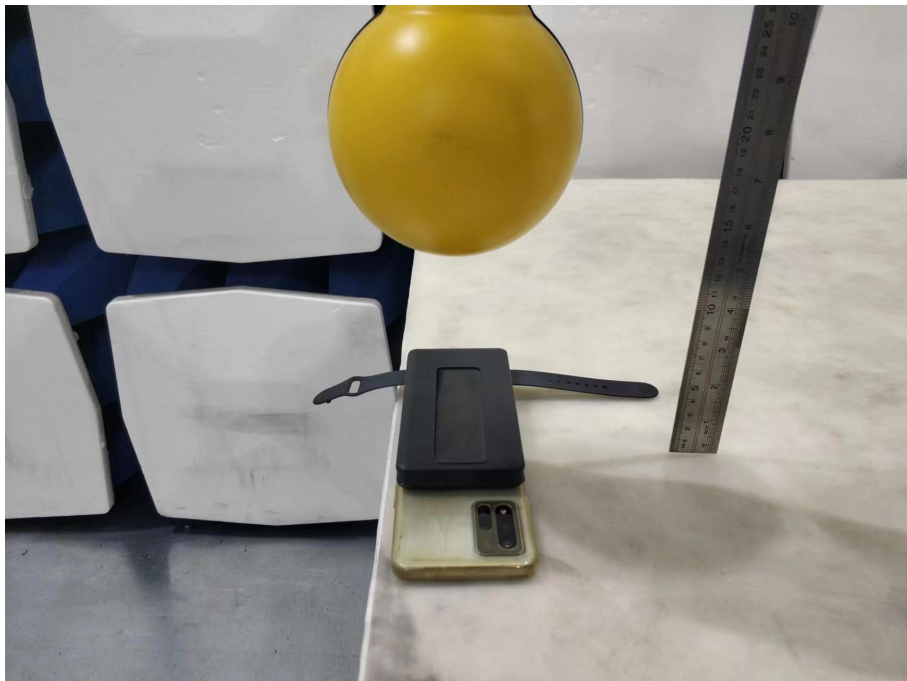




Test Position F (0cm)



Test Position F (20cm)





10 Conclusion

A minimum safety distance of 0 cm to the antenna is required when the device is charging a smart phone for portable exposure and 20 cm to the antenna for mobile exposure. The detected emissions are below the limitations according FCC 680106 D01 RF Exposure Wireless Charging Apps v03r01 and confirmed by the FCC according to KDB Inquire.