RF Exposure Evaluation Report

1. Product Information

FCC ID:	2AZK8-B05PW
Product Name	Power Bank
Model Number	B05PW
Serial Model	N/A
Power Supply	Input1: 5V⎓3A 9V⎓2A Output 1: 5V⎓3A 9V⎓2.22A 12V⎓1.67A Output 2/3: 5V⎓3A 9V⎓2A 12V⎓1.5A 5V⎓4.5A 4.5V⎓5A Battery Capacity: 3.7V 27000mAh/99Wh Wireless Charging: 15W(5W/7.5W/10W)
Modulation Type	CW (Continuous Wave)
Frequency Range	110kHz-205kHz
WPT Operation Frequency	126.54KHz
Antenna Type	Coil Antenna
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mixed Mobile and Portable Device

2. Evaluation Method

Per KDB 680106 D01 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 a 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 centre 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

According to the item 5 of KDB680106 D01 RF Exposure Wireless Charging App v03r01:

Power transfer frequency is less than 1 MHz	The power transfer frequency of ANT is 110kHz-205kHz
Output power from each primary coil is less than or equal to 15 watts.	Out power is less than or equal to ≤ 15W.
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.	The transmission system has only one coil
Client device is placed directly in contact with the transmitter.	Client device is placed directly in contact with the transmitter.
Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	No, The EUT has portable 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.	No, and H-field measurements for each edge/top surface of the host/client pair at every 2 cm, starting from as close as possible out to 20 cm were also evaluated for portable use condition. Please refer to the result of Electric Field Emissions and Magnetic Field Emissions.

3.2 Limit

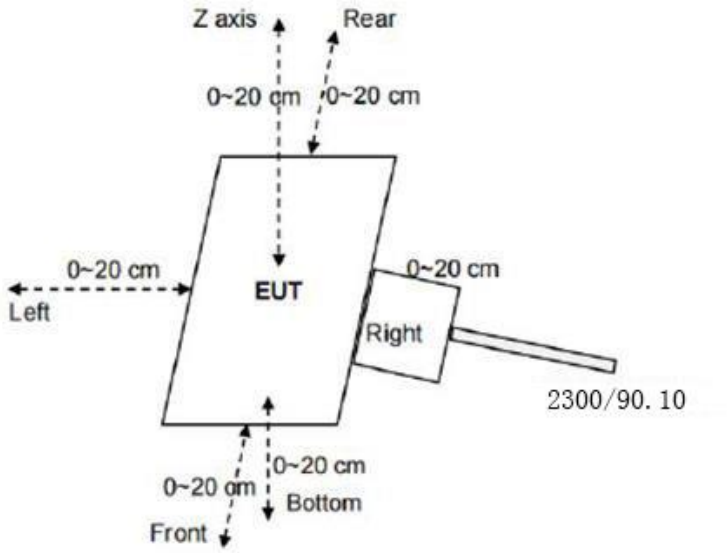
The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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 Exposures				
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
300-1500	/	/	f/300	6
1500-100,000	/	/	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
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density
RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

4. Test Structure Diagram



5. Test Equipment

Equipment	Manufacturer	Model	Serial no.	Calibrated date	Calibrated Due
electric and magnetic field analyzer	Narda	EHP-200A	180ZX40222	2024.09.05	2025.09.04

6. Test Procedure

a.The RF exposure test was performed in an echoic chamber;

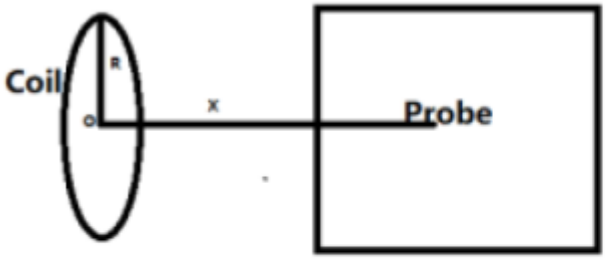
b.The measurement probe was placed at test distance 0cm to 20cm at 2cm iteration, i.e. at a distance of 0cm, 2cm, 4cm, ……. 20cm. Which is between the edge of the charger and the edge of of probe;

c.The highest emission level laws recorded and compared with limit as soon as measurement of each points (A,B, C,D, E)were completed;

d.According to the requirements if KDB 680106 D01 v04, If the centre of the probe sensing element is located more than 5 mm (The sensitive elements are located approximately 8 mm below the external surface specified in user manual of EHP-200A) from the probe outer surface, the field strengths need to be estimated through modeling for those positions that are not reachable;

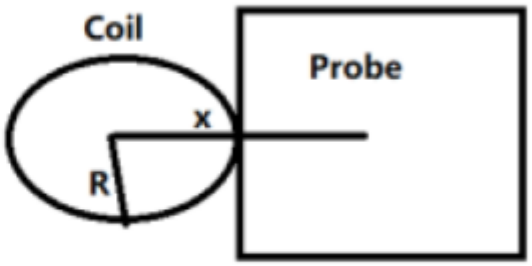
e.Use Biot-Savart Law, the value of 0 cm can be estimated through the results of 2 cm, according to the formula:

Top & Bottom Side:



$$B = \frac{\mu_0 * I * N * R^2}{2 * (R^2 + x^2)^{3/2}}$$

Front, left, right & rear Side:



$$B = \frac{\mu_0 * I * N}{2 * x}$$

Remark:
B: H-field (Unit: T);
u0: Space permeability=4*pi*10-7;
I (Unit: A): The current element passing through a radiated coil;
R: Radius of radiated coil, according to the coil specification: R=0.0215m;
X: The distance from the sensing elements of the probe to the edge of the radiated coil (the dimensions of EUT and load are take into account) (Unit: m); X=0.008m
N: Turns of the radiated coil, according to the coil specification: N=20

7. RF Exposure Evaluation Results

Note: EUT mode: wireless output 15W

1%, 50%, 99% load all have been tested, only worse case Max load (<1%) is reported.

H-Filed Strength at (distance 2cm to 20cm at 2cm iteration, i.e. at a distance of 20cm, 18cm, 16cm, ……. 0cm, Which is between the edge of the charger and the edge of probe,) surrounding the EUT (A/m)

Test Result

Test distance (cm)	Test Position A(A/m)	Test Position B(A/m)	Test Position C(A/m)	Test Position D(A/m)	Test Position E(A/m)	Test Position F(A/m)	Limit
6	0.0271	0.0004	0.0004	0.0005	0.0005	0.0196	1.63
8	0.0132	0.0006	0.0007	0.0003	0.0005	0.0101	1.63
10	0.0073	0.0001	0.0001	0.0002	0.0002	0.0059	1.63
12	0.0045	0.0001	0.0001	0.0001	0.0001	0.0037	1.63
14	0.0029	0.0001	0.0001	0.0001	0.0001	0.0025	1.63
16	0.0020	0.0001	0.0001	0.0001	0.0001	0.0017	1.63
18	0.0014	0.0000	0.0000	0.0000	0.0000	0.0013	1.63
20	0.0011	0.0000	0.0000	0.0000	0.0000	0.0009	1.63

Verify:

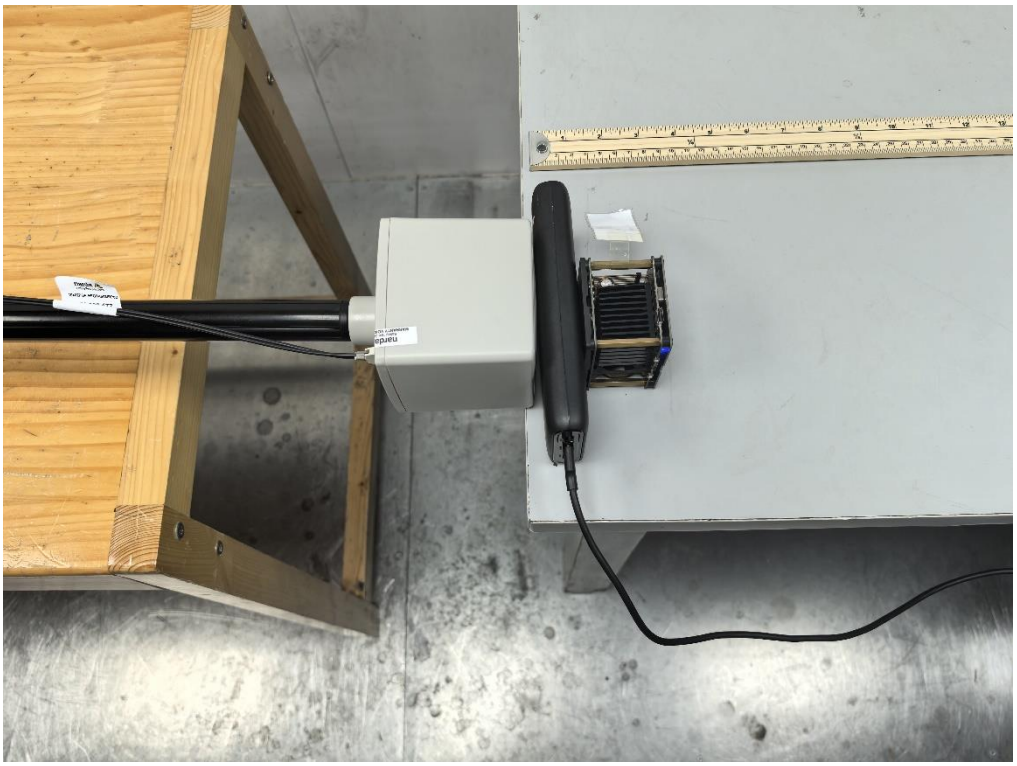
Transmitter Battery level: 100% battery						
Test Position	Test Position A(A/m)	Test Position B(A/m)	Test Position C(A/m)	Test Position D(A/m)	Test Position E(A/m)	Test Position F(A/m)
(6cm)Measure Value (A/m)	0.0271	0.0004	0.0004	0.0005	0.0005	0.0196
(6cm)Valuation(A/m)	0.0302	0.0003	0.0005	0.0004	0.0004	0.0208
(6cm)Agreement ratio	10.82%	28.57%	22.22%	22.22%	22.22%	5.94%
(8cm)Measure Value (A/m)	0.0132	0.0006	0.0007	0.0003	0.0005	0.0101
(8cm)Valuation(A/m)	0.0152	0.0005	0.0006	0.0004	0.0004	0.0108
(8cm)Agreement ratio	14.08%	18.18%	15.38%	28.57%	22.22%	6.70%
Limit	30%	30%	30%	30%	30%	30%
Test result	Pass	Pass	Pass	Pass	Pass	Pass

As the model is sufficient, the value of 0-4cm can be estimated through the results of 6-8 cm

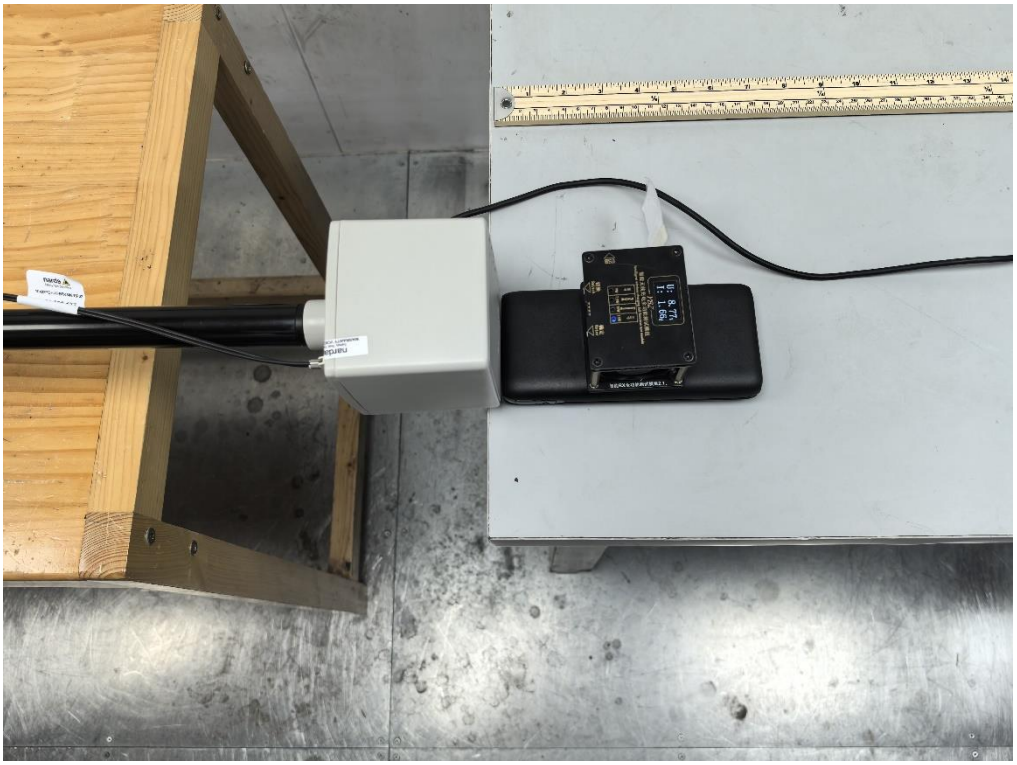
Test distance (cm)	Test Position A(A/m)	Test Position B(A/m)	Test Position C(A/m)	Test Position D(A/m)	Test Position E(A/m)	Test Position F(A/m)	Limit
0(estimated)	0.8167	0.0041	0.0041	0.0067	0.0067	0.5009	1.63
2(estimated)	0.2267	0.0015	0.0015	0.0021	0.0021	0.1308	1.63
4(estimated)	0.0680	0.0007	0.0007	0.0009	0.0009	0.0447	1.63

8. Test Setup Photos

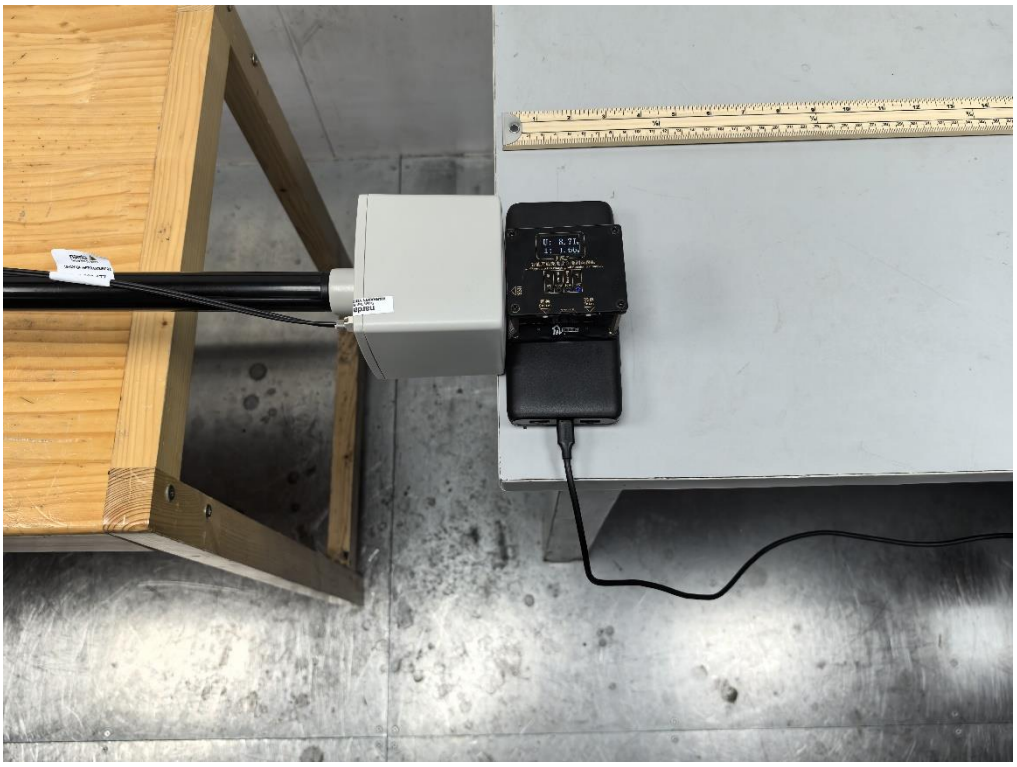
Mode1_0cm_Botton



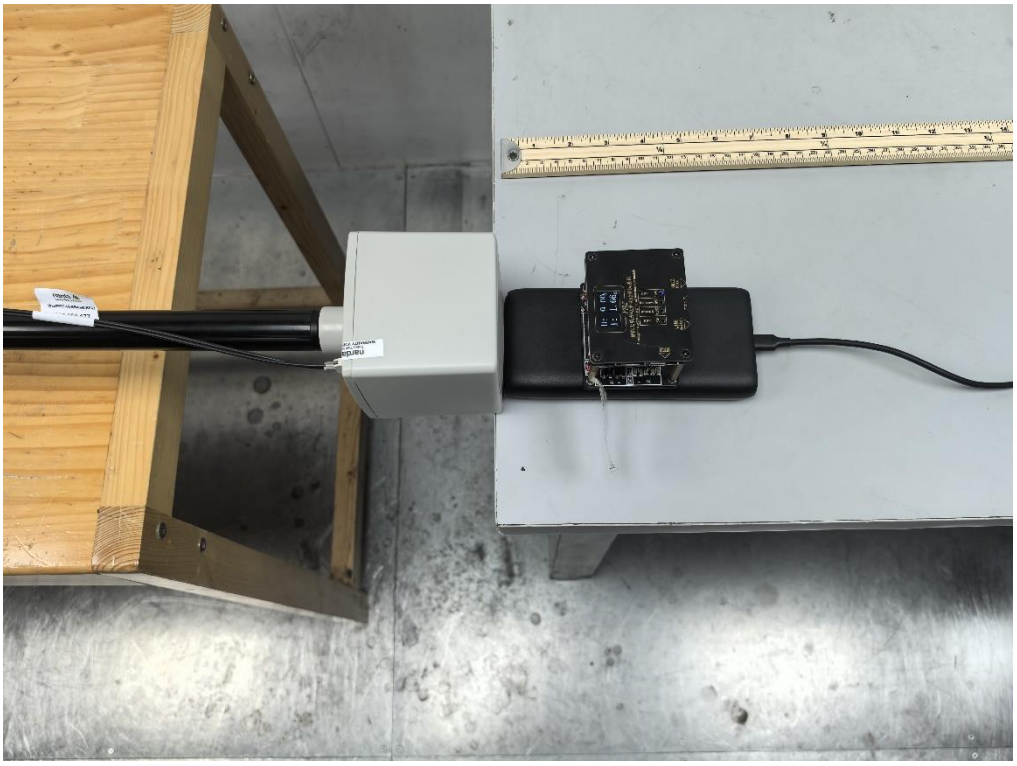
Mode1_0cm_Front



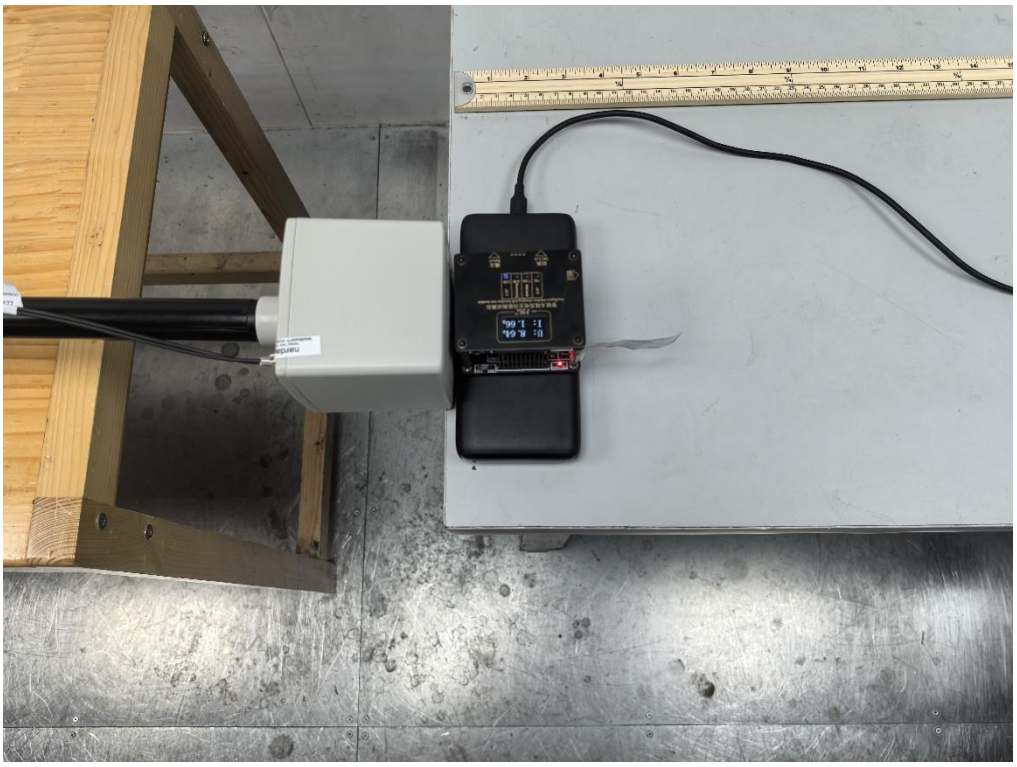
Mode1_0cm_Left



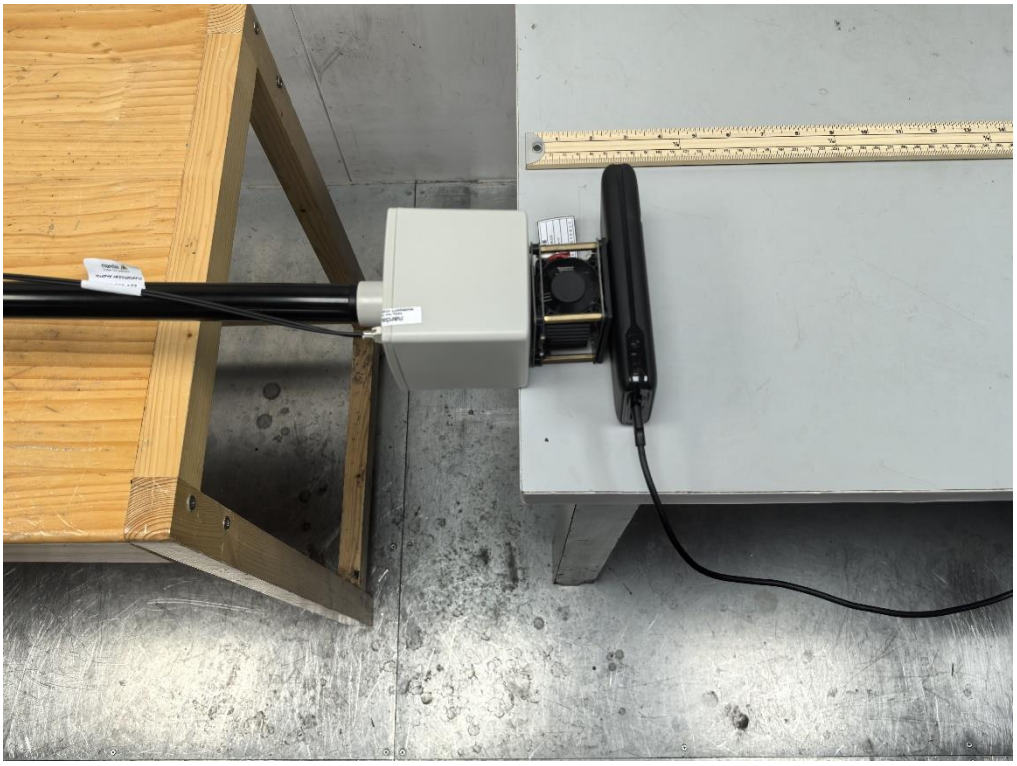
Mode1_0cm_Rear



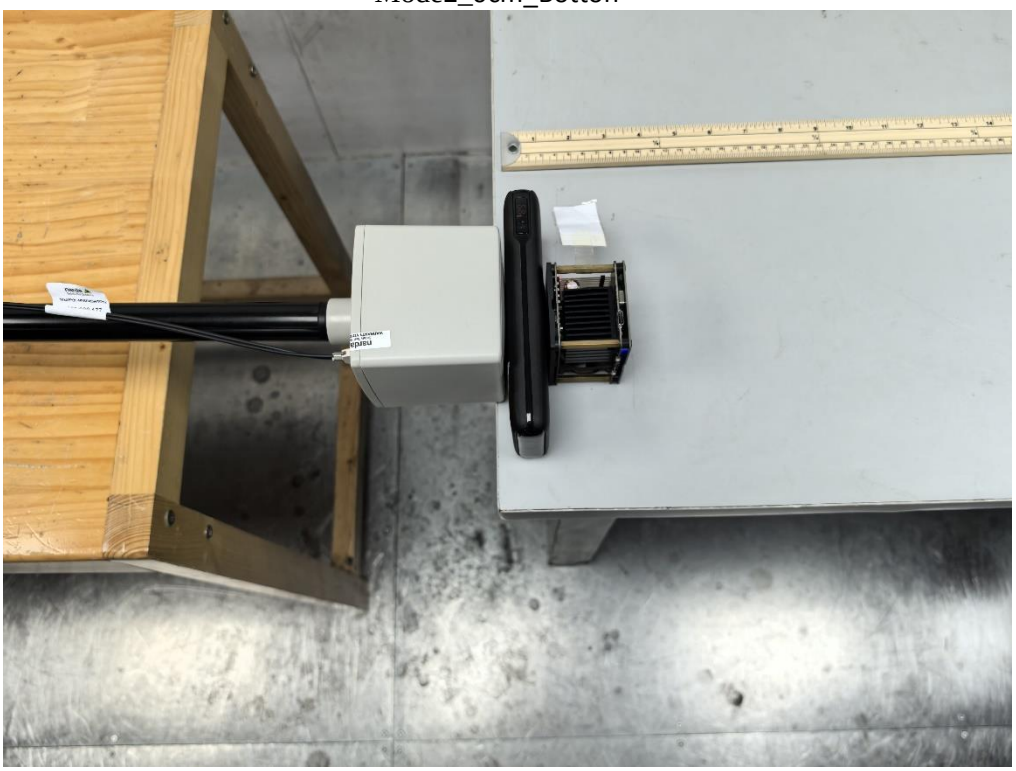
Mode1_0cm_Right



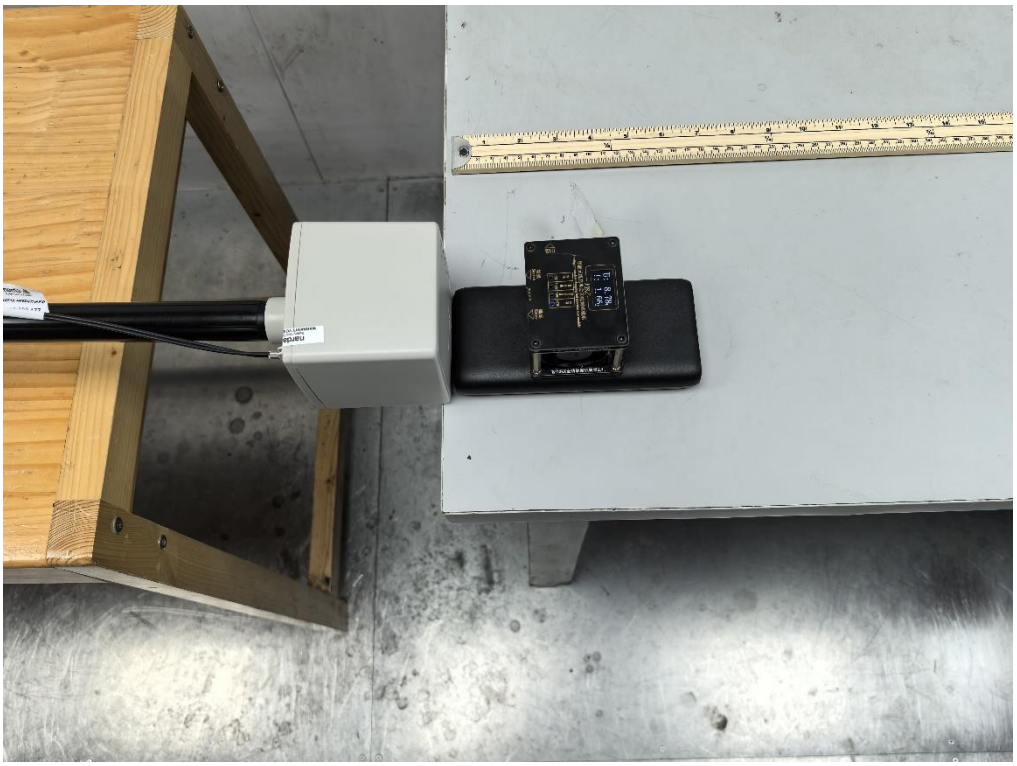
Mode1_0cm_Top



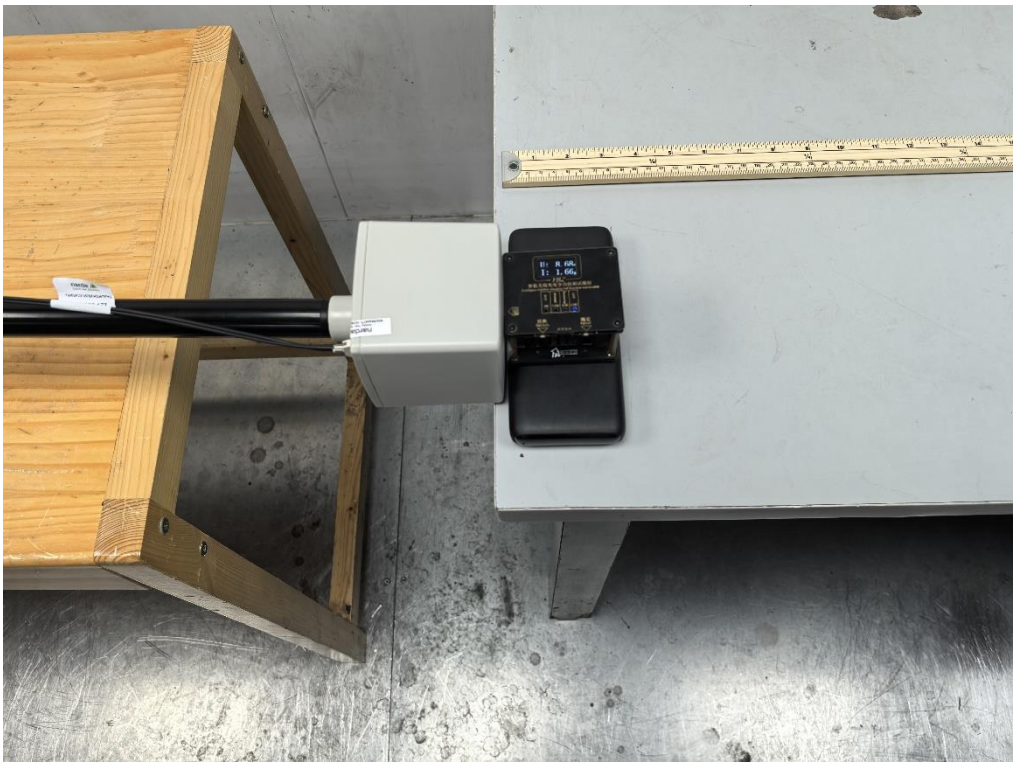
Mode2_0cm_Botton



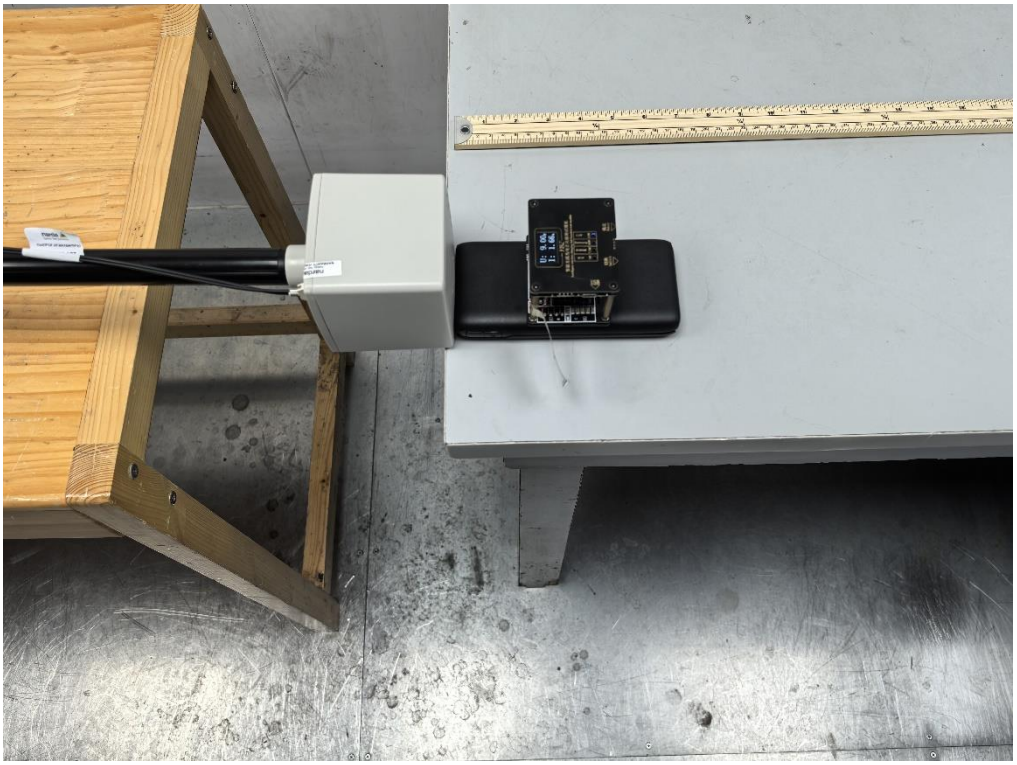
Mode2_0cm_Front



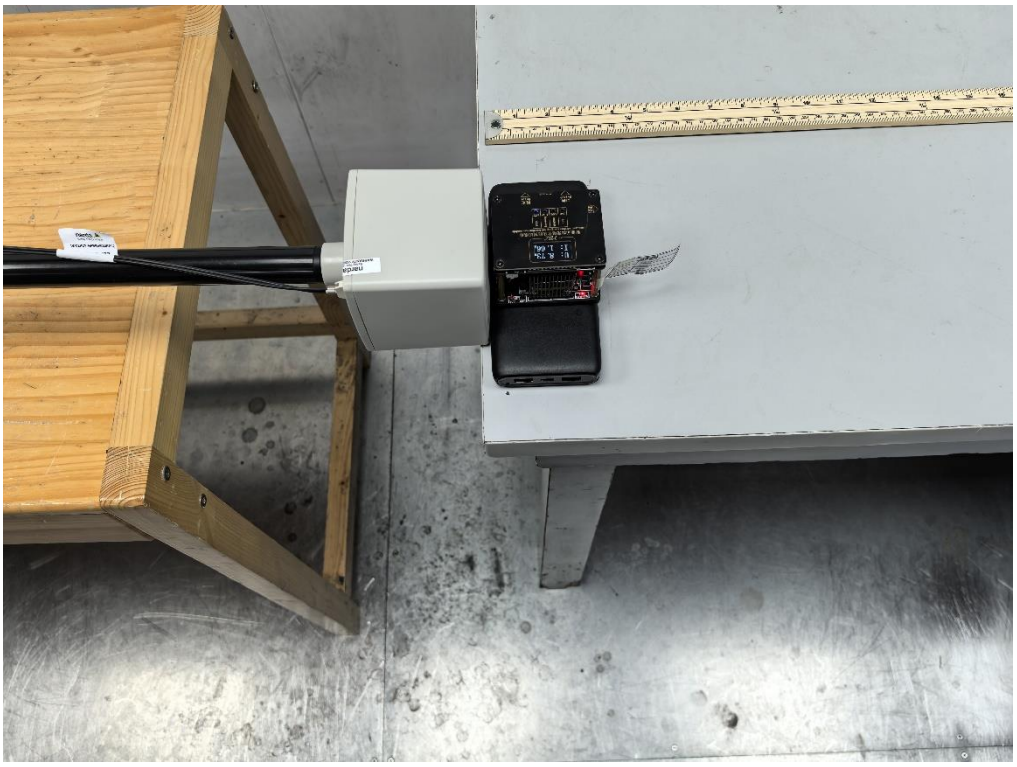
Mode2_0cm_Left



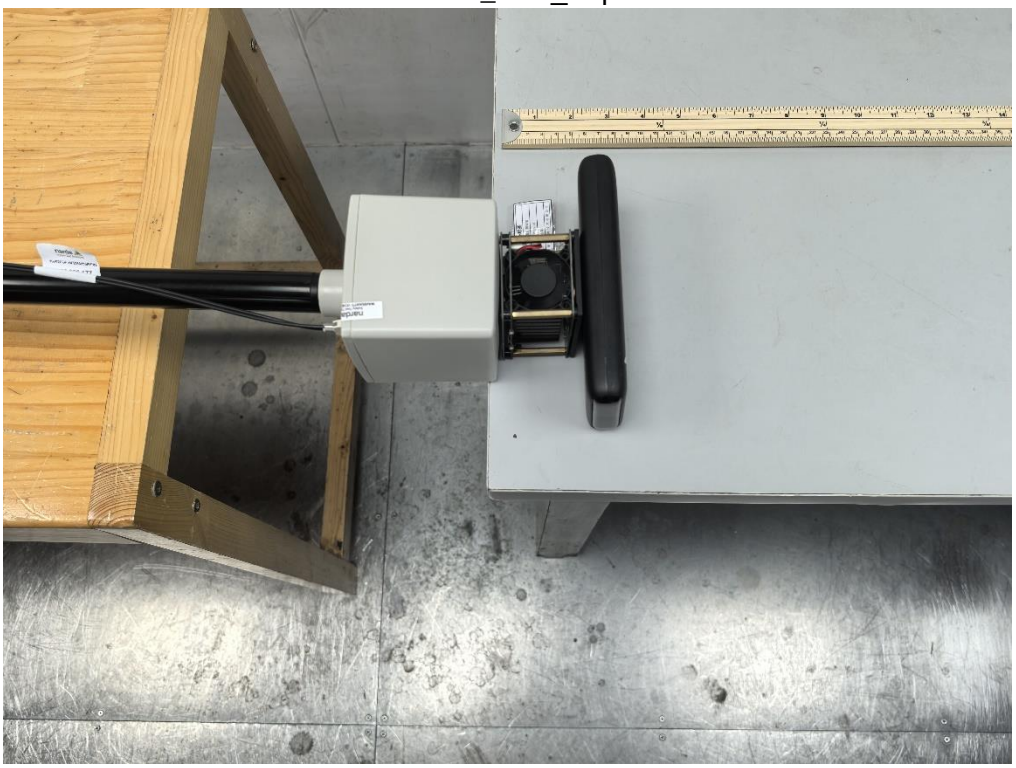
Mode2_0cm_Rear



Mode2_0cm_Right



Mode2_0cm_Top



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