MPE REPORT

Power Bank

MODEL No.: S1

FCC ID: 2BEL5-S1

REPORT NO.:NCT24003226E-2

ISSUE DATE: Jan. 24, 2024

Prepared for

Shenzhen Sodi Innovation Technology Co., Ltd.

21/F, Daoxing Global Center, Honglang North 2nd Road, Xin'an Street, Bao'an District, Shenzhen, China

Prepared by

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TABLE OF CONTENT

Test Report Description Page

1. SUMMARY OF TEST RESULT 4

2. GENERAL INFORMATION 5

2.1. DESCRIPTION OF DEVICE (EUT) 5
2.2. TEST SETUP 6
2.3. DESCRIPTION OF TEST FACILITY 7
2.4. MEASUREMENT UNCERTAINTY 7

3. MEASURING DEVICE AND TEST EQUIPMENT 8

3.1. FOR MPE MEASUREMENT 8

4. RF EXPOSURE 9

4.1. MEASURING STANDARD 9
4.2. REQUIMENTS 9
4.3. TEST CONFIGURATION 10
4.4. LIMITS 11
4.5. TEST UNCERTAINTY: 12
4.6. DESCRIPTION OF SUPPORT UNIT 13
4.7. TEST MODE: 13
4.8. MEASURING RESULTS 13

5. PHOTOGRAPHS OF TEST SETUP 20

TEST REPORT DESCRIPTION

Applicant	:	Shenzhen Sodi Innovation Technology Co., Ltd.
Address	:	21/F, Daoxing Global Center, Honglang North 2nd Road, Xin'an Street, Bao'an District, Shenzhen, China
Manufacturer	:	Shenzhen Sodi Innovation Technology Co., Ltd.
Address	:	21/F, Daoxing Global Center, Honglang North 2nd Road, Xin'an Street, Bao'an District, Shenzhen, China
EUT	:	Power Bank
Model Name	:	S1
Trademark	:	SODI

Measurement Procedure Used:

FCC Part 1(1.1310) and Part 2(2.1091)
680106 D01 RF Exposure Wireless Charging Apps v03r01

The device described above is tested by Shenzhen NCT Testing Technology Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen NCT Testing Technology Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen NCT Testing Technology Co., Ltd.

Test Engineer:

Keven Wu / Engineer

Technical Manager:

Henry Wang / Manager

1. SUMMARY OF TEST RESULT

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

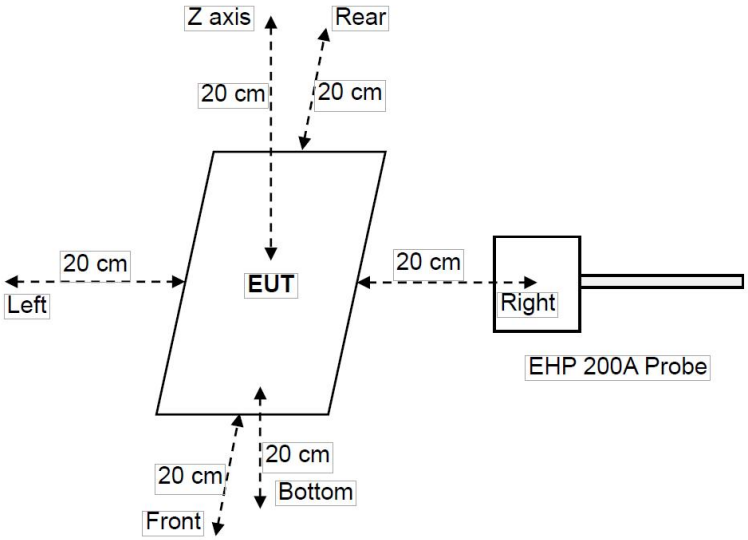
2. GENERAL INFORMATION

2.1. Description of Device (EUT)

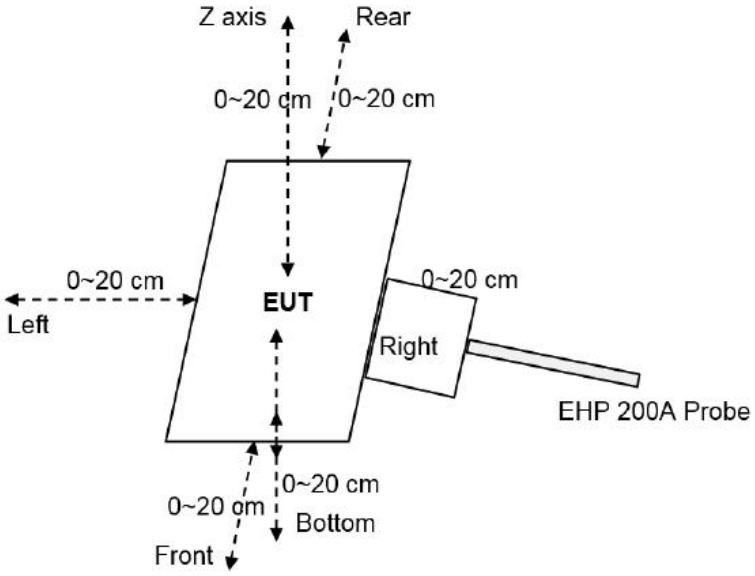
EUT	:	Power Bank
Model Number	:	S1
Power Rating	:	Battery Capacity: 3.85V/5000mAh 19.25Wh Charging Mode Type-C Input: 5V /3A, 9V/2A Type C Output:5V /3A, 9V/2.22A, 12V/1.67A Wireless Charging Output : 15W Max
Operation Frequency for WPT	:	110-205KHz
Modulation	:	FSK
Antenna Type:	:	Coil Antenna
Date of Received	:	Jan.11, 2024
Date of Test	:	Jan.11, 2024 to Jan.23, 2024

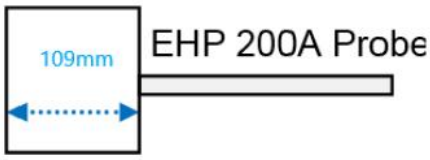
2.2. Test Setup

For Mobile exposure conditions



For portable exposure conditions





Notes: The EHP 200A Probe has a diameter of 10.9cm and a radius of 5.45cm

2.3. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27
The certificate is valid until 2028.01.07
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)
The Certificate Registration Number is L8251

Designation Number: CN1347
Test Firm Registration Number: 894804
Accredited by A2LA, June 14, 2023
The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0150
Company Number: 30806

Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.
Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

2.4. Measurement Uncertainty

Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Electric Field Emissions	±0.08V/m
Magnetic Field Emissions	±0.02A/m
uT	±0.01

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For MPE Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	Exposure Level Tester(1Hz-400KHz)	Narda	EHP-200A	180ZX00634	2023.06.21	2024.06.20

4. RF EXPOSURE

4.1. Measuring Standard

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

4.2. Requiments

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

For mobile exposure conditions:

a. The RF exposure test was performed in anechoic chamber.
b. E and H-field measurements should be made with the center of the probe at a distance of 20 cm above all the surface of the primary/client pair
c. The highest emission level was recorded and compared with limit.
d. The EUT was measured according to the dictates of KDB680106 D01 Wireless Power Transfer v04

For portable exposure conditions:
a. The RF exposure test was performed in anechoic chamber.
b. Perform H-field measurements for each edge/top surface of the host/client pair at every 2 cm, startingfrom as close as possible out to 20 cm
c. The highest emission level was recorded and compared with limit.TCB
d. The EUT was measured according to the dictates of KDB680106 D01 Wireless Power Transfer v04

4.4. Limits

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm²)	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/f²	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/cm²)	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/f²	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 KDB680106 D01 Wireless Power Transfer v04 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-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.

4.5. Test Uncertainty:

E-Filed Strength	:	±0.08V/m
H-Filed Strength	:	±0.02A/m
uT	:	±0.01

Note: The field intensity value A/m in the report is converted from uT, and the formula is as follows:

uT to A/m $A/m = \frac{\mu T}{1.25}$

4.6. Description of Support Unit

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Power Bank	SODI	S1	N/A	EUT
E-2	Phone	Mi	Xiaomi 13 Ultra	N/A	Auxiliary

4.7. Test Mode:

Mode
1 Adapter+Type-C Input + Wireless Charging Output (1%)
2 Adapter+Type-C Input + Wireless Charging Output (50%)
3 Adapter+Type-C Input + Wireless Charging Output (99%)
4 Wireless Charging Output (1%)
5 Wireless Charging Output (50%)
6 Wireless Charging Output (99%)

4.8. Measuring Results

For Mobile exposure conditions
Test Mode: Mode 1

Electric Field Emissions				
Test Position	Measure Value (V/m)	50% Limit(V/m)	Limit(V/m)	Distance(cm)
Top	0.241	307	614	20
Left	0.362	307	614	20
Right	0.329	307	614	20
Rear	0.271	307	614	20
Front	0.143	307	614	20
Magnetic Field Emissions				
Test Position	Measure Value (A/m)	50% Limit(A/m)	Limit(A/m)	Distance(cm)
Top	0.0133	0.815	1.63	20
Left	0.0371	0.815	1.63	20
Right	0.0282	0.815	1.63	20
Rear	0.0319	0.815	1.63	20
Front	0.0262	0.815	1.63	20

Test Mode: Mode 2

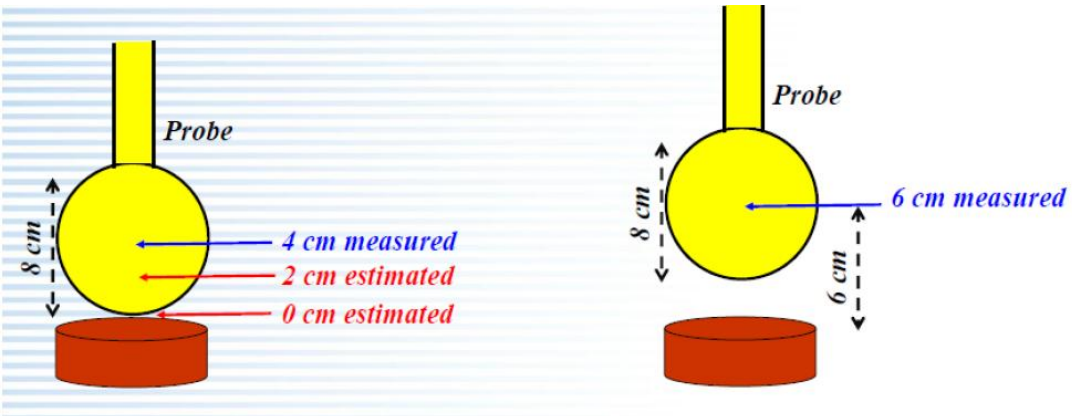
Electric Field Emissions				
Test Position	Measure Value (V/m)	50% Limit(V/m)	Limit(V/m)	Distance(cm)
Top	0.236	307	614	20
Left	0.346	307	614	20
Right	0.354	307	614	20
Rear	0.326	307	614	20
Front	0.416	307	614	20
Magnetic Field Emissions				
Test Position	Measure Value (A/m)	50% Limit(A/m)	Limit(A/m)	Distance(cm)
Top	0.0236	0.815	1.63	20
Left	0.0309	0.815	1.63	20
Right	0.0347	0.815	1.63	20
Rear	0.0346	0.815	1.63	20
Front	0.0242	0.815	1.63	20

Test Mode: Mode 3

Electric Field Emissions				
Test Position	Measure Value (V/m)	50% Limit(V/m)	Limit(V/m)	Distance(cm)
Top	0.236	307	614	20
Left	0.451	307	614	20
Right	0.372	307	614	20
Rear	0.243	307	614	20
Front	0.268	307	614	20
Magnetic Field Emissions				
Test Position	Measure Value (A/m)	50% Limit(A/m)	Limit(A/m)	Distance(cm)
Top	0.0168	0.815	1.63	20
Left	0.0249	0.815	1.63	20
Right	0.0146	0.815	1.63	20
Rear	0.0239	0.815	1.63	20
Front	0.0161	0.815	1.63	20

For portable exposure conditions

Note:
(1). The portable test modes have covered the considerations of th e mobile test, only record the test data ofthe portable conditions in this report.
(2) Operating modes with client device (1 %, 50%, 99% battery status of client device) have been test, onlyshow the data of worst case of 1% battery status of client device.
(3) 20-2cm is the actual test value, and 0 cm is the estimated value.
(4) Perform H-field/E-field measurements are taken alond all three axes the device from 0cm>20cm in 2cmminimum increment for each edge surface of the host/client pair. If the center of the probe sensing element ismore than 5mm from the probe outer edge, the field strenaths need to be estimated for the positions that arenot reachable.

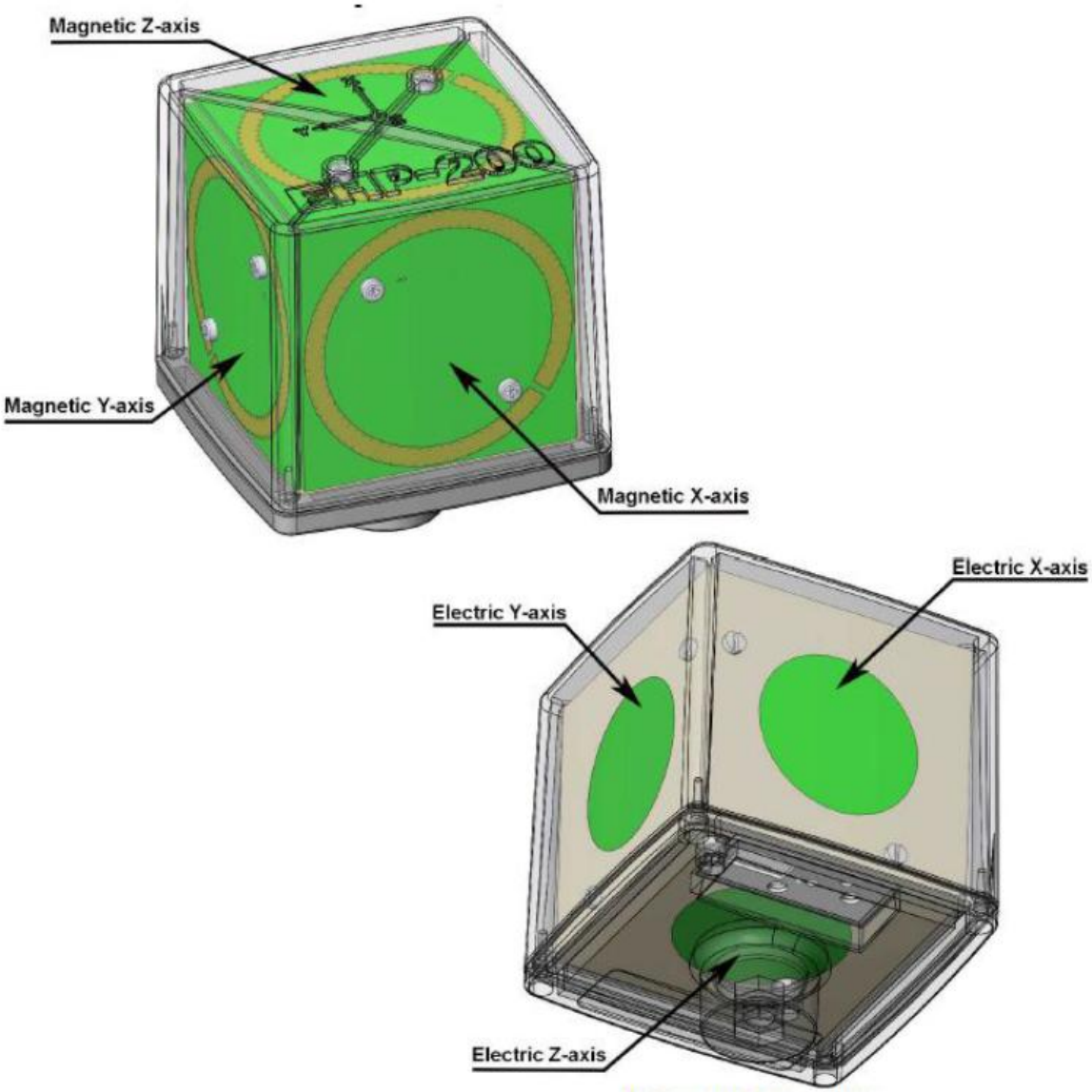


Example of probe measurements in points close to the device surface: estimates compared with measurements at 4 and 6 cm provide validation

According to Calibration information and specification about EHP-200A, The Probe EHP-200A's sensitiveelements center are 8mm below the externa surface, and the dimensions is 92x92x109mm, so the actuacm field strenaths need to be estimated for the positions that are not reachable. The Extrapolated ValueCalculation Method please below). And the result of test distance 2cm-20cm was measured value.

Probe	Length	Width	Height
	109mm	92mm	92mm

lote: EUT is a loop/coil emitting structure, so E-field not required. Just recorded the H-field value

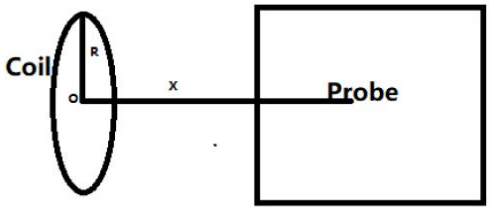


EHP-200A/EHP-200AC axes

The sensitive elements are located approximately 8 mm below the external surface

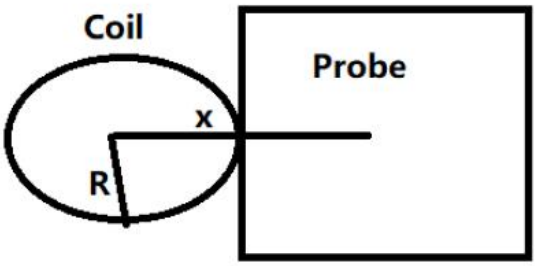
Estimated method for portable RF Exposure condition:
We use Biot-Savart formula theory to estimate the strength of the magnetic field that the measuring instrument cannot measure. According to Biot-Savart formula:

Top & Bottom Side:



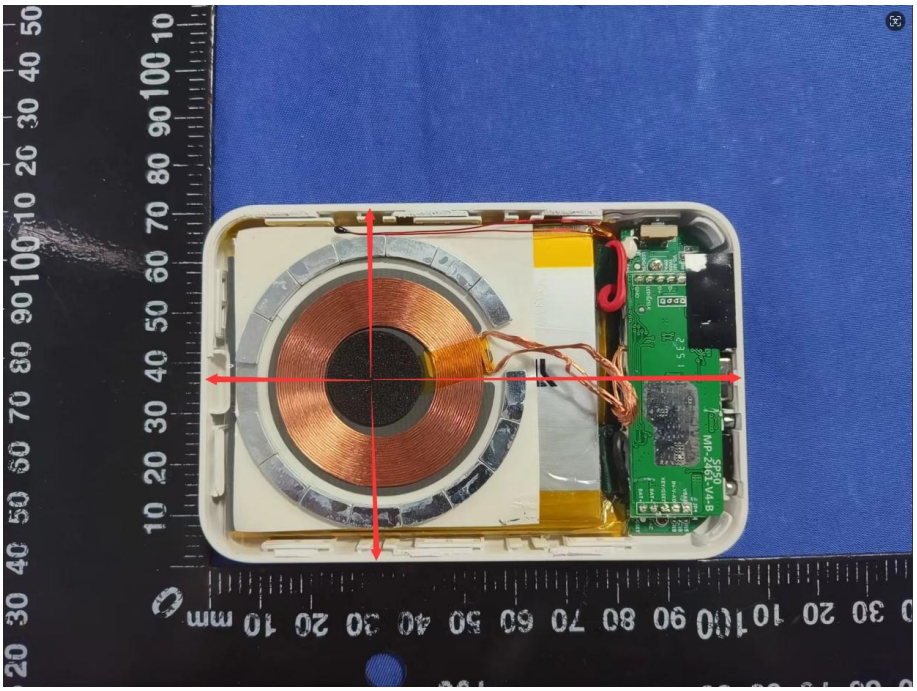
$$B = \frac{\mu_0 * I * N * R^2}{2 * (R^2 + x^2)^{3/2}}$$

Front, left, right & rear Side:



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

B: means H-field value.
Uo is space permeability; u0=4T*10-7:
I:A current element passing through a coil:
R: means the Radius of coil(According to provided Antenna specification: We can get the minimum R=39/2= =0.0195m);
Test Distance: The distance from the sensing element of the probe to the edge of the devicesurface
x: means the center of the coil to the sensing elements of the probe. (For top & bottom side: x=test distance. Foiother side: x=test distance+R)
N: Number of turns, according to providing “Antenna specification” files: N=10



Transmitter to top:2.5±0.5mm
Transmitter to Bottom:9.5±0.5mm
Transmitter to Left:34±0.25mm
Transmitter to Right:34±0.25mm
Transmitter to Front:32±0.5mm
Transmitter to Rear:70±0.5mm

6) For validation purposes: If the value to show a 30% agreement between the mode and the (E- and/or H-field) probemeasurements for the two closest points to the device surface, and with 2cm increments. Then this extrapolation method is reasonable.

Note:
The percent ratio of agreement is the diference between the estimated and measured values divided bythe average of the estimated and measured values.

Validation:

Magnetic Field Emissions							
Test Distance(cm)	Top	Left	Right	Front	Rear	Bottom	Conclusion
	Unit: Agreement (%); H-field (A/m)						
Agreement-2cm	-19.95	15.54	11.95	13.43	16.32	-16.24	Compliance (Within 30%)
2cm(estimated)	0.1861	0.1079	0.0835	0.0898	0.0428	0.1740	
2cm(measured)	0.2274	0.0923	0.0741	0.0785	0.0363	0.2047	

Magnetic Field Emissions							
Test Distance(cm)	Top	Left	Right	Front	Rear	Bottom	Conclusion
	Unit: Agreement (%); H-field (A/m)						
Agreement-2cm	15.60	3.84	-15.88	-3.21	-5.50	2.64	Compliance (Within 30%)
4cm(estimated)	0.0693	0.0438	0.0278	0.0330	0.0228	0.0609	
4cm(measured)	0.0593	0.0421	0.0326	0.0341	0.0241	0.0593	

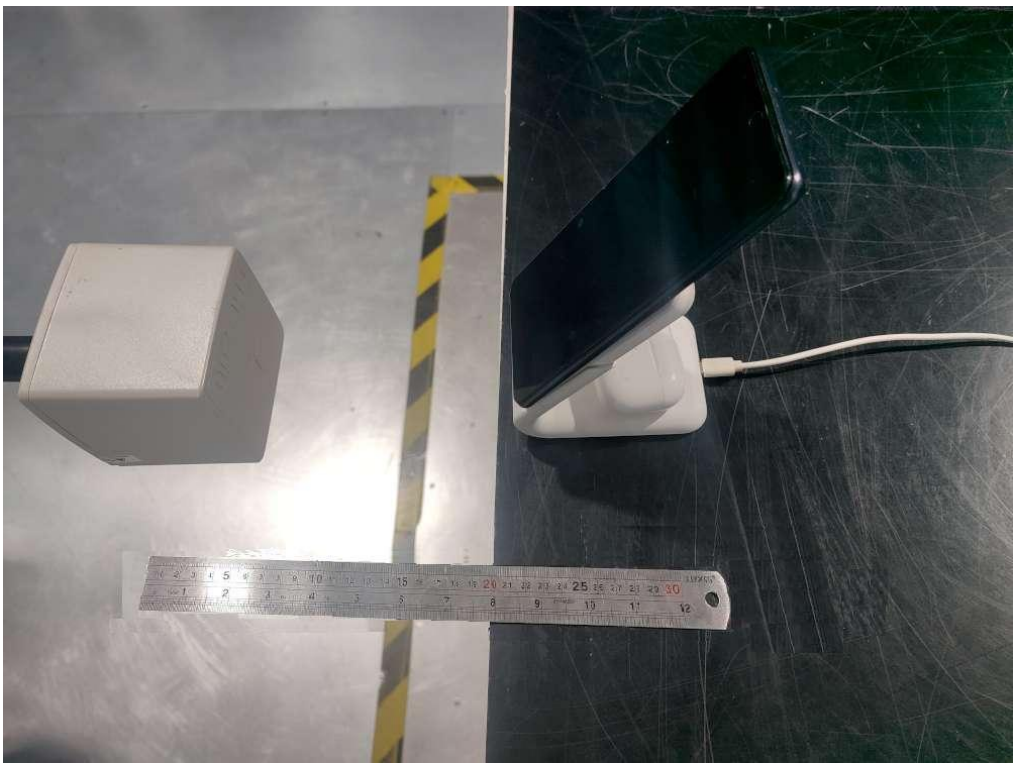
For portable exposure conditions

Mode	measuring distance (cm)	Measured H-Field Strength Values (A/m)						FCC H-Field Strength Limits (A/m)	Max. Percentage (%)
		Test Position A	Test Position B	Test Position C	Test Position D	Test Position E	Test Position F		
Mode 4	0	0.5584	0.3662	0.2940	0.3309	0.0738	0.6245	1.63	38.31
Mode 4	2	0.2274	0.0923	0.0741	0.0785	0.0363	0.2047	1.63	13.95
Mode 4	4	0.0593	0.0421	0.0326	0.0341	0.0241	0.0593	1.63	3.64
Mode 4	6	0.0274	0.0214	0.0136	0.0159	0.0141	0.0259	1.63	1.68
Mode 4	8	0.0266	0.0112	0.0115	0.0094	0.0114	0.0253	1.63	1.63
Mode 4	10	0.0204	0.0105	0.0107	0.0081	0.0116	0.0246	1.63	1.51
Mode 4	12	0.0181	0.0102	0.0092	0.0071	0.0104	0.0224	1.63	1.37
Mode 4	14	0.0166	0.0094	0.0087	0.0065	0.0102	0.0213	1.63	1.02
Mode 4	16	0.0154	0.0093	0.0075	0.0057	0.0093	0.0210	1.63	1.29
Mode 4	18	0.0141	0.0085	0.0067	0.0052	0.0088	0.0187	1.63	1.15
Mode 4	20	0.0110	0.0074	0.0053	0.0034	0.0071	0.0182	1.63	1.12

Remark: All the modes have tested and recorded the worst mode 4 in the report.

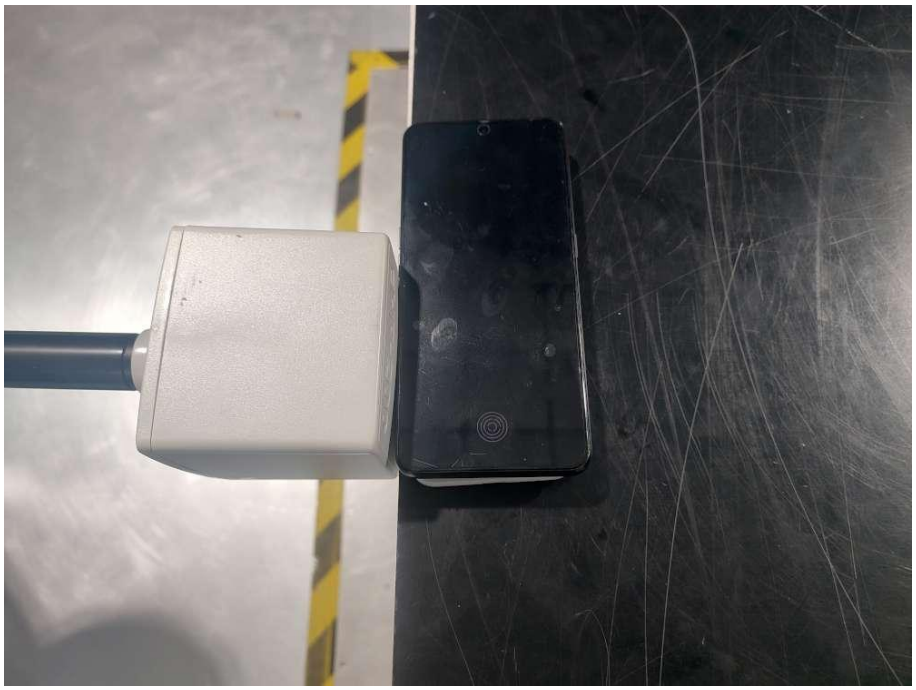
5. PHOTOGRAPHS OF TEST SETUP

For Mobile exposure conditions

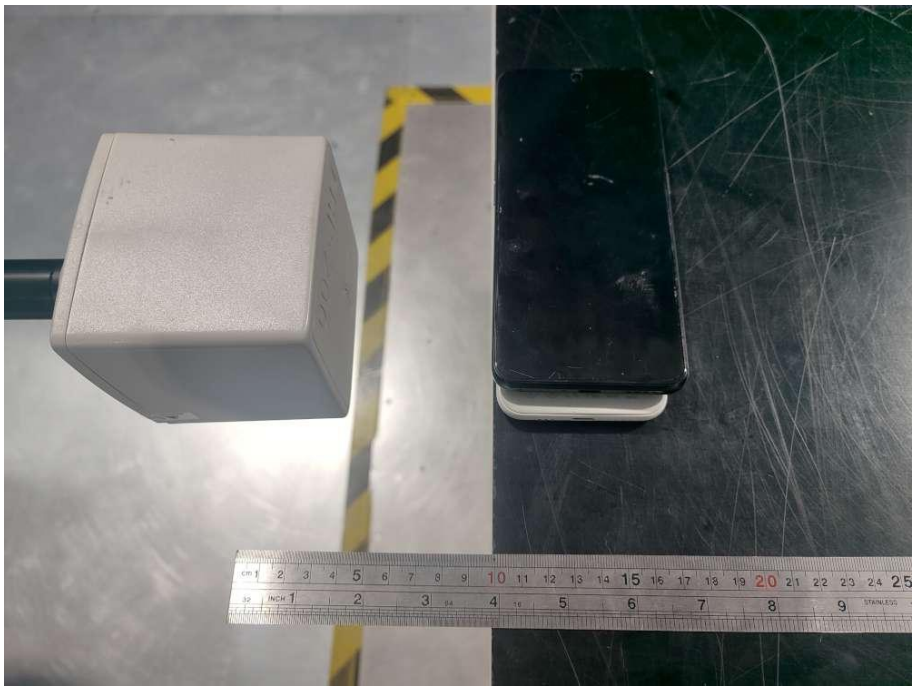


For portable exposure conditions

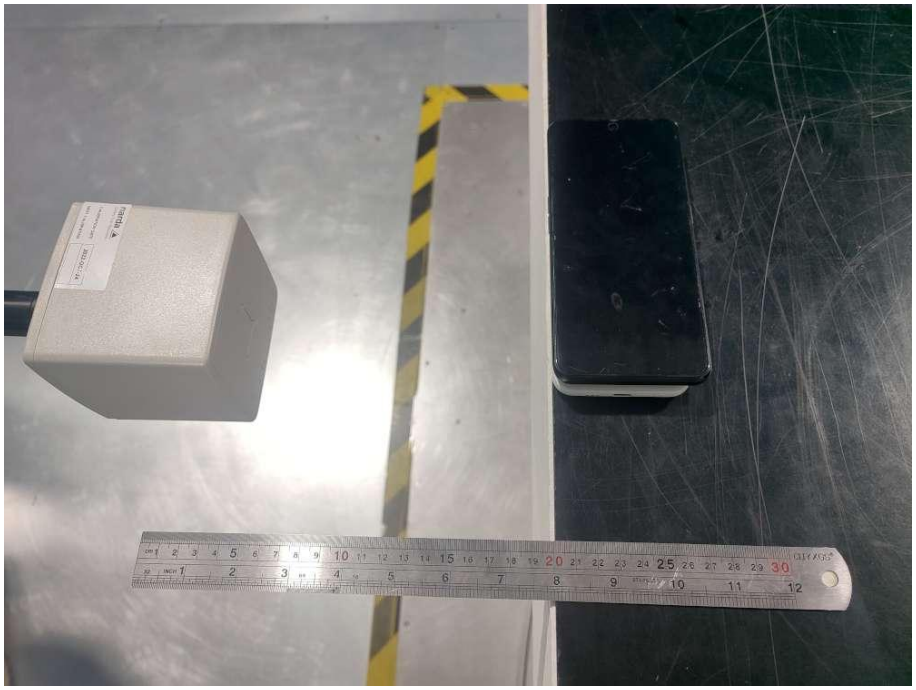
Test Position A（0cm）



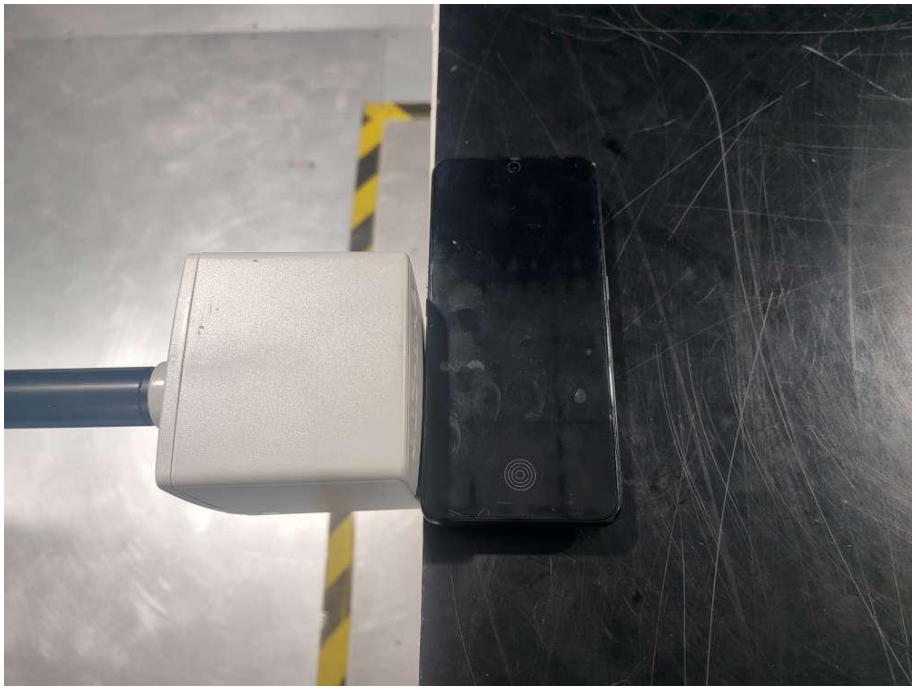
Test Position A（10cm）



Test Position A（20cm）

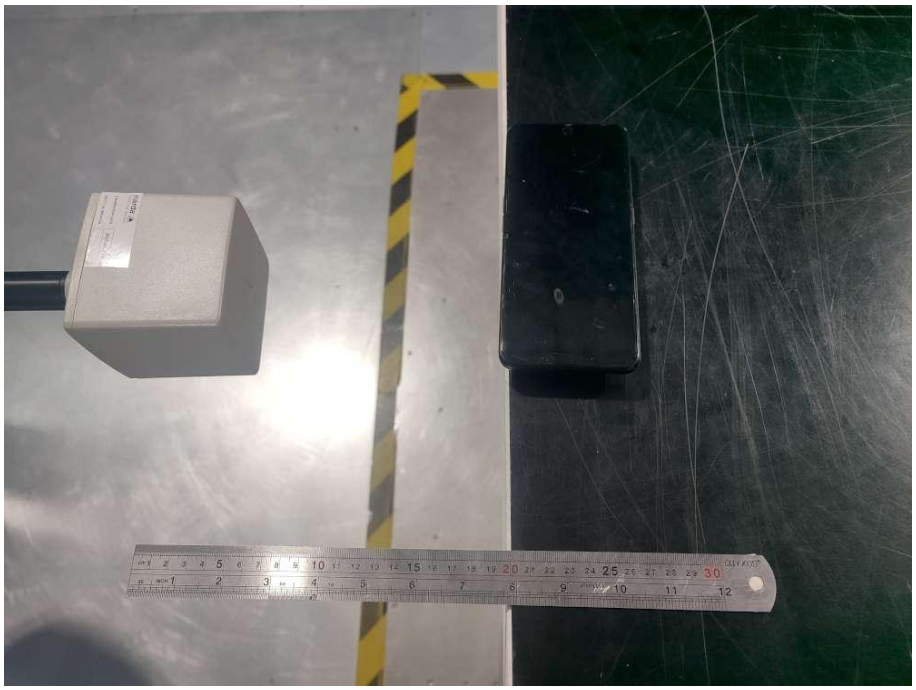


Test Position B（0cm）

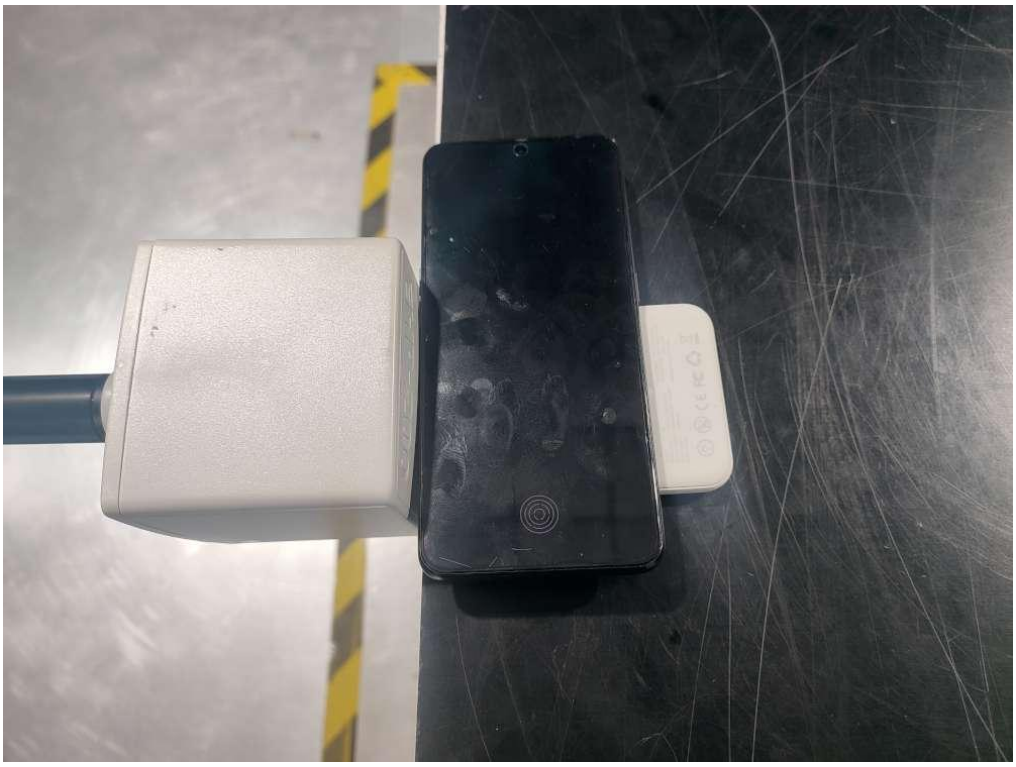


Test Position B（10cm）

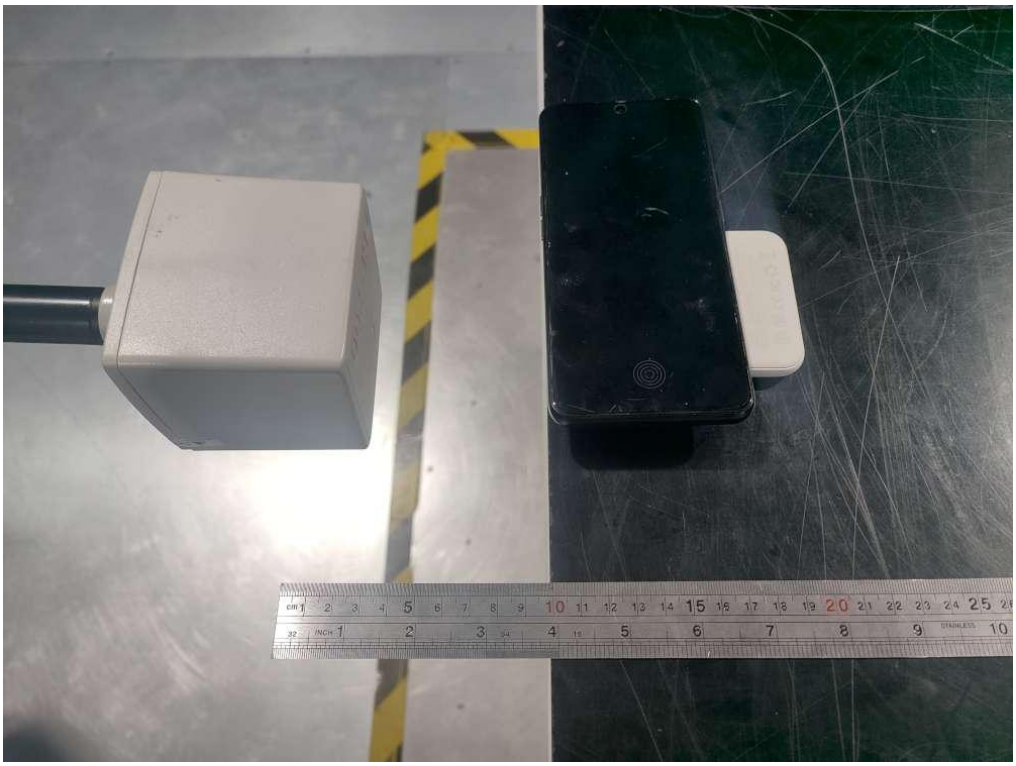
Test Position B（20cm）



Test Position C（0cm）



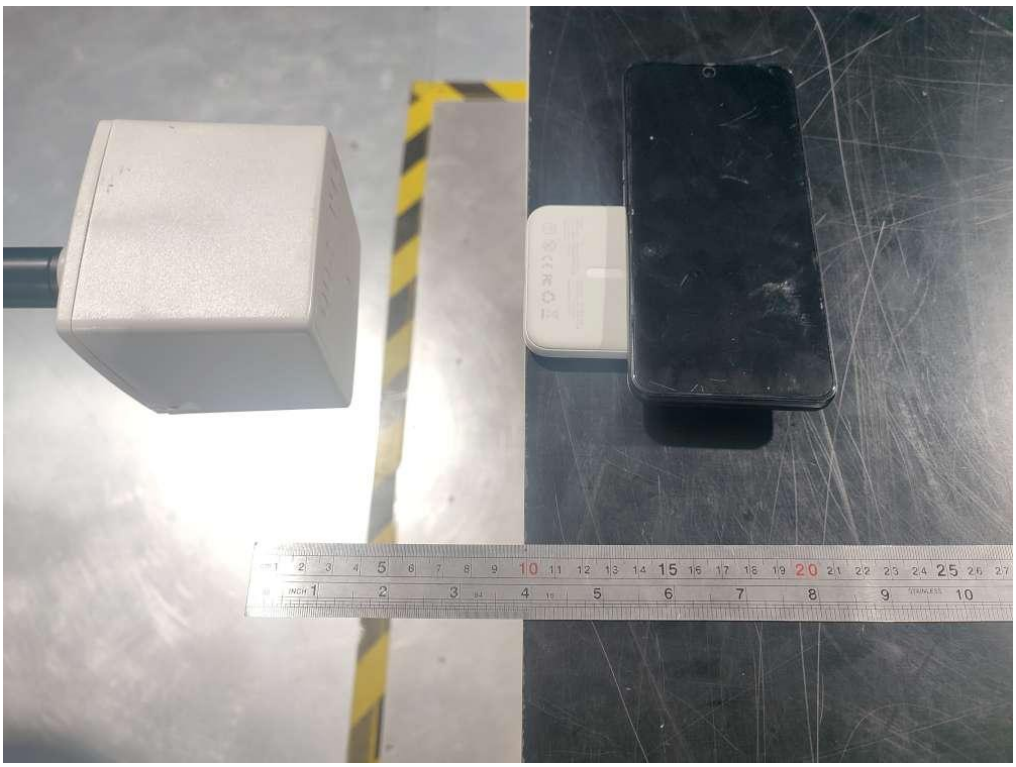
Test Position C（10cm）



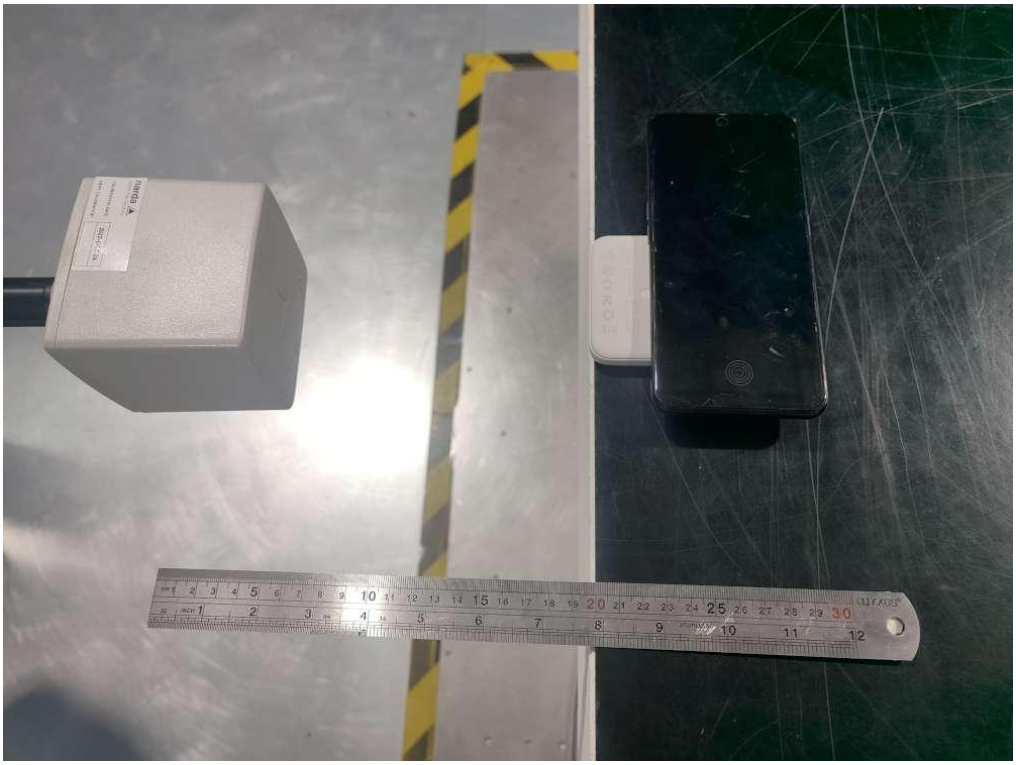
Test Position C（20cm）

Test Position D（0cm）

Test Position D（10cm）

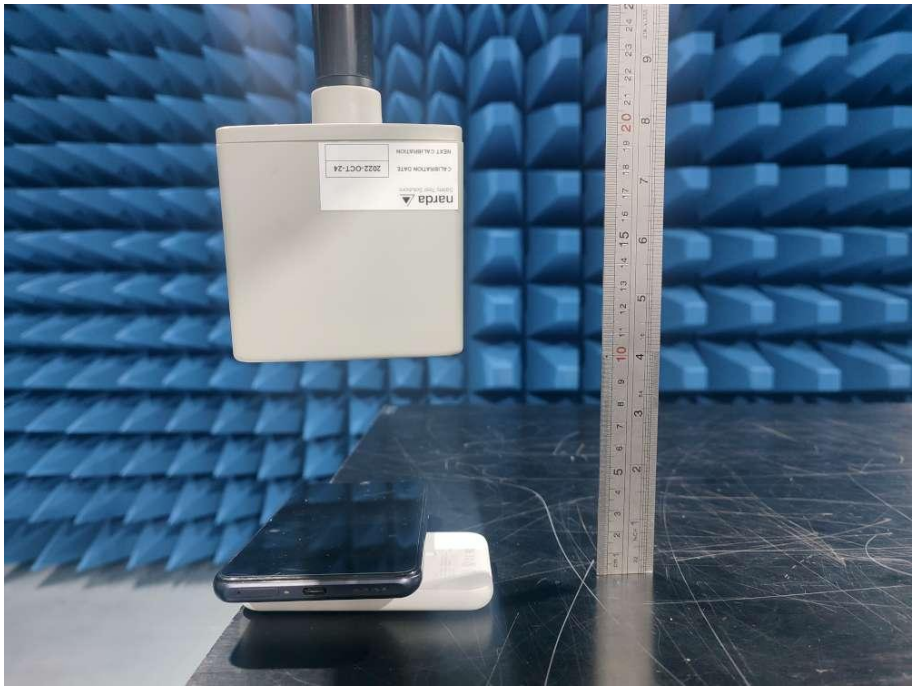


Test Position D（20cm）

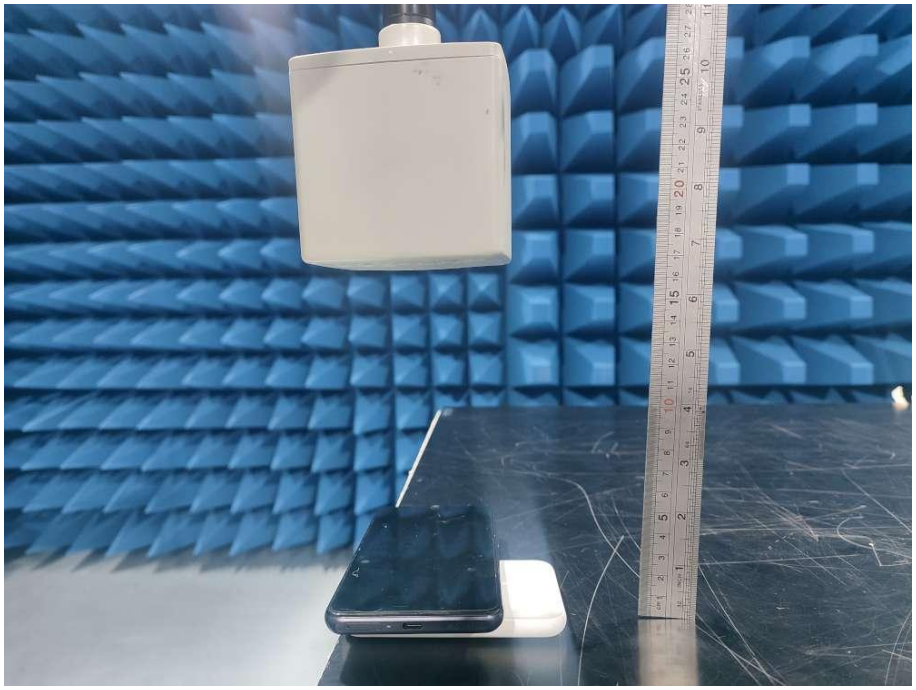


Test Position E（0cm）

Test Position E（10cm）

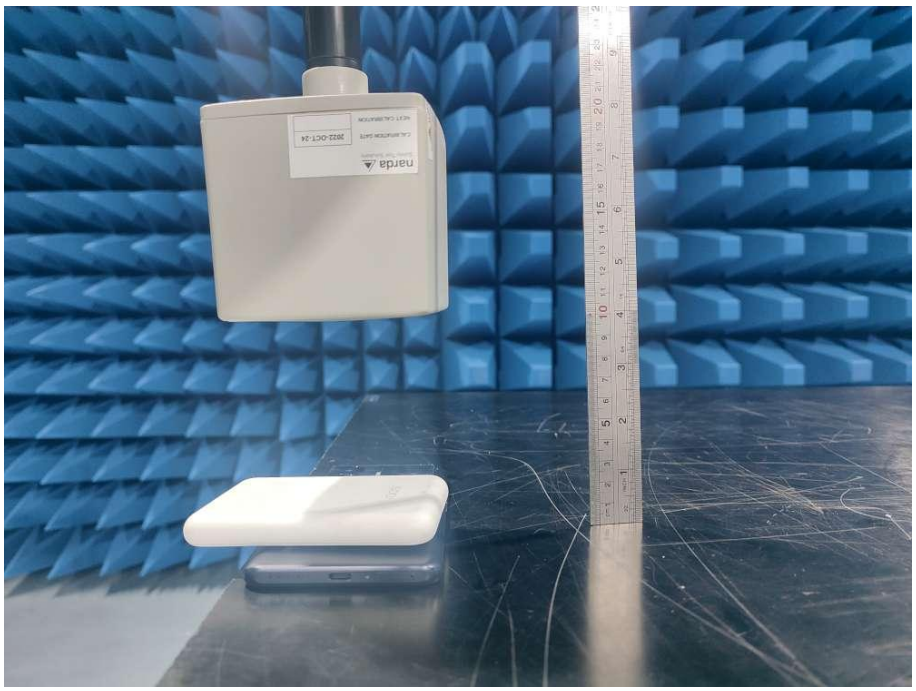
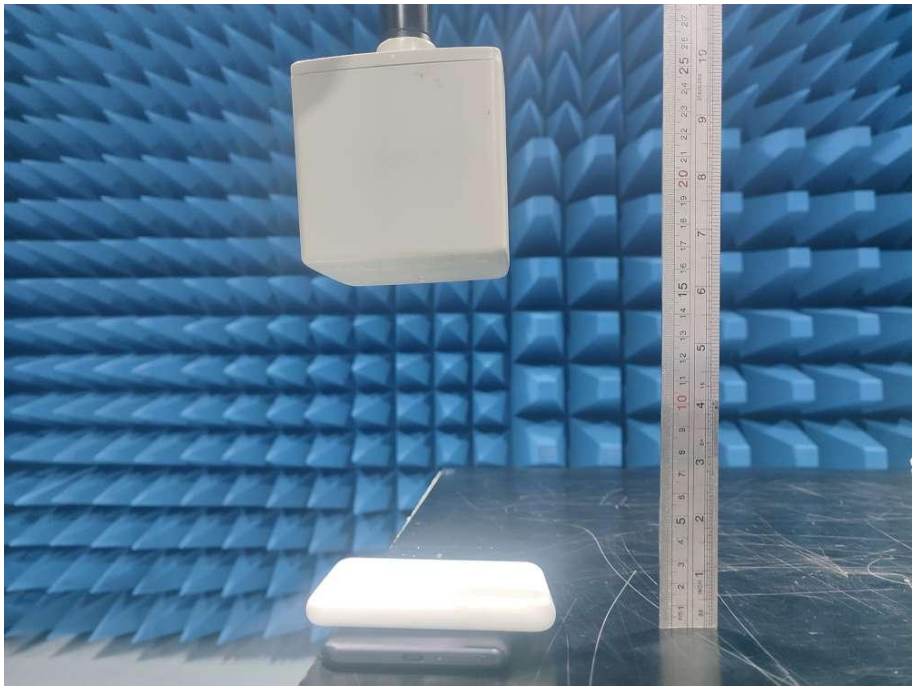


Test Position E（20cm）



Test Position F（0cm）

Test Position F（10cm）



Test Position F（20cm）