

RF EXPOSURE REPORT FOR CERTIFICATION
On Behalf of

Spigen Korea Co., LTD.

Spigen PowerArc ArcField™ Wireless Charger

Model Number: PF2009

FCC ID: 2AFKNPF2009

Prepared for:	Spigen Korea Co., LTD.
	Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea
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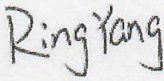
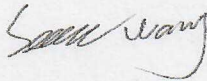
Report Number:	ESTE-R2010086
Date of Test:	Sep. 24~Oct. 14, 2020
Date of Report:	Oct. 19, 2020

TABLE OF CONTENTS

Description	Page
TEST REPORT VERIFICATION.....	3
1. SUMMARY OF TEST	4
1.1. Summary of test result.....	4
1.2. Test Mode.....	4
1.3. Test Equipment List	4
2. MAXIMUM PERMISSIBLE EXPOSURE	5
2.1. Limit	5
2.2. Test Setup	6
2.3. Test Procedure	6
2.4. Equipment Approval Considerations	7
2.5. Test Result for Test setup A:	8
2.6. Test Result for Test setup B:	9
3. TEST SETUP PHOTO	10



EST Technology Co., Ltd.

Applicant:	Spigen Korea Co., LTD.		
Address:	Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea		
Manufacturer:	Spigen Korea Co., LTD.		
Address:	Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea		
E.U.T:	Spigen PowerArc ArcField™ Wireless Charger		
Model Number:	PF2009		
Power Supply:	Input: DC 5.0V/1.5A, 9.0V /1.67A Qi Output: 5.0W/ 7.5W		
Trade Name:	PowerArc	Serial No.:	-----
Date of Receipt:	Sep. 24, 2020	Date of Test:	Sep. 24~Oct. 14, 2020
Test Specification:	FCC CFR 47 Part 1.1307(b)&1.1310 KDB 680106 D01 RF Exposure Wireless Charging Apps v03		
Test Result:	The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC CFR 47 Part 1.1307(b)&1.1310 requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.		
Prepared by:		Reviewed by:	
 _____ Ring Wang / Assistant		 _____ Seven Wang / Engineer	
		Date: Oct. 19, 2020  Approved by: _____ Iceman Hu / Manager	
Other Aspects:			
None.			
Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.			

1. SUMMARY OF TEST

1.1. Summary of test result

Report Section	Description of Test Item	FCC Standard Section	Results
3	Maximum Permissible Exposure	Part 1.1307(b)&1.1310	PASS

1.2. Test Mode

Test Item	Test Mode
Maximum Permissible Exposure	Wireless Charging with Empty Load
	Wireless Charging with Half Load
	Wireless Charging with Full Load

1.3. Test Equipment List

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Electric and Magnetic Field Probe-Analyzer	Narda S.T.S./PMM	EHP-200A	EST-E106	Feb.14,20	1 Year
Simulated load(Full)	/	/	EST-306	N/A	N/A
Simulated load(Half)	/	/	EST-307	N/A	N/A
Test Software	Narda	EHP200-TS	Rel 1.92	N/A	N/A

2. MAXIMUM PERMISSIBLE EXPOSURE

2.1. Limit

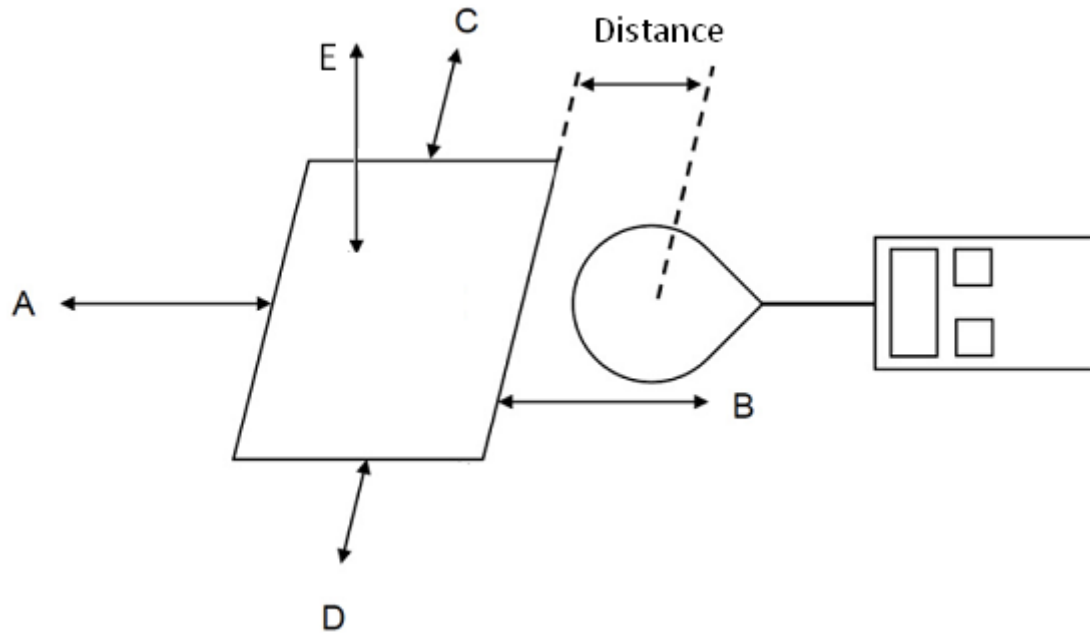
Limits for Maximum Permissible Exposure (MPE)

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 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
(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
300-1,500			f/1500	30
1,500-100,000			1.0	30

Note:

1. f = frequency in MHz * = Plane-wave equivalent power density.
2. 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.

2.2. Test Setup



2.3. Test Procedure

- The test was performed on turn table in anechoic chamber with a dummy load.
- The dummy load must be placed horizontal of the EUT at the top (Parallel to the coil).
- The probe was placed at 15 cm surrounding the device and 20 cm above the top of the charger and the geometric centre of the probe.
- The highest emission level was recorded and compared with limit as soon as measurement of each point; A, B, C, D, E were completed.

2.4. Equipment Approval Considerations

Inductive wireless power transfer applications with supporting field strength results and meeting all of the following requirements are not required to submit a KDB inquiry for devices approved using SDoC or a PAG for equipment approved using certification to address RF exposure compliance.

1	Power transfer frequency is less than 1 MHz
	YES; the device operated in the frequency range from 110.5-168KHz.
2	Output power from each primary coil is less than or equal to 15 watts.
	NO; the maximum output power of the primary coil is 7.5W.
3	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 only single primary and secondary coils.
4	Client device is placed directly in contact with the transmitter.
	YES; Client device is placed directly in contact with the transmitter.
5	Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
	No.
6	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; The EUT field strength levels are 50% x MPE limits.

2.5. Test Result for Test setup A:

E-field strength			
Frequency range (KHz)	110.5 to 168		
Test Mode	Full Load	Half Load	Empty Load
Position A(V/m)	0.365	0.345	0.341
Position B(V/m)	0.342	0.342	0.342
Position C(V/m)	0.348	0.339	0.339
Position D(V/m)	0.359	0.345	0.345
Position E(V/m)	0.612	0.533	0.338
Limits (V/m)	614		
50% Limits(V/m)	307		

H-field strength			
Frequency range (KHz)	110.5 to 168		
Test Mode	Full Load	Half Load	Empty Load
Position A(A/m)	0.042	0.045	0.047
Position B(A/m)	0.052	0.046	0.043
Position C(A/m)	0.048	0.045	0.045
Position D(A/m)	0.045	0.043	0.045
Position E(A/m)	0.043	0.043	0.047
Limits (A/m)	1.630		
50% Limits (A/m)	0.815		

2.6. Test Result for Test setup B:

Test Result for Test setup B:

Empty , Half , Full load all have been tested ,only worse case Max load (Full) is reported.

E-Filed Strength at (distance 10cm to 1cm at 1cm iteration, i.e. at a distance of 10cm, 9cm, 8cm, 1cm, Which is between the edge of the charger and the edge of of probe,) surrounding the EUT (V/m)

Test distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Limits (V/m)
1	19.112	18.546	18.958	19.128	32.123	614
2	17.123	16.564	17.111	17.834	28.987	614
3	15.185	14.987	15.102	15.228	25.124	614
4	13.485	13.297	12.546	13.584	23.245	614
5	11.288	10.985	11.374	12.024	19.223	614
6	9.657	9.786	9.335	9.887	16.953	614
7	7.498	7.256	7.028	7.142	13.852	614
8	5.263	4.956	4.887	4.328	11.246	614
9	2.958	2.357	2.198	2.028	9.264	614
10	0.859	0.852	0.887	0.925	7.102	614

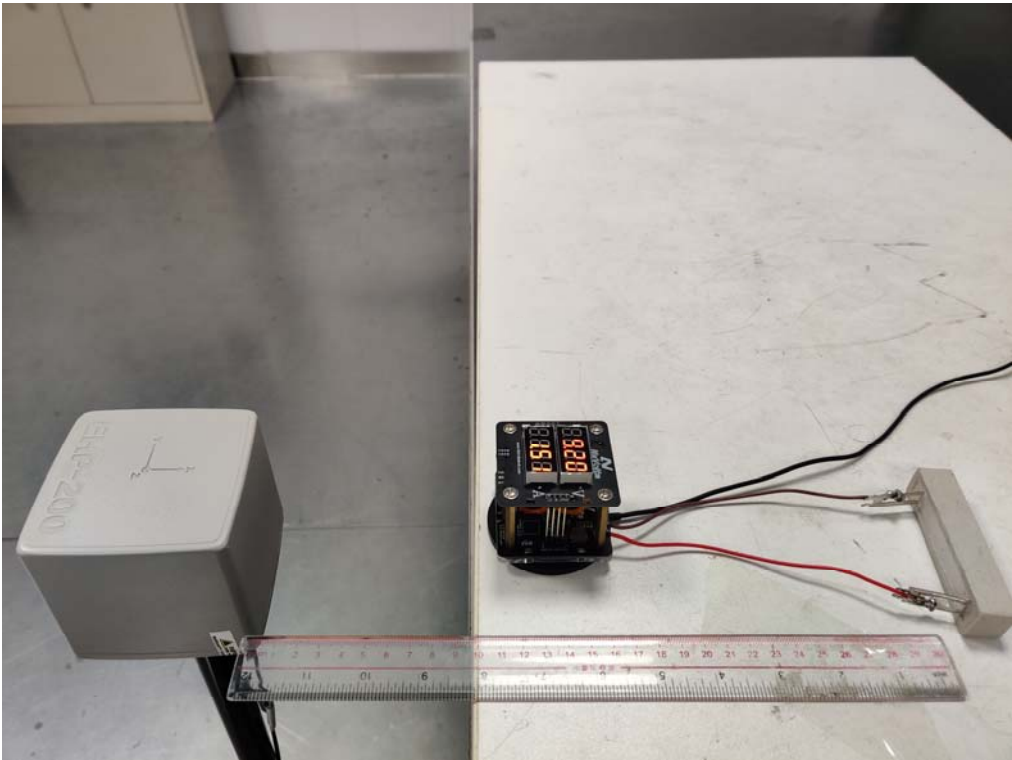
H-Filed Strength at (distance 10cm to 1cm at 1cm iteration, i.e. at a distance of 10cm, 9cm, 8cm, 1cm, Which is between the edge of the charger and the edge of of probe,) surrounding the EUT (A/m)

Test distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Limits (A/m)
1	0.212	0.211	0.220	0.218	0.642	1.63
2	0.175	0.181	0.177	0.182	0.528	1.63
3	0.133	0.132	0.128	0.0122	0.449	1.63
4	0.082	0.083	0.092	0.079	0.358	1.63
5	0.058	0.062	0.059	0.068	0.284	1.63
6	0.050	0.051	0.049	0.048	0.202	1.63
7	0.045	0.045	0.044	0.043	0.126	1.63
8	0.043	0.048	0.46	0.045	0.055	1.63
9	0.048	0.046	0.046	0.043	0.045	1.63
10	0.043	0.045	0.044	0.044	0.044	1.63

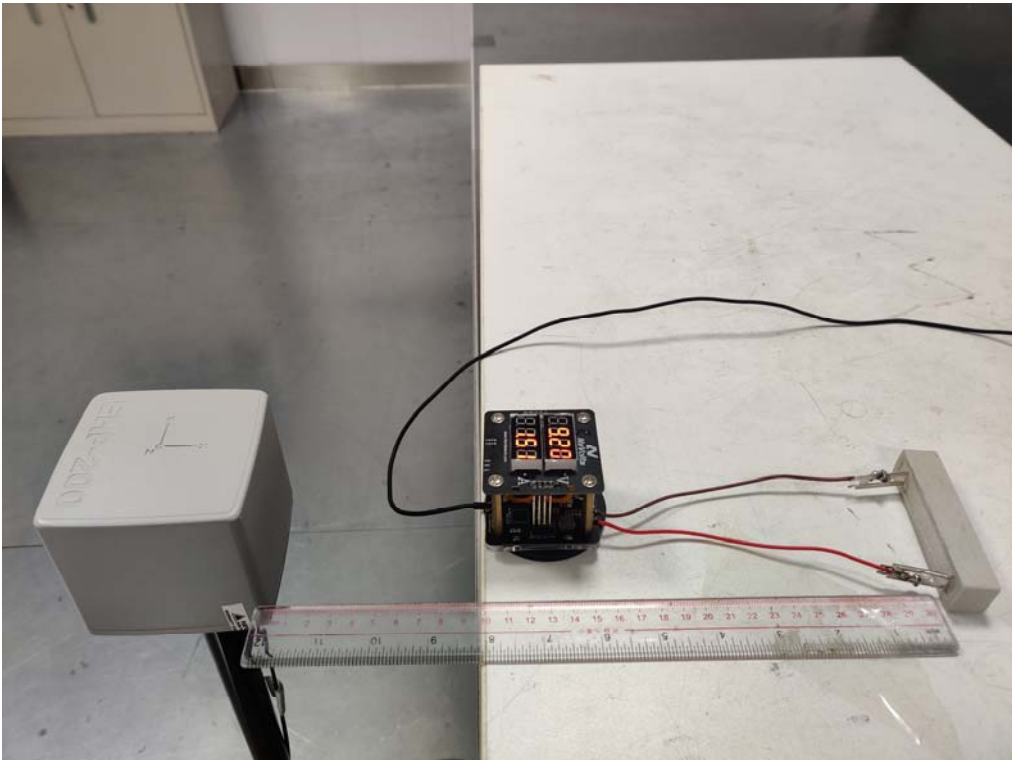
3. TEST SETUP PHOTO

10cm

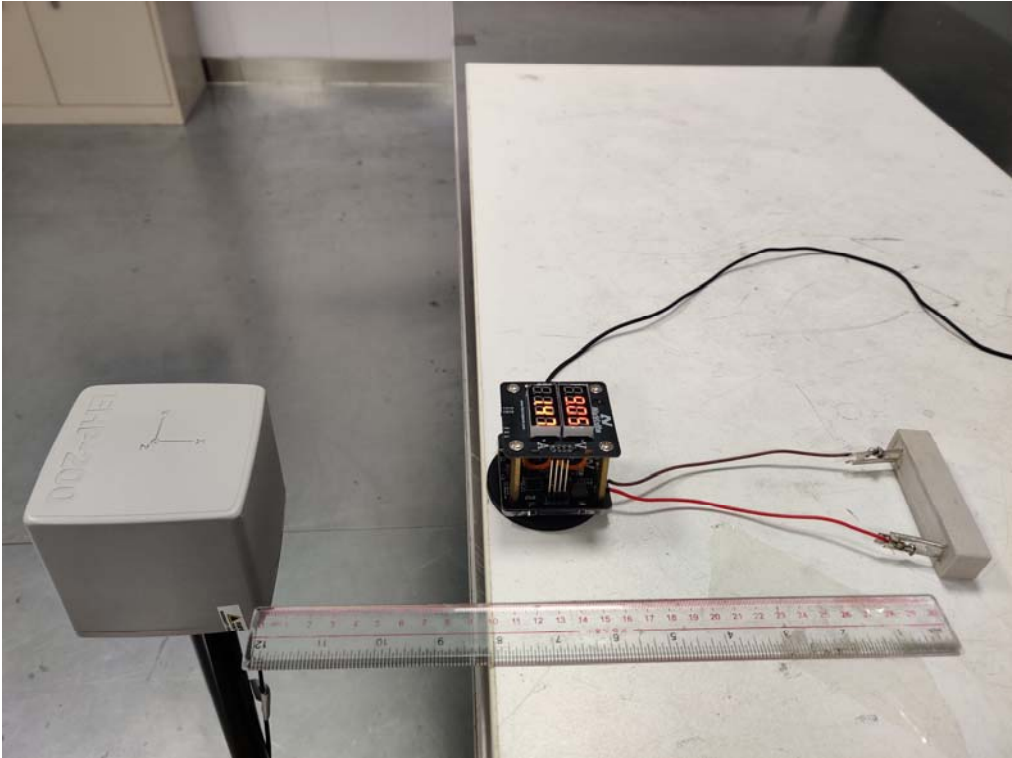
Position A



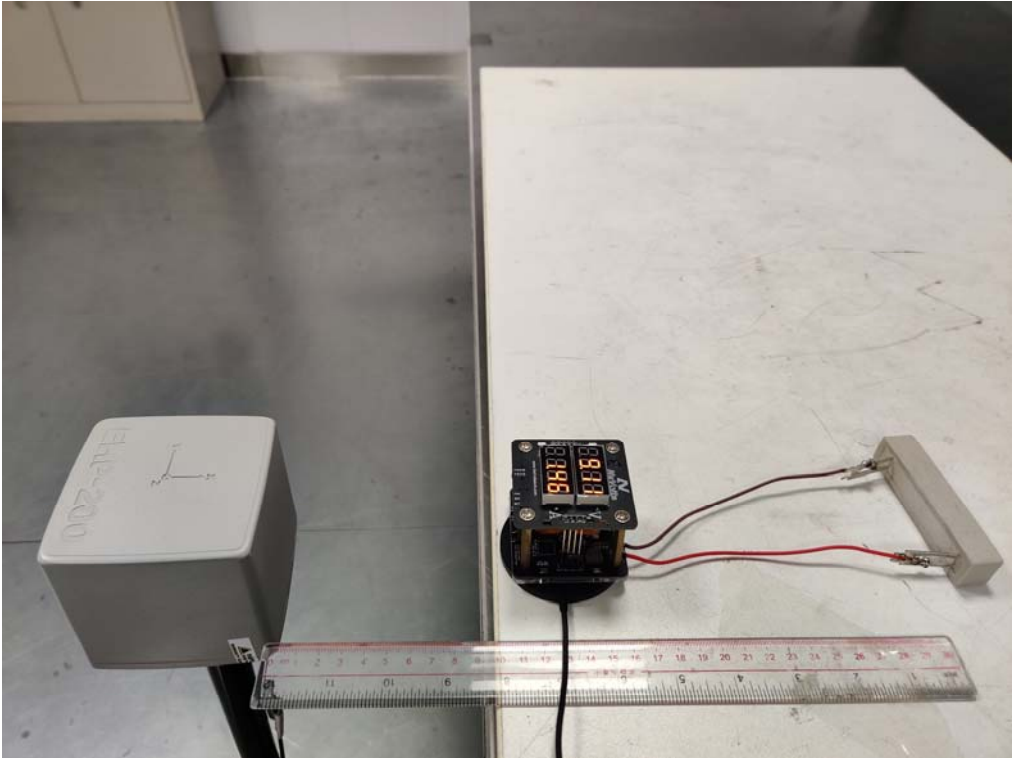
Position B



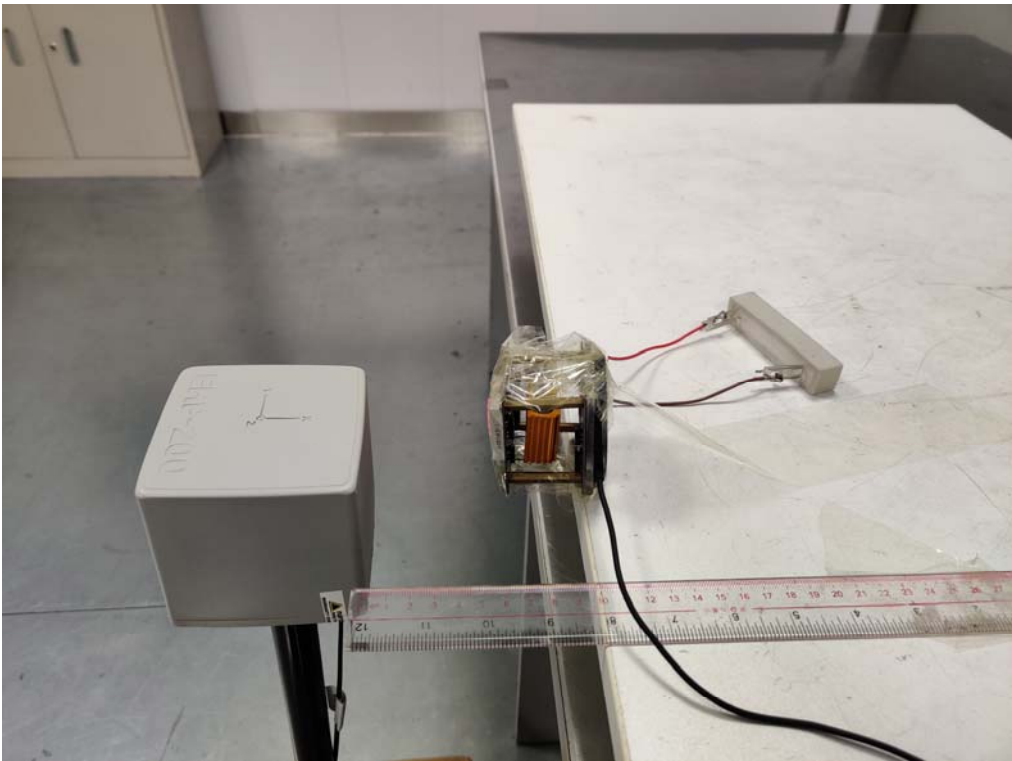
Position C



Position D

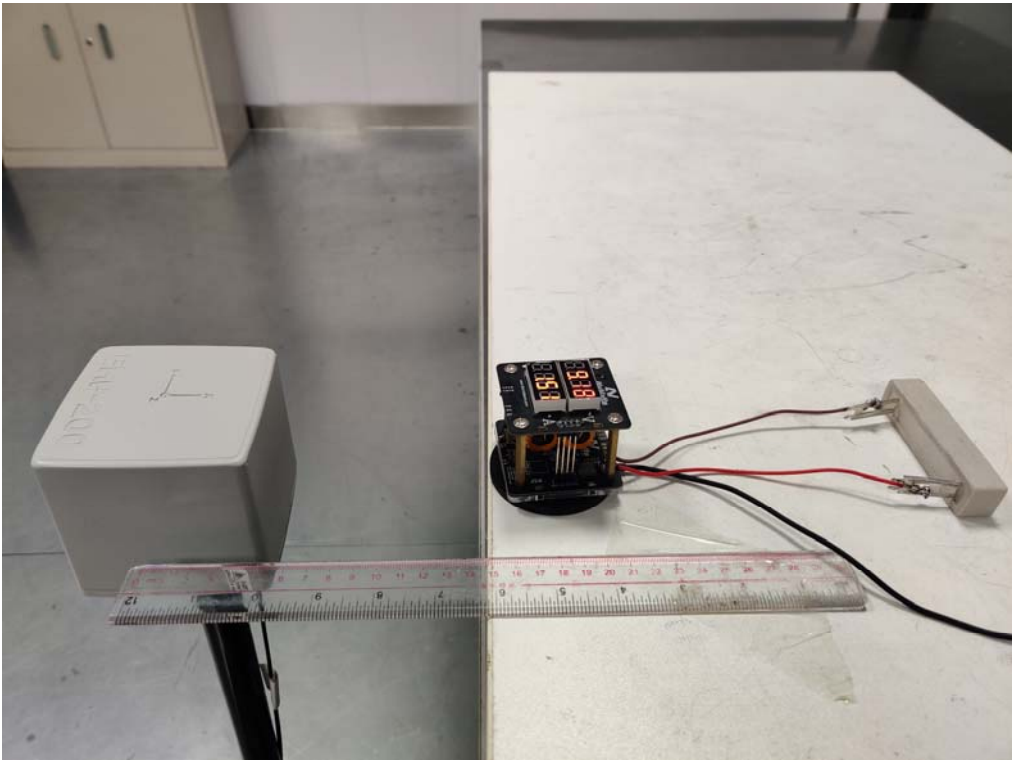


Position E

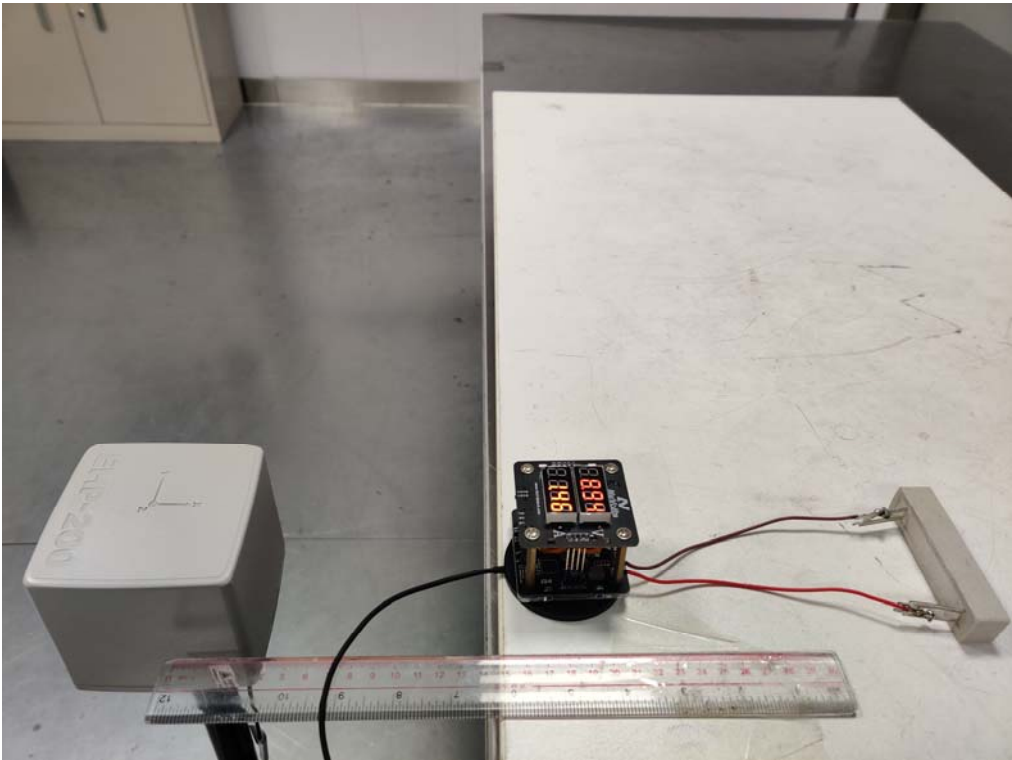


15cm

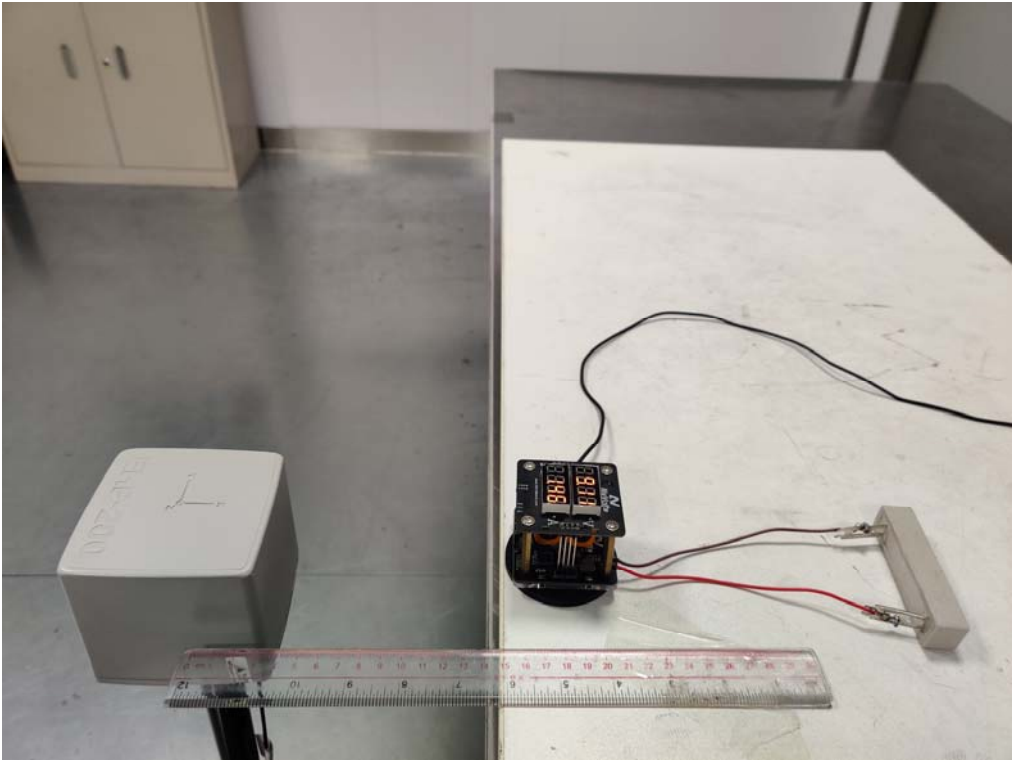
Position A



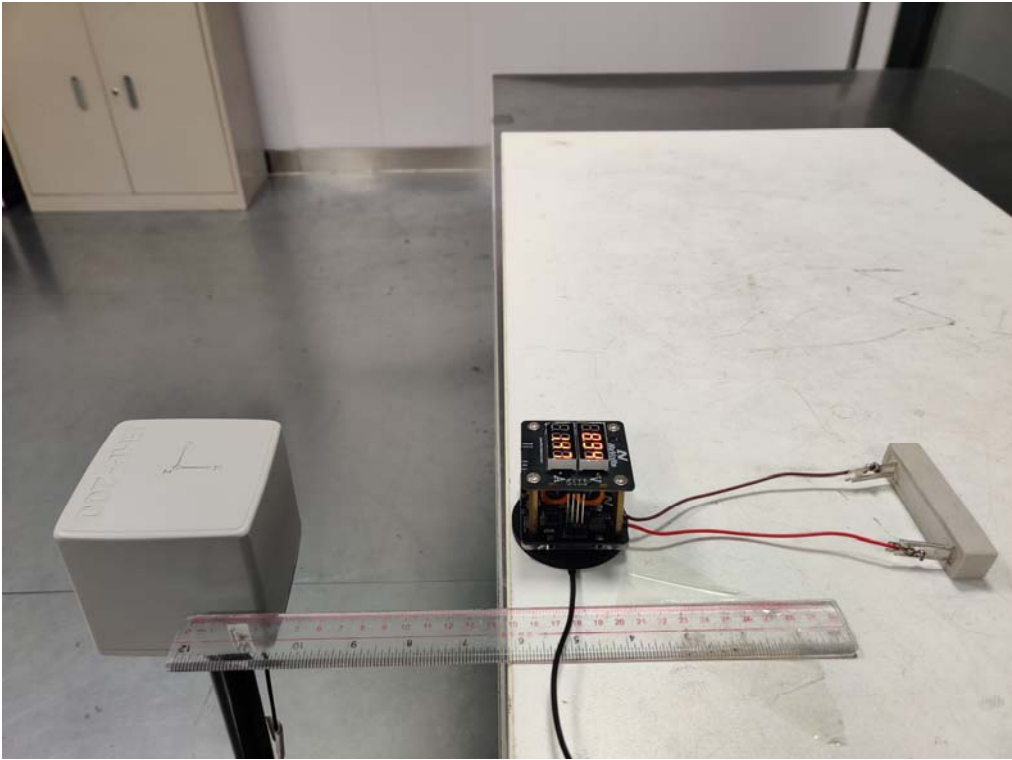
Position B



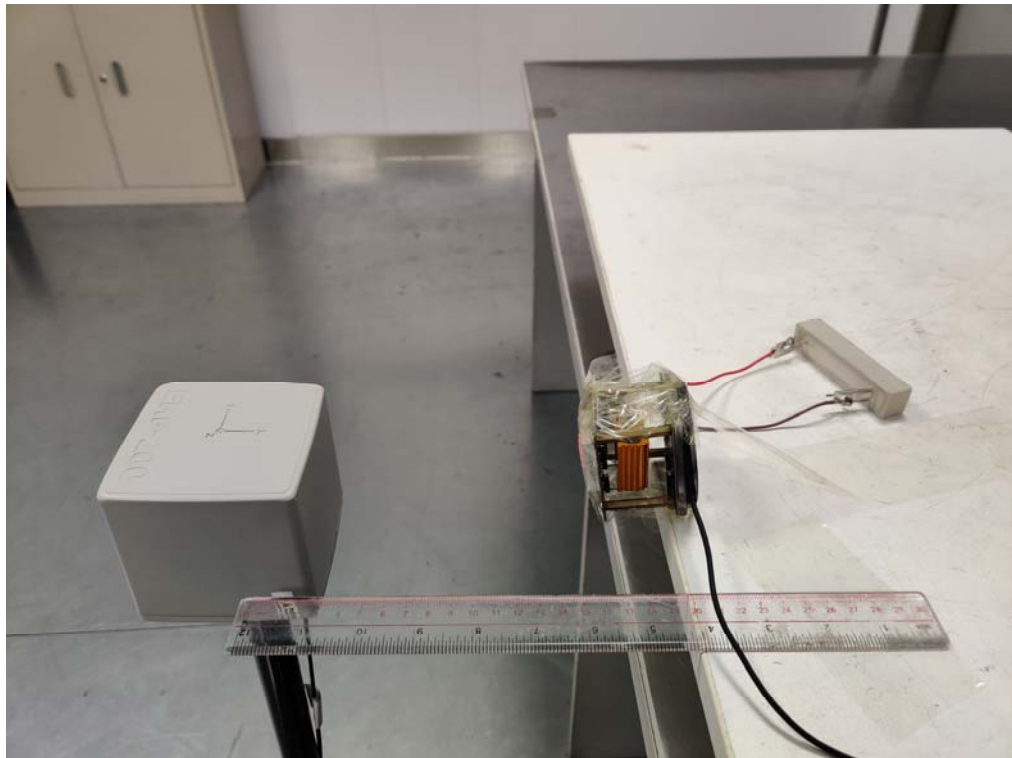
Position C



Position D



Position E



End of Test Report