
RF Exposure Evaluation

FCC ID:2BNU3-W166

Product Name:	wireless charger
Product Model No.:	W166
Test Auxiliary:	Adapter, Phone, Earphone, Watch
Test Auxiliary Model No.:	A895-200150C-CN1, iPhone 13, AirPods 2, iWatch S2
Operation Frequency:	ANT 1&2: 115kHz~205kHz ANT 3: 115kHz~360kHz
Modulation type:	ASK
Antenna Type:	ANT 1&2&3: Loop Coil Antenna
Antenna gain:	ANT 1&2&3: 0dBi
Power supply:	Input: 5V $\overline{\text{---}}$ 3A, 9V $\overline{\text{---}}$ 2A, 12V $\overline{\text{---}}$ 2.5A Output-Phone:7.5W, 10W, 15W AirPods: 3W Watch: 2.5W
Transmitting mode	Keep the EUT in continuously wireless charging mode

EUT all test mode as follows:

Test Modes:			Description:	
Mode 1	Input:5V, 3A Phone Output:7.5W	AC/DC Adapter +EUT+ iPhone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 2	Input:5V, 3A Phone Output:10W	AC/DC Adapter +EUT+ iPhone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 3	Input:5V, 3A Phone Output:15W	AC/DC Adapter +EUT+ iPhone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 4	Input:5V, 3A Earphone Output:3W	AC/DC Adapter +EUT+ Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 5	Input:5V, 3A Watch Output:2.5W	AC/DC Adapter +EUT+ Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 6	Input:5V, 3A Phone Output:7.5W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 7	Input:5V, 3A Phone Output:10W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 8	Input:5V, 3A Phone Output:7.5W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 9	Input:5V, 3A Phone Output:10W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 10	Input:5V, 3A Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 11	Input:5V, 3A Phone Output:7.5W Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 12	Input:9V, 2A Phone Output:7.5W	AC/DC Adapter +EUT+ iPhone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	

Mode 13	Input:9V, 2A Phone Output:10W	AC/DC Adapter +EUT+ iPhone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 14	Input:9V, 2A Phone Output:15W	AC/DC Adapter +EUT+ iPhone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 15	Input:9V, 2A Earphone Output:3W	AC/DC Adapter +EUT+ Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 16	Input:9V, 2A Watch Output:2.5W	AC/DC Adapter +EUT+ Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 17	Input:9V, 2A Phone Output:7.5W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 18	Input:9V, 2A Phone Output:10W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 19	Input:9V, 2A Phone Output:15W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 20	Input:9V, 2A Phone Output:7.5W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 21	Input:9V, 2A Phone Output:10W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 22	Input:9V, 2A Phone Output:15W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 23	Input:9V, 2A Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	

Mode 24	Input:9V, 2A Phone Output:7.5W Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 25	Input:9V, 2A Phone Output:10W Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 26	Input:12V, 2.5A Phone Output:7.5W	AC/DC Adapter +EUT+ Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 27	Input:12V, 2.5A Phone Output:10W	AC/DC Adapter +EUT+ Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 28	Input:12V, 2.5A Phone Output:15W	AC/DC Adapter +EUT+ Earphone	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	
Mode 29	Input:12V, 2.5A Earphone Output:3W	AC/DC Adapter +EUT+ Earphone	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	
Mode 30	Input:12V, 2.5A Watch Output:2.5W	AC/DC Adapter +EUT+ Watch	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	

Mode 31	Input:12V, 2.5A Phone Output:7.5W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 32	Input:12V, 2.5A Phone Output:10W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 33	Input:12V, 2.5A Phone Output:15W Earphone Output:3W	AC/DC Adapter +EUT+ iPhone + Earphone	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	
Mode 34	Input:12V, 2.5A Phone Output:7.5W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 35	Input:12V, 2.5A Phone Output:10W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 36	Input:12V, 2.5A Phone Output:15W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Watch	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	
Mode 37	Input:12V, 2.5A Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ Earphone + Watch	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	
Mode 38	Input:12V, 2.5A Phone Output:7.5W Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 39	Input:12V, 2.5A Phone Output:10W Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Earphone + Watch	Battery $\geq 98\%$	Pretest
			Battery =50%	
			Battery $\leq 1\%$	
Mode 40	Input:12V, 2.5A Phone Output:15W Earphone Output:3W Watch Output:2.5W	AC/DC Adapter +EUT+ iPhone + Earphone + Watch	Battery $\geq 98\%$	Record
			Battery =50%	
			Battery $\leq 1\%$	

Note: All modes have been tested, and the report only reflects the worst case data.

1 Measuring Standard

1.1 According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. According to §1.1310 and §2.1091 RF exposure is calculated. According KDB 680106 D01 Wireless Power Transfer v04.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	H-filed	$\pm 0.93\text{dB}$
2	E-filed	$\pm 0.51\text{dB}$

2.1 Requirements

The EUT does comply with item 5.2 of KDB 680106 D01 V04:

a) The power transfer frequency is below 1 MHz.

Yes. The device operates in the frequency from ANT1&2 is 115kHz to 205kHz, ANT3 is 115kHz to 305kHz.

b) The output power from each transmitting element (e.g., coil) is less than or equal to 15 watts.

Yes, The maximum output power of the primary coil is 15watts.

c) A client device providing the maximum permitted load is placed in physical contact with the transmitter (i.e., the surfaces of the transmitter and client device enclosures need to be in physical contact).

Yes. Client device is placed directly in contact with the transmitter.

d) Only § 2.1091-Mobile exposure conditions apply (i.e., this provision does not cover § 2.1093-Portable exposure conditions).

Yes, the EUT is a fixed wireless charger

e) The E-field and H-field strengths, at and beyond 20 cm surrounding the device surface, are demonstrated to be less than 50% of the applicable MPE limit, per KDB 447498, Table 1. These measurements shall be taken along the principal axes of the device, with one axis oriented along the direction of the estimated maximum field strength, and for three points per axis or until a 1/d (inverse distance from the emitter structure) field strength decay is observed. Symmetry considerations may be used for test reduction purposes.

The device shall be operated in documented worst-case compliance scenarios (i.e., the ones that lead to the maximum field components), and while all the radiating structures

Yes. The EUT coil is evaluated at maximum output power and the test results are less than 50% of the limit.

f) For systems with more than one radiating structure, the conditions specified in (e) must be met when the system is fully loaded (i.e., clients absorbing maximum power available), and with all the radiating structures operating at maximum power at the same time, as per design conditions. If the design allows one or more radiating structures to be powered at a higher level while other radiating structures are not powered, then those cases must be tested as well. .

Yes, the EUT has three coil, all test modes met the conditions specified in (e).

2.2 Limits

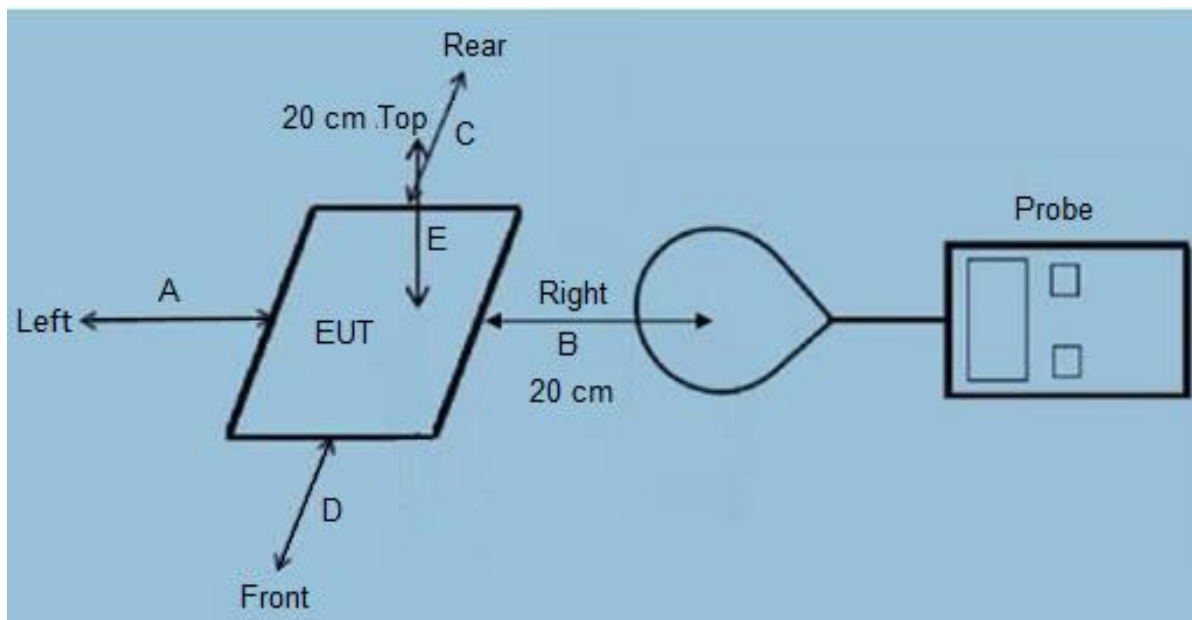
The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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).

2.3 Test Setup



3 Test Procedure

- 1) The RF exposure test was performed on 360 degree turn table in anechoic chamber.
- 2) The measurement probe was placed at test distance (20 cm and above from all sides and Top) which is between the edge of the charger and the geometric centre of probe.
- 3) The turn table was rotated 360d degree to search of highest strength.
- 4) The highest emission level was recorded and compared with limit as soon as measurement of each points were completed.
- 5) The EUT were measured according to the dictates of KDB 680106 D01 V04.

4 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	180ZX10220	Sep. 29, 2024	Sep. 28, 2025
Magnetic field probe 100cm ²	Narda	ELT probe 100cm ²	M0675	Sep. 29, 2024	Sep. 28, 2025

5 Test Result

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	Time:	Apr. 15, 2025

test Mode 28:

H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.29	0.27	0.27	0.26	0.28
50% Battery	0.115-0.205	0.28	0.26	0.28	0.28	0.29
>98% Battery	0.115-0.205	0.27	0.28	0.28	0.27	0.26

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.23	0.22	0.22	0.21	0.23	0.815	1.63
50% Battery	0.115-0.205	0.23	0.21	0.23	0.22	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.22	0.23	0.23	0.21	0.21	0.815	1.63

Test Mode 29:

H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.27	0.26	0.26	0.28	0.28
50% Battery	0.115-0.205	0.26	0.26	0.28	0.28	0.27
>98% Battery	0.115-0.205	0.28	0.28	0.26	0.26	0.26

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.22	0.21	0.21	0.22	0.22	0.815	1.63
50% Battery	0.115-0.205	0.21	0.21	0.23	0.22	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.23	0.22	0.21	0.21	0.21	0.815	1.63

Test Mode 30:**H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):**

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.27	0.27	0.28	0.27	0.29
50% Battery	0.115-0.205	0.28	0.29	0.27	0.28	0.27
>98% Battery	0.115-0.205	0.29	0.27	0.29	0.27	0.28

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.21	0.22	0.23	0.22	0.23	0.815	1.63
50% Battery	0.115-0.205	0.22	0.23	0.22	0.22	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.23	0.22	0.23	0.22	0.23	0.815	1.63

Test Mode 33:**H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):**

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.32	0.31	0.33	0.33	0.32
50% Battery	0.115-0.205	0.32	0.33	0.31	0.32	0.32
>98% Battery	0.115-0.205	0.32	0.32	0.32	0.32	0.31

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.26	0.25	0.26	0.26	0.26	0.815	1.63
50% Battery	0.115-0.205	0.25	0.26	0.25	0.26	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.26	0.26	0.26	0.26	0.25	0.815	1.63

Test Mode 36:**H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):**

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.32	0.33	0.31	0.31	0.31
50% Battery	0.115-0.205	0.31	0.31	0.30	0.30	0.32
>98% Battery	0.115-0.205	0.31	0.31	0.32	0.31	0.31

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.26	0.26	0.25	0.25	0.25	0.815	1.63
50% Battery	0.115-0.205	0.25	0.25	0.24	0.24	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.25	0.24	0.25	0.25	0.25	0.815	1.63

Test Mode 37:**H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):**

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.28	0.27	0.26	0.28	0.27
50% Battery	0.115-0.205	0.29	0.29	0.27	0.28	0.28
>98% Battery	0.115-0.205	0.26	0.26	0.27	0.28	0.28

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.23	0.21	0.21	0.23	0.22	0.815	1.63
50% Battery	0.115-0.205	0.23	0.23	0.22	0.23	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.21	0.21	0.22	0.22	0.23	0.815	1.63

Test Mode 40:**H-Filed Strength at 20 cm from the edges surrounding the EUT (A/m):**

Battery Level:	Frequency Range (MHz)	Test Position Left (uT)	Test Position Right (uT)	Test Position Rear (uT)	Test Position Front (uT)	Test Position Top (uT)
<1% Battery	0.115-0.205	0.33	0.30	0.32	0.30	0.31
50% Battery	0.115-0.205	0.31	0.32	0.30	0.32	0.33
1>98% Battery	0.115-0.205	0.33	0.32	0.32	0.32	0.33

Battery Level:	Frequency Range (MHz)	Test Position Left (A/m)	Test Position Right(A/m)	Test Position Rear(A/m)	Test Position Front(A/m)	Test Position Top(A/m)	Limits 50% (A/m)	Limits (A/m)
<1% Battery	0.115-0.205	0.26	0.24	0.26	0.24	0.25	0.815	1.63
50% Battery	0.115-0.205	0.25	0.25	0.24	0.26	0.22	0.815	1.63
>98% Battery	0.115-0.205	0.26	0.25	0.26	0.26	0.26	0.815	1.63

Remark: A/m = uT/1.25

All modes have been tested, and the report only reflects the worst case data.

6 Test Set-up Photo

Probe	Length	Width	Radius
	11cm	11cm	5.5cm

