RF Exposure Evaluation

FCC ID:2BLLK-Q2

Product Name:	Magnetic wireless charging mobile power supply
Product Model No.:	Q2, Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20
Model Difference:	Q2 is tested model, other models are derivative models .The models are identical in circuit, only different on the model names. So the test data of Q2 can represent the remaining models.
Test Auxiliary:	Wireless charging load
Transmitting mode:	Keep the EUT in continuously wireless charging mode
Ratings:	Battery capacity:10000 mAh/DC 3.85V/38.5 Wh Rated capacity:5400mAh(5 V/3 A) Input:5 V/ 3A, 9 V/2 A(Type-c) Output:PD Type-c 5 V/3 A, 9 V/2.22 A, 12 V/1.5 A(Max) Wireless output:5 W/7.5 W/10 W/15 W Multi port output:2 A

Test Modes:	
Mode 1	Charging mode + Wireless charging mode(5W)
Mode 2	Wireless charging(5W)
Mode 3	Wireless charging(7.5W)
Mode 4	Wireless charging(10W)
Mode 5	Wireless charging(15W)
Note: 1.All modes were tested, only the worst-case was recorded in the report. Mode 5 is the worst mode. 2. The EUT supports portable use. 3. Charging and discharging at the same time can only reach 5W.	

Auxiliary equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Wireless charging load	/	EESON	N/A	AE
E-2	AC Adapter	Xiaomi	MDY-12-ED	N/A	AE

1 Measuring Standard

KDB 680106 D01 Wireless Power Transfer v04

2 Requirements

According to the item 5 of KDB 680106 D01 v04:

Inductive wireless power transfer applications that meet all of the following requirements are excluded from submitting an RF exposure evaluation.

Requirements of section 3 of KDB 680106 D01	Yes/ No	Description
Mobile Device and Portable Device Configurations	Yes	Portable Device
Equipment Authorization Procedures for Devices Operating at Frequencies Below 4 MHz	Yes	The device operate in the frequency range110.1kHz-205kHz
RF Exposure compliance may be ensured only for a minimum conditions at smaller distances can still be considered unlikely.separation distance that is greater than 20 cm, while use	No	The EUT H-field and E-field strengths at 0 cm surrounding the device.

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)

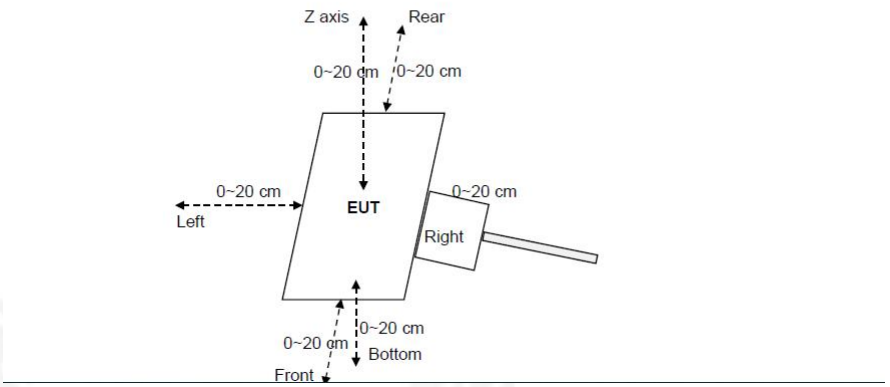
Limits for Maximum Permissible Exposure (MPE)

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).

3 Test Setup

For portable exposure conditions:



4 Test Procedure

1) The RF exposure test was performed in anechoic chamber.

2) The measurement probe was placed at test distance (0-20 cm from all sides and 0-20 cm from the top) which is between the edge of the charger and the geometric center of probe.

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

4) The EUT was measured according to the dictates of KDB 680106 D01 v04.

Remark：The EUT's test position A, B, C, D and E is valid for the E and H field measurements.

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	Sep. 29, 2024	Sep. 28, 2025
Magnetic field probe 100cm2	Narda	ELT probe 100cm2	M0675	Sep. 29, 2024	Sep. 28, 2025
Isotropic Electric field probe	Narda	EP-601	611WX70332	Sep. 29, 2024	Sep. 28, 2025

6 Test Result

E-Filed Strength from the edges surrounding the EUT (V/m)								
The measurement probe was placed at test distance which is between the edge of the charger and the geometric of probe(cm)	Frequency Range (MHz)	Test Position A (Left)	Test Position B (Right)	Test Position C (Rear)	Test Position D (Front)	Test Position E (Top)	Test Position F (Bottom)	Limits (V/m)
6	0.1101-0.205	0.73	0.71	0.72	0.79	0.8	0.78	614
8	0.1101-0.205	0.70	0.67	0.70	0.76	0.85	0.75	614
10	0.1101-0.205	0.66	0.66	0.68	0.72	0.82	0.62	614
12	0.1101-0.205	0.63	0.65	0.63	0.70	0.75	0.55	614
14	0.1101-0.205	0.52	0.56	0.60	0.68	0.64	0.42	614
16	0.1101-0.205	0.49	0.53	0.51	0.62	0.61	0.40	614
18	0.1101-0.205	0.43	0.50	0.50	0.54	0.58	0.38	614
20	0.1101-0.205	0.38	0.48	0.48	0.43	0.43	0.35	614

H-Filed Strength from the edges surrounding the EUT (A/m)														
The measurement probe was placed at test distance which is between the edge of the charger and the geometric of probe(cm)	Frequency Range (MHz)	Test Position A (Left) uT	Test Position A (Left) A/m	Test Position B (Right) uT	Test Position B (Right) A/m	Test Position C (Rear) uT	Test Position C (Rear) A/m	Test Position D (Front) uT	Test Position D (Front) A/m	Test Position E (Top) uT	Test Position E (Top) A/m	Test Position F (Bottom) uT	Test Position F (Bottom) A/m	Limits (A/m)
6	0.1101-0.205	0.55	0.44	0.46	0.37	0.45	0.36	0.58	0.46	0.56	0.45	0.60	0.48	1.63
8	0.1101-0.205	0.54	0.43	0.43	0.34	0.40	0.32	0.56	0.45	0.51	0.41	0.55	0.44	1.63
10	0.1101-0.205	0.50	0.40	0.40	0.32	0.38	0.3	0.55	0.44	0.49	0.39	0.54	0.43	1.63
12	0.1101-0.205	0.41	0.33	0.30	0.24	0.30	0.24	0.51	0.41	0.51	0.41	0.51	0.41	1.63
14	0.1101-0.205	0.34	0.27	0.29	0.23	0.26	0.21	0.49	0.39	0.50	0.40	0.50	0.40	1.63
16	0.1101-0.205	0.28	0.22	0.26	0.21	0.23	0.18	0.48	0.38	0.48	0.38	0.48	0.38	1.63
18	0.1101-0.205	0.24	0.19	0.23	0.18	0.21	0.17	0.46	0.37	0.49	0.39	0.45	0.36	1.63
20	0.1101-0.205	0.21	0.17	0.18	0.14	0.19	0.15	0.35	0.28	0.43	0.34	0.41	0.33	1.63

Note: A/m = uT/1.25

Note: Biot-Savar law:

1. Magnetic field on the axis of a current-carrying circle coil:

$$B = \frac{u_0 I R^2}{2(R^2+X^2)^{\frac{3}{2}}}$$

R is the coil outside diameter radius.

X is the distance from the test point to the center of the coil circle.

B is the magnetic magnetic field.

2. According to the KDB 680106, the model needs to be validated by probe measurements at the two points closest to the surface of the device, in 2cm increments, and if there is a 30% agreement between the model and the (E-field and/or h-field) probe measurements, the validation is considered sufficient.

3. We derived the field strengths at 10cm to 8cm and 8cm to 6cm, respectively, which are close to the actual test values, based on the field strength at 6 cm, the field strength at 4cm and 2cm and 0 cm can be deduced.

H-Filed Strength at (distance from 4cm to 0cm) surrounding the EUT (A/m):

H-Filed Strength from the edges surrounding the EUT (A/m)								
Distance (cm)	Frequency Range (MHz)	Test Position A (Left) A/m	Test Position B (Right) A/m	Test Position C (Rear) A/m	Test Position D (Front) A/m	Test Position E (Top) A/m	Test Position F (Bottom) A/m	Limits (A/m)
0	0.1101-0.205	1.42	1.19	1.19	1.49	1.46	1.55	1.63
2	0.1101-0.205	1.18	0.99	0.99	1.24	1.21	1.29	1.63
4	0.1101-0.205	0.75	0.63	0.63	0.79	0.77	0.82	1.63

Use the Biot-Savart Law to estimated the results of 4cm through 6cm.

Test position	Measure Value(A/m)	Estimated Value (A/m)	Agreement Ratio	Limits
A	0.81	0.75	-7.41	30%
B	0.75	0.63	-16.00	30%
C	0.56	0.62	10.71	30%
D	0.80	0.79	-1.25	30%
E	0.70	0.77	10.00	30%
F	0.76	0.82	7.89	30%

As the model is sufficient, the value of 0cm can be estimated through the results of 2cm

Test position	Estimated Value (A/m)	Limits(A/m)
A	1.42	1.63
B	1.19	1.63
C	1.19	1.63
D	1.49	1.63
E	1.45	1.63
F	1.55	1.63

Test Set-up Photo