RF Exposure Evaluation

FCC ID: 2A3ZO-240042A

1 Measuring Standard

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 KDB680106 D01: KDB 680106 D01 Wireless Power Transfer v04.

2 Requirements

According to the item 3 of KDB 680106 D01v04:

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

(1) Mobile Device and Portable Device Configurations

(2) Equipment Authorization Procedures for Devices Operating at Frequencies Below 4 MHz

(3) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the top surface.

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

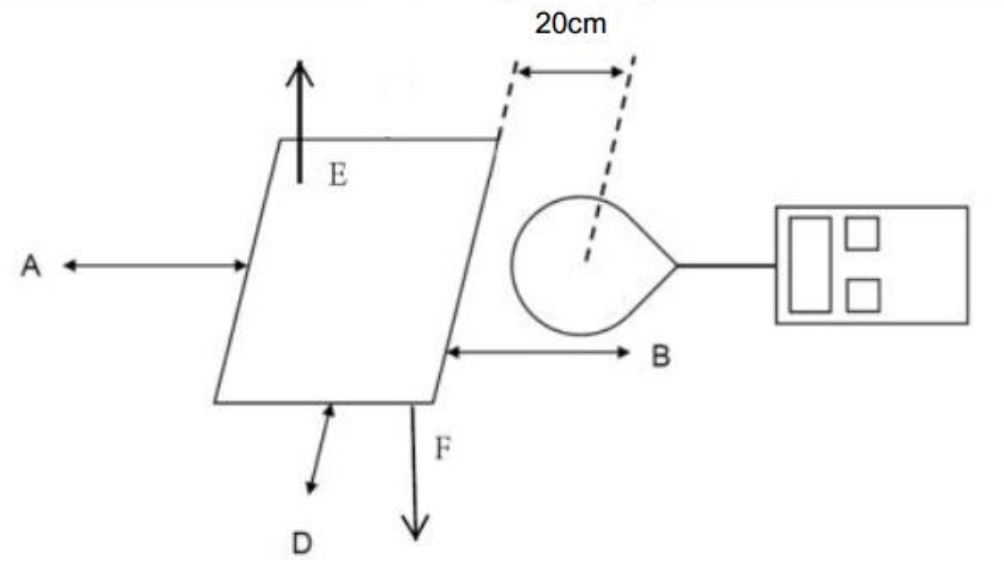
F=frequency in MHz
*=Plane-wave equivalent power density
RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Statement of the measurement uncertainty

Test	Measurement Uncertainty	Notes
Magnetic field measurement (9kHz~30MHz)	±7.8 %	(1)
Electric field measurements (9kHz~ 30MHz)	±7.8 %	(1)

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3 Test Setup



4 Test Procedure

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

2) The measurement probe was placed at test distance (20 cm from all sides) 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 D01v04.

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

5 Equipment Approval Considerations

The EUT does comply with KDB 680106 D01 as follow table.

Requirements of KDB 680106 D01	Yes / No	Description
Mobile Device and Portable Device Configurations	Yes	Mobile Device
Equipment Authorization Procedures for Devices Operating at Frequencies Below 4 MHz	Yes	The device operate in the frequency range 300KHz~350KHz
RF Exposure compliance may be ensured only for a minimum separation distance that is greater than 20 cm, while use conditions at smaller distances can still be considered unlikely.	Yes	The EUT H-field strengths at 20 cm surrounding the device.

6 Description of the test mode

Equipment under test was operated during the measurement under the following conditions:

☒ Charging and communication mode

Test Modes:		
Mode 1	AC Adapter (120V) + EUT + Watch (Battery Status: <1%)	Record
Mode 2	AC Adapter (120V) + EUT + Watch (Battery Status: <50%)	Record
Mode 3	AC Adapter (120V) + EUT + Watch (Battery Status: 100%)	Record
Note: All test modes were pre-tested, but we only recorded the worst case in this report.		

7 Description of Support Units

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
Watch	Apple	Apple watch SE	/	FCC	Lab

8 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	June 24 2024	June 23 2025
Magnetic field probe 100cm^2	Narda	ELT probe 100cm^2	M0675	June 24 2024	June 23 2025

9 Test Result

H-Field Strength at 20 cm from the edges surrounding the EUT

Charging Battery Level	Unit	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)					FCC H-Field Strength Limits (A/m)
			Test Position A	Test Position B	Test Position C	Test Position D	Test Position E	
1%	uT	0.325	0.305	0.311	0.293	0.296	0.295	--
1%	A/m	0.325	0.244	0.249	0.234	0.237	0.236	1.63
50%	uT	0.325	0.223	0.214	0.216	0.218	0.220	--
50%	A/m	0.325	0.178	0.171	0.173	0.174	0.176	1.63
99%	uT	0.325	0.141	0.143	0.136	0.134	0.140	--
99%	A/m	0.325	0.113	0.114	0.109	0.107	0.112	1.63

Note:1. A/m=uT/1.25

Note: *2. During test* the frequencies less than 1 MHz *and E/H* ratio less than 1/10 of the 377-ohm free space wave impedance, only record H-field measurements result.

10 Conclusion

A minimum safety distance of 20 cm to the antenna is required when the device is charging a smart phone for mobile exposure. The detected emissions are below the limitations according FCC KDB 680106 and confirmed by the FCC according to KDB Inquire.

11 Test Set-up Photo

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