RF Exposure Evaluation

FCC ID: 2A8EV-U17

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.
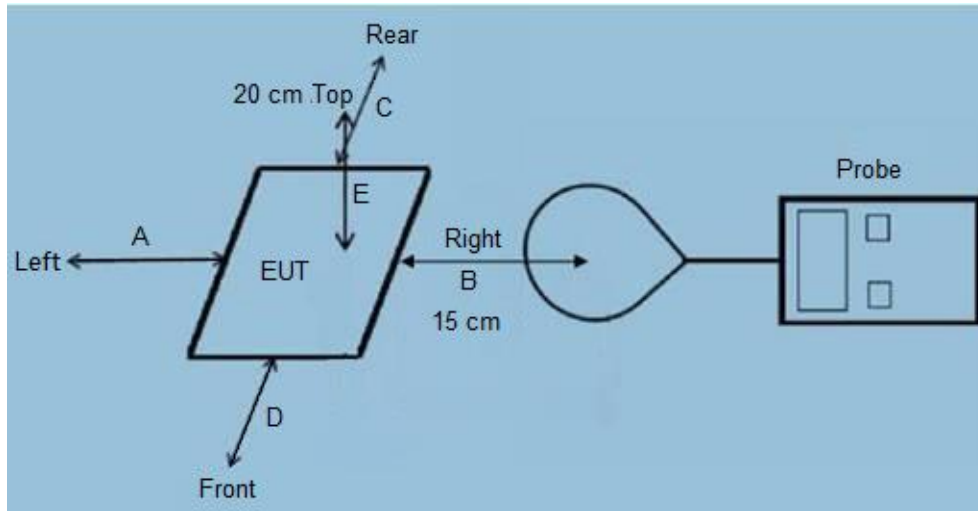
Limits

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).

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 (15 cm from all sides and 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 D01v04.

Remark：The EUT's test position A, B, C, D and E is valid for the E and 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 110KHz~205KHz
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 15 cm surrounding the device and 20 cm above the top surface.

6 Description of the test mode

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

☒ Charging and communication mode

Test Modes:		
TM1	DC (9V) + EUT + Full Load(10W)	Record
TM2	DC (9V) + EUT + Half Load (10W)	Pre-tested
TM3	DC (9V) + EUT + Empty Load (10W)	Pre-tested
TM4	DC (9V) + EUT + Full Load(7.5W)	Pre-tested
TM5	DC (9V) + EUT + Half Load (7.5W)	Pre-tested
TM6	DC (9V) + EUT + Empty Load (7.5W)	Pre-tested
TM7	DC (9V) + EUT + Full Load(5W)	Pre-tested
TM8	DC (9V) + EUT + Half Load (5W)	Pre-tested
TM9	DC (9V) + EUT + Empty Load (5W)	Pre-tested
Note: All modes were tested, only recorded the worst case data(TM1) in the test 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
Load	/	/	/	/	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 25 2023	June 24 2024
Magnetic field probe 100cm^2	Narda	ELT probe 100cm^2	M0675	June 25 2023	June 24 2024

9 Test Result

E-Field Strength at 15 cm from the edges surrounding the EUT and 15cm from the top surface of the EUT

Test Mode	Unit	Frequency Range (MHz)	Measured E-Field Strength Values (V/m)					FCC E-Field Strength 50% Limits (V/m)	FCC E-Field Strength Limits (V/m)
			Test Position A	Test Position B	Test Position C	Test Position D	Test Position E		
TM1	V/m	0.147	97.643	93.496	96.512	91.611	94.627	307.0	614.0

Note: V/m= A/m *377

H-Filed Strength at 15 cm from the edges surrounding the EUT and 15 cm above the top surface

Test Mode	Unit	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)					FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
			Test Position A	Test Position B	Test Position C	Test Position D	Test Position E		
TM1	uT	0.147	0.324	0.310	0.320	0.304	0.314	--	--
	A/m	0.147	0.259	0.248	0.256	0.243	0.251	0.815	1.63

H-Field Strength at 20cm from the top surface of the EUT

Test Mode	Unit	Frequency Range (MHz)	Measured H-Field Strength Values (A/m) Test Position E	FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
TM1	uT	0.147	0.236	--	--
	A/m	0.147	0.189	0.815	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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