RF Exposure Evaluation

FCC ID: 2AZ9Z-EY-510

1 Measuring Standard

KDB 680106 D01 RF Exposure Wireless Charging Apps v03

2 Requirements

According to the item 5 of KDB 680106 D01v03:

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

(1) Power transfer frequency is less than 1MHz.

(2) Output power from each primary coil is less than or equal to 15 watts.

(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.

(4) Client device is placed directly in contact with the transmitter.

(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).

(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.

Remark: Meet all the above requirements.

Limits

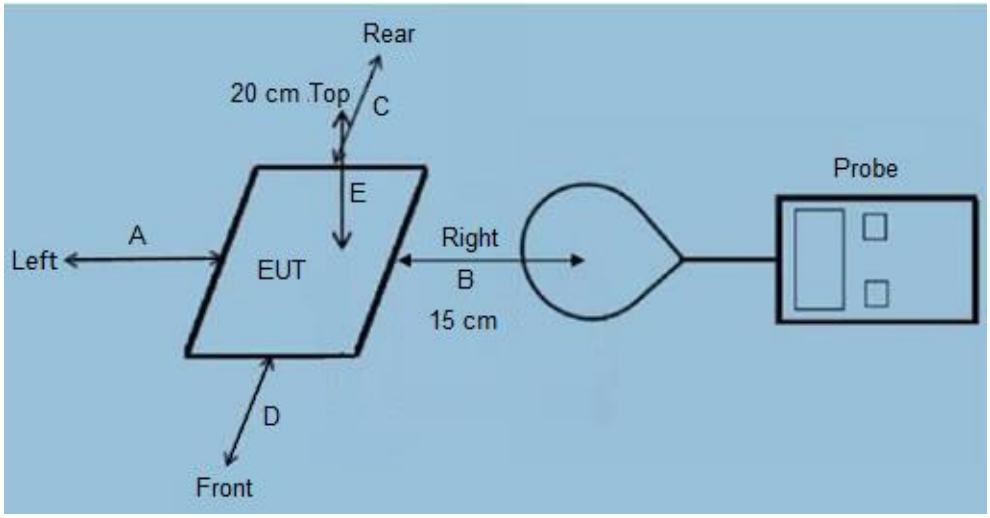
The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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 D01v03.

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
Power transfer frequency is less than 1 MHz	Yes	The device operate in the frequency range 110KHz~205KHz
Output power from each primary coil is less than 15 watts	Yes	The maximum output power for each primary coil is 10W.
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 one primary coils.
Client device is placed directly in contact with the transmitter.	Yes	Client device is placed directly in contact with the transmitter.
Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	Yes	Mobile exposure conditions only
The aggregate H-field strengths at 15 cm	Yes	The EUT 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.		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.

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/DC Adapter (5V/2.0A) + EUT + Battery Load (Battery Status: <1%)	Pre-tested
Mode 2	AC/DC Adapter (5V/2.0A) + EUT + Battery Load (Battery Status: <50%)	Pre-tested
Mode 3	AC/DC Adapter (5V/2.0A) + EUT + Battery Load (Battery Status: 100%)	Pre-tested
Mode 4	AC/DC Adapter (9V/2.0A) + EUT + Battery Load (Battery Status: <1%)	Record
Mode 5	AC/DC Adapter (9V/2.0A) + EUT + Battery Load (Battery Status: <50%)	Pre-tested
Mode 6	AC/DC Adapter (9V/2.0A) + EUT + Battery Load (Battery Status: 100%)	Pre-tested
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
Adapter	I.T.E	GEO101U-050210U	Input: 100-240V~, 50/60Hz, 0.3A Output: 5V⎓2A / 9V⎓2A	FCC	Manufacturer

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	2020/11/3	2021/11/2
Magnetic field probe 100cm^2	Narda	ELT probe 100cm^2	M0675	2020/11/3	2021/11/2

9 Test Result

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

Charging Battery Level	Unit	Frequency Range (MHz)	Measured E-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		
1%	uT	0.122	0.181	0.174	0.189	0.176	0.165	--	--
1%	A/m	0.122	0.145	0.139	0.151	0.141	0.132	0.815	1.63
50%	uT	0.122	0.134	0.131	0.140	0.126	0.135	--	--
50%	A/m	0.122	0.107	0.105	0.112	0.101	0.108	0.815	1.63
99%	uT	0.122	0.109	0.101	0.114	0.105	0.103	--	--
99%	A/m	0.122	0.087	0.081	0.091	0.084	0.082	0.815	1.63

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

Charging Battery Level	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		
1%	V/m	0.122	54.665	52.403	56.927	53.157	49.764	307.0	614.0
50%	V/m	0.122	40.339	39.585	42.224	38.077	40.716	307.0	614.0
99%	V/m	0.122	32.799	30.537	34.307	31.668	30.914	307.0	614.0

Note: V/m= A/m *377

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

Charging Battery Level	Unit	Frequency Range (MHz)	Measured E-Field Strength Values (A/m) Test Position E	FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
1%	uT	0.122	0.111	--	--
1%	A/m	0.122	0.089	0.815	1.63
50%	uT	0.122	0.079	--	--
50%	A/m	0.122	0.063	0.815	1.63
99%	uT	0.122	0.068	--	--
99%	A/m	0.122	0.054	0.815	1.63

Note:A/m=uT/1.25

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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