

- RF Exposure

1. Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

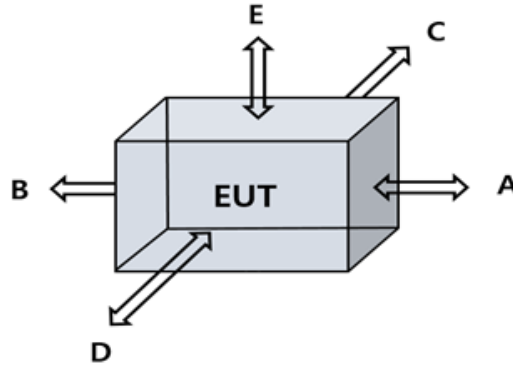
Table 1—Limits for Maximum Permissible Exposure (MPE)

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

Note f = frequency in MHz * = Plane-wave equivalent power density

Per the guidance of KDB 680106, the E-field and H-field limits shown in the table above are extended down to 100kHz.

2. Test Set-up



2.1. Support equipment

Client device	Model	FCC ID
Samsung Mobile Phone	SM-G965N	A3LSMG965KOR
LG Mobile Phone	LM-Q710EM	ZNFQ710EM
Dummy load	N/A ¹⁾	N/A

Note¹⁾ : The manufacturer customized and provided receiver load as worst one of max. capacity of EUT.

2.2. Test configurations

In order to check all kinds of possible configurations, EUT was evaluated with appropriate client and under each charging condition as below table. Output power of the EUT are 5 W, 10 W and 15 W in WPC mode.

EUT Mode	Description
5 W Charging Mode with Client device (Model : SM-G965N, FCC ID : A3LSMG965KOR)	Less than 1 % of Battery
	Less than 50 % of Battery
	100 % full charging of Battery
10 W Charging Mode with Client device (Model : LM-Q710EM, FCC ID : ZNFQ710EM)	Less than 1 % of Battery
	Less than 50 % of Battery
	100 % full charging of Battery
15 W Charging Mode with Dummy load	The worst status of full load

Note : Above test configurations were declared by the manufacturer.

2.3 Measurement procedure

- a) The RF exposure test was performed on the table in anechoic chamber.
- b) The measurement was investigated between the edge of the charger and center of the field probe in the closest state.
- c) Maximum E-field and H-field measurements were made on each of five sides of the EUT that could come in contact with a user. Five sides are defined as follows: Right (B), Top (E), Left (A), Rear (D) and Front (C). Refer to the test position diagram above.
- d) According to the guidance of KDB 680106 D01 v03 test distance was 15 cm on the surrounding sides from the EUT.
- e) Equipment approval considerations item 5.b) of KDB 680106 D01 v03
 - (1) Power transfer frequency is less than 1 MHz.
 - The device operates at a frequency of 110 kHz ~ 145 kHz
 - (2) Output power from each primary coil is less than or equal to 15 watts.
 - Refer to following section 2.2
 - Output power from primary coil : 5 Watts, 10 Watts, 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.
 - The transfer system including a charging system with one primary coils is to detect and allow only between individual pairs of coils.
 - (4) Client device is placed directly in contact with the transmitter.
 - Client device is placed directly in contact with the transmitter.
 - (5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
 - Mobile exposure conditions was evaluated.
 - (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.
 - Refer to following worst test result (For more detail, please refer to section 3)
 - 1) The worst E-Field Strength levels at 15 cm < 50 % of the MPE E-Field Strength limit 614 V/m
5 W Charging Mode (Less than 1 % of Battery) : 3.411 V/m < 307 V/m.
 - 2) The worst H-Field Strength levels at 15 cm < 50 % of the MPE H-Field Strength limit 1.63 A/m
15 W Charging Mode : 0.143 A/m < 0.815 A/m.

3. Test Result

- Complied

- Date of Test : 2018-06-18

The probe was positioned at the location where there is maximum field strength on each side of the EUT. The maximum E-field and H-field is reported below.

- 5 W Charging Mode (Less than 1 % of Battery)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	2.370	2.510	1.931	1.922	3.407	3.411	614.00
20					1.772		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.030	0.031	0.041	0.038	0.043	0.046	1.63
20					0.026		1.63

- 5 W Charging Mode (Less than 50 % of Battery)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	2.426	2.295	1.819	1.920	3.225	3.247	614.00
20					1.938		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.032	0.033	0.040	0.037	0.044	0.048	1.63
20					0.028		1.63

- 5 W Charging Mode (100 % full charging of Battery)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	2.553	2.166	1.935	1.911	3.118	3.126	614.00
20					1.971		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.029	0.034	0.039	0.038	0.042	0.046	1.63
20					0.026		1.63

- 10 W Charging Mode (Less than 1 % of Battery)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	1.940	1.911	1.615	1.706	2.471	2.479	614.00
20					1.422		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.046	0.050	0.060	0.047	0.064	0.066	1.63
20					0.036		1.63

- 10 W Charging Mode (Less than 50 % of Battery)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	1.966	2.021	1.899	1.623	2.305	2.311	614.00
20					1.242		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.048	0.051	0.061	0.046	0.065	0.068	1.63
20					0.035		1.63

- 10 W Charging Mode (100 % full charging of Battery)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	2.135	2.128	1.590	1.416	2.646	2.654	614.00
20					1.662		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.046	0.053	0.059	0.048	0.066	0.067	1.63
20					0.038		1.63

- 15 W Charging Mode (With Dummy load)

E-field Measurements

Distance (cm)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Around A to E (V/m)	Limit (V/m)
15	1.098	1.091	1.502	0.991	1.085	1.090	614.00
20					0.778		614.00

H-field Measurements

Distance (cm)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Around A to E (A/m)	Limit (A/m)
15	0.052	0.053	0.070	0.086	0.139	0.143	1.63
20					0.068		1.63

4. Test equipment used for test

	Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
■	DC Power Supply	AGILENT	E3632A	MY40004399	19.01.05
■	MAGNETIC FIELD TESTER	HIOKI	FT3470-52	171129500	18.12.26
■	Isotropic Electric Field	ETS Lindgren	HI-6105	00202714	19.04.25
■	Laser data Interface	ETS Lindgren	HI-6113	00150924	-