

RF Exposure Requirement

1. Limits

According to FCC 1.1310: 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)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300 - 1500	-	-	F/300	6
1500 - 100,000	-	-	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300 - 1500	-	-	F/1500	6
1500 - 100,000	-	-	1	30

F = Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm^2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 23 °C and 42 % R.H.

3. Test Result of RF Exposure Evaluation

3.1 RF Exposure Evaluation.

- Mode : LE

: RF Specification of EUT

Operating mode	Frequency	RF Output Power (dBm)
LE (GFSK)	2402 ~ 2480 MHz	2.4

1) Maximum RF Power = 2.4 dBm = 1.74 mW

2) $1.74/(4*3.14*400) = 0.000346$

3) Result of Evaluation

Frequency Band (MHz)	Maximum RF Power (mW)	Power Density at R = 20 cm (mW/cm^2)
2402 ~ 2480	1.74	0.000346

4) Test Result : Pass

- Mode : WPT

: RF Specification of EUT

Operating mode	Frequency	RF Output Power (W)
WPT	117.82 ~ 146.62 kHz	10 W

1) Power transfer frequency is less than 1MHz

Frequency	Limit	Result
117.82 ~ 146.62	< 1MHz	Pass

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

RF Output power	Limit	Result
10 W	≤ 15 W	Pass

(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.

- This EUT use only single primary coils. (the number of coils has two.)
- Pass

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

- This EUT is a power charger that operates only in direct contact with the client device.
- Pass

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

- N/A

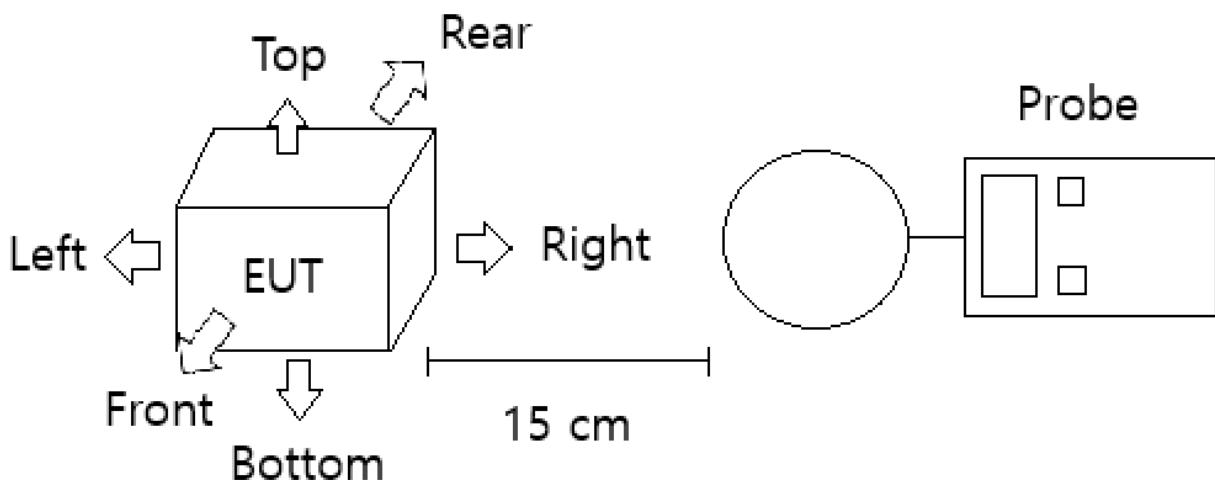
- (6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.

6-1) Test Limit

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

6-2) Description of Test Setup



6-4) Test result : Pass

E-Field Strength at 15 cm surrounding the EUT and 15cm above the surface of the EUT

Battery Power	Frequency Range (kHz)	Test Position (Top) (V/m)	Test Position (Bottom) (V/m)	Test Position (Left) (V/m)	Test Position (Right) (V/m)	Test Position (Front) (V/m)	Test Position (Rear) (V/m)	50% Limit (V/m)	Limit (V/m)	Result
1%	117.82 ~ 146.62	9.16	3.67	3.12	3.11	15.26	9.33	307	614	Pass
50 %	117.82 ~ 146.62	9.37	3.71	3.23	3.25	15.77	9.48	307	614	Pass
99 %	117.82 ~ 146.62	9.51	3.89	3.28	3.29	15.98	9.64	307	614	Pass
Stand-by	117.82 ~ 146.62	9.14	3.52	3.19	3.12	15.13	9.27	307	614	Pass

H-Field Strength at 15 cm surrounding the EUT and 15cm above the surface of the EUT

Battery Power	Frequency Range (kHz)	Test Position (Top) (A/m)	Test Position (Bottom) (A/m)	Test Position (Left) (V/m)	Test Position (Right) (V/m)	Test Position (Front) (V/m)	Test Position (Rear) (V/m)	50% Limit (A/m)	Limit (A/m)	Result
1%	117.82 ~ 146.62	0.527	0.352	0.272	0.311	0.397	0.664	0.815	1.63	Pass
50 %	117.82 ~ 146.62	0.613	0.384	0.275	0.332	0.415	0.725	0.815	1.63	Pass
99 %	117.82 ~ 146.62	0.625	0.401	0.283	0.347	0.442	0.756	0.815	1.63	Pass
Stand-by	117.82 ~ 146.62	0.511	0.349	0.270	0.316	0.389	0.657	0.815	1.63	Pass

3.2 Total test result.

- Pass

Note : The power density P_d (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .