

## **FCC §1.1310, §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to subpart §1.1310, 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.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                                      |                                      |                                          |                                 |
|----------------------------------------------------------------|--------------------------------------|--------------------------------------|------------------------------------------|---------------------------------|
| <b>Frequency Range (MHz)</b>                                   | <b>Electric Field Strength (V/m)</b> | <b>Magnetic Field Strength (A/m)</b> | <b>Power Density (mW/cm<sup>2</sup>)</b> | <b>Averaging Time (minutes)</b> |
| 0.3–1.34                                                       | 614                                  | 1.63                                 | *(100)                                   | 30                              |
| 1.34–30                                                        | 824/f                                | 2.19/f                               | *(180/f <sup>2</sup> )                   | 30                              |
| 30–300                                                         | 27.5                                 | 0.073                                | 0.2                                      | 30                              |
| 300–1500                                                       | /                                    | /                                    | f/1500                                   | 30                              |
| 1500–100,000                                                   | /                                    | /                                    | 1.0                                      | 30                              |

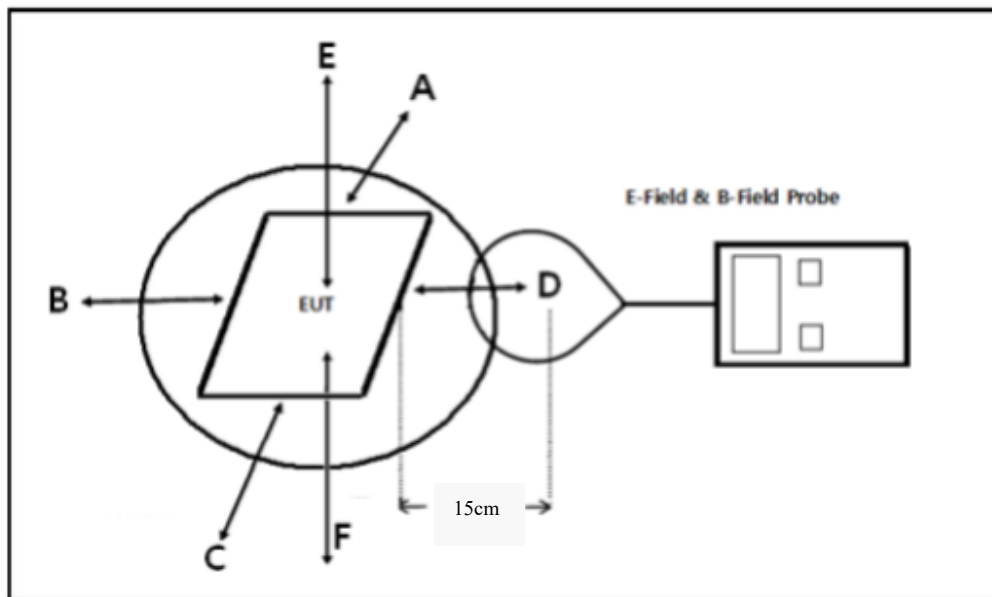
f = frequency in MHz; \* = Plane-wave equivalent power density;

According with KDB 680106 D01 RF Exposure Wireless Charging Apps v03r01 clause 3 c)

- c) For devices designed for typical desktop applications, such as wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. A KDB inquiry is required to determine the applicable exposure limits below 100 kHz.

According to KDB 680106 D01 RF Exposure Wireless Charging App v03r01 clause 5 b)

- b) Inductive wireless power transfer applications with supporting field strength results and meeting all of the following requirements are not required to submit a KDB inquiry for devices approved using SDoC<sup>2</sup> or a PAG<sup>3</sup> for equipment approved using certification to address RF exposure compliance. However, the responsible party is required to keep a copy of the test report in accordance with KDB 865664 D02. A copy of the test report is to be submitted with the application if the device is approved using certification.
- (1) Power transfer frequency is less than 1 MHz
  - (2) Output power from each primary coil is less than or equal to 15 watts.
  - (3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.
  - (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 anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

**Block Diagram of Test Setup**

Note: 20 cm for Top test.

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25.6 °C   |
| <b>Relative Humidity:</b> | 56 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

*The testing was performed by Blaker Zhang on 2021-04-13.*

*Test Mode: Wireless Charging*

**H-Field Strength**

| Frequency Range (kHz) | Position A (A/m) | Position B (A/m) | Position C (A/m) | Position D (A/m) | Position E (A/m) | 50% Limit (A/m) | Limit (A/m) |
|-----------------------|------------------|------------------|------------------|------------------|------------------|-----------------|-------------|
| 110-205               | 0.262            | 0.252            | 0.253            | 0.249            | 0.253            | 0.815           | 1.63        |

**E-Field Strength**

| Frequency Range (kHz) | Position A (V/m) | Position B (V/m) | Position C (V/m) | Position D (V/m) | Position E (V/m) | 50% Limit (V/m) | Limit (V/m) |
|-----------------------|------------------|------------------|------------------|------------------|------------------|-----------------|-------------|
| 110-205               | 1.156            | 1.139            | 1.185            | 1.073            | 1.134            | 307             | 614         |

Note: Test with 15cm distance from the center of the probe(s) to the edge of the device, 20 cm for top test.

**Result: Pass****Considerations of compliance 680106 D01 RF Exposure Wireless Charging App v03r01 clause 5 b:**

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

Yes, the operation frequency is 110-205 kHz.

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

Yes, the maximum output power of primary coil is 10Watts.

(3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.

The transfer system includes one primary coils to detect and allow coupling only between individual pairs of coils.

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

Yes, client device is placed directly in contact with the transmitter

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

Yes, mobile exposure conditions only

(6) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

Yes, the test result for H and E-Field strength less than 50% of the MPE limit.