

**FCC §1.1307(b) & §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 to §1.1310 and §2.1091 RF exposure is calculated.

**Calculated Formulary:**

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

**Calculated Data:**

| Mode     | Frequency Band(MHz) | Antenna Gain |           | Cable Loss<br>dB | Maximum Conducted Power |      | Evaluation Distance<br>(cm) | Power Density<br>(mW/cm <sup>2</sup> ) | MPE Limit<br>(mW/cm <sup>2</sup> ) |
|----------|---------------------|--------------|-----------|------------------|-------------------------|------|-----------------------------|--|------------------------------------|
|          |                     | (dBi)        | (numeric) |                  | (dBm)                   | (mW) |                             |  |                                    |
| Uplink   | 698-716             | 9.5          | 8.91      | 1.7              | 20                      | 100  | 20.00                       | 0.120                                  | 0.465                              |
|          | 776-787             | 9.5          | 8.91      | 1.7              | 20                      | 100  | 20.00                       | 0.120                                  | 0.517                              |
|          | 824-849             | 9.5          | 8.91      | 1.7              | 20                      | 100  | 20.00                       | 0.120                                  | 0.549                              |
|          | 1710-1755           | 10           | 10        | 2.7              | 20                      | 100  | 20.00                       | 0.107                                  | 1                                  |
|          | 1850-1915           | 10           | 10        | 2.7              | 20                      | 100  | 20.00                       | 0.107                                  | 1                                  |
| Downlink | 728-746             | 7            | 5.01      | 0.8              | 8.5                     | 7.08 | 20.00                       | 0.006                                  | 0.485                              |
|          | 746-757             | 7            | 5.01      | 0.8              | 8.5                     | 7.08 | 20.00                       | 0.006                                  | 0.497                              |
|          | 869-894             | 7            | 5.01      | 0.8              | 8.5                     | 7.08 | 20.00                       | 0.006                                  | 0.579                              |
|          | 2110-2155           | 9            | 7.94      | 1.4              | 8.5                     | 7.08 | 20.00                       | 0.008                                  | 1                                  |
|          | 1930-1995           | 9            | 7.94      | 1.4              | 8.5                     | 7.08 | 20.00                       | 0.008                                  | 1                                  |

Note: the power was used for evaluation is rated power including tolerance.

The worst antenna kitting, please refer the user manual.

Downlink Cable loss=inside cable loss+Power supply Insertion loss

**Result:** The device meet FCC MPE at 20 cm distance.