

## FCC §1.1310 & §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart §2.1091 and 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) Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|---------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                                   | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
| 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 Range (MHz) | Antenna Gain |           | Tune-up Output Power |       | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|--------------|-----------------------|--------------|-----------|----------------------|-------|--------------------------|-------------------------------------|---------------------------------|
|              |                       | (dBi)        | (numeric) | (dBm)                | (mW)  |                          |                                     |                                 |
| 802.11b      | 2412~2462             | 2.41         | 1.74      | 15.00                | 31.62 | 20                       | 0.0109                              | 1.0                             |
| 802.11g      |                       | 2.41         | 1.74      | 19.00                | 79.43 | 20                       | 0.0275                              | 1.0                             |
| 802.11n-HT20 |                       | 2.41         | 1.74      | 19.50                | 89.13 | 20                       | 0.0308                              | 1.0                             |
| 802.11n-HT40 | 2422~2452             | 2.41         | 1.74      | 17.50                | 56.23 | 20                       | 0.0195                              | 1.0                             |
| 802.11a      | 5150~5250             | 3.51         | 2.24      | 11.50                | 14.13 | 20                       | 0.0063                              | 1.0                             |
|              | 5725~5850             | 3.51         | 2.24      | 16.00                | 39.81 | 20                       | 0.0178                              | 1.0                             |
| 802.11n20    | 5150~5250             | 3.51         | 2.24      | 11.50                | 14.13 | 20                       | 0.0063                              | 1.0                             |
|              | 5725~5850             | 3.51         | 2.24      | 16.00                | 39.81 | 20                       | 0.0178                              | 1.0                             |
| 802.11n40    | 5150~5250             | 3.51         | 2.24      | 7.00                 | 5.01  | 20                       | 0.0022                              | 1.0                             |
|              | 5725~5850             | 3.51         | 2.24      | 16.00                | 39.81 | 20                       | 0.0178                              | 1.0                             |

**Note:** 1. For the above tune up power were declared by the manufacturer.

2. 2.4G Wi-Fi and 5G Wi-Fi can't transmit simultaneously.

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