

## 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);

### Measurement Result

| 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             | -3.5         | 0.45      | 22.5                 | 177.83 | 20                       | 0.0158                              | 1.0                             |
| 802.11g      |                       | -3.5         | 0.45      | 23.5                 | 223.87 | 20                       | 0.0199                              | 1.0                             |
| 802.11n-HT20 |                       | -3.5         | 0.45      | 23.0                 | 199.53 | 20                       | 0.0177                              | 1.0                             |
| BLE(1Mbps)   | 2402~2480             | -3.5         | 0.45      | 11.0                 | 12.59  | 20                       | 0.0011                              | 1.0                             |

**Note:** 1. The Tune-up output power was declared by the Manufacturer.

2. WIFI and BLE can't transmit simultaneously.

**Conclusion:** The device meets MPE at distance 20cm.