

# FCC §15.247 (I) & §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

## Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

| 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

## 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) | Maximum Antenna Gain |           | Tune-up Conducted 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             | 2.00                 | 1.00      | 25.00                   | 316.23 | 20                       | 0.0994                              | 1.0                             |
| 802.11g      |                       | 2.00                 | 1.00      | 23.00                   | 199.53 | 20                       | 0.0627                              | 1.0                             |
| 802.11n-HT20 |                       | 2.00                 | 1.00      | 22.00                   | 158.49 | 20                       | 0.0498                              | 1.0                             |
| BLE          | 2402-2480             | 2.00                 | 1.00      | 9.00                    | 7.94   | 20                       | 0.0025                              | 1.0                             |

**Note:** Wi-Fi and BLE can't transmit simultaneously.

**Conclusion:** The EUT meets exemption requirement- RF exposure evaluation greater than 20cm distance specified in § 2.1091. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by § 2.1093.