

## FCC §15.247 & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE

### Applicable Standard

According to subpart 15.247 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.

Per 447498 D01 General RF Exposure Guidance v06, simultaneous transmission MPE test exclusion applies when the sum of the MPE for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.

### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:

S = 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);

| Mode      | Frequency Range (MHz) | 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             | 2.0          | 1.58      | 14.5                    | 28.18 | 20                       | 0.009                               | 1.0                             |
| 802.11g   | 2412-2462             | 2.0          | 1.58      | 19.0                    | 79.43 | 20                       | 0.025                               | 1.0                             |
| 802.11n20 | 2412-2462             | 2.0          | 1.58      | 19.0                    | 79.43 | 20                       | 0.025                               | 1.0                             |

Result: The device meets 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.