

## FCC §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/4πR<sup>2</sup> = 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);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

**Calculated Data (worst case):**

| 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> ) | MPE ratio |
|------|-----------------------|----------------------|-------------|-------------------------|--------|--------------------------|-------------------------------------|---------------------------------|-----------|
|      |                       | (dBi)                | (numerical) | (dBm)                   | (mW)   |                          |                                     |                                 |           |
| SRD  | 904-925               | 4.00                 | 2.51        | 14.00                   | 25.12  | 20                       | 0.0125                              | 0.60                            | 0.0209    |
|      | 2403.985-2472.985     | 4.00                 | 2.51        | 20.00                   | 100.00 | 20                       | 0.0499                              | 1.00                            | 0.0499    |

**Note:**

(1) The Tune-up output power was declared by the Manufacturer.  
 (2) 2.4G SRD and 900MHz SRD can transmit simultaneously, the worst condition as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0209 + 0.0499 = 0.07 < 1.0$$

**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.