

## **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.

| <b>Limits for General Population/Uncontrolled Exposure</b> |                                      |                                      |                                          |                                 |
|------------------------------------------------------------|--------------------------------------|--------------------------------------|------------------------------------------|---------------------------------|
| <b>Frequency Range (MHz)</b>                               | <b>Electric Field Strength (V/m)</b> | <b>Magnetic Field Strength (A/m)</b> | <b>Power Density (mW/cm<sup>2</sup>)</b> | <b>Averaging Time (minutes)</b> |
| 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);

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):**

| Mod<br>e | Frequency Range<br>(MHz) | Maximum<br>Antenna Gain |           | Tune-up<br>Conducted<br>Power |        | Evaluatio<br>n<br>Distance<br>(cm) | Power<br>Density<br>(mW/cm <sup>2</sup><br>) | MPE<br>Limit<br>(mW/cm <sup>2</sup><br>) | MPE<br>ratio |
|----------|--------------------------|-------------------------|-----------|-------------------------------|--------|------------------------------------|----------------------------------------------|------------------------------------------|--------------|
|          |                          | (dBi)                   | (numeric) | (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:

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

**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.