# FCC §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

## Applicable Standard

According to subpart 1.1307 (b)(1), 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 Occupational/Controlled Exposure**

| Limits for occupational/Controlled Exposure | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Electric Field Strength (V/m)** | **Magnetic Field Strength (A/m)** | **Power Density ($mW/cm^2$)** | **Averaging Time (Minutes)** |
| 0.3-1.34 | 614 | 1.63 | *(100) | 6 |
| 1.34-30 | 1842/f | 4.89/f | *($900/f^2$) | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | / | / | f/300 | 6 |
| 1500-100,000 | / | / | 5.0 | 6 |

f = frequency in MHz
* = Plane-wave equivalent power density

## Result

### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. $mW/cm^2$)
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)

| Frequency Range (MHz) | Antenna Gain | | Conducted Power | Evaluation Distance (cm) | Power Density ($mW/cm^2$) | Strictest MPE Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|
| | (dBi) | (numeric) | (mW) | | | |
| 136-174 | 3.5 | 2.24 | 23386.76 | 80 | 0.65 | 1.0 |

Note: The rated max tune-up output power is 46.7dBm(46773.51mW), 50% duty cycle was used in evaluation, so the power is 23386.76mW

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

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

Simultaneous transmitting consideration: (referring to the bluetooth report, the highest MPE is 0.0001mW/cm$^2$)

The ratio=MPE/limit$_{TNB}$+MPE/limit$_{DSS}$=0.65/1+0.0001/1=0.6501＜1.0

**Result: Compliance.**The device meets MPE requirement for Occupational/Controlled use at 80cm distance.