

## FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.247 (i) and 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 General Population/Uncontrolled Exposure

| 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

### 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<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)

| Frequency<br>(MHz)       | Antenna Gain |           | Max Tune-up Power |       | Evaluation<br>Distance<br>(cm) | Power<br>Density<br>(mW/cm <sup>2</sup> ) | MPE Limit<br>(mW/cm <sup>2</sup> ) |
|--------------------------|--------------|-----------|-------------------|-------|--------------------------------|---|------------------------------------|
|                          | (dBi)        | (numeric) | (dBm)             | (mW)  |                                |   |                                    |
| GSM850<br>(824-849MHz)   | 1.6          | 1.4       | 24.5              | 281.8 | 20                             | 0.079                                     | 0.55                               |
| PCS1900<br>(1850-1910)   | 1.6          | 1.4       | 20.5              | 112.2 | 20                             | 0.031                                     | 1.00                               |
| WCDMA850<br>(824-849MHz) | 1.6          | 1.4       | 23.5              | 223.9 | 20                             | 0.062                                     | 0.55                               |
| WCDMA1900<br>(1850-1910) | 1.6          | 1.4       | 24.0              | 251.2 | 20                             | 0.070                                     | 1.00                               |
| Wi-Fi<br>(2412-2462)     | 2.6          | 1.8       | 19.0              | 79.4  | 20                             | 0.028                                     | 1.00                               |
| Bluetooth<br>(2402-2480) | 0.5          | 1.1       | 6.5               | 4.5   | 20                             | 0.001                                     | 1.00                               |

**Note 1:** The Tune-up power and antenna gain were declared by the applicant.

**Note 2:** Please refer to the report of FCC ID: UDV-1009092010008 for the max tune-up power.

**Note 3:** The Wi-Fi and Bluetooth have its own module, so they can transmit at the same time.

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.079/0.55 + 0.028/1 + 0.001/1 = 0.173 < 1.0$$

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

**Result: Compliance**