

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

### Applicable Standard

According to FCC §1.1307 (b)(1) and §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

### Test Data

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)

Cellular Band:

| Mode | Frequency (MHz) | Antenna Gain |           | Conducted Power |       | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|------|-----------------|--------------|-----------|-----------------|-------|--------------------------|-------------------------------------|---------------------------------|
|      |                 | (dBi)        | (numeric) | (dBm)           | (mW)  |                          |                                     |                                 |
| UL   | 836.5           | 5            | 3.16      | 16.63           | 46.03 | 20                       | 0.029                               | 0.558                           |
| DL   | 881.6           | 5            | 3.16      | 4.71            | 2.96  | 20                       | 0.002                               | 0.588                           |

PCS Band:

| Mode | Frequency (MHz) | Antenna Gain |           | Conducted Power |       | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|------|-----------------|--------------|-----------|-----------------|-------|--------------------------|-------------------------------------|---------------------------------|
|      |                 | (dBi)        | (numeric) | (dBm)           | (mW)  |                          |                                     |                                 |
| UL   | 1850.2          | 5            | 3.16      | 16.72           | 46.99 | 20                       | 0.03                                | 1.0                             |
| DL   | 1960.0          | 5            | 3.16      | 4.37            | 2.74  | 20                       | 0.002                               | 1.0                             |

**Result:** Compliant