

## **FCC §1.1307 & §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**

<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

### **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)

For worst case:

### Uplink

Frequency (MHz)	Max tune-up power		Antenna Gain		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBm)	(mW)	(dBi)	(numeric)			
824-849	21.00	125.89	7	5.01	30	0.056	0.56
1850-1910	21.00	125.89	7	5.01	30	0.056	1.00

### Downlink

Frequency (MHz)	Max tune-up power		Antenna Gain		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBm)	(mW)	(dBi)	(numeric)			
869-894	25.00	316.23	7	5.01	30	0.140	0.59
1930-1990	25.00	316.23	7	5.01	30	0.140	1.00

The Maximum indoor and outdoor Gain is 7.0 dBi

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 30cm from nearby persons.

**Result: Compliance**