

## **FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to 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);

### Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)			
GPRS 850	824~849	2.66	1.845	29	794.33	20	0.2917	0.55
EDGE 850	824~849	2.66	1.845	24	251.19	20	0.0922	0.55
GPRS 1900	1850~1910	5.50	3.548	27	501.19	20	0.3539	1.00
EDGE 1900	1850~1910	5.50	3.548	23	199.53	20	0.1409	1.00
Band 2	1850-1910	5.50	3.548	21.50	141.254	20	0.100	1.00
Band 4	1710-1755	5.22	3.327	21.50	141.254	20	0.093	1.00
Band 5	824-849	2.66	1.845	23.50	223.872	20	0.082	0.55
Band 12	699-716	1.65	1.462	23.00	199.526	20	0.058	0.47
Band 13	777-787	1.09	1.285	23.00	199.526	20	0.051	0.52
Band 26	814-849	2.66	1.845	23.00	199.526	20	0.073	0.54

Note: For GPRS Mode, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.25 dB	-3 dB

**Result:** The device meet FCC MPE at 20 cm distance.