

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.

| Limits for General Population/Uncontrolled Exposure | | | | |
|--|--------------------------------------|--------------------------------------|--|---------------------------------|
| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm²) | Averaging Time (minutes) |
| 0.3-1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f ²) | 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/cm²);

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

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

Calculated Data:

| Mode | Frequency Range (MHz) | Antenna Gain | | Tune-up Conducted Power | | Evaluation Distance (cm) | Power Density (mW/cm ²) | MPE Limit (mW/cm ²) | MPE Ratio |
|---------------|-----------------------|--------------|-----------|-------------------------|--------|--------------------------|-------------------------------------|---------------------------------|-----------|
| | | (dBi) | (numeric) | (dBm) | (mW) | | | | |
| Wi-Fi | 2412~2462 | -2.00 | 0.63 | 16 | 39.81 | 20 | 0.0050 | 1.00 | 0.0050 |
| GPRS 850 | 824~849 | 2.00 | 1.58 | 27 | 501.19 | 20 | 0.1580 | 0.55 | 0.2873 |
| EGPRS 850 | 824~849 | 2.00 | 1.58 | 21 | 125.89 | 20 | 0.0397 | 0.55 | 0.0722 |
| WCDMA Band V | 824~849 | 2.00 | 1.58 | 23 | 199.53 | 20 | 0.0629 | 0.55 | 0.1144 |
| GPRS 1900 | 1850~1910 | 2.00 | 1.58 | 24 | 251.19 | 20 | 0.0792 | 1.00 | 0.0792 |
| EGPRS 1900 | 1850~1910 | 2.00 | 1.58 | 19 | 79.43 | 20 | 0.0250 | 1.00 | 0.0250 |
| WCDMA Band II | 1850~1910 | 2.00 | 1.58 | 23 | 199.53 | 20 | 0.0629 | 1.00 | 0.0629 |
| WCDMA Band IV | 1710~1755 | 2.00 | 1.58 | 23 | 199.53 | 20 | 0.0629 | 1.00 | 0.0629 |

Note:

(1) For GPRS/EGPRS 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 |

(2) **Wi-Fi** and **GPRS** or **WCDMA** can transmit simultaneously; the worst condition is Wi-Fi & GPRS 850, as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1 \quad = 0.0050 + 0.2873 = 0.2923 < 1.0$$

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