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

## Applicable Standard

According to subpart 15.247 (i) and subpart 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 ($mW/cm^2$)** | **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

## 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/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:

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

## Result

| Mode/Band | Frequency range (MHz) | Antenna Gain | | Tune up Power | | Evaluation Distance (cm) | Power Density ($mW/cm^2$) | MPE Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|---|---|
| | | (dBi) | (numeric) | (dBm) | (mW) | | | |
| WiFi | 2412-2462 | 4.00 | 2.51 | 20.0 | 100 | 20 | 0.050 | 1.0 |
| WCDMA Band 5 | 824-849 | 3 | 2.00 | 22.5 | 177.83 | 20 | 0.071 | 0.55 |
| WCDMA Band 2 | 1850-1910 | 3 | 2.00 | 22.5 | 177.83 | 20 | 0.071 | 1.0 |
| LTE Band 4 | 1710-1755 | 2.5 | 1.78 | 23.5 | 223.87 | 20 | 0.079 | 1.0 |
| LTE Band 5 | 824-849 | 3 | 2.00 | 23.0 | 199.53 | 20 | 0.079 | 0.55 |
| LTE Band 7 | 2500-2570 | 2.5 | 1.78 | 24.0 | 251.19 | 20 | 0.089 | 1.0 |
| LTE Band 66 | 1710-1780 | 2.5 | 1.78 | 23.5 | 223.87 | 20 | 0.079 | 1.0 |

Note: the maximum gain is external antenna used for MPE calculation.

Consider the transmit simultaneously:

The ratio =0.05/1.0+0.079/0.55=0.19＜1.0, simultaneous exposure is not required.

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

**Result: Compliance**