

FCC §1.1307& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §2.1091 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) 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;

According to §1.1310 and §2.1091 RF exposure is calculated.

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);

Calculated Data:

| Mode | Max Turn-up power (dBm) | ERP/EIRP Limit (dBm) | Max Antenna Gain (dBi) |
|-----------------|-------------------------|----------------------|------------------------|
| WCDMA (Band V) | 24.0 | 38.45 | 14.45 |
| WCDMA (Band II) | 23.5 | 33 | 9.5 |
| FDD (Band 2) | 23.0 | 33 | 10 |
| FDD (Band 4) | 23.0 | 30 | 7 |
| FDD (Band 5) | 23.0 | 38.45 | 15.45 |
| FDD (Band 13) | 22.0 | 34.77 | 12.77 |
| FDD (Band 17) | 22.0 | 34.77 | 12.77 |

| Mode | Frequency | Antenna Gain | | Target Output Power | | Evaluation Distance | Power Density | MPE Limit |
|-----------------|-----------|--------------|-----------|---------------------|--------|---------------------|-----------------------|-----------------------|
| | (MHz) | (dBi) | (numeric) | (dBm) | (mW) | (cm) | (mW/cm ²) | (mW/cm ²) |
| WCDMA (Band V) | 826.4 | 10.42 | 11.03 | 24.0 | 251.19 | 20 | 0.551 | 0.551 |
| WCDMA (Band II) | 1880.0 | 13.52 | 22.46 | 23.5 | 223.87 | 20 | 1.000 | 1.000 |
| FDD (Band 2) | 1880.0 | 14.01 | 25.19 | 23.0 | 199.53 | 20 | 1.000 | 1.000 |
| FDD (Band 4) | 1732.5 | 14.01 | 25.19 | 23.0 | 199.53 | 20 | 1.000 | 1.000 |
| FDD (Band 5) | 836.5 | 11.48 | 14.05 | 23.0 | 199.53 | 20 | 0.558 | 0.558 |
| FDD (Band 13) | 782.0 | 12.18 | 16.53 | 22.0 | 158.49 | 20 | 0.521 | 0.521 |
| FDD (Band 17) | 710.0 | 11.77 | 15.01 | 22.0 | 158.49 | 20 | 0.473 | 0.473 |

| Mode | Max Allow Antenna Gain (dBi) |
|--|------------------------------|
| WCDMA (Band V) Uplink Frequency: 826.4 MHz~846.6 MHz | 10.42 |
| WCDMA (Band II) Uplink Frequency: 1852.4 MHz~1907.6 MHz | 9.5 |
| FDD (Band 2) Uplink Frequency: 1850 MHz~1910 MHz | 10 |
| FDD (Band 4) Uplink Frequency: 1710 MHz~1755 MHz | 7 |
| FDD (Band 5) Uplink Frequency: 824 MHz~849MHz | 11.48 |
| FDD (Band 13) Uplink Frequency: 777 MHz~787 MHz | 12.18 |
| FDD (Band 17) Uplink Frequency: 704 MHz~716 MHz | 11.77 |

Note :

For the above target output power are all declared by the manufacturer.

To meet RF exposure & ERP/EIRP, the maximum net gain of antennas allowed are 10.42 dBi @ B5, 9.5 dBi @ B2, 7 dBi @ B4, 12.18 dBi @ B13, and 11.77 dBi @ B17.