# 1 Human Exposure Assessment

## 1.1 Maximum Permissible Exposure

### 1.1.1 Limit of Maximum Permissible Exposure

| Limits for Occupational / Controlled Exposure | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Electric Field Strength (E) (V/m)** | **Magnetic Field Strength (H) (A/m)** | **Power Density (S) (mW/ cm²)** | **Averaging Time \|E\|²,\|H\|² or S (minutes)** |
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842 / f | 4.89 / f | (900 / f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | - | - | F/300 | 6 |
| 1500-100,000 | - | - | 5 | 6 |
| **Limits for General Population / Uncontrolled Exposure** | | | | |
| **Frequency Range (MHz)** | **Electric Field Strength (E) (V/m)** | **Magnetic Field Strength (H) (A/m)** | **Power Density (S) (mW/ cm²)** | **Averaging Time \|E\|²,\|H\|² or S (minutes)** |
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | - | - | F/1500 | 30 |
| 1500-100,000 | - | - | 1.0 | 30 |
| Note 1: f = frequency in MHz ; *Plane-wave equivalent power density<br>Note 2: For the applicable limit, see FCC 1.1310 | | | | |

| RF Field Strength Limits for Controlled Use Devices (Controlled Environment) | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Electric Field (V/m rms)** | **Magnetic Field (A/m rms)** | **Power Density (W/m2)** | **Averaging Time (minutes)** |
| 0.003-1 | 600 | 4.9 | - | 6 |
| 1-10 | 600/$f$ | 4.9/$f$ | - | 6 |
| 10-30 | 60 | 4.9/$f$ | - | 6 |
| 30-300 | 60 | 0.163 | 10* | 6 |
| 300-1500 | 3.54 $f$ 0.5 | 0.0094 $f$ 0.5 | $f$/30 | 6 |
| 1500-15000 | 137 | 0.364 | 50 | 6 |
| 15000-150000 | 137 | 0.364 | 50 | 616000/$f$ 1.2 |
| 150000-300000 | 0.354 $f$ 0.5 | 9.4 x 10-4 $f$ 0.5 | 3.33 x 10-4 $f$ | 616000/$f$ 1.2 |
| **RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)** | | | | |
| **Frequency Range (MHz)** | **Electric Field (V/m rms)** | **Magnetic Field (A/m rms)** | **Power Density (W/m2)** | **Averaging Time (minutes)** |
| 0.003-1 | 280 | 2.19 | - | 6 |
| 1-10 | 280/$f$ | 2.19/$f$ | - | 6 |
| 10-30 | 28 | 2.19/$f$ | - | 6 |
| 30-300 | 28 | 0.073 | 2* | 6 |
| 300-1500 | 1.585 $f^{0.5}$ | 0.0042 $f^{0.5}$ | $f$/150 | 6 |
| 1500-15000 | 61.4 | 0.163 | 10 | 6 |
| 15000-150000 | 61.4 | 0.163 | 10 | 616000/$f^{1.2}$ |
| 150000-300000 | 0.158 $f^{0.5}$ | 4.21 x $10^{-4}$ $f^{0.5}$ | 6.67 x $10^{-5}$ $f$ | 616000/$f^{1.2}$ |
| Note 1: $f$ is frequency in MHz.<br>Note 2: For the applicable limit, see IC RSS-102 | | | | |

## 1.1.2 MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$

Power Density: Pd (W/m$^2$) = $\frac{E^2}{377}$

**E** = Electric field (V/m)
**P** = RF output power (W)
**G** = EUT Antenna numeric gain (numeric)
**d** = Separation distance between radiator and human body (m)

The formula can be changed to

**Pd** = $\frac{30 \times P \times G}{377 \times d^2}$

### 1.1.3 Result of Maximum Permissible Exposure

| Frequency Range (MHz) | Maximum Conducted Power (dBm) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5150-5250 | 16.53 | 4.1618 | 20 | 0.023 | 1 |
| 5725-5850 | 26.88 | 4.2025 | 20 | 0.255 | 1 |