# Appendix B. Maximum Permissible Exposure

# 1. Maximum Permissible Exposure

## 1.1. Applicable Standard

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 levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.25 m normally can be maintained between the user and the device.

(A) 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 |

(B) 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: f = frequency in MHz ; *Plane-wave equivalent power density

## 1.2. MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

**E** = Electric field (V/m)

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

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

## 1.3. Calculated Result and Limit

<For Ant. 1>

Antenna Type : PANEL Antenna

Max Conducted Power for IEEE 802.11g: 24.70 dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Output Power (dBm) | Output Power ( mW ) | Power Density (S) (mW/cm²) | Limit of Power Density (S) (mW/cm²) | Test Result |
|---|---|---|---|---|---|---|
| 11.3 | 13.4896 | 24.7000 | 295.1209 | 0.792411 | 1 | Complies |

<For Ant. 2>

Antenna Type : OMNI Antenna

Max Conducted Power for IEEE 802.11g: 29.14 dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Output Power (dBm) | Output Power ( mW ) | Power Density (S) (mW/cm²) | Limit of Power Density (S) (mW/cm²) | Test Result |
|---|---|---|---|---|---|---|
| 1 | 1.2589 | 29.1400 | 820.3515 | 0.205566 | 1 | Complies |

<For Ant. 3>

Antenna Type : YAGI Antenna

Max Conducted Power for IEEE 802.11b: 27.60dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Output Power (dBm) | Output Power ( mW ) | Power Density (S) (mW/cm²) | Limit of Power Density (S) (mW/cm²) | Test Result |
|---|---|---|---|---|---|---|
| 8.3 | 6.7608 | 27.6000 | 575.4399 | 0.774373 | 1 | Complies |

<For Ant. 4>

Antenna Type : DIPOLE Antenna

Max Conducted Power for IEEE 802.11g: 29.51dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Output Power (dBm) | Output Power ( mW ) | Power Density (S) (mW/cm²) | Limit of Power Density (S) (mW/cm²) | Test Result |
|---|---|---|---|---|---|---|
| 4.1 | 2.5704 | 29.5100 | 893.3055 | 0.457036 | 1 | Complies |

<For Ant. 5>

Antenna Type : DIPOLE Antenna

Max Conducted Power for IEEE 802.11n: 20. 66 dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Output Power (dBm) | Output Power ( mW ) | Power Density (S) (mW/cm²) | Limit of Power Density (S) (mW/cm²) | Test Result |
|---|---|---|---|---|---|---|
| 5.00 | 3.1623 | 20.6600 | 116.4126 | 0.073274 | 1 | Complies |