



Appendix C. 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 0.2 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/ cm ²) | 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/ cm ²) | 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

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

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

Antenna Type : Dipole

Max Conducted Power for IEEE 802.11b 20MHz Ant. A : 18.1dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 18.1000 | 64.5654 | 0.020368 | 1 | Complies |

Antenna Type : Dipole

Lower Channel Max Conducted Power for IEEE 802.11b 40MHz Ant. A : 17.68dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.6800 | 58.6138 | 0.018491 | 1 | Complies |

Antenna Type : Dipole

Upper Channel Max Conducted Power for IEEE 802.11b 40MHz Ant. A : 17.89dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.8900 | 61.5177 | 0.019407 | 1 | Complies |

Antenna Type : Dipole

Max Conducted Power for IEEE 802.11g 20MHz Ant. A : 14.55dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 14.5500 | 28.5102 | 0.008994 | 1 | Complies |

Antenna Type : Dipole

Max Conducted Power for IEEE 802.11g 40MHz Ant. A + Ant. B: 17.47dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.4700 | 55.8470 | 0.017618 | 1 | Complies |

Antenna Type : Dipole

Max Conducted Power for draft 11n MCS8 20MHz Ant. A + Ant. B : 17.52dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.5200 | 56.4937 | 0.017822 | 1 | Complies |

Antenna Type : Dipole

Max Conducted Power for draft 11n MCS8 40MHz Ant. A + Ant. B : 17.50dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.5000 | 56.2341 | 0.017740 | 1 | Complies |

Antenna Type : Dipole

Max Conducted Power for draft 11n MCS15 20MHz Ant. A + Ant. B : 17.52dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.5200 | 56.4937 | 0.017822 | 1 | Complies |

Antenna Type : Dipole

Max Conducted Power for draft 11n MCS15 40MHz Ant. A + Ant. B : 17.48dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|--------------------|------------------------|-------------------------|--------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 2 | 1.5849 | 17.4800 | 55.9758 | 0.017658 | 1 | Complies |