

## 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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 : Omni-Directional Ant. / Ant. 1/2

Max Conducted Power for IEEE 802.11b/g : 20.23dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
8	6.3096	14	20.2300	105.4387	0.005272	1	Complies

Antenna Type : Omni-Directional Ant. / Ant. 3

Max Conducted Power for IEEE 802.11b/g : 20.23dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
10	10.0000	18	20.2300	105.4387	0.003326	1	Complies

Antenna Type : Omni-Directional Ant. / Ant. 4

Max Conducted Power for IEEE 802.11b/g : 20.23dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
18	63.0957	18	20.2300	105.4387	0.020987	1	Complies

Antenna Type : Patch Ant. / Ant. 5

Max Conducted Power for IEEE 802.11b/g : 13.73dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
14.5	28.1838	0.9	13.7300	23.6048	0.107634	1	Complies

Antenna Type : Omni-Directional Ant./ Ant. 8/9

Max Conducted Power for IEEE 802.11a : 21.85dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
8	6.3096	12	21.8500	153.1087	0.012133	1	Complies

**Antenna Type : Embedded Ant./ Ant. 10**

**Max Conducted Power for IEEE 802.11a : 24.85dBm**

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
13.5	22.3872	2	24.8500	305.4921	0.858915	1	Complies

**Antenna Type : Embedded Ant./ Ant. 11**

**Max Conducted Power for IEEE 802.11a : 10.54dBm**

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
17	50.1187	0	10.5400	11.3240	0.112967	1	Complies

**Antenna Type : Directional Panel Ant./ Ant. 12**

**Max Conducted Power for IEEE 802.11a : 14.57dBm**

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
23	199.5262	2	14.5700	28.6418	0.717712	1	Complies

**Antenna Type : Wideband Panel / Ant. 13**

**Max Conducted Power for IEEE 802.11a: 14.31dBm**

Antenna Gain (dBi)	Antenna Gain (numeric)	Cable lose (dB )	Peak Output Power (dBm)	Peak Output Power ( mW )	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
13	19.9526	1.8	14.3100	26.9774	0.070786	1	Complies