

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

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

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

For 5GHz Band: Band 1

Antenna Type : Dipole Antenna

Max Conducted Power for 802.11a Ant. B-1 + An.t B-2 + Ant. B-3 : 16.29 dBm

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
4.28	2.6792	16.2900	42.5598	0.022696	1	Complies

Antenna Type : Emdeded Antenna

Max Conducted Power for 802.11a Ant. D-1 + An.t D-2 + Ant. D-3 : 16.67 dBm

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
5.1	3.2359	16.6700	46.4515	0.029919	1	Complies

Antenna Type : Dipole Antenna

Max Conducted Power for draft n 40MHz Ant. B-1 + An.t B-2 + Ant. B-3 : 16.52 dBm

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
4.28	2.6792	16.5200	44.8745	0.023930	1	Complies

Antenna Type : Emdeded Antenna

Max Conducted Power for draft n 20MHz Ant. D-1 + An.t D-2 + Ant. D-3 : 16.78 dBm

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
5.1	3.2359	16.7800	47.6431	0.030687	1	Complies

For 5GHz Band: Band 4

Antenna Type : Dipole Antenna

Max Conducted Power for 802.11a Ant. B-1 + An.t B-2 + Ant. B-3 : 27.01 dBm

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
4.28	2.6792	27.0089	502.2181	0.267820	1	Complies

Antenna Type : Emdeded Antenna

Max Conducted Power for 802.11a Ant. D-1 + An.t D-2 + Ant. D-3 : 27.64 dBm

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
5.1	3.2359	27.6352	580.1175	0.373651	1	Complies

Antenna Type : Dipole Antenna

Max Conducted Power for draft n 20MHz Ant. B-1 + An.t B-2 + Ant. B-3 : 27.43 dBm

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
4.28	2.6792	27.4337	553.8245	0.295340	1	Complies

Antenna Type : Emdeded Antenna

Max Conducted Power for draft n 20MHz Ant. D-1 + An.t D-2 + Ant. D-3 : 27.80 dBm

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
5.1	3.2359	27.8022	602.8596	0.388299	1	Complies

For 2.4GHz Band:

Antenna Type : Dipole Antenna

Max Conducted Power for 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 : 24.18 dBm

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
4.9	3.0903	24.1753	261.5342	0.160871	1	Complies

Antenna Type : Emdeded Antenna

Max Conducted Power for 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 : 24.15 dBm

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
3.8	2.3988	24.1474	259.8594	0.124076	1	Complies

Antenna Type : Dipole Antenna

Max Conducted Power for draft n 20MHz Ant. A-1 + Ant. A-2 + Ant. A-3 : 22.75 dBm

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
4.09	2.5645	22.7522	188.4614	0.096200	1	Complies

Antenna Type : Emdeded Antenna

Max Conducted Power for draft n 20MHz Ant. D-1 + Ant. D-2 + Ant. D-3 : 22.61 dBm

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
3.8	2.3988	22.6050	182.1816	0.086987	1	Complies