

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 0.5 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 = Average 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 EUT RF output power, the minimum mobile separation distance, d=0.5m, as well as the gain of the used antenna, the RF power density can be obtained.

1.3. Calculated Result and Limit

For 5GHz UNII Band:

<For Antenna 3>

Antenna Type : Dipole Antenna

Max Conducted Power for IEEE 802.11n MCS0 20MHz : 16.90dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
4.00	2.5119	16.8983	48.9585	0.003917	1	Complies

For 5GHz ISM Band: P to M

Mode 1 <For Antenna 1>

Antenna Type : Panel Antenna

Max Conducted Power for IEEE 802.11n MCS0 5MHz : 19.58dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	19.5821	90.8260	0.114067	1	Complies

Mode 2 <For Antenna 2>

Antenna Type : Sector Antenna

Max Conducted Power for IEEE 802.11n MCS0 5MHz : 19.58dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	19.5821	90.8260	0.018251	1	Complies

Mode 3 <For Antenna 3>

Antenna Type : Dipole Antenna

Max Conducted Power for IEEE 802.11n MCS0 10MHz : 23.70dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
4.00	2.5119	23.7031	234.5881	0.018766	1	Complies

Mode 4 <For Antenna 4>

Antenna Type : Omni Antenna

Max Conducted Power for IEEE 802.11n MCS0 10MHz : 19.58dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	19.5821	90.8260	0.018251	1	Complies

Mode 5 <For Antenna 5>

Antenna Type : Dish Antenna

Max Conducted Power for IEEE 802.11a: 15.41dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
12.00	15.8489	15.4134	34.7807	0.109721	1	Complies

For 5GHz ISM Band: P to P

Mode 1 <For Antenna 1>

Antenna Type : Panel Antenna

Max Conducted Power for IEEE 802.11n MCS0 10MHz : 23.70dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	23.7031	234.5881	0.294616	1	Complies

Mode 2 <For Antenna 2>

Antenna Type : Sector Antenna

Max Conducted Power for IEEE 802.11n MCS0 10MHz : 23.70dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	23.7031	234.5881	0.047139	1	Complies

Mode 3 <For Antenna 3>

Antenna Type : Dipole Antenna

Max Conducted Power for IEEE 802.11n MCS0 10MHz : 23.70dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
4.00	2.5119	23.7031	234.5881	0.018766	1	Complies

Mode 4 <For Antenna 4>

Antenna Type : Omni Antenna

Max Conducted Power for IEEE 802.11 n MCS0 10MHz : 23.70dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	23.7031	234.5881	0.047139	1	Complies

Mode 5 <For Antenna 5>

Antenna Type : Dish Antenna

Max Conducted Power for IEEE 802.11 n MCS0 5MHz : 24.69dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
12.00	15.8489	24.6888	294.3625	0.928609	1	Complies