Appendix A. 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/ 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

Antenna Type : Dipole Antenna
Max Conducted Power for IEEE 802.11n (20MHz) port A: 21.54dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
5G	20	2	1.584893	21.54	142.5608	**0.0450**

Max Conducted Power for IEEE 802.11n (20MHz) port B: 22.36dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
5G	20	2	1.584893	22.36	172.1869	**0.0543**

IEEE 802.11n (20MHz) port A + port B Power Density = 0.0450 + 0.0543 = 0.0993 (mW/cm2)

Max Conducted Power for IEEE 802.11n (40MHz) port A: 20.61dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
5G	20	2	1.584893	20.61	115.0800	**0.0363**

Max Conducted Power for IEEE 802.11n (40MHz) port B: 21.87dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
5G	20	2	1.584893	21.87	153.8155	**0.0485**

IEEE 802.11n (40MHz) port A + port B Power Density = 0.0363 + 0.0485 = 0.0848 (mW/cm2)

Max Conducted Power for IEEE 802.11n (20MHz) port A: 19.52dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
2.4G	20	2	1.584893	19.52	89.5365	**0.0282**

Max Conducted Power for IEEE 802.11n (20MHz) port B: 18.53dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
2.4G	20	2	1.584893	18.53	71.2853	**0.0225**

IEEE 802.11n (20MHz) port A + port B Power Density = 0.0282 + 0.0225 = 0.0507 (mW/cm2)

Max Conducted Power for IEEE 802.11n (40MHz) port A: 18.16dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
2.4G	20	2	1.584893	18.16	65.4636	**0.0207**

Max Conducted Power for IEEE 802.11n (40MHz) port B: 17.32dBm

Test Mode	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm2)
2.4G	20	2	1.584893	17.32	53.9511	**0.0170**

IEEE 82.11n (40MHz) port A + port B Power Density = 0.0207 + 0.0170 = 0.0377 (mW/cm2)