

## RF Exposure Compliance Requirement

## 1. Standard requirement

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 level in excess limit for maximum permissible exposure. In accordance with 47 CFR PCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m 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 Times $ 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
1500-100000			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 Times $ E ^2$ , $ H ^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	30
3.0-30	842/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			f/500	30
1500-100000			1.0	30

Note: f/frequency in MHz; \*Plane-wave equivalent power density

## 2. MPE Calculation Method

$$S(\text{mW}/\text{cm}^2) = P \cdot G / 4\pi \cdot R^2$$

$$S = \text{Power Density (mW}/\text{cm}^2)$$

$$P = \text{Peak RF conducted output Power (mW)}$$

$$G = \text{EUT Antenna numeric gain (numeric)}$$

$$R = \text{Separation distance between radiator and human body (cm)}$$

$$R = ((P \cdot G) / 4\pi \cdot S)^{1/2}$$

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit above, the minimum distance between the antenna and human body will be calculated.

## 3. Calculated Result

For Band 1 Downlink:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (s) (mW/cm <sup>2</sup> )	Minimum Distance to human body (cm)
873.5	21	125	43.5	22387	f/300	277
873.5	21	125	43.5	22387	f/500	358

For Band 1 Uplink:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (s) (mW/cm <sup>2</sup> )	Minimum Distance to human body (cm)
828.5	21	125	33.1	2041	f/300	86
828.5	21	125	33.1	2041	f/500	111

For Band 2 Downlink:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (s) (mW/cm <sup>2</sup> )	Minimum Distance to human body (cm)
880.0	21	125	43.3	21380	f/300	277
880.0	21	125	43.3	21380	f/500	357

For Band 2 Uplink:

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (s) (mW/cm <sup>2</sup> )	Minimum Distance to human body (cm)
835.0	21	125	33.3	2138	f/300	88
835.0	21	125	33.3	2138	f/500	113

Worst case consideration, 2 output ports operate at the max power at the same time

Downlink

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (s) (mW/cm <sup>2</sup> )	Minimum Distance to human body (cm)
873.5 and 880.0	21	125	46.4	22387 + 21380	f/300	387
873.5 and 880.0	21	125	46.4	22387 + 21380	f/500	499

Uplink

Frequency (MHz) F	Maximum Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit of Power Density (s) (mW/cm <sup>2</sup> )	Minimum Distance to human body (cm)
828.5 and 835.0	21	125	36.2	2041 + 2138	f/300	123
828.5 and 835.0	21	125	36.2	2041 + 2138	f/500	159

Conclusion:

The recommended distance between the EUT and human body is more than 5 meters