

6.13. RF EXPOSURE REQUIRMENTS [§§ 1.1310 & 2.1091]

The following criteria shall be used to evaluate the environmental impact of human exposure to RF radiation:

FCC 1.1310:- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	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				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Calculation Method of RF Safety Distance:

$$S = PG/4\pi r^2 = EIRP/4\pi r^2 \implies r = \sqrt{PG/4\pi S} = \sqrt{EIRP/4\pi S}$$

- Where:
- P: power input to the antenna in mW
 - EIRP: Equivalent (effective) isotropic radiated power.
 - S: power density mW/cm²
 - G: numeric gain of antenna relative to isotropic radiator
 - r: distance to center of radiation in cm

MPE Evaluation

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	Compliance with FCC Rules
Minimum calculated separation distance between antenna and persons required: 48 cm	Manufacturer' instruction for separation distance between antenna and persons required: 48 cm
Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement	See user manual.
Caution statements and/or warning labels that are necessary in order to comply with the exposure limits	See user manual.
Any other RF exposure related issues that may affect MPE compliance	None.

Limits for General Population/Uncontrolled Exposure:

Antenna Gain = 0 dBi = 10^(0/10) numeric
 Pp = 46.53 dBm (Rated peak power)
 Duty Cycle = 100 %
 Pa = Pp + 10*log(Duty Cycle) = 46.53 dBm + 10*log(100/100) dBm = 46.53 dBm = 45000 mW (rated average power)
 S = f/300 = 1.5 mW/cm² (Limit for General Population/Uncontrolled Exposure)

$$r = \sqrt{P_a G / 4\pi S} = \sqrt{(45000mW \times 1) / 4\pi S} = 48 \text{ cm}$$