

5.6. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

5.6.1. Limits

- **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).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
300-1500	F/300	6
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	F/1500	6

F = Frequency in MHz

5.6.2. Method of Measurements

Refer to FCC @ 1.1310 and 2.1091

- In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:
 - (1) Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.
 - (2) Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement
 - (3) Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits
 - (4) Any other RF exposure related issues that may affect MPE compliance

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

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 centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi \cdot S}} = \sqrt{\frac{EIRP}{4\pi \cdot S}}$$

FCC radio frequency exposure limits may not be exceeded at distances closer than r cm from the antenna of this device

5.6.3. Test Data

5.6.3.1. Outdoor Antenna - Uplink

Antenna Gain Limit specified by Manufactuer: 15 dBi

Minimum Frequency (MHz)	Maximum Composite Conducted Power (dBm)	Maximum EIRP (dBm)	Calculated RF Safety Distance r (cm)	Manufacturer' Specified Separation Distance (cm)	Compliance
799	28.5	43.5	58	100	Complies

Note: RF EXPOSURE DISTANCE LIMITS: $r = (PG/4\pi S)^{1/2} = (EIRP/4\pi S)^{1/2}$
 $S = F/1500 = \text{lowest-f}/1500 = 799/1500 \text{ mW/cm}^2 = 0.533 \text{ mW/cm}^2$

5.6.3.2. Indoor Antenna - Downlink

Antenna Gain Limit specified by Manufactuer: 2.2 dBi

Minimum Frequency (MHz)	Maximum Composite Conducted Output Power (dBm)	Maximum EIRP (dBm)	Calculated RF Safety Distance r (cm)	Manufacturer' Specified Separation Distance (cm)	Compliance
769	41.5	43.7	60	100	Complies

Note: RF EXPOSURE DISTANCE LIMITS: $r = (PG/4\pi S)^{1/2} = (EIRP/4\pi S)^{1/2}$
 $S = F/1500 = \text{lowest-f}/1500 = 769/1500 \text{ mW/cm}^2 = 0.513 \text{ mW/cm}^2$

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	Compliance with FCC Rules
Minimum separation distance between antenna and persons, specified by the manufacturer, for <ul style="list-style-type: none"> Indoor Antenna: 100 cm Outdoor Antenna: 100 cm 	Complies Complies