

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 Manufacturer: 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 Manufacturer: 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 |