

5.12. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

5.12.1. 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

5.12.2. 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

5.12.3. Evaluation of RF Exposure Compliance Requirements

Lowest Frequency, **F[MHz]** = 763

MPE Limit for Occupational/Controlled Exposure, **S_{controlled}[mW/cm²]** = F / 300 = 763 / 300 = 2.54

MPE Limit for General Population/Uncontrolled Exposure, **S_{uncontrolled}[mW/cm²]** = F / 1500 = 763/1500 = 0.509

Maximum RF Power conducted, **P_{conducted}[dBm]** = 34.82

Maximum Antenna Gain, **G[dBd]** = 0

Maximum EIRP, **P_{EIRP}[dBm]** = 34.82 + 2.15 = 36.97

Calculated RF Safety Distance for Occupational/Controlled Exposure, **r_{safety_controlled}[cm]** = 12.5

Calculated RF Safety Distance for General Population/Uncontrolled Exposure, **r_{safety_uncontrolled}[cm]** = 27.9

Specified Safety Separation Distance in User's Manual = **28 cm**

Antenna Gain (dBd)	Maximum EIRP (dBm)	Calculated RF Safety Distances (cm)	Specified Separation distance (cm)	Compliance
0	36.97	12.5 & 28.0	28	Complies