6.6. RF EXPOSURE REQUIRMENTS @ 1.1310 & 2.1091

6.6.1. 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
1500-100,000	...	...	5	6
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	...	...	F/1500	6
1500-100,000	...	...	1.0	30

F = Frequency in MHz

6.6.2. Method of Measurements

Refer to FCC @ 1.1310, 2.1091 and Public Notice DA 00-705 (March 30, 2000)

- 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:

$S = PG/4\Pi r^2$

Where: P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

$r = \sqrt{PG/4\Pi S}$

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

Calculation Example using a 6 dBi antenna gain

For General Population/Uncontrolled Exposure, Power Density (S) = F/1500 mW/cm^2

For the operating frequency range of 806-821 MHz for this device,

F = lowest operating frequency of 806 MHz, therefore Power Density (S) = 806/1500 = 0.537 mW/cm^2

P = 32.7 dBm = 1862.088 mW
G = 6 dBi = $10^{(6/10)}$ = 3.98 numeric
S = 0.537 mW/cm^2

Since $r = \sqrt{PG/4\Pi S}$

Then $r = \sqrt{1862.088 \text{ mW} \times 3.98 \text{ numeric} / 4 \times \Pi \times S}$

= 34 cm

Therefore, the minimum separation distance of 34 cm (with antenna gain equal to or less than 6 dBi) is necessary to comply with RF Exposure requirements. The following RF exposure warning statement will be placed in the installation manual.

RF Exposure Warning:

To ensure user's safety and to satisfy RF exposure requirements,
this unit must be installed so that a minimum separation distance of 34 cm is always maintained between the antenna of the transmitting device and the body of nearby persons. Operations at closer than this distance is not recommended.

6.6.3. Test Data

Maximum Antenna Gain (G) (dBi)	Frequency (MHz)	Measured Conducted Power (P) (dBm)	Calculated Minimum RF Safety Distance r (cm)	Laboratory's Recommended Minimum RF Safety Distance r (cm)
6	806.0	32.4	32.0	34
6	813.5	32.6	32.8	34
6	821.0	32.7	33.1	34

Note 1: RF EXPOSURE DISTANCE LIMITS: $r = \sqrt{PG/4\Pi S}$

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	**Compliance with FCC Rules**
Minimum calculated separation distance between antenna and persons required: 34 cm	Manufacturer' instruction for separation distance between antenna and persons required: 34 cm. Please refer to the User's Manual and FCC RF Exposure folder
Caution statements and/or warning labels that are necessary in order to comply with the exposure limits	Please refer to the Users/ Manual and FCC RF Exposure folder
Any other RF exposure related issues that may affect MPE compliance	None.