

## 6.12. RF EXPOSURE REQUIREMENTS @ 1.1310 & 2.1091

### 6.12.1. 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 <sup>2</sup> )	Average Time (minutes)
<b>(A) Limits for Occupational/Control Exposures</b>				
300-1500	...	...	F/300	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
300-1500	...	...	F/1500	6

F = Frequency in MHz

### 6.12.2. 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/cm<sup>2</sup>  
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

### **6.12.3. Evaluation of RF Exposure Compliance Requirements**

Lowest Frequency, **F[MHz]** = 406.1

MPE Limit for General Population/Uncontrolled Exposure, **S<sub>uncontrolled</sub>[mW/cm<sup>2</sup>]** = F / 1500 = 406.1 / 1500 = 0.271

Maximum RF Power conducted, **P<sub>conducted</sub>[dBm]** = 37

Antenna Gain (dBd)	Maximum EIRP (dBm)	Calculated RF Safety Distance (cm)	Specified Separation distance (cm)	Compliance
0	39.14	49	50	Complies
3	42.14	69	70	Complies
6	45.14	98	100	Complies
8	47.14	123	130	Complies
10	49.14	155	160	Complies
12	51.14	195	200	Complies

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