

## 6.6. RF EXPOSURE REQUIRMENTS @ 1.1310 & 2.1091

### MPE EVALUATION

**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).

TABLE 1—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> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30–300 .....	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

### Calculation Method of RF Safety Distance:

$$S = PG/4\pi r^2 = EIRP/4\pi r^2 \implies r = (PG/4\pi S)^{1/2} = (EIRP/4\pi S)^{1/2}$$

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 center of radiation in cm

Evaluation of RF Exposure Compliance Requirements	
RF Exposure Requirements	Compliance with FCC Rules
Minimum calculated separation distance between antenna and persons required: <b>33.2 cm</b>	Manufacturer' instruction for separation distance between antenna and persons required: <b>50 cm</b> . Please refer to Users Manual and FCC RF Exposure folder for details.
Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement	Please refer to User Manual for details.
Caution statements and/or warning labels that are necessary in order to comply with the exposure limits	Please refer to User Manual and FCC RF Exposure folder for RF Exposure Information.
Any other RF exposure related issues that may affect MPE compliance	None.

**Note 1:** RF Exposure Distance Limits:  $r = (PG/4\pi S)^{1/2} = (EIRP/4\pi S)^{1/2}$

P = 29.70 dBm = 933.25 mW (maximum RF power measured at antenna terminal)  
G = 9.5 dBi =  $10^{9.5/10}$  numeric (maximum antenna gain specified by the manufacturer)  
EIRP = 39.2 dBm =  $10^{39.5/10}$  mW  
S = 903/1500 mW/cm<sup>2</sup> (Limits for General Population/Uncontrolled Exposure)

$$r = (EIRP/4\pi S)^{1/2} (10^{39.5/10} \text{ mW}) / 4\pi(903/1500 \text{ mW/cm}^2) = 33.2 \text{ cm}$$

#### ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4  
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: [vic@ultratech-labs.com](mailto:vic@ultratech-labs.com), Website: <http://www.ultratech-labs.com>

File #: WTI-020F90  
November 11, 2002

*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*