

RF Human Exposure Analysis

Users may be concerned with the power levels achieved using booster amplifiers in-line with the handset, cradle and automobile antenna.

The far field on-axis power flux density (W/m^2) is calculated using the following formula:

$$S = G P_T / 4\pi R^2,$$

Where:

- G = Numerical gain of the antenna
- P_T = Power delivered to the antenna in watts
- R = Distance from the antenna in meters

The following table shows the maximum output power of the booster amplifier combined with an antenna with 3dBi gain. This is the maximum antenna gain permissible as documented in the user/installation manual. The resulting radiated power density is compared to MPE limits for both uncontrolled and controlled environments.

Cellular Band (824-849MHz)

Output power of the amplifier:	2W maximum	
Antenna Gain: Maximum antenna gain allowed as described in user/installation manual.	3dBi	
Operational Frequency:	824-849MHz	
Minimum distance (Controlled): From radiating source for personnel aware of radiofrequency equipment and who are able to limit their exposure time. (Installation Technicians)	0.5m Antenna mounted on vehicle exterior	
Minimum distance (Uncontrolled): From radiating source for personnel unaware of radiofrequency equipment and who are not able to limit their exposure time. (General Public)	0.5m Antenna mounted on vehicle exterior	
Estimated RF Power Density:	0.127mW/cm ²	
Maximum Permissible Exposure (MPE):	Controlled 6 min avg exposure 2.75mW/cm ²	Uncontrolled 30 min avg exposure 0.55mW/ cm ²
Complies with MPE Limits	Yes	Yes

Table 1. Cellular Band MPE Calculations

PCS Band (1850-1910MHz)

Output power of the amplifier:	1W maximum	
Antenna Gain: Maximum antenna gain allowed as described in user/installation manual.	3dBi	
Operational Frequency:	1850-1910MHz	
Minimum distance (Controlled): From radiating source for personnel aware of radiofrequency equipment and who are able to limit their exposure time. (Installation Technicians)	0.5m Antenna mounted on vehicle exterior	
Minimum distance (Uncontrolled): From radiating source for personnel unaware of radiofrequency equipment and who are not able to limit their exposure time. (General Public)	0.5m Antenna mounted on vehicle exterior	
Estimated RF Power Density:	0.064 mW/cm ²	
Maximum Permissible Exposure (MPE):	Controlled 6 min avg exposure 5 mW/cm ²	Uncontrolled 30 min avg exposure 1 mW/ cm ²
Complies with MPE Limits	Yes	Yes

Table 2. PCS Band MPE Calculations