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## 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)

<b>Output power of the amplifier:</b>	2W maximum	
<b>Antenna Gain:</b> Maximum antenna gain allowed as described in user/installation manual.	3dBi	
<b>Operational Frequency:</b>	824-849MHz	
<b>Minimum distance (Controlled):</b> 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	
<b>Minimum distance (Uncontrolled):</b> 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	
<b>Estimated RF Power Density:</b>	0.127mW/cm <sup>2</sup>	
<b>Maximum Permissible Exposure (MPE):</b>	<b>Controlled</b> 6 min avg exposure 2.75mW/cm <sup>2</sup>	<b>Uncontrolled</b> 30 min avg exposure 0.55mW/ cm <sup>2</sup>
<b>Complies with MPE Limits</b>	<b>Yes</b>	<b>Yes</b>

Table 1. Cellular Band MPE Calculations

PCS Band (1850-1910MHz)

<b>Output power of the amplifier:</b>	1W maximum	
<b>Antenna Gain:</b> Maximum antenna gain allowed as described in user/installation manual.	3dBi	
<b>Operational Frequency:</b>	1850-1910MHz	
<b>Minimum distance (Controlled):</b> 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	
<b>Minimum distance (Uncontrolled):</b> 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	
<b>Estimated RF Power Density:</b>	0.064 mW/cm <sup>2</sup>	
<b>Maximum Permissible Exposure (MPE):</b>	<b>Controlled</b> 6 min avg exposure 5 mW/cm <sup>2</sup>	<b>Uncontrolled</b> 30 min avg exposure 1 mW/ cm <sup>2</sup>
<b>Complies with MPE Limits</b>	<b>Yes</b>	<b>Yes</b>

Table 2. PCS Band MPE Calculations