MPE Calculations

FCC part 1.1310, Table 1 limits the power density for uncontrolled exposure to 1mW/ cm^2 for systems operating in the UNII bands. The distance, d(cm) from the antenna at which the power density, P_d (mW/cm^2) is below this limit is calculated from the maximum EIRP, P_t (mW) using the equation:

$$P_d = P_t/(4 \pi d^2)$$

Re-arranging for the distance at which the power density is 1mW/cm2 gives:

$$d = \sqrt{(P_t /(4 \pi))}$$

The device under test is designed to use an integral antenna which can be configured to give either an Omni-Directional pattern or a half-circular radiation pattern. The gain gains stated for the omni configuration is 2dBi and for the half-circle configuration the stated gain is 5.6dBi. The maximum output power across all channels is 15.7dBm.

The maximum EIRP for omni pattern is, therefore, 17.7 dBm (59 mW):

$$d = \sqrt{(59 / (4 \pi))} = \mathbf{\underline{2.2\ cm\ (0.9")}}$$

The maximum EIRP for half circle pattern is, therefore, 21.3 dBm (135 mW):

$$d = \sqrt{(135 / (4 \pi))} = \mathbf{\underline{3.3\ cm\ (1.3")}}$$

The distance from the antenna that the power density is 1mW/ cm^2 is, therefore, 3.3cm.

The users guide instructs the user to install the device such that it has a separation of at least 20cm from persons to comply with the FCC's requirements. This separation of 20cm more than meets the FCC's and Industry Canada rf exposure requirements. The actual power density at a distance of 20cms for the two antenna configurations is given below:

Antenna Configuration	EIRP	Power Density at 20cm	
		Calculated	Measured
Omni (p. 5 of 6)	17.7 dBm (59mW)	0.012 mW/cm^2	0.0141 mW/cm^2
Half-Circle (p. 6 of 6)	21.3 dBm (135mW)	0.027 mW/cm^2	0.0172 mW/cm^2