

Maximum Permissible Exposure calculations

The MPE distance will be calculated for the worst case of a 100% transmitter duty cycle. For an isotropic radiator the surface area of a sphere can be used to determine the area over which the transceiver energy is radiated.

$$\text{Surface area of a sphere} = 4 * \pi * \text{radius}^2$$

In the case where there is an antenna gain, the worst case energy density is increased by the antenna gain. In this case, the exposure level for a controlled environment can be calculated as follows:

$$\text{MPE distance} = ((\text{output power} * \text{duty cycle} * 10 * (\text{antenna gain}/10)) / (4 * \pi * \text{Exposure Limit} [\text{mW}/\text{cm}^2]))^{1/2}$$

In the case of 14 dBi HA8089 antenna

$$\begin{aligned} \text{MPE distance} &= ((100 \text{ mW} * 1 * 25.1) / (4 * 3.14 * 1))^{1/2} \\ &= 22.7 \text{ cm} \end{aligned}$$

In the case of 6.5 dBi shark fin antenna

$$\begin{aligned} \text{MPE distance} &= ((100 \text{ mW} * 1 * 4.5) / (4 * 3.14 * 1))^{1/2} \\ &= 9.6 \text{ cm} \end{aligned}$$