

## **CALCULATED SAR for UNCONTROLLED, GENERAL POPULATION**

Maximum Permissible Exposure (MPE) for 915 MHz general population / uncontrolled exposure is calculated from the equation  $S=f/1500$  averaged over 30 minutes. Then the calculated limit for the 915 MHz transmitter is 0.610 (mW/cm<sup>2</sup>). The equation for power density is:

$$S = PG/(4\pi R^2) \text{ Calculated limit for 915 MHz (general population / uncontrolled) } = 0.610(\text{mW}/\text{cm}^2).$$

Where S = power density in mw/cm<sup>2</sup>  
P = input power to antenna in mw.  
G = numeric power gain of antenna.  
R = distance from antenna in cm.

To calculate the minimum safe distance for the transmitter the maximum power density calculated above is used and the equation is solved for the distance R. For the 1-watt operation and a 3-dB gain (2 numeric gain) antenna, R is:

$$R = [1000(2)/(4\pi(0.61))]^{1/2} = 16.15 \text{ cm.}$$

This requires a person to be 16.15-cm distance from the antenna opening of the transmitter. The intent of the design was to read tags at a distance of one to eighty inches. There should be no non-user in the area of the radio frequency field.

### **MPE) for 915 MHz Controlled exposure**

Maximum Permissible Exposure (MPE) for 915 MHz occupational / controlled exposure is calculated from the equation  $S=f/300$  averaged over 6 minutes. Then the calculated limit for the 915 MHz transmitter is 3.05 (mW/cm<sup>2</sup>).

The equation for power density is:

$$S = PG/(4\pi R^2) \text{ Calculated limit for 915 MHz (Occupational / controlled) } = 3.05(\text{mW}/\text{cm}^2).$$

To calculate the minimum safe distance for the transmitter the maximum power density calculated above is used and the equation is solved for the distance R. For the 1-watt operation and a 3-dB gain (2 numeric gain) antenna, R is:

$$R = [1000(2)/(4\pi(3.05))]^{1/2} = 7.22 \text{ cm.}$$

This requires a person to be 7.22-cm distance from the antenna opening of the transmitter. The intent of the design was to read tags at a distance of one to eighty inches. There should be no user in the area of the radio frequency field.