§ 15.247(i) Maximum Permissible Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit Calculation: EUT's operating frequencies @ 2400-2483.5MHz; highest conducted power = -11.18*dBm* (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

Gain of Antenna Elements @ 2.4GHz= 3dBi

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S = Power Density (mW/cm^2)
P = Power Input to antenna (0.076mW)
G = Antenna Gain (1.995)
R = Separation Distance between Antenna and User (20 cm)

$S = (0.076*1.995/ 4*3.14*20^2) = 0.00003 mW/cm^2$

Since S<1mW/cm^2, the device meets the RF exposure limits at a separation distance of 20cm with one radio operating at a time.

$S_4=(P_1G_1+P_2G_2+P_3G_3+P_4G_4)/(4*3.14*R^2)$
Where, $G_1=G_2=G_3=G_4=3dBi$
P_1= 0.052mW, P_2= 0.056mW, P_3= 0.047mW, P_4= 0.076mW
R = 20cm
$S_4 = (1.995*(0.052+0.056+0.047+0.076))/(4*3.14*20^2) = 0.00009 mW/cm^2$

Since S<1mW/cm^2, the device meets the RF exposure limits at a separation distance of 20cm with all radios transmitting simultaneously.