§ 15.407(f)   RF 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 @ 5150-5250 MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

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

$$S = PG / 4\pi R2 \qquad or \qquad R = \sqrt{PG} / 4\pi S$$

where,   S = Power Density
P = Power Input to antenna=18.29 dBm (67.45 mW)
G = Antenna Gain 8 dBi, Array gain = 8+10log(3) = 12.77 dBi (18.9277 linear)
R = Minimum Distance between User and Antenna (25cm)

$$S = (67.45*18.9277)/(4*3.14*625) = 0.162 \text{ mW/cm2}$$

Since S < 1 mW/cm2, the minimum distance (R) is 25cm

Co-location:

Frequency Range	MPE Result (mW/cm^2)	Limit (mW/cm^2)
2.4GHz	0.42	1
5.150-5.250GHz	0.162	1

Test Requirements: [MPE(f1) / limit(f1) + MPE(f2) / limit(f2)] < 1

Test Results:

MPE(f1) Frequency (MHZ)	MPE(f2) Frequency (MHZ)	Calculation [MPE(f1) / limit(f1) + MPE(f2) / limit(f2)]	MPE Result (mW/cm^2)
2412 - 2462	5150-5250	0.42 / 1 + 0.162 / 1 = (0.42+ 0.162)	**0.582**

Therefore, the uncontrolled exposure limit is not exceeded at 25 cm.

MPE Limit Calculation: EUT's operating frequencies @ 5725-5850 MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

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

$$S = PG / 4\pi R2 \quad \text{or} \quad R = \sqrt{PG} / 4\pi S$$

where, S = Power Density
P = Power Input to antenna =23.04dBm = 201.37mW
G = Antenna Gain = 8 dBi, Array gain = 12.77 dBi (18.93 linear)
R = Minimum Distance between User and Antenna (25cm)

S = (201.37*18.93)/(4*3.14*625) = 0.48 mW/cm2

Since S < 1 mW/cm2, the minimum distance (R) is 25cm

Co-location:

Frequency Range	MPE Result (mW/cm^2)	Limit (mW/cm^2)
2.4GHz	0.42	1
5725-5850GHz	0.48	1

Test Requirements: [MPE(f1) / limit(f1) + MPE(f2) / limit(f2)] < 1

Test Results:

MPE(f1) Frequency (MHZ)	MPE(f2) Frequency (MHZ)	Calculation [MPE(f1) / limit(f1) + MPE(f2) / limit(f2)]	MPE Result (mW/cm^2)
2412 - 2462	5725-5850	0.42 / 1 + 0.48 / 1 = (0.42+ 0.48)	**0.9**

Therefore, the uncontrolled exposure limit is not exceeded at 25 cm.