Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) 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.

Test Results: The EUT was compliant with the requirements of this section. The 2.4 GHz and 5.8 GHz radio are not co-located.

2.4 GHz Band

$$S = PG/4\pi R^2$$

$$\frac{(751.67mW)(3.16)}{4\pi(20)^2}$$

$$S1 = 0.472\ mW/cm^2$$

Therefore, the EUTs meet the Uncontrolled Exposure limit at 20 cm.

5.8 GHz

$$S = PG/4\pi R^2$$

$$\frac{(422.69mW)(3.98)}{4\pi(20)^2}$$

$$S2 = 0.335mW/cm^2$$

Therefore, the EUTs meet the Uncontrolled Exposure limit at 20 cm.

MPE Limit Calculation: EUT's operating frequencies @ 4940-4990 MHz; highest conducted power = 32.6dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

EUT maximum antenna gain = 26 dBi.
EUT Minimum antenna gain = 9 dBi.

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

EUT with 26dBi Antenna

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

where, S = Power Density (1 mW/cm^2)
P = Power Input to antenna (1819.7mW)
G = Antenna Gain (398.1 numeric)

$R = (1819.7*398.1/4*3.14)^{1/2} = (724422.9/12.56)^{1/2} = 240.1$cm in order to comply with 1 mW/cm^2

EUT with 9dBi Antenna

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

where, S = Power Density (1 mW/cm^2)
P = Power Input to antenna (1819.7mW)
G = Antenna Gain (7.94 numeric)

$R = (1819.7*7.94/4*3.14)^{1/2} = (14448.4/12.56)^{1/2} = 33.9$cm in order to comply with 1 mW/cm^2