

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output and 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 @ 5745-5825 MHz; highest conducted power = 26.95 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 7dBi Omni Antenna

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 (1 mW/cm²)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (5.01 numeric)
R = Distance (20cm)

$$S = (495.45 \times 5.01 / 4 \times 3.14 \times 20.0^2) = (2483.13 / 5024) = \mathbf{0.4942 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (495.45 \times 5.01 / 4 \times 3.14 \times 1.0)^{1/2} = (2483.13 / 12.56)^{1/2} = \mathbf{14.061 \text{ cm}}$$

MPE Limit Calculation: EUT's operating frequencies @ 5745-5825 MHz; highest conducted power = 26.95 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 20 dBi Sector Antenna

where, S = Power Density (1 mW/cm²)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (100.00 numeric)
R = Distance (20cm)

$$S = (495.45 \times 100 / 4 \times 3.14 \times 20.0^2) = (49545.02 / 5024) = \mathbf{9.862 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (495.45 \times 100 / 4 \times 3.14 \times 1.0)^{1/2} = (49545.02 / 12.56)^{1/2} = \mathbf{62.806 \text{ cm}}$$

MPE Limit Calculation: EUT's operating frequencies @ 5745-5825 MHz; highest conducted power = 26.95 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 24dBi Panel Antenna

where, S = Power Density (1 mW/cm²)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (251.19 numeric)
R = Distance (20cm)

$$S = (495.45 * 251.19 / 4 * 3.14 * 20.0^2) = (124451.50 / 5024) = \mathbf{24.771 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (495.45 * 251.19 / 4 * 3.14 * 1.0)^{1/2} = (124451.50 / 12.56)^{1/2} = \mathbf{99.542\text{cm}}$$

MPE Limit Calculation: EUT's operating frequencies @ 5745-5825 MHz; highest conducted power = 26.95 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 30 dBi Grid Antenna

where, S = Power Density (1 mW/cm²)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (1000.00 numeric)
R = Distance (20cm)

$$S = (495.45 * 1000 / 4 * 3.14 * 20.0^2) = (495450.20 / 5024) = \mathbf{98.617 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (495.45 * 1000 / 4 * 3.14 * 1.0)^{1/2} = (495450.20 / 12.56)^{1/2} = \mathbf{198.612 \text{ cm}}$$

MPE Limit Calculation: EUT's operating frequencies @ 5745-5825 MHz; highest conducted power = 26.95 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 30 dBi Dish Antenna

where, S = Power Density (1 mW/cm²)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (1000.00 numeric)
R = Distance (20cm)

$$S = (495.45 * 1000 / 4 * 3.14 * 20.0^2) = (495450.20 / 5024) = \mathbf{98.617 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (495.45 * 1000 / 4 * 3.14 * 1.0)^{1/2} = (495450.20 / 12.56)^{1/2} = \mathbf{198.612 \text{ cm}}$$

MIMO Mode:

MPE Limit Calculation: EUT's operating frequencies @ 5745-5825 MHz; highest conducted power = 28.99dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 7dBi Omni Antenna

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 (1 mW/cm²)
P = Power Input to antenna (792.5mW)
G = Antenna Gain (5.01 numeric)
R = Distance (20cm)

$$S = (792.5 * 5.01 / 4 * 3.14 * 20.0^2) = (3971.915 / 5024) = \mathbf{0.790 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (792.5 * 5.01 / 4 * 3.14 * 1.0)^{1/2} = (3971.915 / 12.56)^{1/2} = \mathbf{17.78 \text{ cm}}$$

EUT maximum antenna gain = 30dBi Dish Antenna

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 (1 mW/cm²)
P = Power Input to antenna (792.5mW)
G = Antenna Gain (1000 numeric)
R = Distance (20cm)

$$S = (792.5 * 1000 / 4 * 3.14 * 20.0^2) = (792501.3 / 5024) = \mathbf{157.74 \text{ mW/cm}^2 @ 20\text{cm separation}}$$
$$R = (792.5 * 1000 / 4 * 3.14 * 1.0)^{1/2} = (792501.3 / 12.56)^{1/2} = \mathbf{251.19 \text{ cm}}$$