# 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/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = 7dBi Omni Antenna

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

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

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (5.01 numeric)
R = Distance (20cm)

$S = (495.45*5.01/ 4*3.14*20.0^2) = (2483.13 / 5024)$ = **0.4942 mW/cm$^2$**@ 20cm separation
$R = (495.45*5.01/ 4*3.14*1.0)^{1/2} = (2483.13/ 12.56)^{1/2}$ = **14.061 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/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = 20 dBi Sector Antenna

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (495.45mW)
G = Antenna Gain (100.00 numeric)
R = Distance (20cm)

$S = (495.45*100/ 4*3.14*20.0^2) = (49545.02/ 5024)$ = **9.862 mW/cm$^2$**@ 20cm separation
$R = (495.45*100/ 4*3.14*1.0)^{1/2} = (49545.02/ 12.56)^{1/2}$ = **62.806 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/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = 24dBi Panel Antenna

where, S = Power Density (1 mW/cm$^2$)
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) = **24.771 mW/cm$^2$**@ 20cm separation
R = (495.45*251.19/ 4*3.14*1.0)$^{1/2}$ = (124451.50/ 12.56) $^{1/2}$ = **99.542cm**

MPE Limit Calculation: EUT's operating frequencies @ 5745-5825 MHz; highest conducted power = 26.95 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = 30 dBi Grid Antenna

where, S = Power Density (1 mW/cm$^2$)
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) = **98.617 mW/cm$^2$**@ 20cm separation
R = (495.45*1000/ 4*3.14*1.0)$^{1/2}$ = (495450.20/12.56) $^{1/2}$ = **198.612 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/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = 30 dBi Dish Antenna

where, S = Power Density (1 mW/cm$^2$)
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) = **98.617 mW/cm$^2$**@ 20cm separation
R = (495.45*1000/ 4*3.14*1.0)$^{1/2}$ = (495450.20/12.56) $^{1/2}$ = **198.612 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/cm$^2$ or 10 W/m$^2$**

**EUT maximum antenna gain = 7dBi Omni Antenna**

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

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

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (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) = **0.790 mW/cm$^2$**@ 20cm separation
R = (792.5*5.01/ 4*3.14*1.0)$^{1/2}$ = (3971.915 /12.56) $^{1/2}$ = **17.78 cm**

**EUT maximum antenna gain = 30dBi Dish Antenna**

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

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

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (792.5mW)
G = Antenna Gain (1000 numeric)
R = Distance (20cm)

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

  