

Since EUT has co-located antennas:

MPE Limit Calculation: EUT's operating frequencies @ 824.2 – 849.2 MHz; highest conducted power = ERP – Max Antenna Gain = 23.93 – 11.5 = 12.43dBm (peak) therefore, **Limit for Uncontrolled exposure = Freq/1500 = 824.2/1500 = 0.549 mW/cm² or 5.49 W/m²**

EUT maximum antenna gain = 8.5 dBi + 10log(# of antennas) = 8.5 + 3.0 = 11.5dBi

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

$$S1 = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S1 = Power Density (Limit = 0.549 mW/cm²)

P = Power Input to antenna (17.498mW)

G = Antenna Gain (14.125 numeric)

R = Minimum Distance between User and Antenna (20 cm)

$$S1 = (17.498 * 14.125) / (4 * 3.14 * 20^2) = 247.172 / 5024 = 0.049 \text{ mW/cm}^2$$
$$S1 < 0.549 \text{ mW/cm}^2,$$

MPE Limit Calculation: EUT's operating frequencies @ 1850-1910 MHz; highest conducted power = EIRP – Antenna Gain = 26.107 – 8.4 = 17.71dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 5.4 dBi + 10log(# of antennas) = 5.4 + 3.0 = 8.4dBi

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

$$S2 = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S2 = Power Density (Limit = 1 mW/cm²)

P = Power Input to antenna (59.020mW)

G = Antenna Gain (6.918 numeric)

R = Minimum Distance between User and Antenna (20 cm)

$$S2 = (59.020 * 6.918) / (4 * 3.14 * 20^2) = 408.319 / 5024 = 0.082 \text{ mW/cm}^2$$
$$S2 < 1 \text{ mW/cm}^2,$$

MPE Limit Calculation: EUT's operating frequencies @ 2400-2483.5 MHz; highest conducted power = 28.86dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

EUT maximum antenna gain = 4.3dBi + 10log(# of antennas) = 4.3 + 3.0 = 7.3dBi

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

$$S3 = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S3 = Power Density (Limit = 1 mW/cm²)

P = Power Input to antenna (770.96mW)

G = Antenna Gain (5.383 numeric)

R = Minimum Distance between User and Antenna (20 cm)

$$S3 = (770.96 * 5.383) / (4 * 3.14 * 20^2) = 4130.08 / 5024 = 0.826 \text{ mW/cm}^2$$

$$S3 < 1 \text{ mW/cm}^2$$

MPE Limit Calculation: EUT's operating frequencies @ 5745-5850 MHz; highest conducted power = *16.681dBm* therefore, **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

$$\text{EUT maximum antenna gain} = 4 \text{ dBi} + 10 \log(\# \text{ of antennas}) = 4.0 + 3.0 = 7.0 \text{ dBi.}$$

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

$$S4 = PG / 4 \pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4 \pi S}$$

where, S4 = Power Density (Limit = 1 mW/cm²)
P = Power Input to antenna (46.57mW)
G = Antenna Gain (5.024 numeric)
R = Minimum Distance between User and Antenna (20 cm)

$$S4 = (46.57 * 5.024) / (4 * 3.14 * 20^2) = 233.4 / 5024 = 0.046 \text{ mW/cm}^2$$

$$S4 < 1 \text{ mW/cm}^2$$

For Co-located Antennas:

$$S1 + S2 + S3 + S4 < 1 \text{ mW/cm}^2$$

Since,
 $0.049 \text{ mW/cm}^2 + 0.082 \text{ mW/cm}^2 + 0.826 \text{ mW/cm}^2 + 0.046 \text{ mW/cm}^2 > 1 \text{ mW/cm}^2$

The Minimum Distance between User and Antennas is

$$R = (\sqrt{P1G1 / (4 * 3.14 * 0.549)}) + (\sqrt{(P2G2 + P3G3 + P4G4) / (4 * 3.14 * 1)})$$

$$= (\sqrt{247.17 / 3.79}) + ((408.32 + 4130.48 + 233.4) / 12.56)$$

$$= 21.1 \text{ cm}$$