

RF Exposure – MPE Calculations (2412-2462 MHz Band)

Transmitter Power: 120 mW

Antenna Gain: 14 dB (Directional)

Cable loss: 3 dB

Frequency range: 2412 - 2462 MHz

Assumptions

1. A single ¼ wavelength radiating antenna is assumed.
2. Closest exposure distance is assumed to be 20 cm

Calculations

The following results shall be assumed to be accurate for the far-field only. These predictions will over-estimate power density in the near-field. Based on the use of a ¼ wavelength radiator, a distance of 20 cm is considered to be in the far-field for all cases.

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

P is 120 mW

G is 11 dB (Antenna gain – loss) or $10^{(11/10)}$ or 12.59

R is 20 cm

$$S = 0.301 \text{ mW/cm}^2$$

For Occupational/Controlled Exposure

From 1,500 to 100,000 MHz, power density limit is **5 mW/cm² for 6 minutes**

For General Population/Uncontrolled Exposure

From 1,500 to 100,000 MHz, power density limit is **1 mW/cm² for 30 minutes**

Conclusion: ***Meets MPE limits***

RF Exposure – MPE Calculations (5270-5840 MHz Band)

Transmitter Power: 100 mW

Antenna Gain: 8 dB

Cable loss: 6 dB

Frequency range: 5270 - 5840 MHz

Assumptions

1. A single $\frac{1}{4}$ wavelength radiating antenna is assumed.
2. Closest exposure distance is assumed to be 20 cm

Calculations

The following results shall be assumed to be accurate for the far-field only. These predictions will over-estimate power density in the near-field. Based on the use of a $\frac{1}{4}$ wavelength radiator, a distance of 20 cm is considered to be in the far-field for all cases.

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

P is 100 mW

G is 2 dB (Antenna gain – loss) or $10^{(0/10)}$ or 1.00

R is 20 cm

$$S = 0.025 \text{ mW/cm}^2$$

For Occupational/Controlled Exposure

From 1,500 to 100,000 MHz, power density limit is **5 mW/cm² for 6 minutes**

For General Population/Uncontrolled Exposure

From 1,500 to 100,000 MHz, power density limit is **1 mW/cm² for 30 minutes**

Conclusion: ***Meets MPE limits***

RF Exposure – MPE Requirements to be added to OEM Installation instructions:

The following statement should be added to the bottom of the Grant of Equipment Authorization.

Modular Approval. Power Output listed is conducted. Approval is limited to OEM installation only. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. OEM integrators must be provided with antenna installation instructions and has to ensure the installation procedures comply with 15.407(d) integral antenna requirement which prevent the end user to access the transmitter module after the installation. OEM integrators and end-Users must be provided with transmitter operation conditions for satisfying RF exposure compliance.