

MPE Calculations

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines.

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). The MPE calculation for this exposure is shown below.

The peak radiated output power (EIRP) is calculated as follows:

$$\text{EIRP} = P + G$$

$$\text{EIRP} = 3.00 \text{ dBm} + (-2.55) \text{ dBi}$$

$$\text{EIRP} = 0.45 \text{ dBm} (1.046 \text{ mW})$$

Where

P = Power input to the antenna (mW).

G = Power gain of the antenna (dBi) – worst case

Power density at the specific separation:

$$S = PG/(4R^2\Pi)$$

$$S = (1.995 \times 0.556) / (4 \times 20^2 \times \Pi)$$

$$S = 0.00022 \text{ mW/cm}^2$$

Where

S = Maximum power density (mW/cm²)

P = Power input to the antenna (mW).

G = Numeric power gain of the antenna – worst case

R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)

The maximum permissible exposure (MPE) for the general population is 1mW/cm².

The power density at 20cm does not exceed the 1mW/cm² limit. Therefore, the exposure condition is compliant with FCC rules.

Estimated safe separation:

$$R = \sqrt{PG/4\Pi}$$

$$R = \sqrt{(1.995 \times 0.556) / 4\Pi}$$

$$R = 0.2971 \text{ cm}$$

Where

P = Power input to the antenna (mW).

G = Numeric power gain of the antenna – worst case

R = The safe estimated separation that the user must maintain from the antenna (cm)

The numeric gain (G) of the antenna with a gain specified in dB is determined by:

$$G = \text{Log } -1 (\text{dB antenna gain}/10)$$

$$G = \text{Log } -1 (02.55 \text{ dBi}/10)$$

$$G = .5556$$