

MPE Calculations

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manor 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.

Using the Antennas with highest output power:

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

| Antenna | Frequency (GHz) | Power input to the antenna (P) (dBm) | Power gain of the antenna (G) (dBi) | EIRP (P+G) (dBm) | EIRP Log ^{-1(dBm/10)} (mW) |
|---------|-----------------|--------------------------------------|-------------------------------------|------------------|-------------------------------------|
| WNC | 5 | 21.20 | 1.49 | 22.69 | 185.78 |
| WNC | 2.4 | 24.12 | 1.38 | 25.50 | 354.81 |

$$EIRP = P + G$$

Where

P = Power input to the antenna (mW).

G = Power gain of the antenna (dBi)

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

| Antenna | Frequency (GHz) | Antenna Gain (G) (dBi) | Numeric Antenna Gain Log ^{-1(dBm/10)} (dB) |
|---------|-----------------|------------------------|---|
| WNC | 5 | 1.49 | 1.41 |
| WNC | 2.4 | 1.38 | 1.37 |

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

Power density at the specific separation:

| Antenna | Frequency (GHz) | Power input to the antenna (P) (mW) | Numeric Power Gain of the Antenna (G) (dB) | Maximum Power Spectral Density S=PG/(4R ² π) (mW/cm ²) | Maximum Power Spectral Density Limit (mW/cm ²) |
|---------|-----------------|-------------------------------------|--|---|--|
| WNC | 5 | 131.83 | 1.41 | 0.037 | 1.00 |
| WNC | 2.4 | 258.23 | 1.37 | 0.071 | 1.00 |

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

Where

S = Maximum power density (mW/cm²)

P = Power input to the antenna (mW).

G = Numeric power gain of the antenna

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.