

MAXIMUM PERMISSIBLE EXPOSURE FOR SUBPART C 2.4 GHz BAND

Calculations

Power density at the specific separation:

$$\begin{aligned} S &= PG/(4R^2\pi) \\ S &= (80.9095899 * 2.449) / (4 * 20^2 * \pi) \\ S &= 0.039421 \text{ mW/cm}^2 \text{ (at 20 cm)} \\ \text{Limit} &= 1 \text{ mW/cm}^2 \end{aligned}$$

where

$$\begin{aligned} S &= \text{Maximum power density (mW/cm}^2\text{)} \\ P &= \text{Power input to the antenna (mW)} \\ G &= \text{Numeric power gain of the antenna} \\ R &= \text{distance to the center of the radiation of the antenna (20 cm = limit for MPE)} \end{aligned}$$

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

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

Additionally the power density at 4 cm does not exceed the 1 mW/cm²

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

$$\begin{aligned} G &= \text{Log}_{10}(\text{dB antenna gain}/10) \\ G &= \text{Log}_{10}(3.89 \text{ dBi}/10) \\ G &= 2.449 \end{aligned}$$