

Power Density Calculation for Aclara LLB2015002

Part 1.1310 & 1.1307. Maximum Permissible Exposure

The following calculations are provided to show a comparison to the Maximum Permissible Exposure (MPE) for the general population in an uncontrolled area even though the LLB2015002 MTU is categorically excluded from the necessity of a radio frequency exposure evaluation. The exclusion (2.1091) applies to Part 90 transmitters operating below 1.5 GHz with output below 1.5 Watts.

Normal Field Operation of LLB2015002:

Frequency Range: 450 MHz – 470 MHz
Transmit Power: 0.741 W (dipole equivalent power)
Transmission Length: 60 mSec.
Transmission Period: One transmission every 6 hours

Extreme Values Used for the Calculation:

Transmit Power: 0.741 W (dipole equivalent power)
Transmission Length: 100 mSec.
Transmission Period: Four transmissions every hour

Average Power Calculation:

RF exposure for the general population in uncontrolled areas is determined using transmitted power averaged over 30 minutes. The equation used in the calculation is:

$$P_{avg} = P \times T_x \times TL/t$$

Where P_{avg} is the average power, P is measured power output (mW), T_x is the number of transmission in 30 seconds, TL is the transmission length (Sec) and t is the number of seconds in 30 minutes. Therefore:

$$\begin{aligned} P_{avg} &= 741 \text{ mW} \times 3 \times 0.10 \text{ Sec} / (30 \text{ min} \times 60 \text{ sec/min}) \\ &= 222.3 \text{ mW-Sec} / 1800 \text{ Sec} = 0.1235 \text{ mW} \end{aligned}$$

Average Power Density Calculation:

Average power density is calculated at a distance of 20 cm by using the following equation:

$$S = P_{avg} \times G/4 \times \pi \times r^2$$

where S is the average power density, P_{avg} is the average power, G is the gain of a dipole antenna and r is the distance from the transmitter. Therefore:

$$\begin{aligned} S &= 0.1235 \text{ mW} \times 1.64/4 \times 3.1416 \times 20\text{cm} \times 20\text{cm} \\ &= 0.205 \text{ mw}/5027 \text{ cm}^2 = 0.402 \text{ uW/cm}^2 \end{aligned}$$

Comparison of LLB2015002 to MPE:

The MPE for the general population in uncontrolled areas is $460/1500 = 0.3067 \text{ mW/cm}^2$

The average power density of the LLB2015002 MTU is 0.402 uW/cm^2 , which is almost 1,000 times lower than the MPE of 0.3067 mW/cm^2 .