



ABOUT LIGHT EMITTING DIODES (LEDs)

Light Emitting Diodes are current rather than voltage operated devices. Therefore, virtually any DC voltage can be used to power an LED, if a proper value current limiting resistor is wired in series with it. You should not apply AC power to an LED. All Circuitron OUTPUTS that are specified to drive an LED will be DC regardless of whether you supply the board with AC or DC, so you will not need to be concerned with that.

The formula for calculating current through an LED is quite simple. It is: Supply Voltage (V_s) - Forward Voltage of the LED (V_f) divided by the current desired in amps. Most Red, Yellow, Orange and standard (yellowish) Green LEDs (All Mitey Lites™ *Super Brights* and Mitey Lites™ Red, Amber and Orange *Hyper Brites™*) have forward voltage ratings of right around 2.1 volts. Mitey Lites™ *Hyper Brite™* Blue, White and Pure (bluish) Green LEDs have forward voltage ratings of 3.1-3.8 volts. These ratings are the minimum voltage that can be applied to the LED before it will start to light.

Thus the formula for a standard LED would be:

$$\frac{V_s - 2.1}{I \text{ (current)}}$$

Practically speaking, most all LEDs can handle 30 - 35 milliamps (.030 - .035 amps) on a continuous basis without causing problems. However, it is usually better to drive them at 20-25 ma., just to provide a window of safety. 25 ma. will usually provide a very bright flash, if the LED is a high efficiency unit such as the ones CIRCUITRON sells.

So... plugging into our formula would yield:

$$\frac{12 - 2.1}{.025} = 396 \text{ ohms (for a 12 volt DC input)}$$

Choose the closest standard value resistor to the calculated value, in this case it would be 390 ohms. Use a 1/2 watt resistor available from Radio Shack. Some Circuitron products such as the BF-3 has what is known as a half-wave rectifier on it. As a result, if AC power is used on the input, only about 1/2 of the total power will be available at the output terminal to the LED. In this case you may want to cut the resistance in half to compensate for the half wave rectifier and bring the LED back up to full brightness.