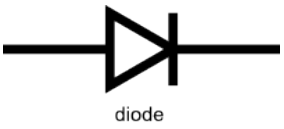
THE BASICS OF LIGHT-EMITTING DIODES

LEDs are all around us: In our phones, our cars and even our homes. Any time something electronic lights up, there's a good chance that an LED is behind it. They come in a huge variety of sizes, shapes, and colors, but no matter what they look like they have one thing in common: they're the bacon of electronics. They're widely purported to make any project better and they're often added to unlikely things (to everyone's delight).

Unlike bacon, however, they're no good once you've cooked them. This guide will help you avoid any accidental LED barbecues! First things first, though. What exactly *is* this LED thing everyone's talking about?

LEDs (that's "ell-ee-dees") are a particular type of diode that convert electrical energy into light. In fact, LED stands for "Light Emitting Diode." (It does what it says on the tin!) And this is reflected in the similarity between the diode and LED schematic symbols:



diode

light emitting diode

In short, LEDs are like tiny lightbulbs. However, LEDs require a lot less power to light up by comparison. They're also more energy efficient, so they don't tend to get hot like conventional lightbulbs do (unless you're really pumping power into them). This makes them ideal for mobile devices and other low-power applications. Don't count them out of the high-power game, though. High-intensity LEDs have found their way into accent lighting, spotlights and even automotive headlights!

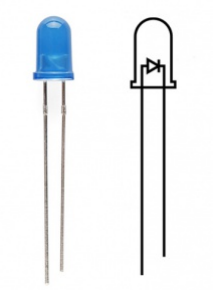
Are you getting the craving yet? The craving to put LEDs on everything? Good, stick with us and we'll show you how!

How to Use Them

So you've come to the sensible conclusion that you need to put LEDs on everything. We thought you'd come around. Let's go over the rule book:

1) Polarity Matters

In electronics, polarity indicates whether a circuit component is symmetric or not. LEDs, being diodes, will only allow current to flow in one direction. And when there's no current-flow, there's no light. Luckily, this also means that you can't break an LED by plugging it in backwards. Rather, it just won't work.



The positive side of the LED is called the **"anode"** and is marked by having a longer "lead," or leg. The other, negative side of the LED is called the **"cathode."** Current flows from the anode to the cathode and never the opposite direction. A reversed LED can keep an entire circuit from operating properly by blocking current flow. So don't freak out if adding an LED breaks your circuit. Try flipping it around.

2) Moar Current Equals Moar Light

The brightness of an LED is directly dependent on how much current it draws. That means two things. The first being that super bright LEDs drain batteries more quickly, because the extra brightness comes from the extra power being used. The second is that you can control the brightness of an LED by controlling the amount of current across it. But, setting the mood isn't the only reason to cut back your current.

3) There is Such a Thing as Too Much Power

If you connect an LED directly to a current source it will try to dissipate as much power as it's allowed to draw, and, like the tragic heroes of olde, it will destroy itself. That's why it's important to limit the amount of current flowing across the LED.

For this, we employ resistors. Resistors limit the flow of electrons in the circuit and protect the LED from trying to draw too much current. Don't worry, it only takes a little basic math to determine the best resistor value to use. You can find out all about it in our resistor tutorial!

Don't let all of this math scare you, it's actually pretty hard to mess things up too badly. In the next section, we'll go over how to make an LED circuit without getting your calculator.

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