



Tri-Color LED Breakout Landing Page

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Skill Level:

★ Beginner

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### Overview:

Brighter than the [LED Starter Kit](#) but not quite packing the punch of the [über bright Luxeons](#), the [Tri-Color LED Breakout Kit](#) lets your geek shine. If you need something large, bright, and colorful to cast your project in the best light, look no further than the Tri-Color LED Breakout Kit. With superbright LEDs it can ~~blind~~ brighten just about anything! Here we have everything you need here to get you up and running with it quickly.



## Requirements:

Assembly of this kit will require soldering. So, if you don't already know how, please check out this helpful [guide](#). Additionally, you will need a few tools for assembly:

- [soldering iron](#)
- [solder](#)
- [cutters](#)
- [male headers](#) or other connection method
- (optional) [needle nose pliers](#)
- (optional) [third hand](#)

Since the Tri-Color LED Breakout is simply a breakout there are many, many ways you can use or control it. However, for this guide you will find the following helpful:

- [breadboard](#)
- [jumper wires](#)
- [Arduino](#)
- (optional) [multimeter](#) or [coin cell battery](#)

## What it Does:

The Tri-Color LED Breakout Kit is a simple kit designed to allow control of very bright LEDs which draw more current than the pins of a microcontroller can provide. Each LED has transistor to switch the 5V source to the LEDs. There is also a current limiting resistor to drive each LED as close to their 80mA maximum as possible. Check out the [schematic](#) to see it all laid out.

## How to Use it:

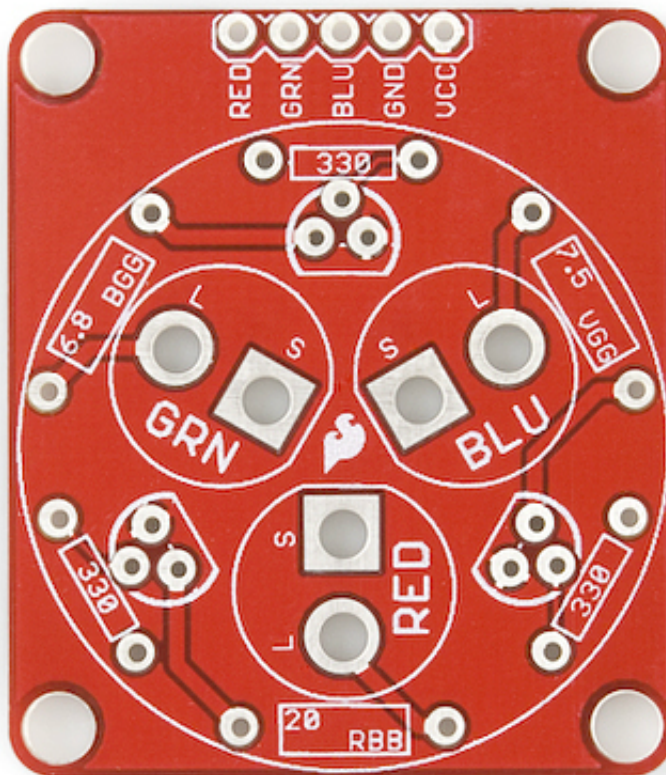
### Assembly:

Before beginning assembly, carefully check that you've got all the parts. You should have the following:

- 1x Tri-Color LED Breakout PCB
- 1x [Super Bright LED - Red 10mm](#)
- 1x [Super Bright LED - Green 10mm](#)
- 1x [Super Bright LED - Blue 10mm](#)
- 1x Resistor 7.5 Ohm (Stripes will be colored: Violet, Green, Gold, Gold)
- 1x Resistor 6.8 Ohm (Stripes will be colored: Blue, Gray, Gold, Gold)
- 1x Resistor 20 Ohm (Stripes will be colored: Red, Black, Black, Gold)
- 3x [Transistor 2N3904](#)
- 3x [Resistor 330 Ohm](#) (Stripes will be colored: Orange, Orange, Brown, Gold)

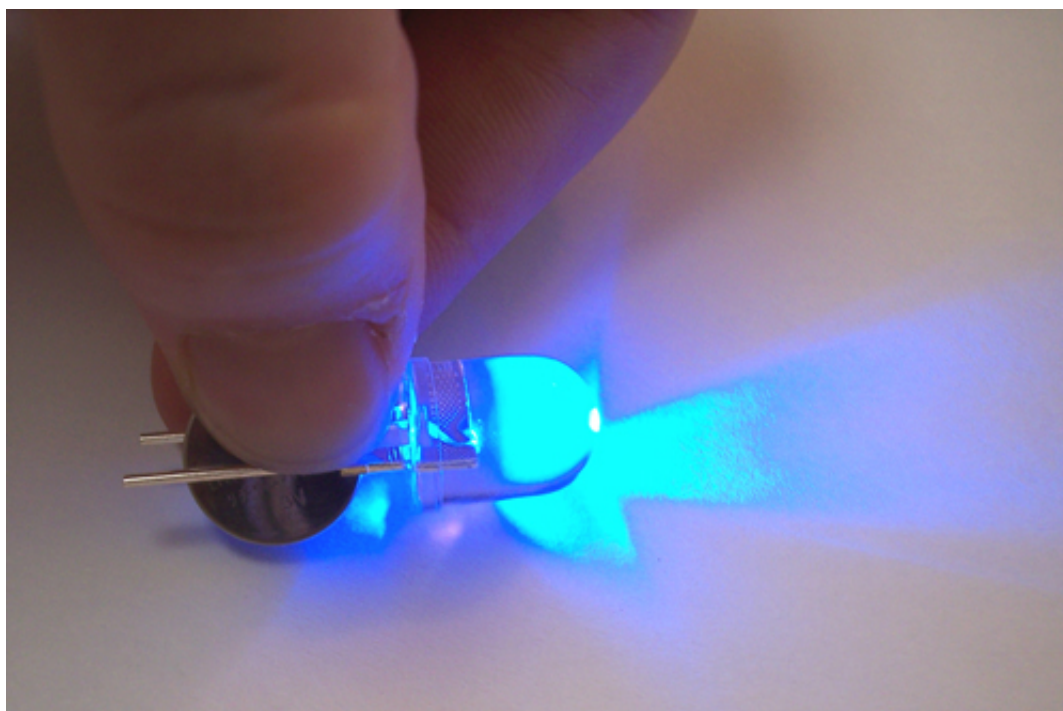
Missing any parts? (Bad SparkFun kitters!) Drop our customer service team an [email](#). We'll get them out to you as soon as possible.

Alright, let's begin building!

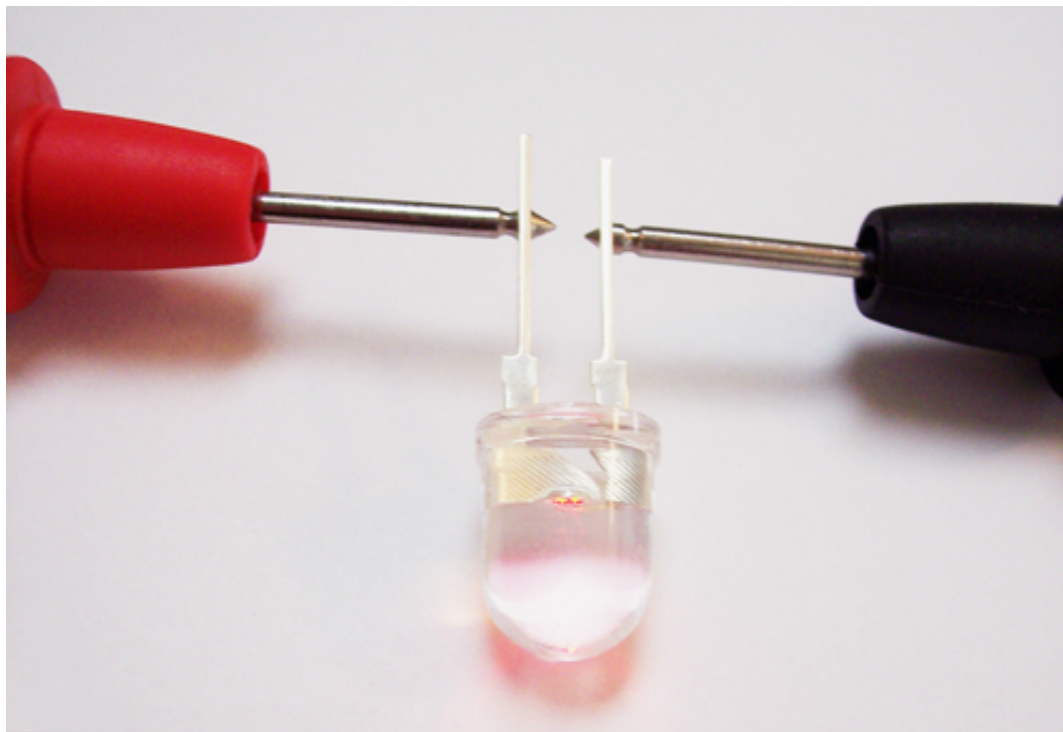


Grab that PCB and check out the big round silk screens in the center. These are for your LEDs. The longer leg of each of the LEDs will go into the hole marked “L” for long and the shorter leg in the hole marked “S” for short. This is really important because LEDs are diodes and if you install them backwards they will not turn on.

Now you need to figure out which color each LED is. There are a few ways to do this:

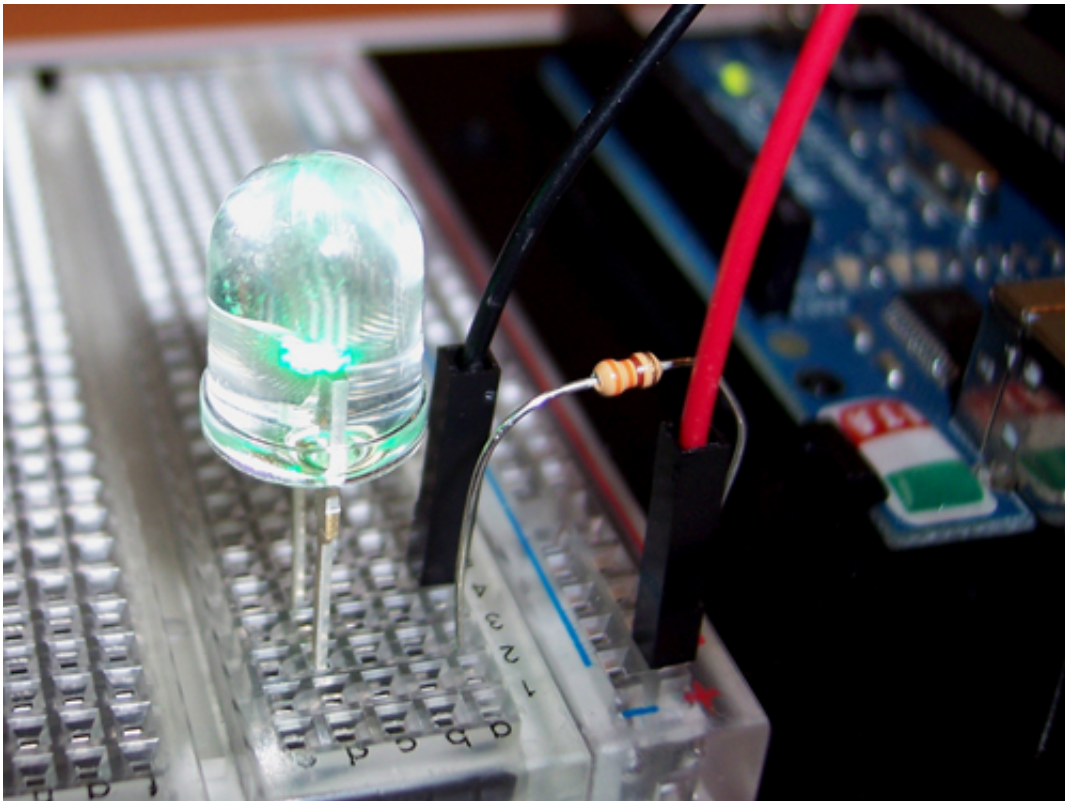


1) Grab a **coin cell battery** and insert the coin cell between the battery leads with the positive side of the battery contacting the longer lead (the anode) on the LED. The LED should light up, indicating its color. If it does not, make sure that the battery is oriented correctly and that both sides of the battery are touching the LED leads. The battery is only capable of outputting a small amount of current so don't worry your LED will be brighter once this is assembled!

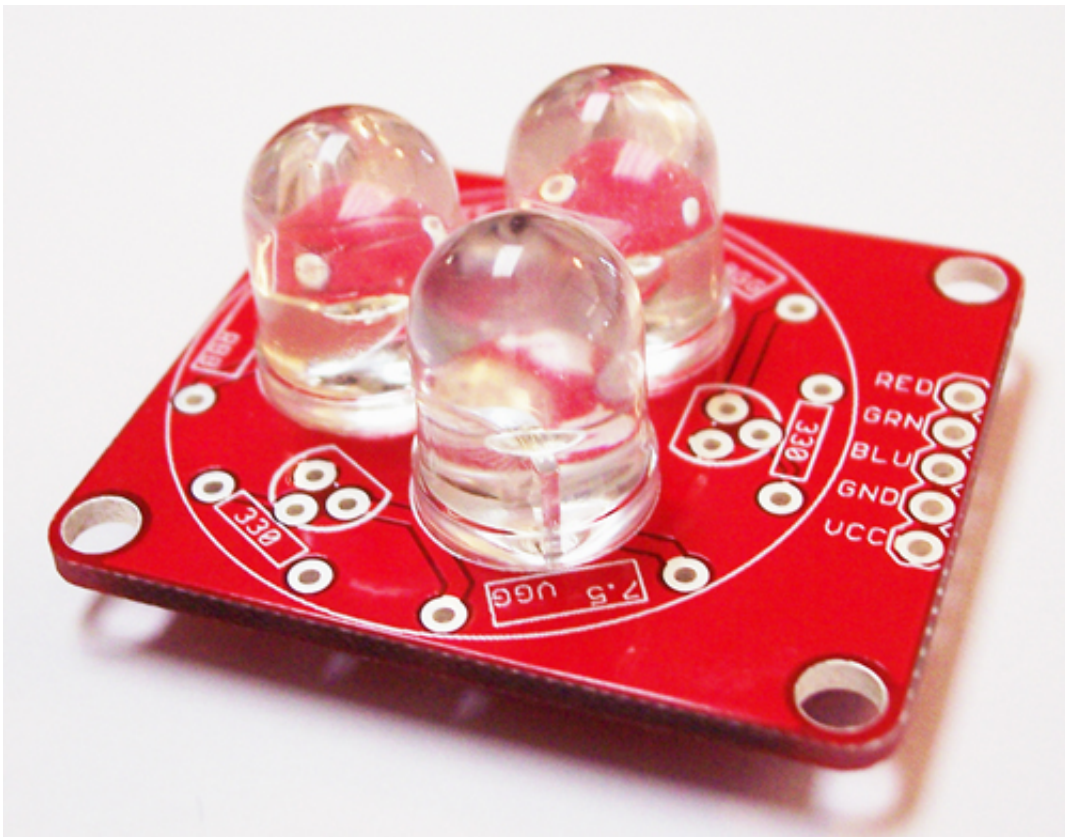


2) A nice **multimeter** will have diode test setting (sometimes combined with continuity testing) which you can use as shown to light up your LEDs. The multimeter only puts the tiniest bit of current through the LED so don't worry that your LED looks super dim!



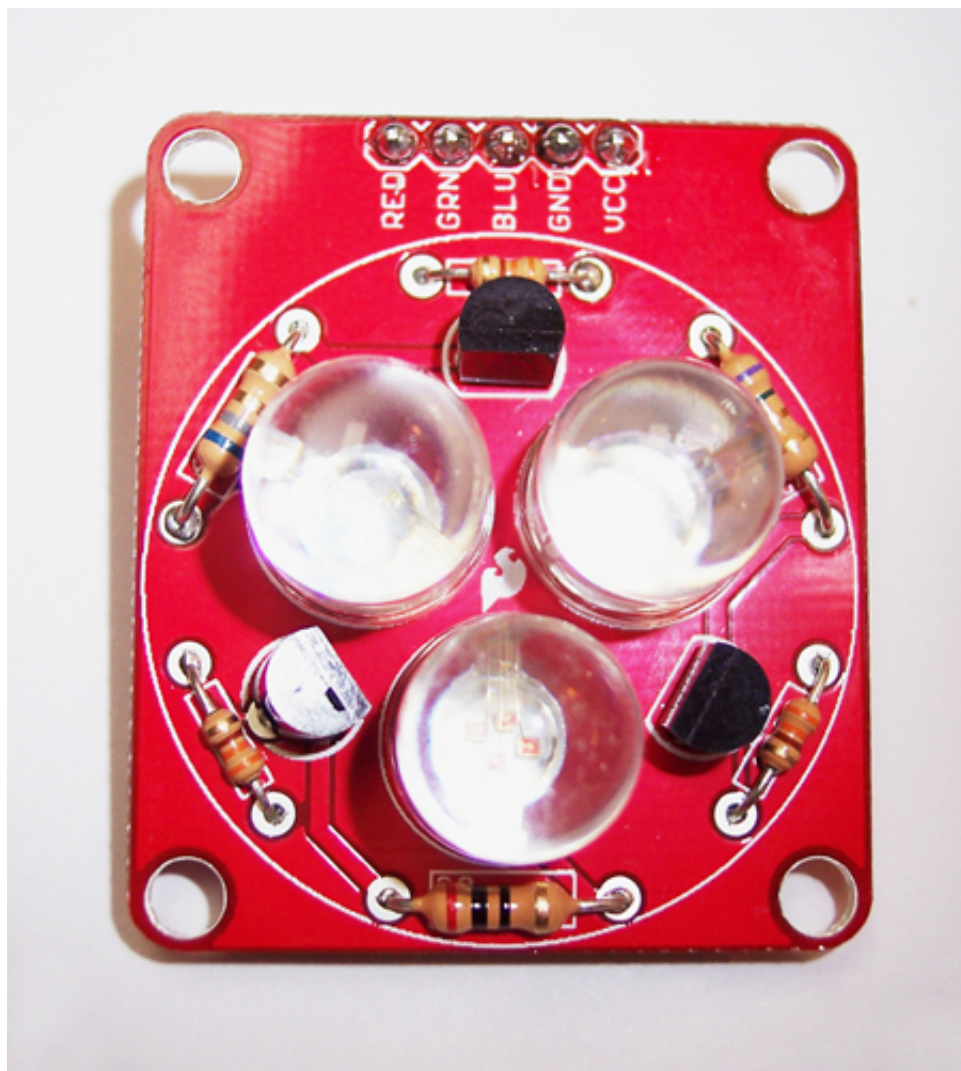


3) Grab a 330 ohm resistor (the one with stripes colored in this order: Orange, Orange, Brown, Gold) and 5V. Connect as shown. We are using the 330ohm resistor to limit the current because we want to be sure the current is low enough to not destroy the LED. So, again, don't worry your LED will be brighter once this is assembled!



Now that you know which color is which solder those little buggers in the right places and clip their leads. Make sure to push the LEDs flat against the PCB. They should take a little pushing to get all the way through.

Next, it is time for the transistors. Transistors are used because these LEDs will be running at their maximum brightness around 80mA. That's more than a typical microcontroller, like [Arduino](#), can output on a pin. So, we use transistors to switch the LEDs on and off. Line the transistors up with their footprints. A little wiggling should get them as close to the board as possible. Then solder and clip their leads.



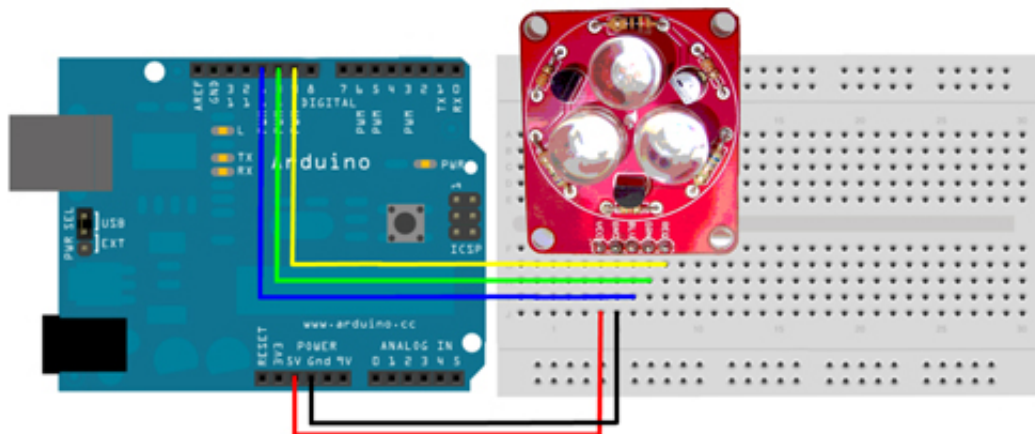
Third, the resistors. Each resistor will have a color code indicating its value. You can either read this color code or use a multimeter to measure the resistor's value. It is important to match the resistors up with their correct spots on the PCB. Match them using the number printed on the PCB or use the first letter of each color of the bands. Don't worry about the direction in which they are inserted, it is not important. Color codes for the resistors in this kit are given below:

- 7.5 Ohm (Violet, Green, Gold)
- 6.8 Ohm (Blue, Gray, Gold)
- 20 Ohm (Red, Black, Black)
- 330 Ohm (Orange, Orange, Brown, Gold)

Finally solder on a connector. We choose to use [male headers](#) for use in a breadboard but you, of course, are free to use just about anything you please.

## Hardware:

Now let's get this thing shining! You can treat the board like a simple LED breakout because the transistors are pre-configured for use with a low current digital signal. Wiring this to a microcontroller is incredibly simple just make sure that your power supply can provide 240mA (80mA \* 3 LEDs). Most **wall warts** and **USB sources** can provide this easily. Now, wire to your Arduino as shown:



## Firmware:

Now that everything has been hooked up, we're ready to control it with our Arduino. First, you will need to install the **Arduino IDE** if you haven't already. This will allow us to load example code and control our LEDs. Check [this tutorial](#) if you need more help installing the Arduino IDE.

Notice we wired the **PWM** pins on the Arduino? This allows us to flicker the LEDs on and off very fast, faster than the eye can see, to produce a 'dimming' effect. Check out the example code below for a demonstration:

```
}  
}  
//Fade all the LEDs in and out  
//Fade in  
for(int fade=0; fade<=255; fade+=5){  
    analogWrite(RedLED, fade);  
    analogWrite(GrnLED, fade);  
    analogWrite(BluLED, fade);  
    delay(30);  
}  
//Fade out  
for(int fade=255; fade>=0; fade-=5){  
    analogWrite(RedLED, fade);  
    analogWrite(GrnLED, fade);  
    analogWrite(BluLED, fade);  
    delay(30);  
}  
}
```

That should be all you need to get your lights shining.

## Resources:

- [Tri-Color LED Breakout Kit Product Page](#)
- [Basic Explanation of LEDs](#)
- [LED current limiting resistors](#)
- [Anode vs Cathode](#)

## Conclusion:

Enjoy your new LEDs! If you have any problems, feel free to contact SparkFun Technical Support at [techsupport@sparkfun.com](mailto:techsupport@sparkfun.com)

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