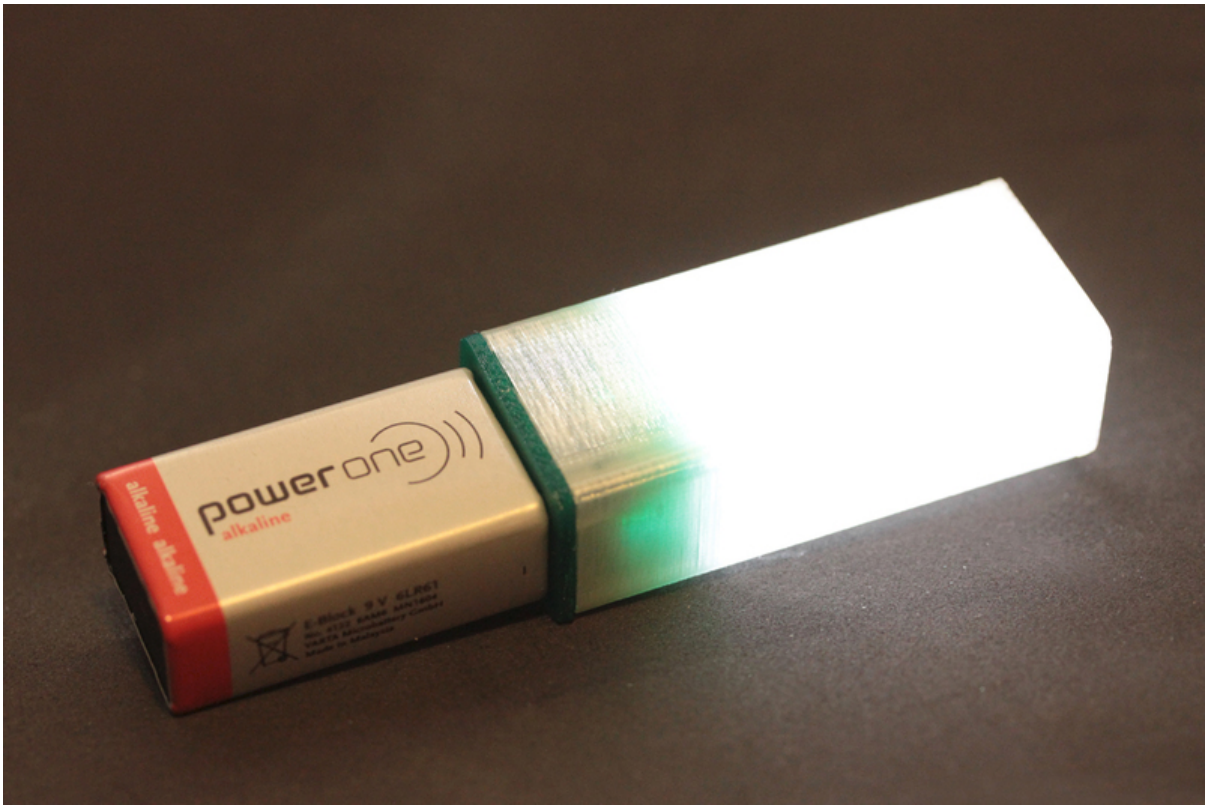
Personal Torch 3000

Created by Rick Winscot



https://learn.adafruit.com/pt3000-personal-torch

Last updated on 2024-06-03 01:36:11 PM EDT

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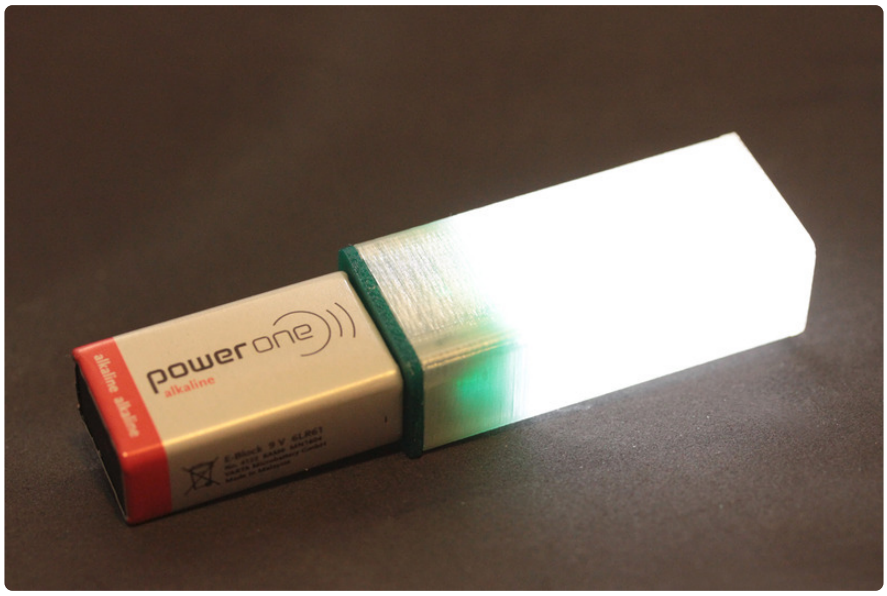


Do you have a flashlight for when the power goes out? Or... something to help little ones get around during Halloween?

I guess you could always go to the store... Nah, let's make one instead!

The following items are what the guide uses to construct the PT3000... there is a lot of room for substitution and creativity.

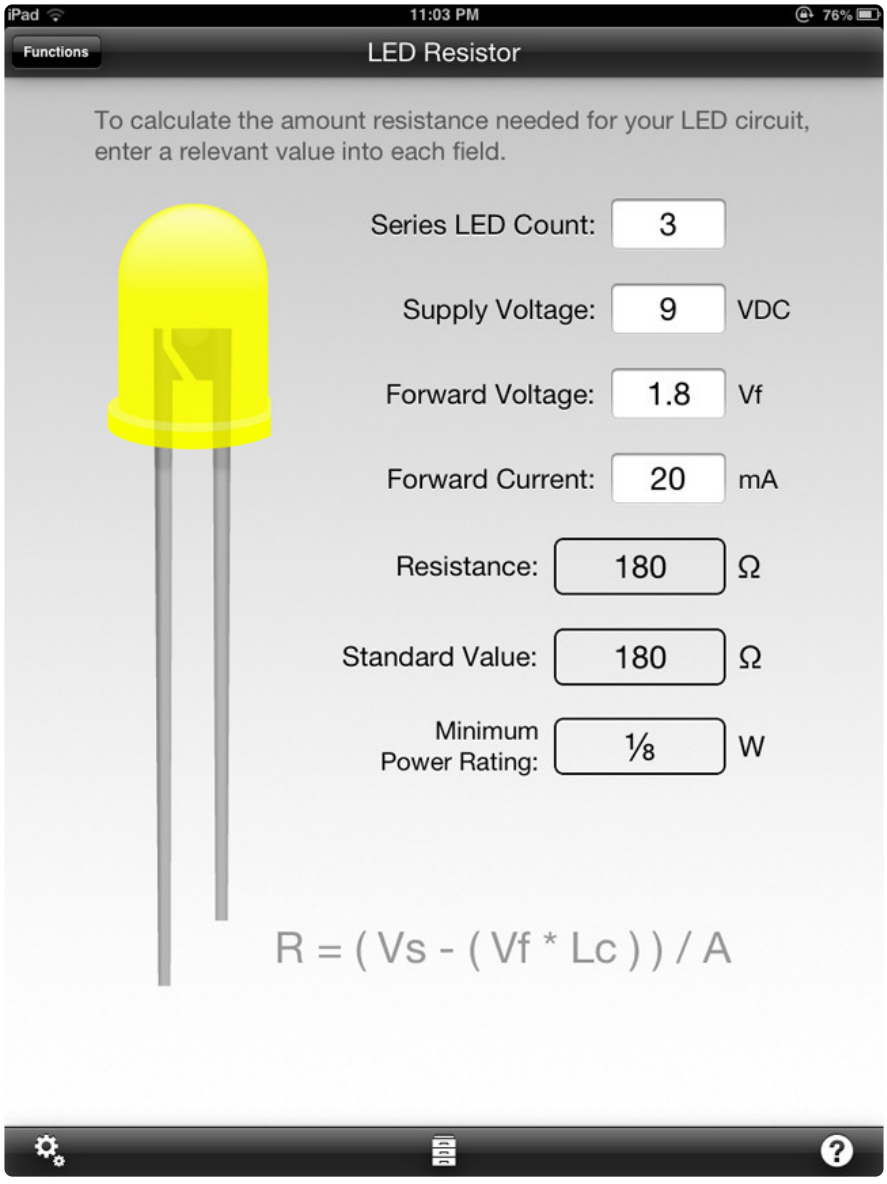
- Super Glue (plastic-to-plastic)
- E6000 (plastic-to-PCB)
- Semi-transparent filament
- Soldering iron and solder
- Wire stripper / flush-cutters
- 3x 3mm LEDs
- 1x appropriate value resistor
- 1x 9v battery clip
- 1x 9v battery

Datasheet... to prototype

Grab the datasheet for your LEDs and open Circuit Playground... find the values for 'Forward Voltage' and 'Forward Current.'

Plug-em' in, and voila!

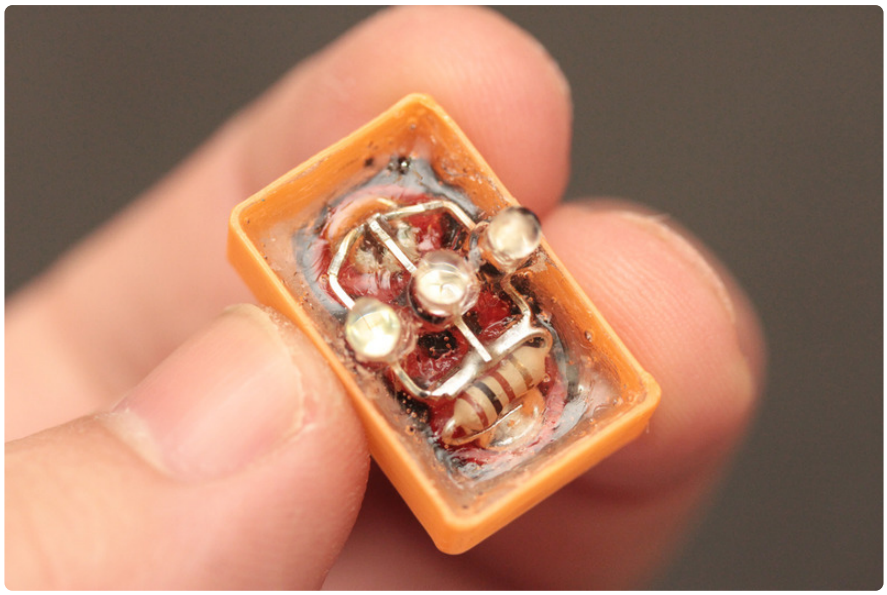
It looks like the LEDs I selected require a 1/8 watt 180 Ohm resistor to prevent the battery from over-driving the LEDs and burning them out.



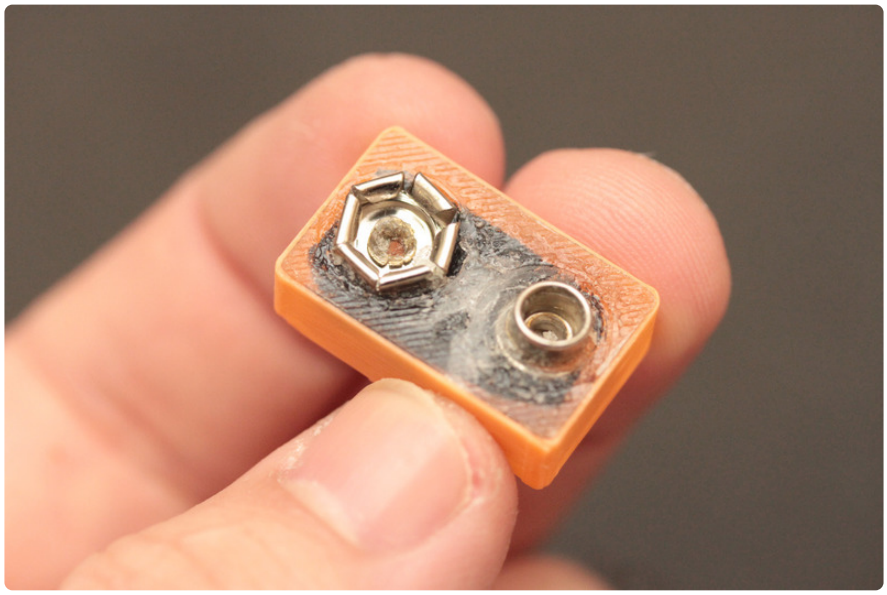
There can be a little variance in the resistor value... +/- 10% shouldn't be a problem.

Just remeber to enter 3x for the Series LED Count!

You can even free-wire the circuit if you want... my prototype may be ugly, but it works a treat!



I sealed the prototype in epoxy to prevent the connectors from wiggling around. Some of the epoxy ran through the holes in the clip... next time I'll plug those with a bit of hot-glue.

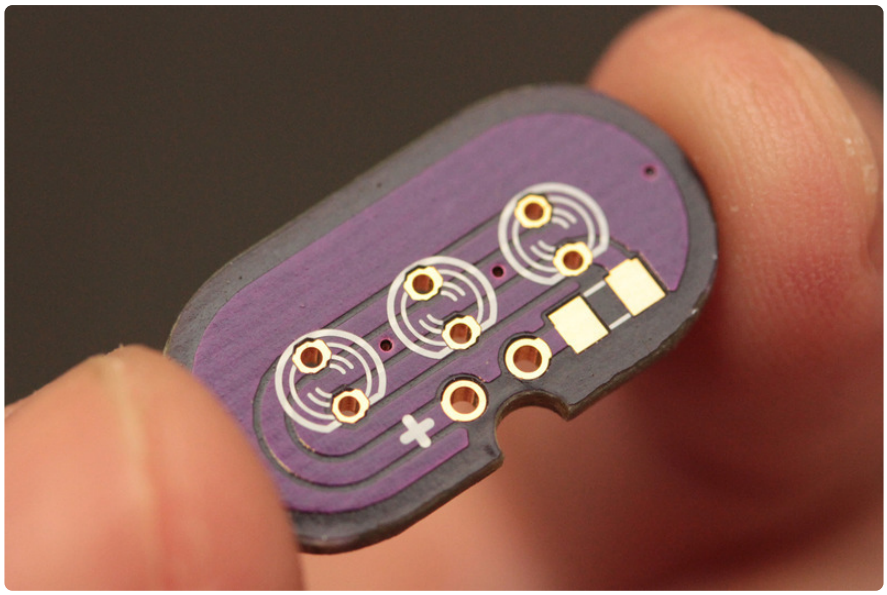


PCB Production

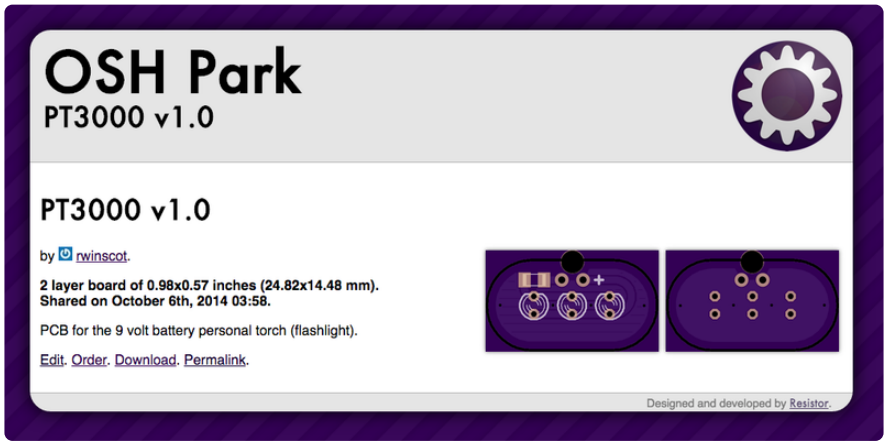
If you think producing PCBs is difficult... this project might change your mind.

It's true, years ago, you had to produce hundreds or even thousands of PCBs before a fab-house would want to talk to you. Now, fast-turn / low quantity services abound.

And... there are services like OSH Park (https://adafru.it/e2G) that are crazy awesome.



These little purple boards cost a couple bucks for three... and will arrive in about 10 calendar days. A couple clicks, and your PCBs will be on the way!

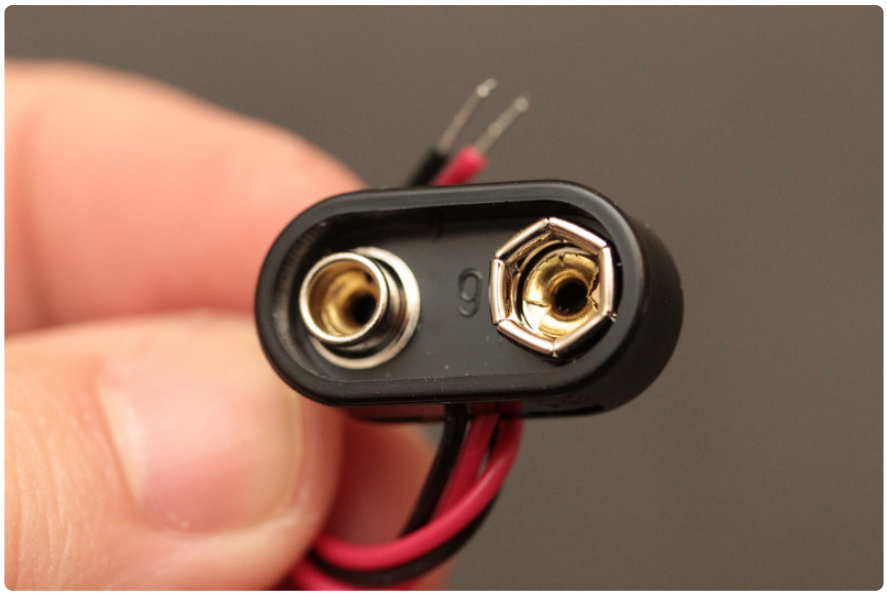


OSH Park Shared Project: PT3000 (https://adafru.it/e2H)

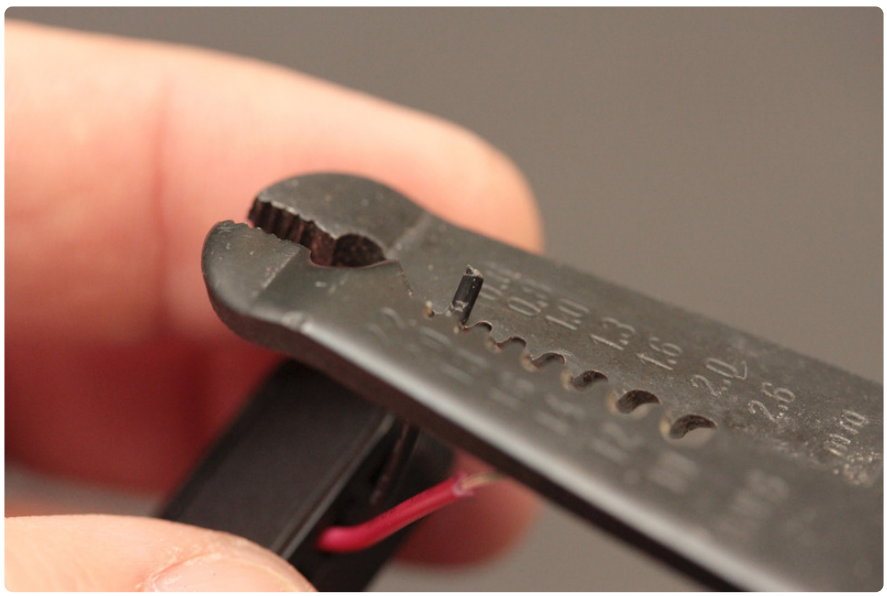
Soldering

You can retrofit this design easily with just about any kind of 9 volt battery clip... I've used one that has a beefy plastic housing for glue to stick to.

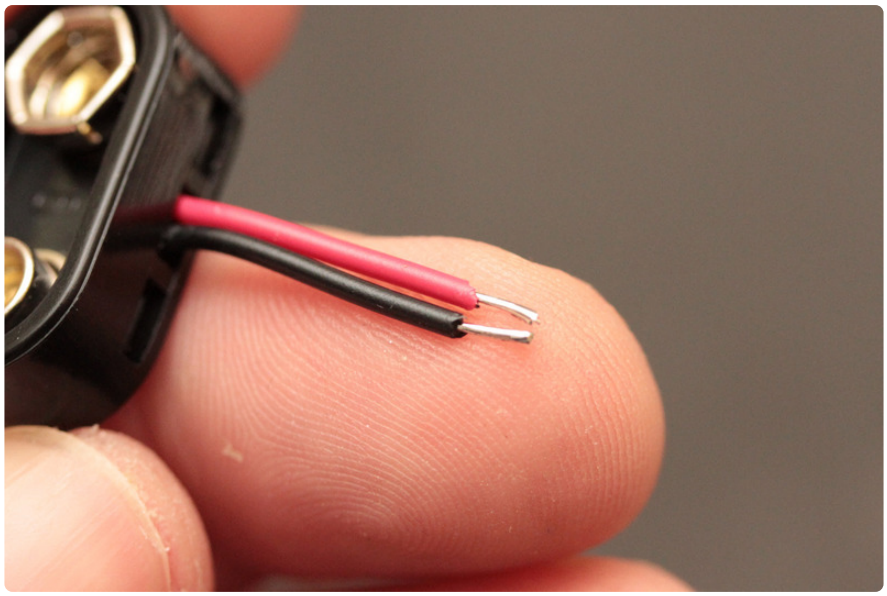
9 volt battery clip (https://adafru.it/e2I) (link to Digikey)



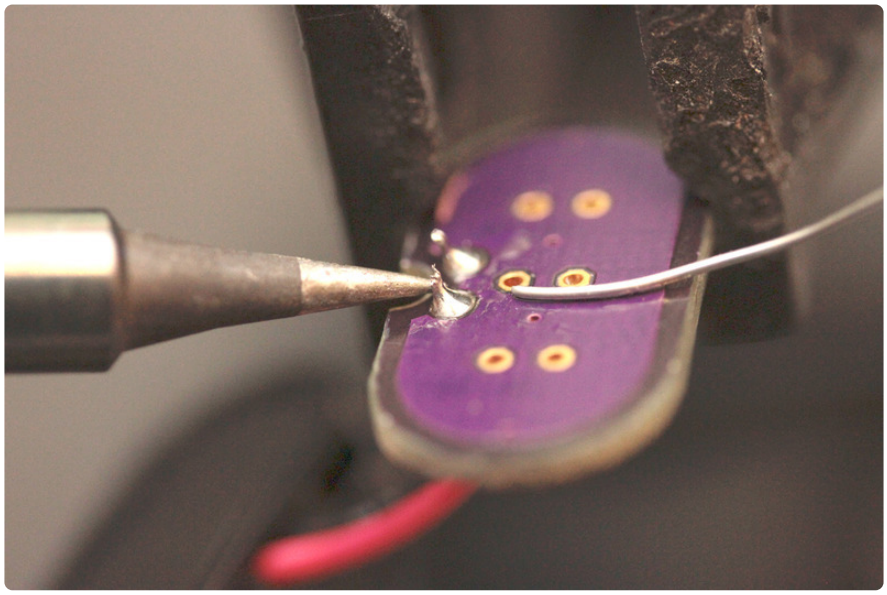
Trim the leads down to about 3/4 of an inch...



Strip and tin the ends.



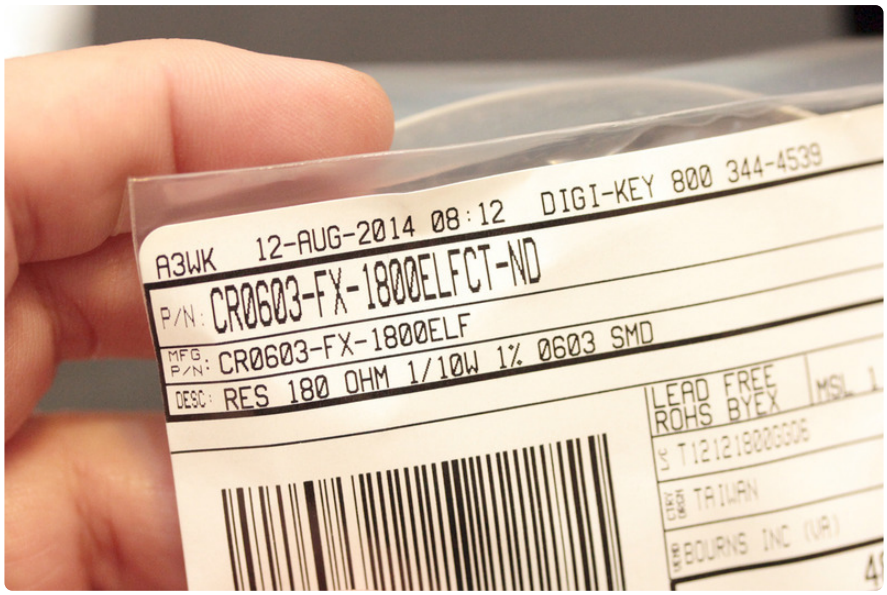
Solder to the PCB... positive is marked with a + on the opposite side.



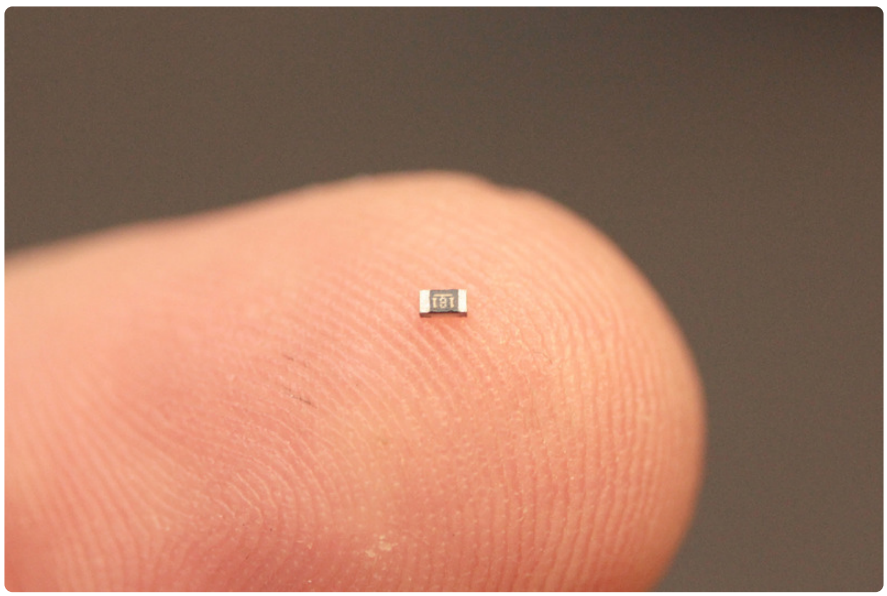
Now... I'm going to cheat a little bit - I orderd 1/10 watt 0603 resistors instead of 1/8 watt 1206.

Precision is great though...

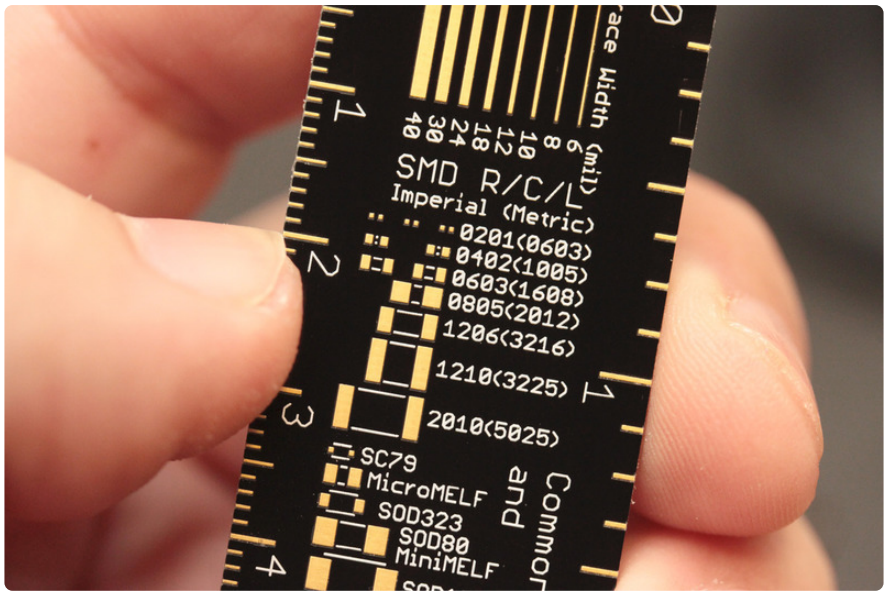
You can pick any resistor you want from about 180 ohms to 1000 ohms, the brightness will vary but so will the battery life!



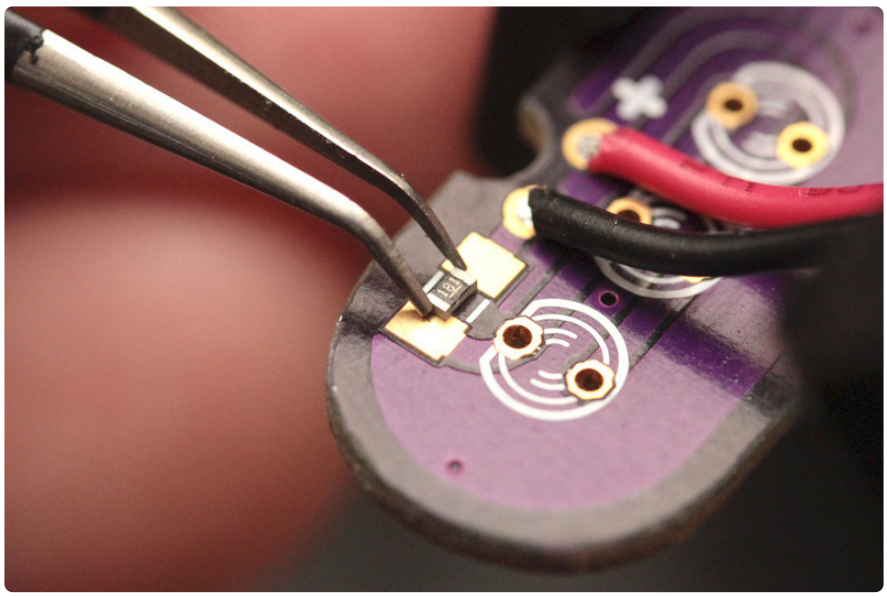
0603 is small...



0402 and 0201 are even smaller - yikes!

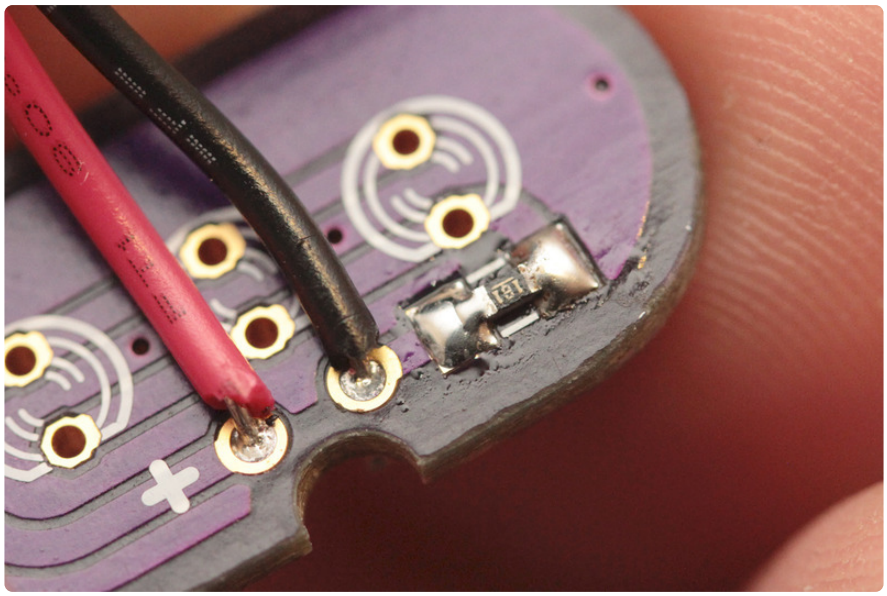


It's a bit of a stretch, but it looks like it will work just fine.



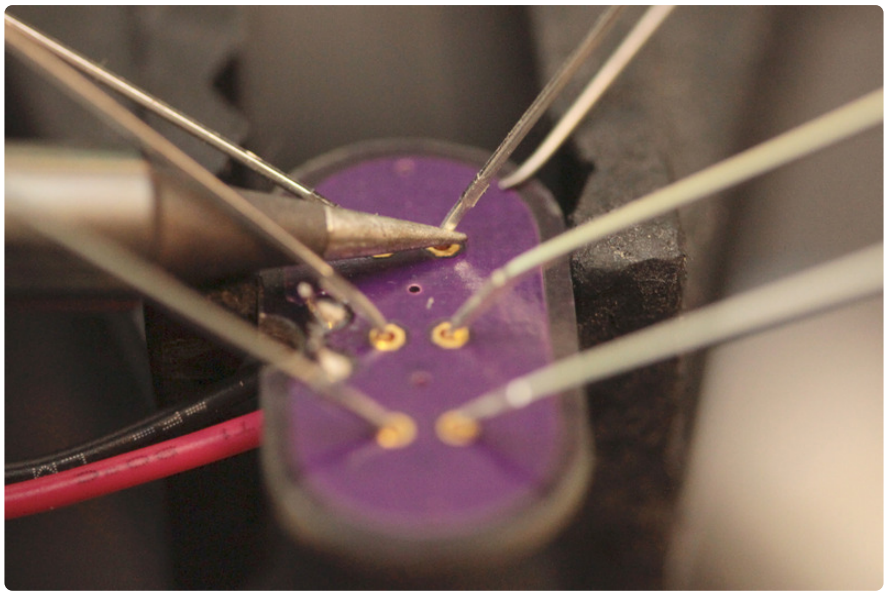
The torch has been running for about a day with the 1/10 watt resistor in place... seems to be okay.

Still, I'd recommend using the value recommended in Circuit Playground.

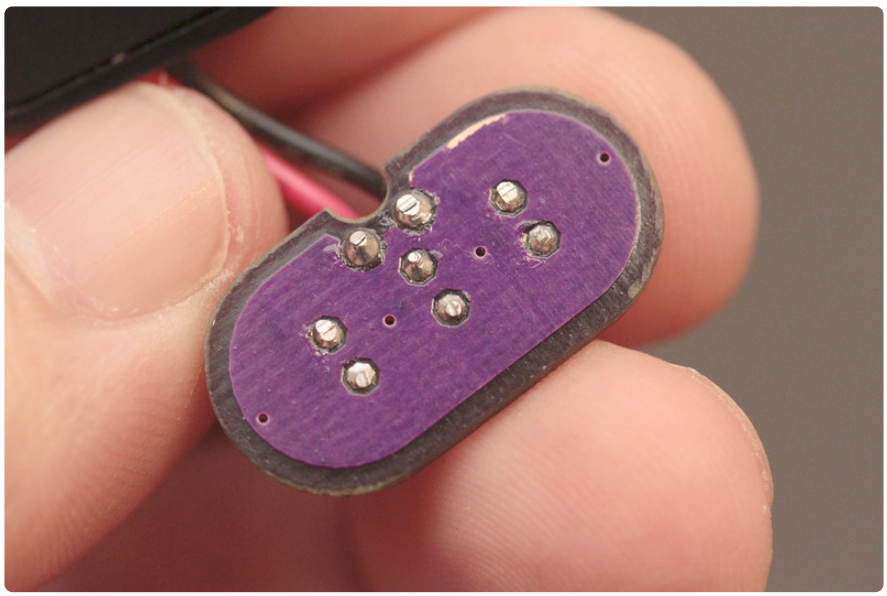


LEDs have polarity... which is marked on the board with the white silkscreen and on the LED via a flattened side.

Match-em' up and solder in-place.



Trim your leads down a bit and... let's assemble!

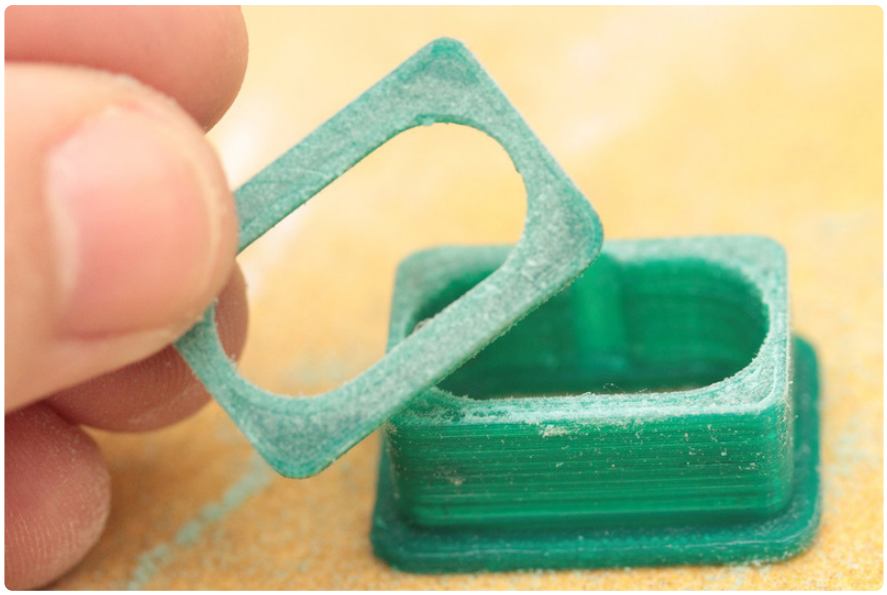


Assembly

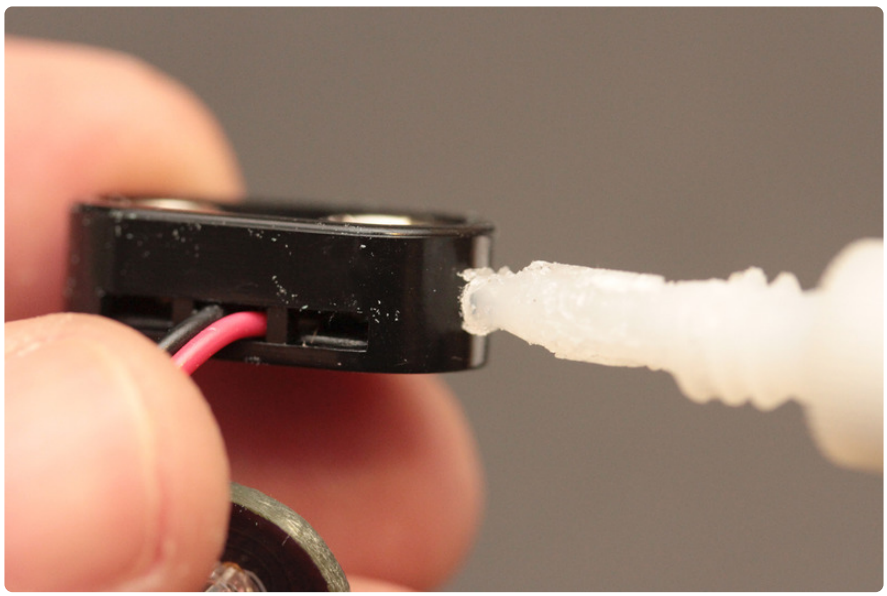
Knock-down the rough spots with a bit of sandpaper...

Oh!

Here's a little trick with Super Glue - don't blow or rub-off the plastic dust. When you add Super Glue, and press the two dusty parts together it helps fill gaps and improves adhesion.

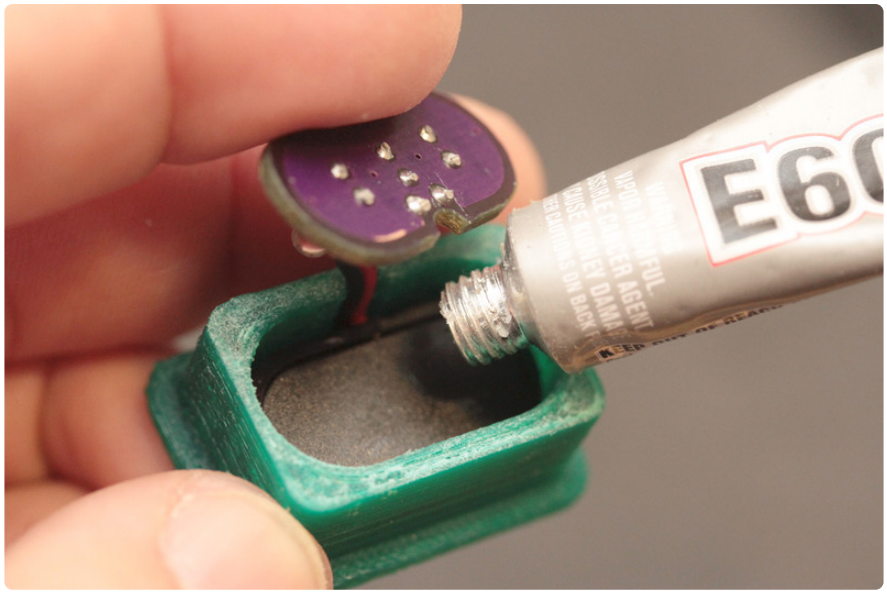


Load-up the sides of the battery connector with glue... and quickly press it into place.



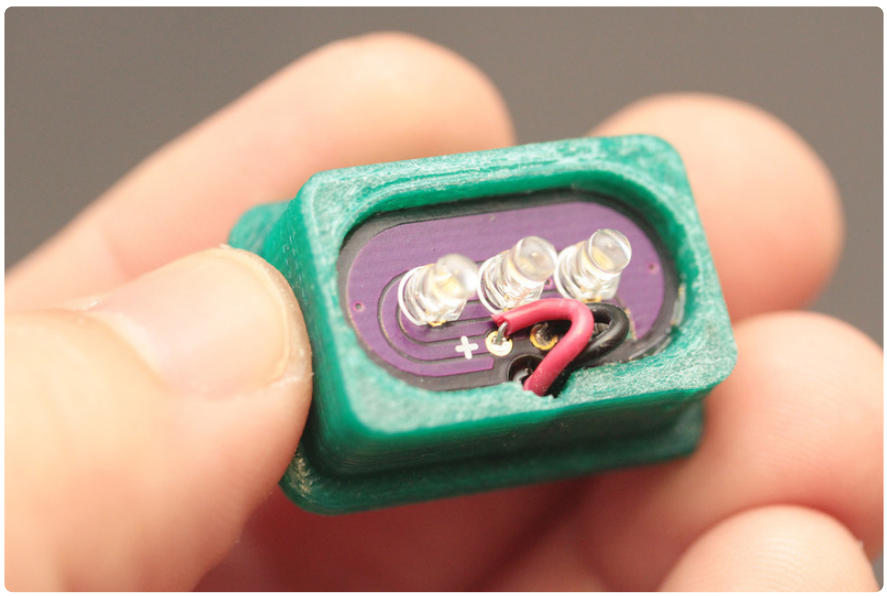
Make sure that the battery connector is flush with the bottom of the torch base. Else, the clip might have a tendancy to pop-off.

Make everything permanent by adding a little E6000 to the top of the battery connector and around the sides.

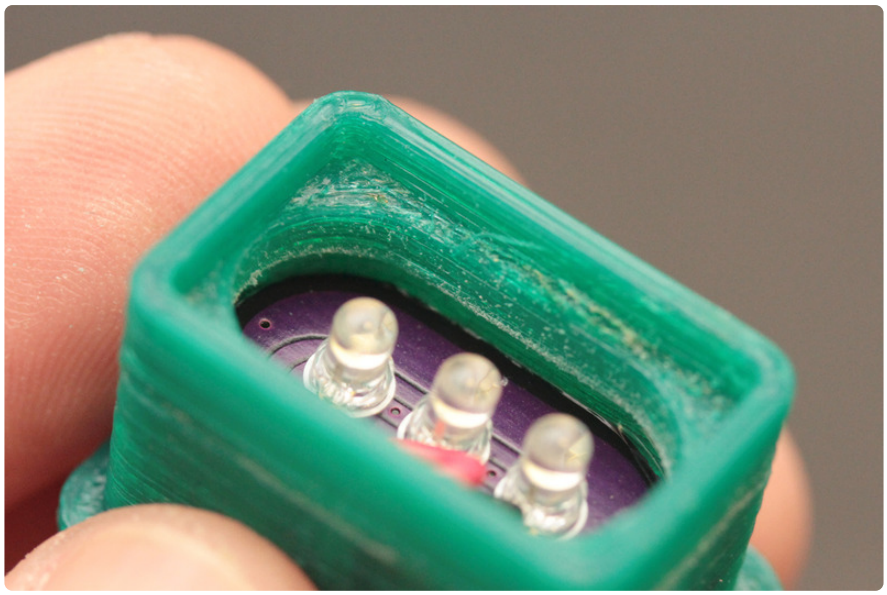


Good coverage will partially seal the connector from moisture...

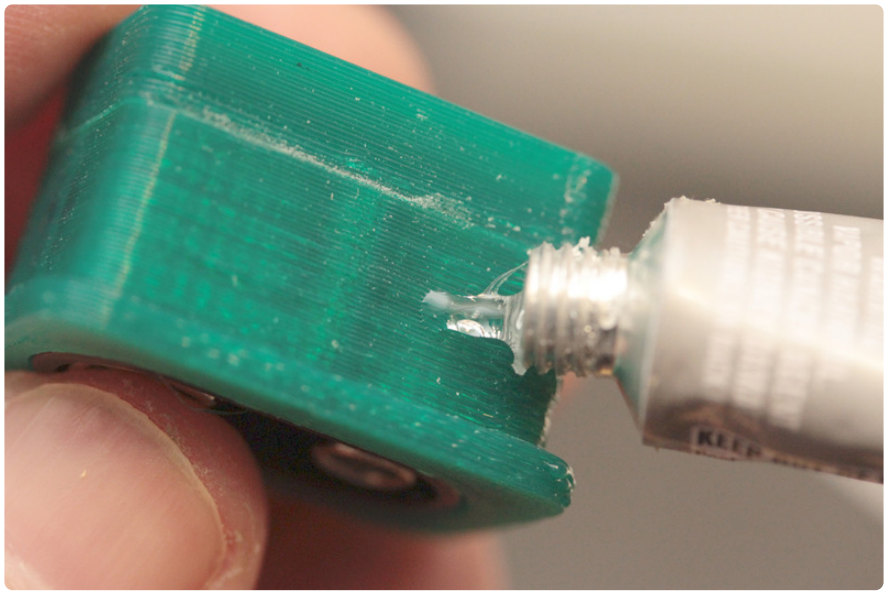
Press the PCB into place.



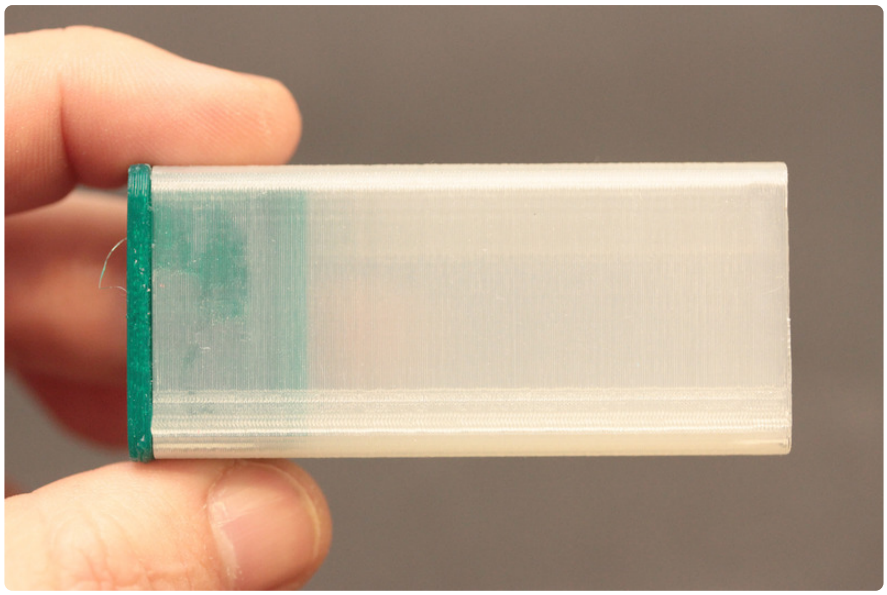
And, add the base cap - it acts as a spacer to prevent the battery terminals from coming onto contact with the LEDS.



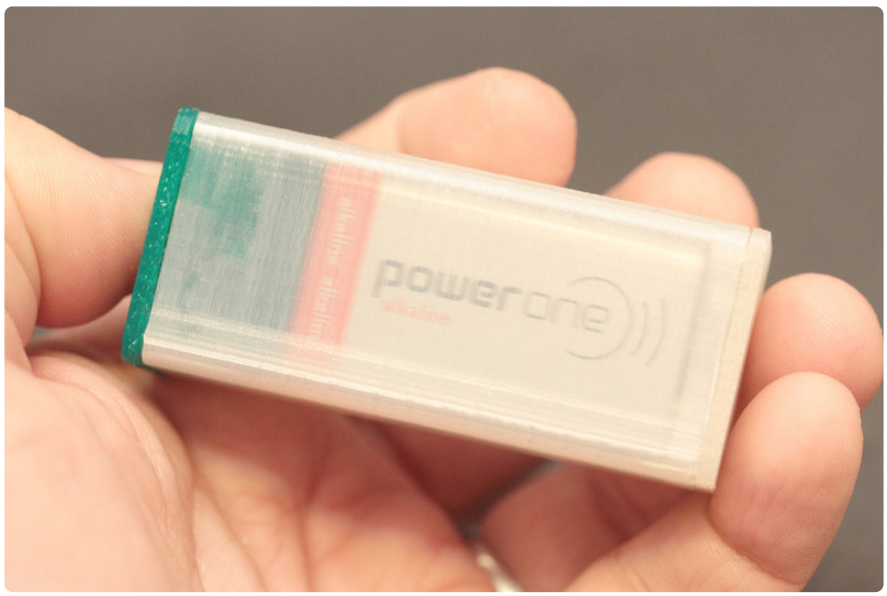
Put a smidge of E6000 on the sides of the container to hold the diffuser in place.



Make sure that the end with the rounded lip is left open - this is the end that the diffuser cap snaps-into.

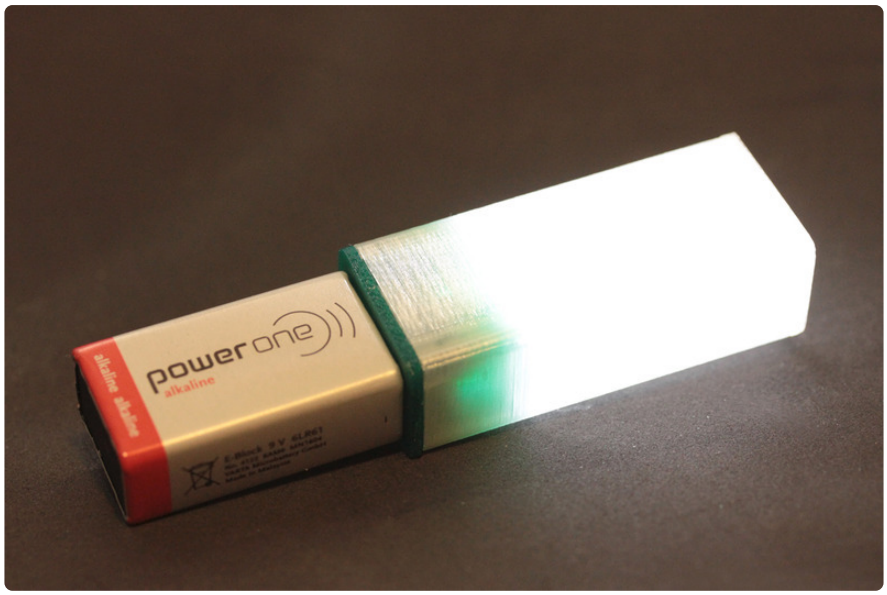


The battery will fit inside either way... snazzy!



When you're ready to use it, take the battery out and snap it into the base.

Given the capacity of most 9 volt alkaline batteries, I would expect this to light-the-way for several dozen hours.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