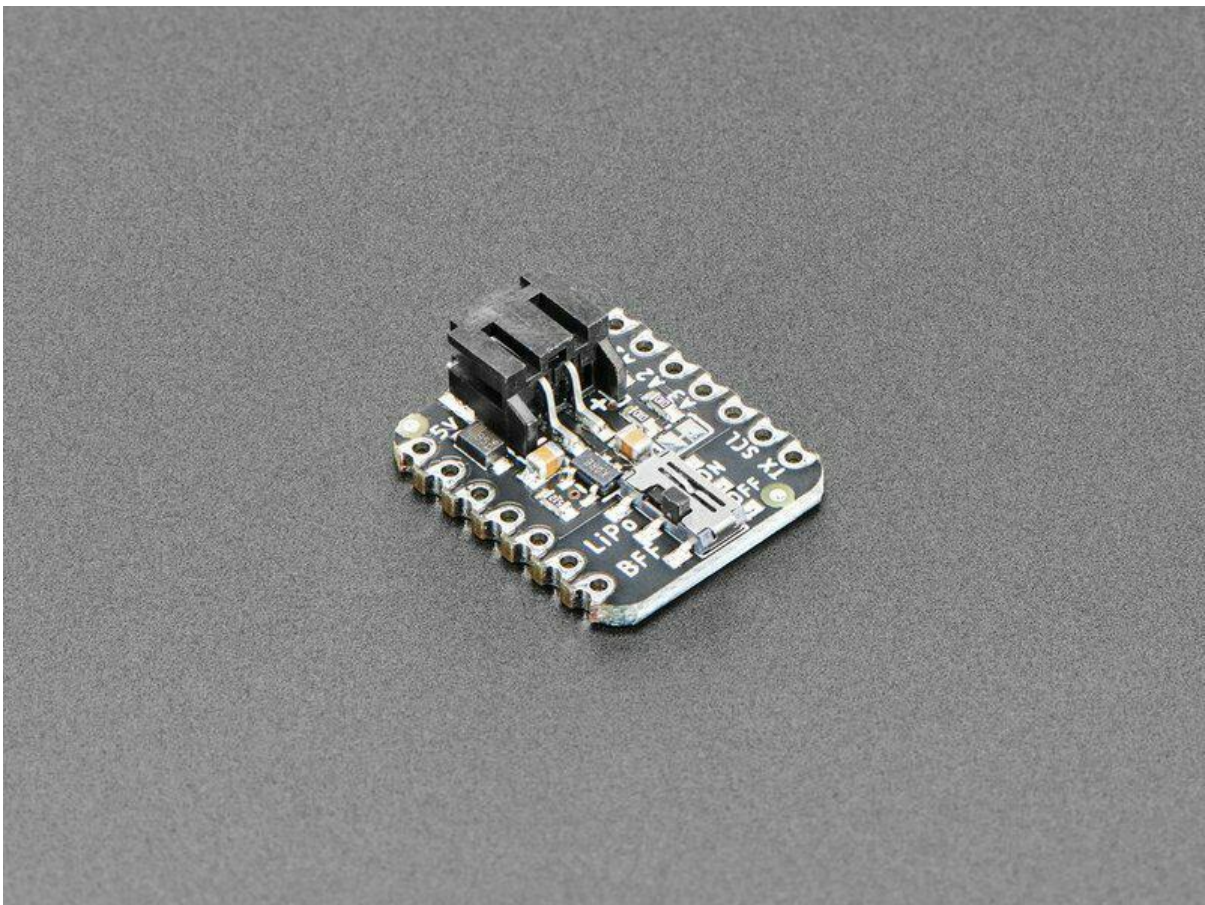




# Adafruit Lilon or LiPoly Charger BFF Add-On for QT Py

Created by Kattni Rembor



<https://learn.adafruit.com/adafruit-qt-py-charger-bff>

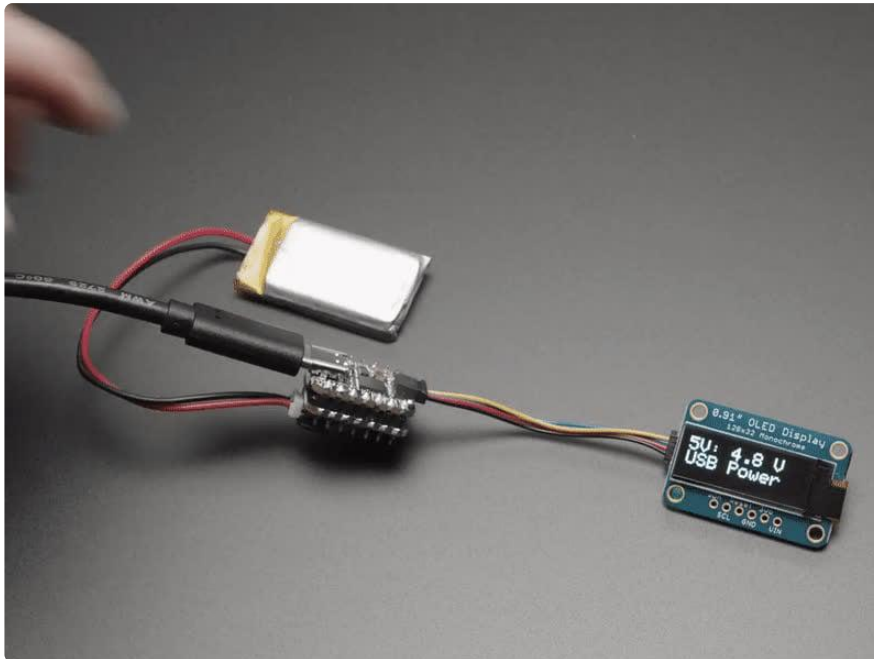
Last updated on 2023-08-29 04:48:27 PM EDT

# Table of Contents

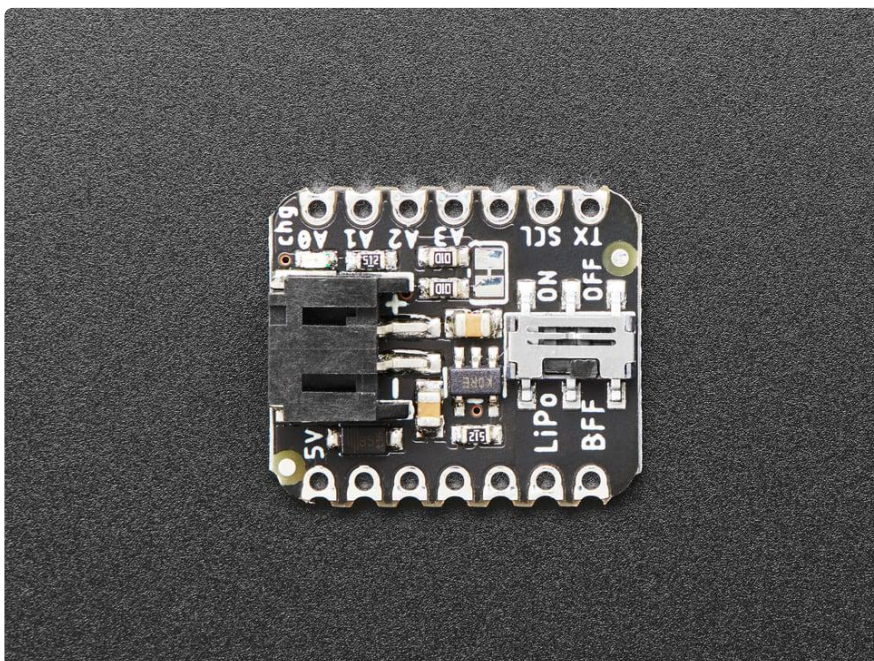
<a href="#">Overview</a>	<a href="#">3</a>
<hr/>	
<a href="#">Pinouts</a>	<a href="#">6</a>
<hr/>	
<ul style="list-style-type: none"><li>• <a href="#">Power Slide Switch</a></li><li>• <a href="#">Battery JST Connector</a></li><li>• <a href="#">Charge LED</a></li><li>• <a href="#">Battery Monitor Pin and Jumper</a></li><li>• <a href="#">Charge Chip and Voltage Divider</a></li></ul>	
<a href="#">Downloads</a>	<a href="#">9</a>
<hr/>	
<ul style="list-style-type: none"><li>• <a href="#">Files</a></li><li>• <a href="#">Schematic and Fab Print</a></li><li>• <a href="#">3D Model</a></li></ul>	

---

# Overview



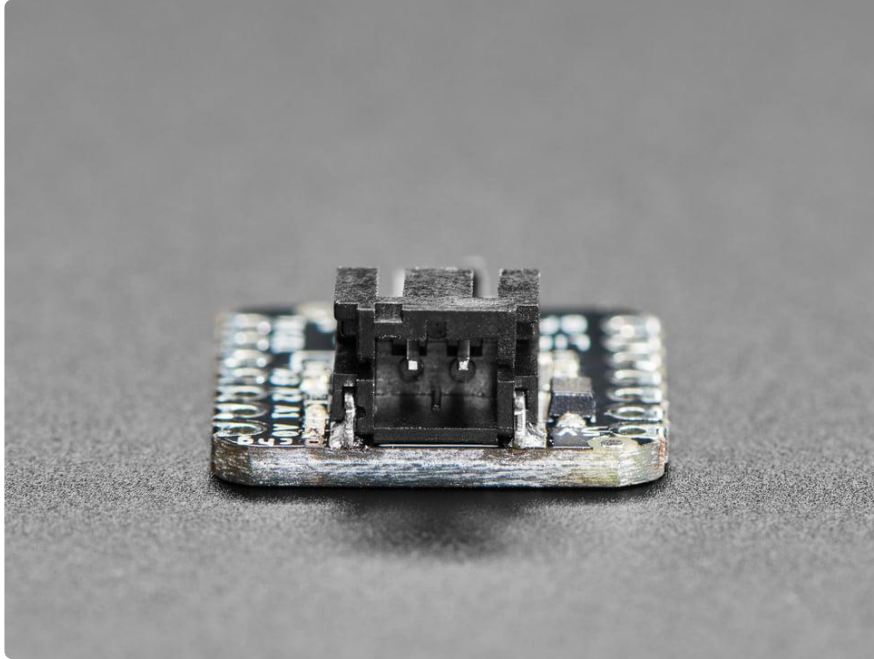
[Is your QT Py all alone \(\)](#), lacking a friend to travel the wide world with? When you were a kid you may have learned about the "buddy" system. Well, this product is kinda like that! A board that will watch your QT Py's back and give it the power and support to wander out past your USB port.



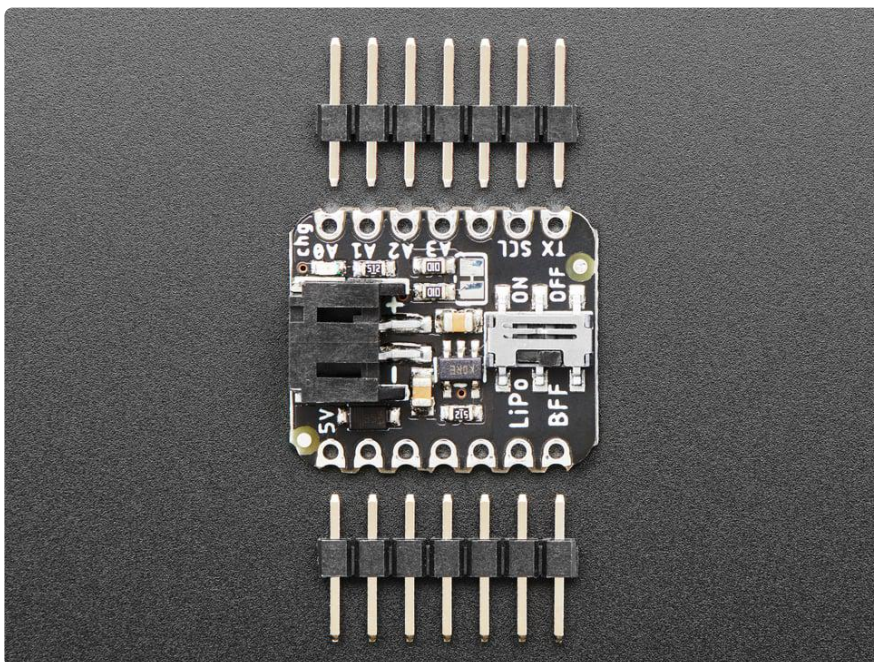
This little lipo charger is designed to fit onto the back of any QT Py board, and make it easy for portable powering. Simply plug any standard 3.7V/4.2V lithium polymer or lithium-ion rechargeable battery into the JST plug on the end. When powered by the

USB port on the QT Py, the charger kicks in and will charge up the battery at 200mA max rate. You'll see the yellow LED light up when that happens.

When the USB is removed, the battery will reverse charge into the 5V port via a Schottky diode. You can turn it on or off with the built in slide switch as well.

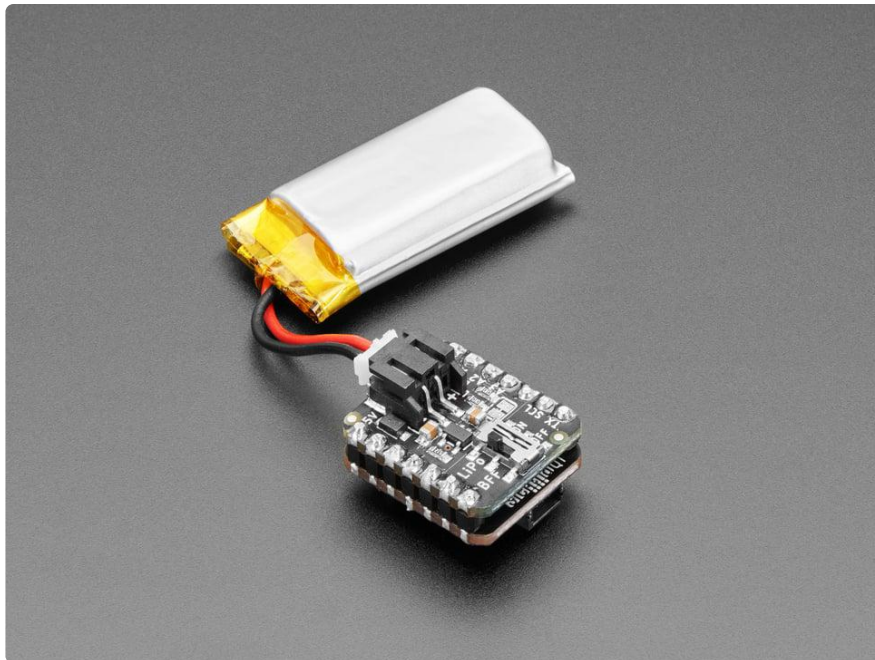


A simple voltage divider on the cathode side of the diode and connected to pin A2 will let your firmware detect basic modes: if the voltage is over 4.3V, it is probably plugged into USB. If the voltage is 4.2V or below it's probably running on the Lipoly battery and you can roughly determine the battery state.



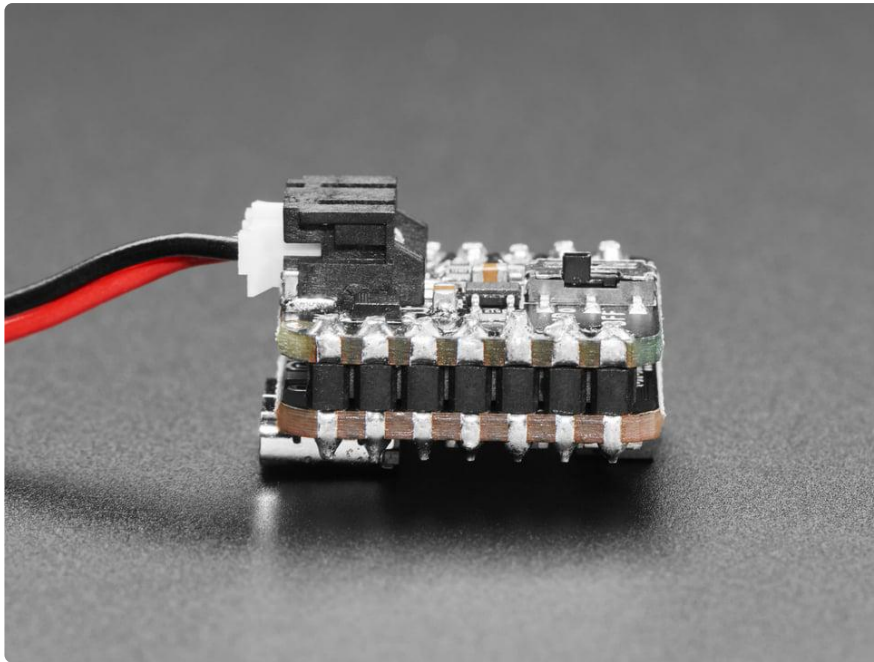
We include some header that you can solder to your QT Py. [You can also pick up an Itsy Bitsy short female header kit to make it removable but compact \(\)](#), you'll just need to trim down the headers to 7 pins long.

For use with Adafruit LiPoly/Lilon batteries only! Other batteries may have different voltage, chemistry, polarity, or pinout.

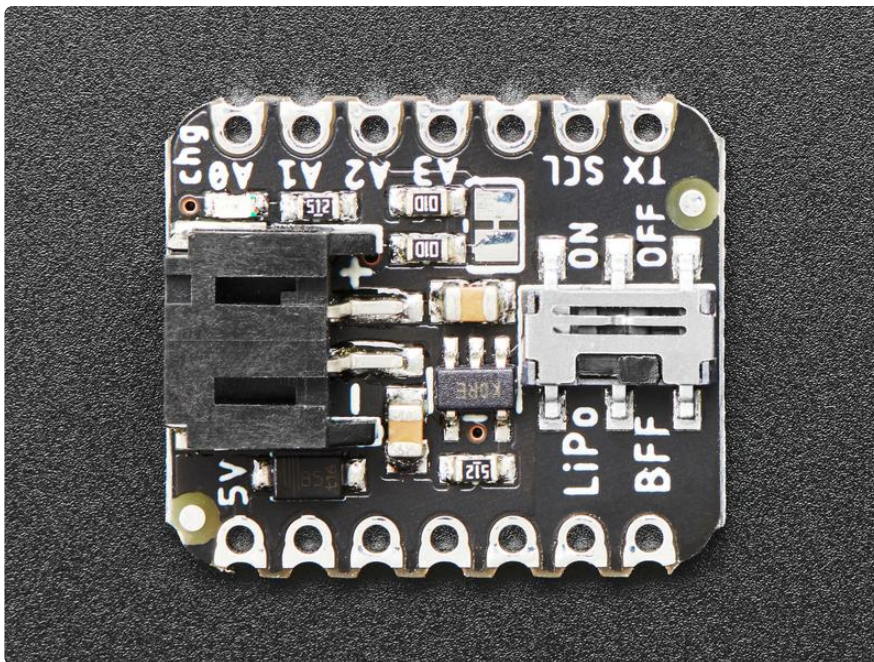


- Comes as an assembled and tested PCB
- Uses the 5V input via USB Type-C connector on QT Py
- For charging single Lithium Ion/Lithium Polymer 3.7/4.2v batteries (not for older 3.6/4.1v cells)
- 200mA charge current

[Batteries \(http://adafru.it/258\)](http://adafru.it/258) and QT Py are not included.

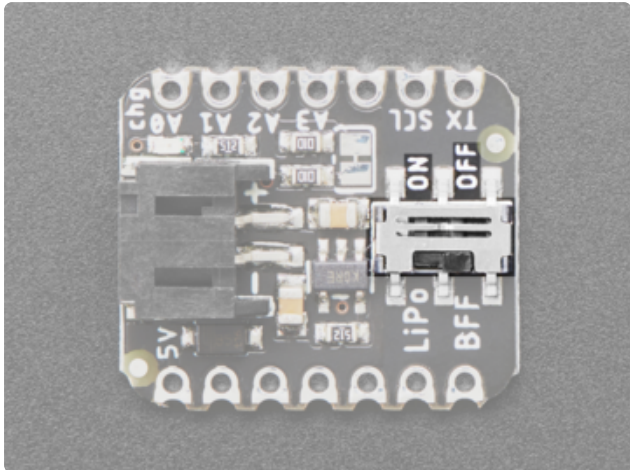


## Pinouts



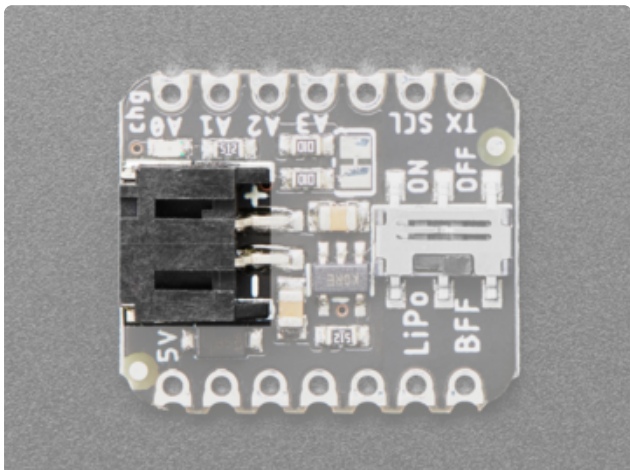
This QT Py BFF has a bunch of features packed into a cute little board. This page will explain the hardware!

## Power Slide Switch



The power slide switch, located in the middle of the right side of the board, turns the BFF on or off, but only when the QT Py is NOT plugged into USB power.

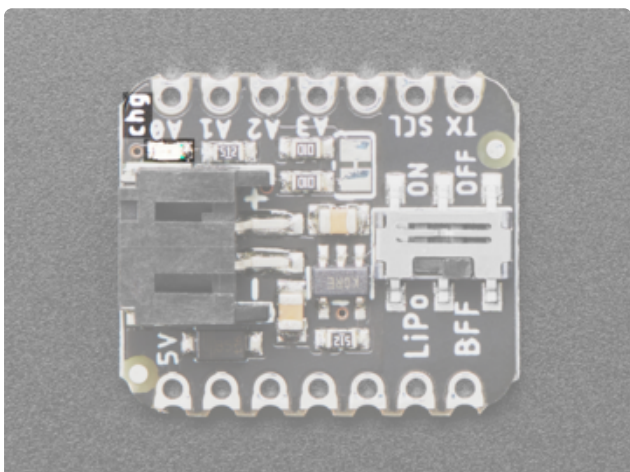
## Battery JST Connector



The battery JST connector, located in the middle of the left side of the board, enables you to plug in any standard 3.7V/ 4.2V lithium polymer or lithium-ion rechargeable battery to the BFF.

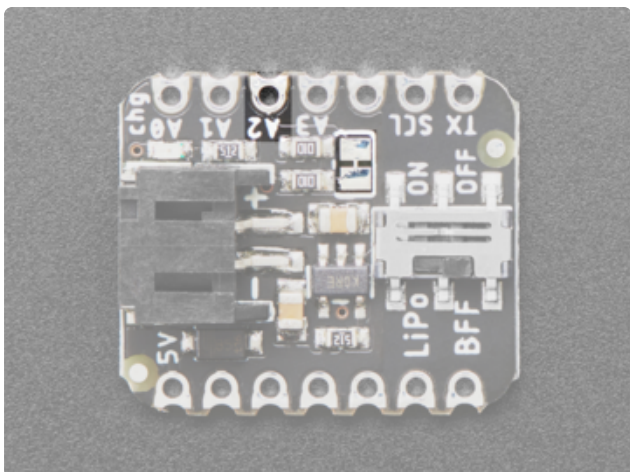
For use with Adafruit LiPoly/Lilon batteries only! Other batteries may have different voltage, chemistry, polarity, or pinout.

## Charge LED



The charge LED, located in the upper left corner of the board, lights up when the battery is charging. Charging occurs only when the QT Py is plugged into USB power.

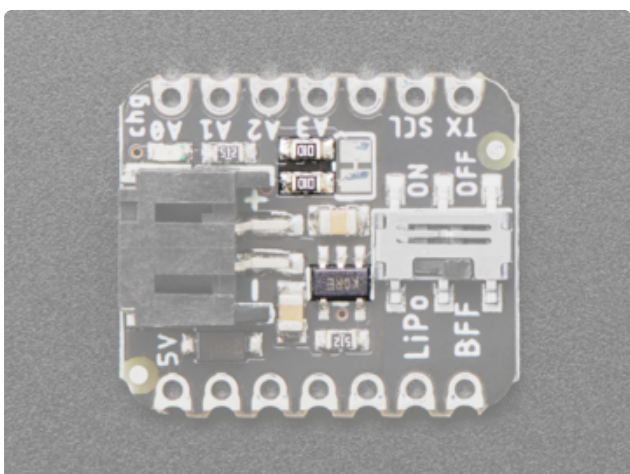
## Battery Monitor Pin and Jumper



Pin A2, located to the left of center along the top edge of the board, is connected to the simple voltage divider, which will let your firmware detect basic modes. It measures the 5V line which is after a schottkey diode. If the voltage is over 4.0V, it is probably plugged into USB. If the voltage is 3.9V or below, its probably running on the Lipoly battery and you can roughly determine the battery state.

There are a pair of jumper pads, located to the right of center, below the pins along the top edge. These pads are connected to pin A2, between the pin and the voltage divider. In the event that you want to use pin A2 for something other than battery monitoring, you can cut the trace between these pads to disable monitoring on pin A2. Solder the pads back together to enable monitoring again.

## Charge Chip and Voltage Divider



The MCP73831 lipo charge chip, located near the center of the board, will charge up the battery at 200mA max rate. Charging occurs only while the QT Py is plugged into USB, and will happen regardless of the status of the slide switch. When the chip is charging a battery, the charge LED will light up.

The voltage divider, located below the A3 pin label on the BFF silk, is connected between A2 and 5V via the cathode side of a diode. It allows for simple monitoring of voltage levels, which can indicate whether the QT Py is running off USB, or being powered by a battery plugged into the BFF.

To obtain the voltage level from A2 using CircuitPython, run the following code.

```
import time
import board
```



```

import analogio

analog_pin = analogio.AnalogIn(board.A2)

def get_voltage(pin):
    return (pin.value / 65535) * 3.3

while True:
    print(get_voltage(analog_pin))
    time.sleep(0.1)

```

## Downloads

### Files

- [MCP73831 Datasheet \(\)](#)
- [EagleCAD PCB files on GitHub \(\)](#)
- [Fritzing object in the Adafruit Fritzing Library \(\)](#)
- [3D models on GitHub \(\)](#)

## Schematic and Fab Print

