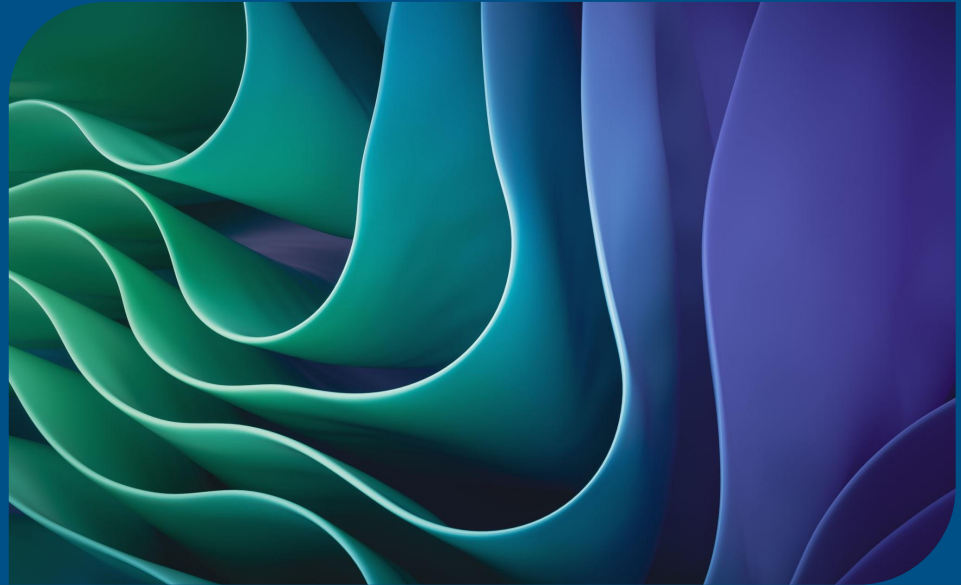
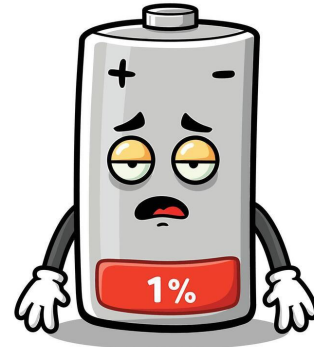


Power Bank that's not a Power Bank

Kristopher Schmit , Tzchen (Edison) Wu



Don't you just hate
running out of battery on
your phone?



Fear not!

Our Power Bank that's not a Power Bank is here to help!

Disclaimer: It doesn't charge away from a power supply at the moment.

What is a Power bank?

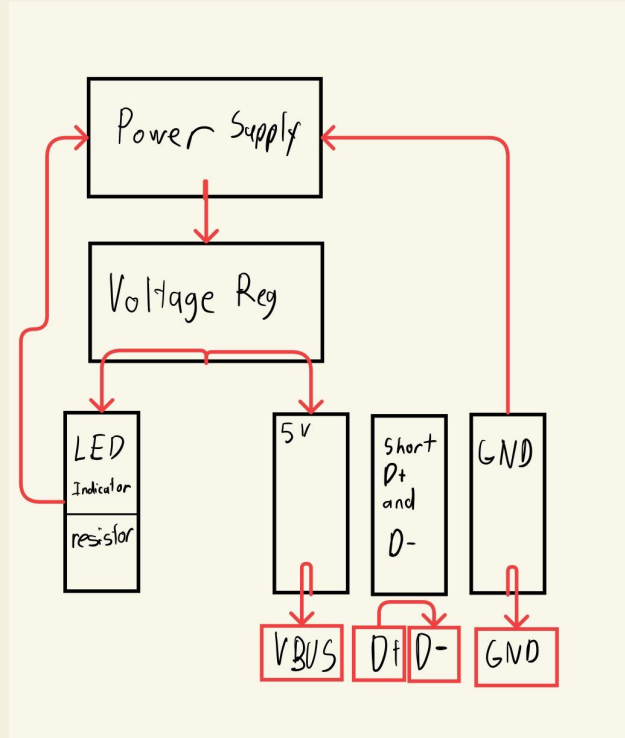
Maybe this?



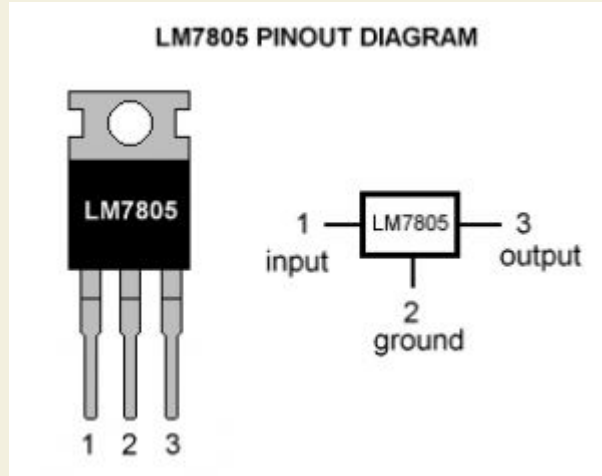
Or
this?



Not Yet, we gotta blow it up first



LM7805 Voltage Regulator



- LM78XX Last 2 numbers mean the voltage it regulates
- A linear regulator

Excess Voltage is dissipated as **HEAT**.

$$P = (V_{in} - V_{out}) * I_{out}$$

$$\text{Ex. } P = (9V - 5V) * 0.5A = 2W \text{ of } \text{HEAT}$$

More current the device draws the hotter the regulator gets.

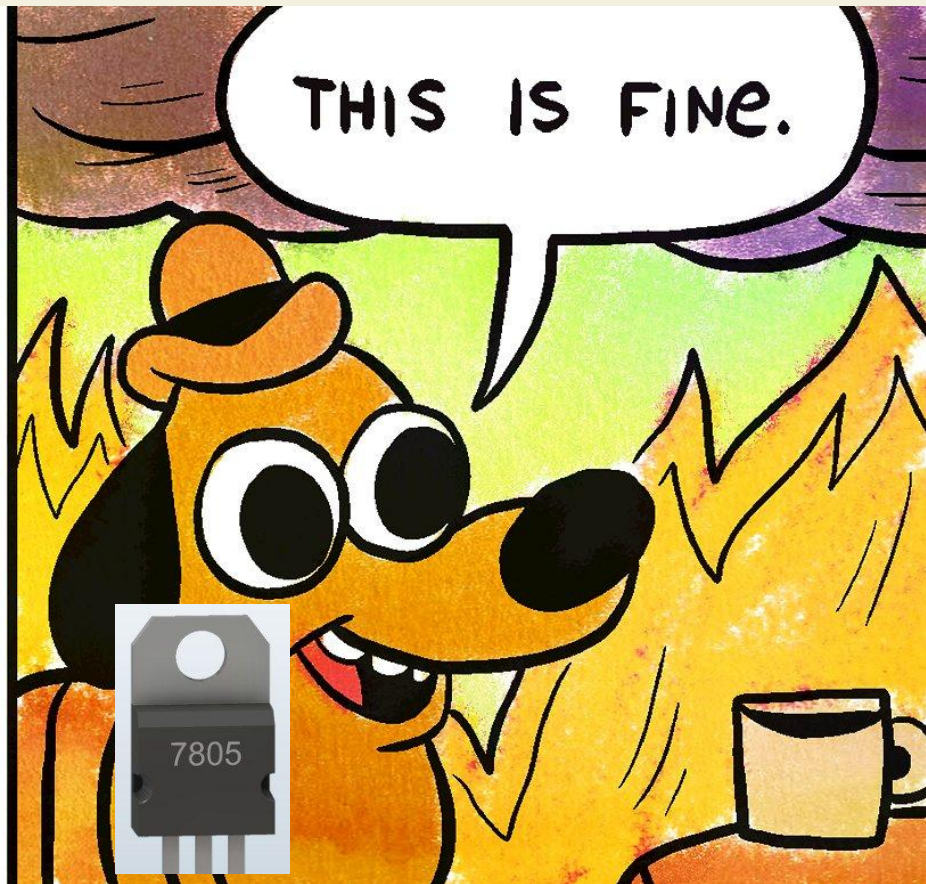
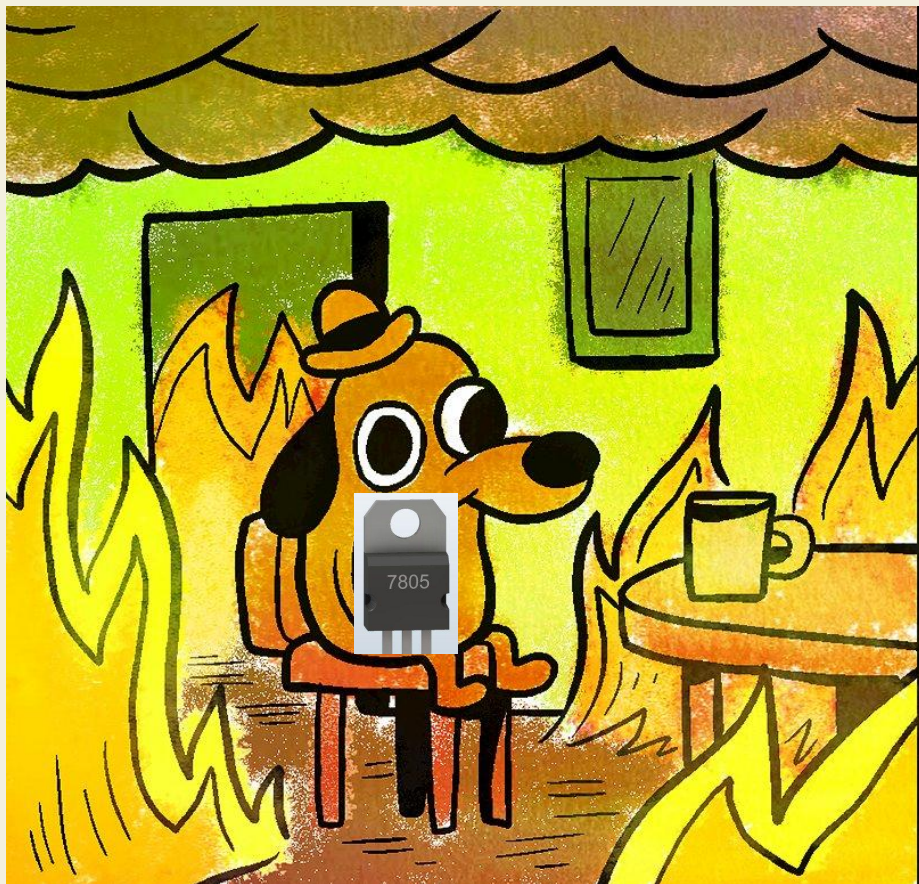
$$5V/9V = 56\%$$

56% of the V_{in} goes to load and **44%** is wasted as heat

Not very efficient.

- Ideally Min Voltage of 7V, Max of 25V (can go up to 35V)
- Max output current ~1A-1.5A
- Can and probably will Overheat

The limit is **HEAT** and the ability to keep the LM7805 cool and happy



LED and Resistor



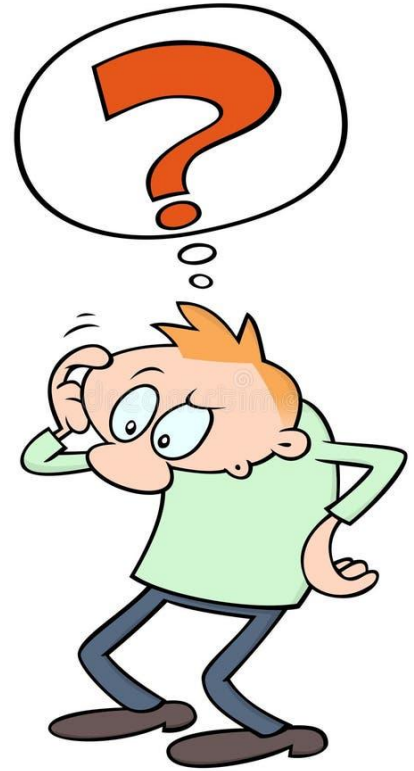
- Indicator that power is being supplied.
- Acts as a minimum load to help with stability of the Voltage regulator.
- Specifically using a 350 Ohm resistor so that LED doesn't burn out and draw too much current away from the USB power.

How to connect?

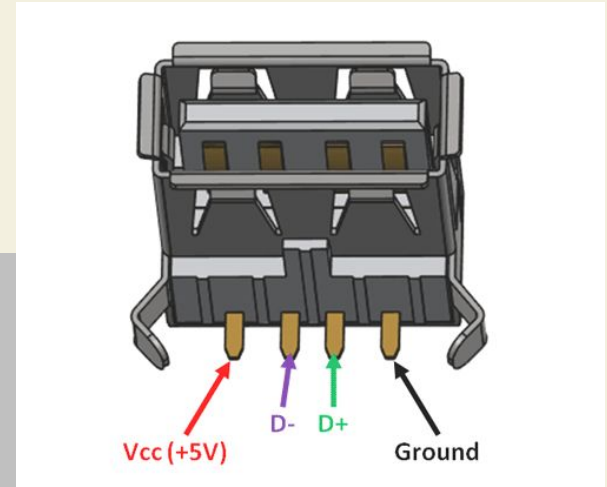
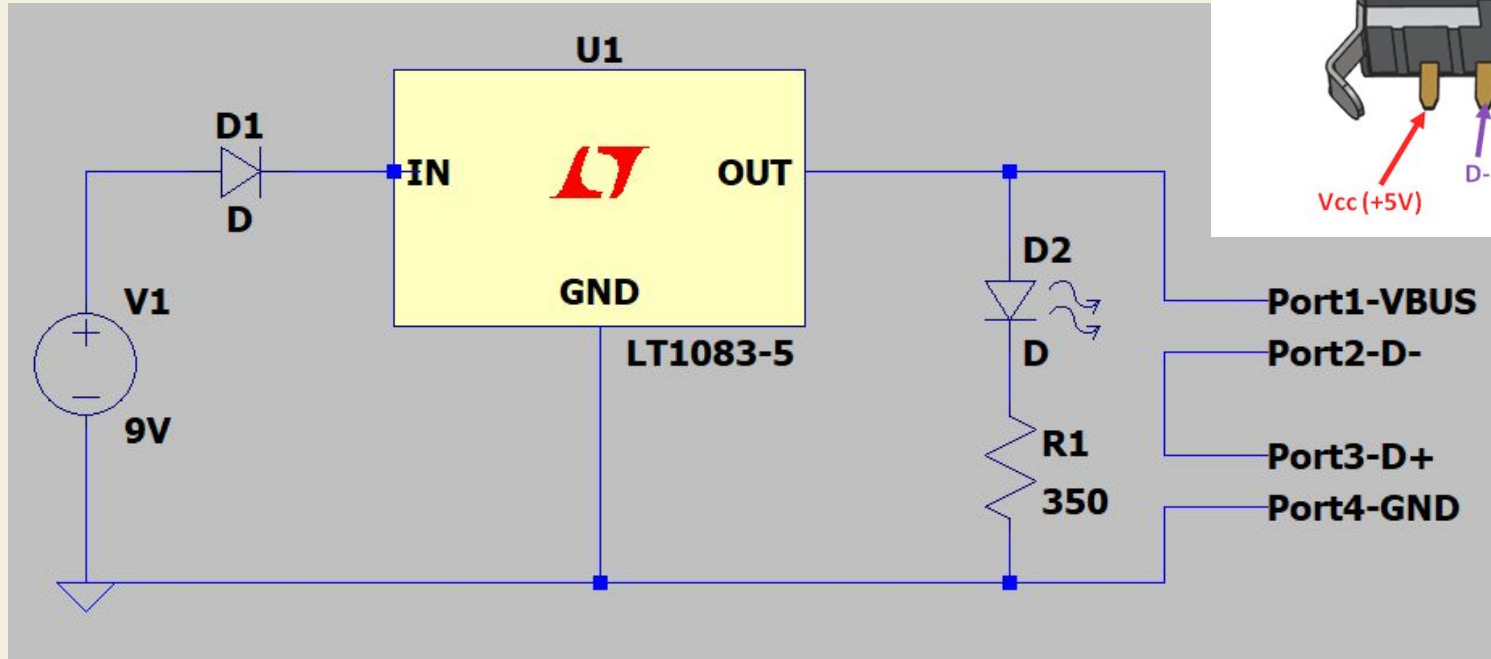
PIN DEFINITION



Pin Number	Sinal Name	Description
1	VBUS	Power
2	D-	USB 2.0 Data-
3	D+	USB 2.0 Data+
4	GND	Ground



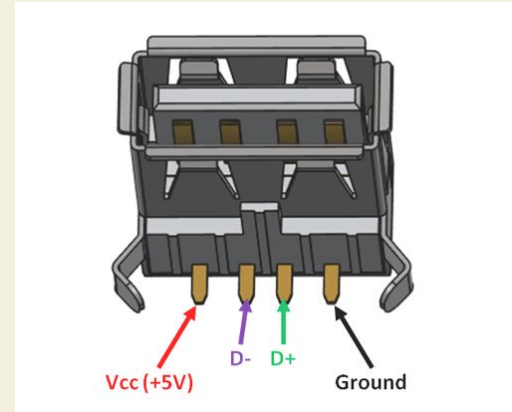
A more indepth view



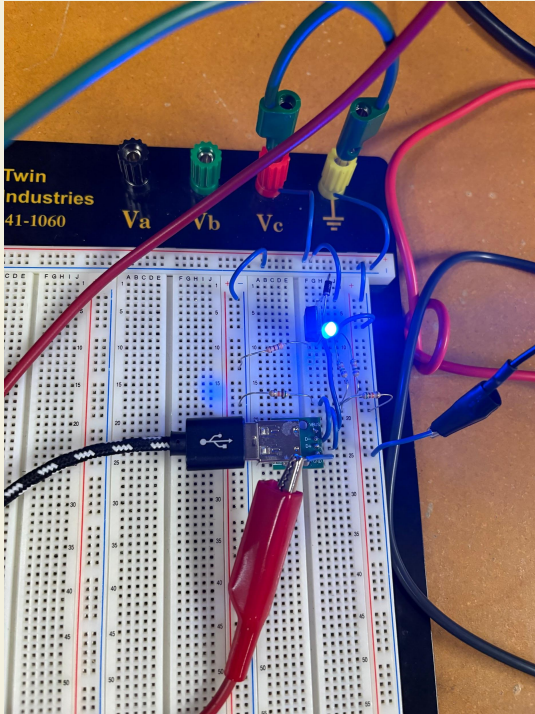
Why short the Data Pins?

Devices probe the Data Lines for information.

1. Device applies small voltage/current to D+ and D- .
2. When shorted the voltage equalize.
3. Universal standard to indicate a dedicated charging port (DCP).
4. Device understands that it can pull more current.



Implementation



The current draw of a random fan that runs on a rechargeable battery.

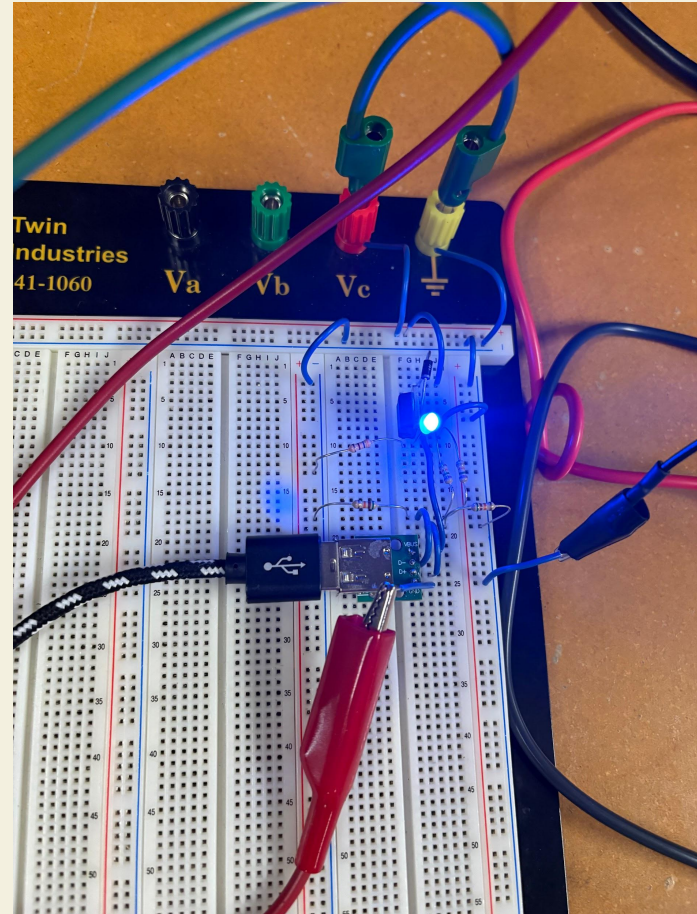
$$P = V * I$$

$P = 5V * 0.11A = 0.55W$ being supplied to the random rechargeable fan.

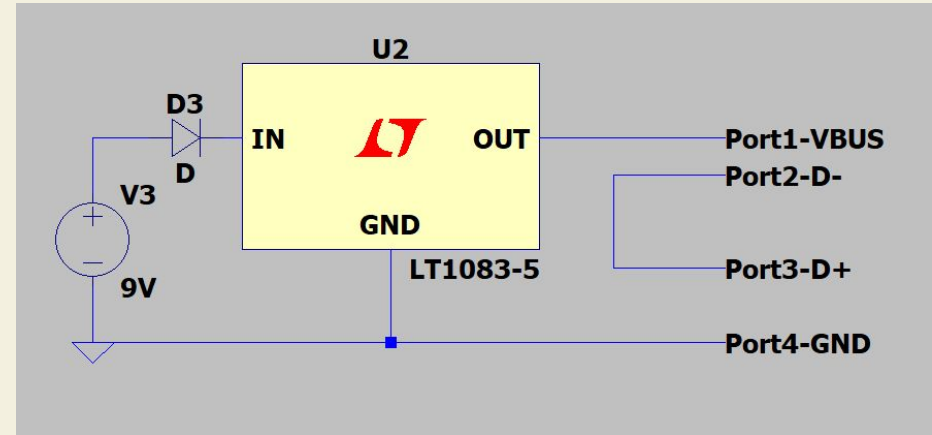
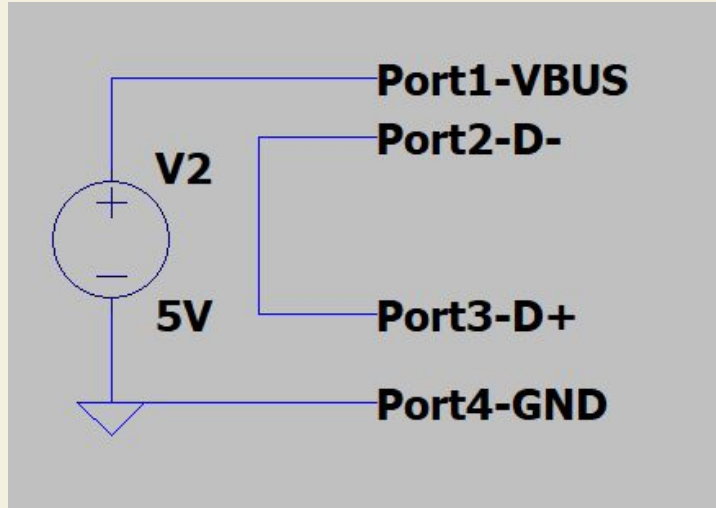
$$P = (9-5) * 0.11 = 0.44W \text{ dissipated by the LM7805}$$

Demonstration

We're gonna blow up David's
Iphone!

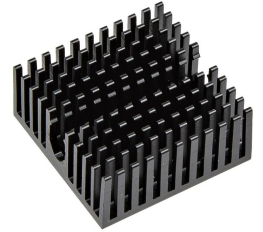


Problems Encountered



Soldering

Future Improvements



- Buck Converter (Converts Voltage more efficiently)