Power Notes

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1 High Level Design

- The entire system will be powered by a single 14V power supply. This is quite noisy, so we will need LDOs for all the logic level supplies. For the 14V power supply, let's use this: https://www.amazon.com/Universal-Adapter-Charger-Interchangeable-Adapters/dp/B0CPPPVG1G/ref=sr_1_3?crid=2KLES6HGGUCI2&dib=eyJ2IjoiMSJ9.4r7Cki0zlXUtJQKT-1hYuwlbBar_RD_jqO8kzk3YThAURSIVDYEFQyR5ftYOVwzLVe2k_Az4fdqSYnsUkUqUPjn3C6fEPJ39Uh68V2Aji0IBiFielAX_ZnYKr8bwzX3uQVFOwX4dY91pt86CmygiIaYbwo5iViyVy0eNgYn-7KdniKJ8pnflphct3hYxPMlpg8BKUBbNV4c0ou_J1ZHIAdPAI9vWayJgM&dib_tag=se&keywords=dc+power+supply+14V&qid=1727954337&sprefix=dc+power+supply+14v%2Caps%2C368&sr=8-3

- Let's use the AZ1117ID-ADJTRG1 for our 12V supply. It has a good PSRR of 70 dB @ 120 Hz. This works since Vin = Vout + 2V for the adj supply.

- Let's use the AZ1117ID-3.3 and AZ1117ID-5 for our 3.3V and 5V supplies respectively. For those, $1.5V < Vin - Vout < 10V$, so we can use the 12V supply as Vin so that Vin - Vout = 8.7V for the 3V3 supply and 7V for the 5V supply.

- Let's use the recommended 10 uF and 22 uF decoupling caps as recommended in the datasheet, and select caps that are low ESR.

2 Calculations

- For the adjustable supply, the resistors needed are given by this formula: VOUT=VREF * (1+R2/R1) + IADJ * R2

- The reference voltage is fixed at 1.25V. The IADJ can be ignored since it's very small.

- To get a 12V supply from 14V and setting R2 = 2kohms, 1k/R1 = 12/1.25 - 1 so R1 = 232.558139534 ohms.