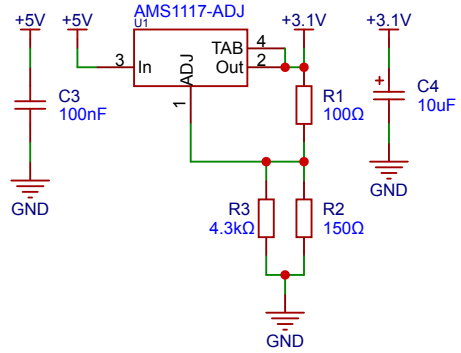
Voltage Regulator

Datasheet



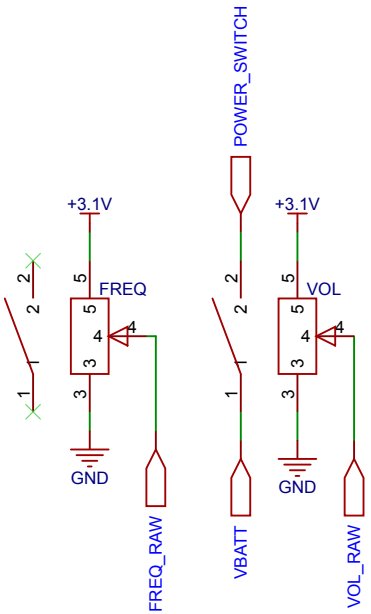
The ESP32-S3 ADC can only read voltages up to roughly 3.1V. (The exact max value depends on the ADC reference voltage, which varies from chip to chip.) Rather than use a fixed resistor in series with the potentiometers to limit the maximum reading, we used an adjustable voltage regulator. This ensured that the circuit would continue to work even if we had to switch to potentiometers with a different resistance range.

This adjustable regulator is calibrated to produce an output voltage slightly below 3.1V (3.06V) and was intended to ensure that the potentiometers never read higher than the maximum voltage measurable by the ESP32-S3 ADC. However, given variability in the ADC reference voltage, this is actually slightly too high.

If you wanted to optimize BOM, you could change the resistors to output 2.8V or less and remove the resistor dividers of R37-R40 in the main board schematic.

Potentiometers

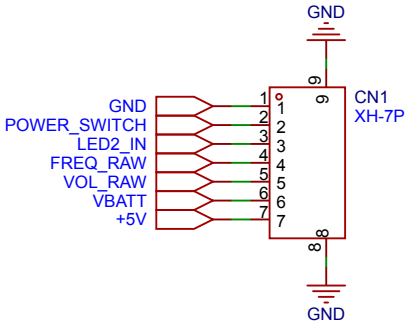
Datasheet



To reduce potential errors during assembly and prevent the possibility of mis-wiring, it was important that the potentiometers be soldered to a PCB. Because potentiometers do not have consistent heights, it was cheaper to use two switch-potentiometers, even though the frequency dial did not need a switch. We used physical stops in the enclosure to prevent the potentiometer from reaching the switch range.

These potentiometers have about 240° of rotational travel, excluding the switch portion. However, they have a dead zone at both the minimum and maximum end of that travel, documented to be about 5% on each side, but in our testing was often closer to 10%, leaving only 192° of measurable position. For the frequency dial, this necessitated careful calibration and knob placement to ensure that the full 180° range was measurable.

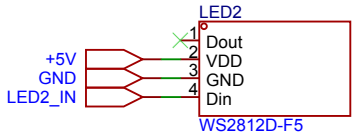
Connector



This SMT connector is compatible with a JST XH (2.54mm) connector. We opted for SMT to minimize assembly costs. The JST XH cables we used were wired such that pin 1 on one end connected to pin 7 on the other. Therefore, the pinout here is inverted relative to the main board.

Note that VBATT is used for signaling (see the "IP5306 Workarounds" section of the main board schematic) and not power; it carries virtually no current.

Status LED



Page	Front	Radio Front Daughterboard			
Update Date	2025-03-07				
Create Date	2024-09-16	VER	SIZE	PAGE 1 OF 1	
EasyEDA		V0.1	A4	Death & Mayhem	