

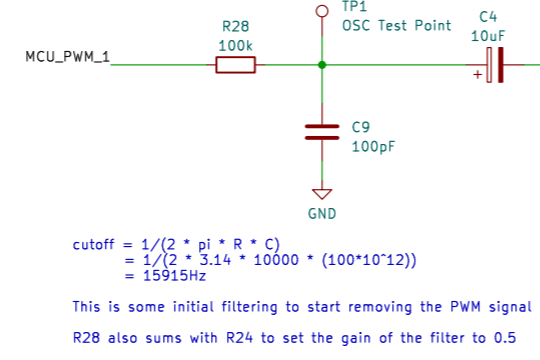
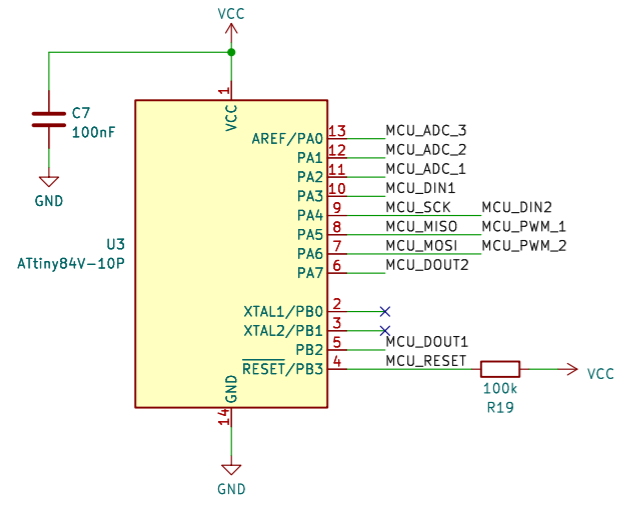
$$\text{cutoff} = \frac{1}{\sqrt{2} * \pi * R * C}$$

$$= \frac{1}{\sqrt{2} * 3.14 * 10000 * (10 * 10^{-9})}$$

$$= 1592\text{Hz}$$

Using a low cutoff given this signal should be LFO rate

R29 in combination with R18 halves the range of the signal so it plays nicely with the 0 to 2.5v range for the JFETs, and means we don't get issues with the input voltage to the op-amp being in the 4.5v to 5v range.



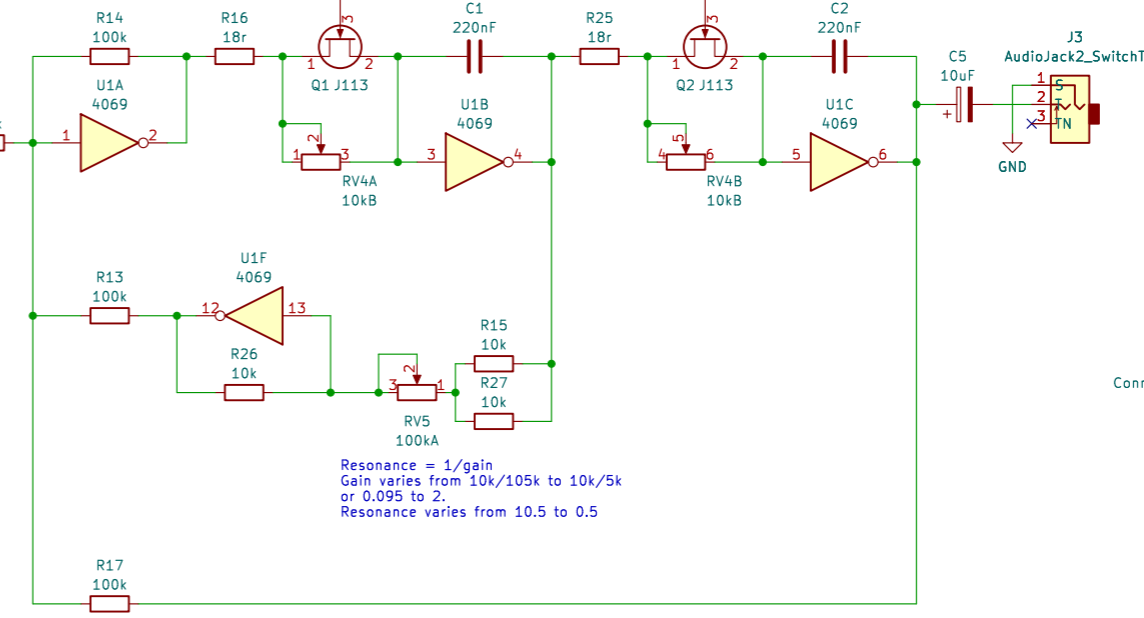
$$\text{cutoff} = \frac{1}{\sqrt{2} * \pi * R * C}$$

$$= \frac{1}{\sqrt{2} * 3.14 * 10000 * (100 * 10^{-12})}$$

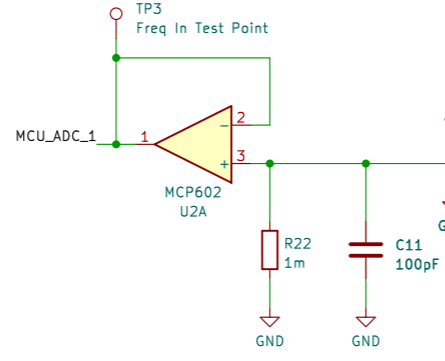
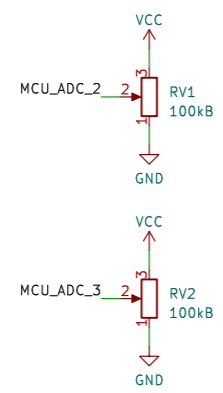
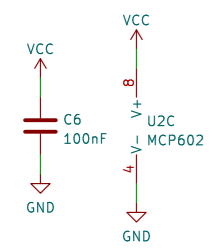
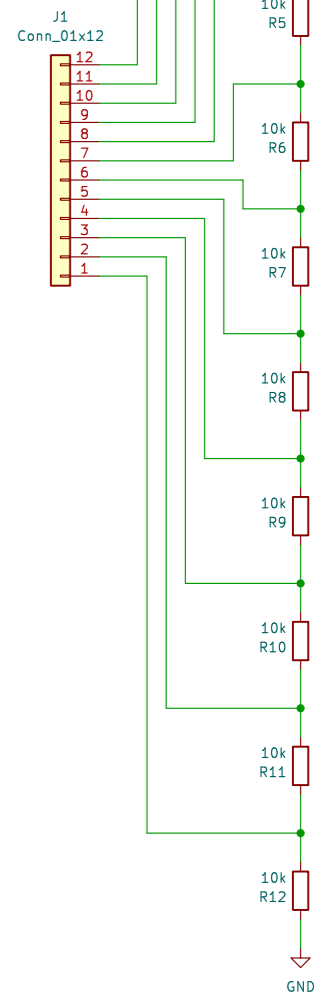
$$= 15915\text{Hz}$$

This is some initial filtering to start removing the PWM signal

R28 also sums with R24 to set the gain of the filter to 0.5



Resonance = $1/\text{gain}$
 Gain varies from 10k/105k to 10k/5k
 or 0.095 to 2.
 Resonance varies from 10.5 to 0.5



Cut off varies depending on position on keyboard being played

$r = 33\text{k to }143\text{k}$
 $f = \frac{1}{\sqrt{2} * \pi * R * C}$

at top of keyboard
 $= \frac{1}{\sqrt{2} * 3.14 * 33000 * (10 * 10^{-9})}$
 $= 48253\text{Hz}$

at bottom of keyboard
 $= \frac{1}{\sqrt{2} * 3.14 * 143000 * (10 * 10^{-9})}$
 $= 11135\text{Hz}$

Mainly just to try and stop any noise spikes retriggering things

