

Neptune

Winterbloom

A salty diode ladder filter

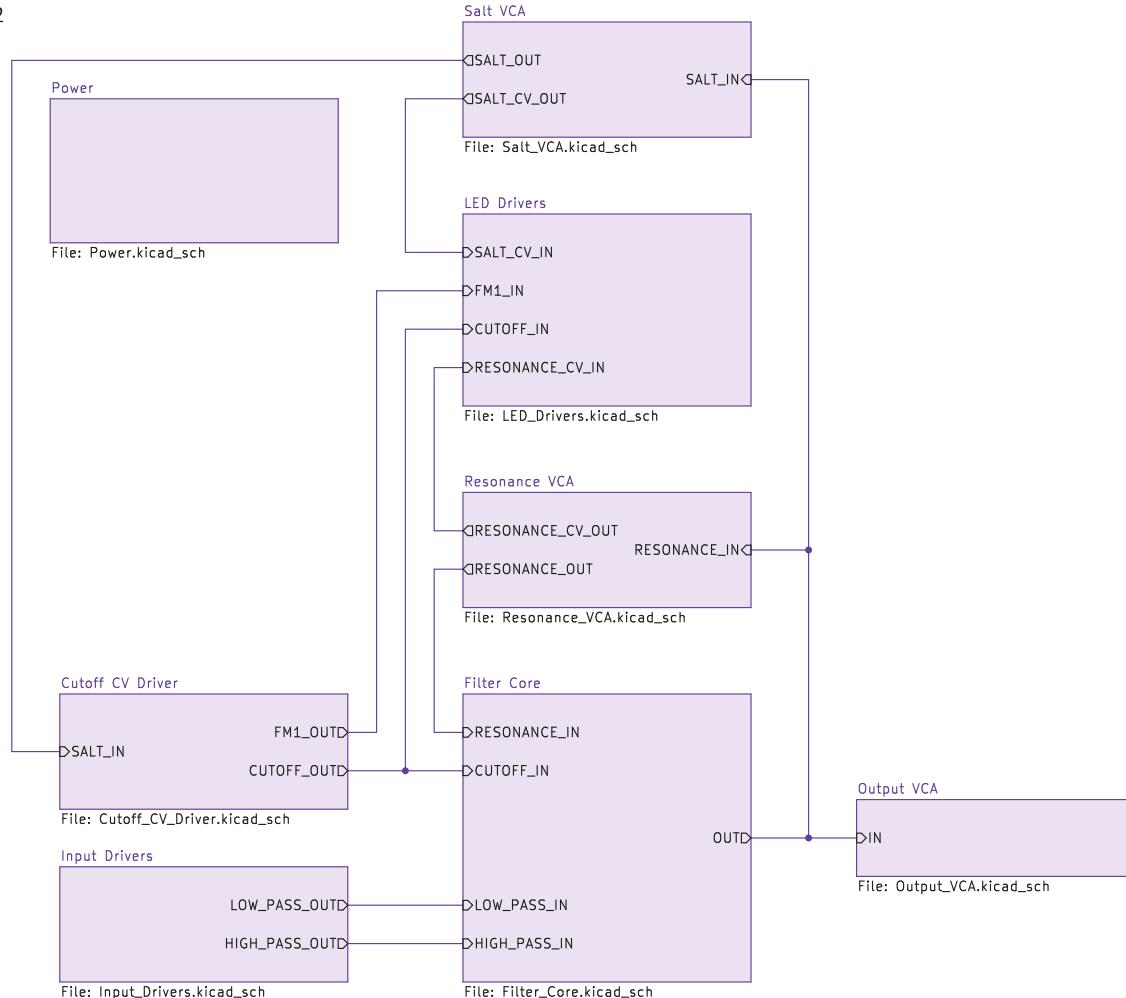
Designed by Carson Walls & Thea Flowers

Inspired by Moritz Klein & Arturia

Open-source hardware under CERN-OHL-P V2

Documentation: <https://heptune.wntr.dev>

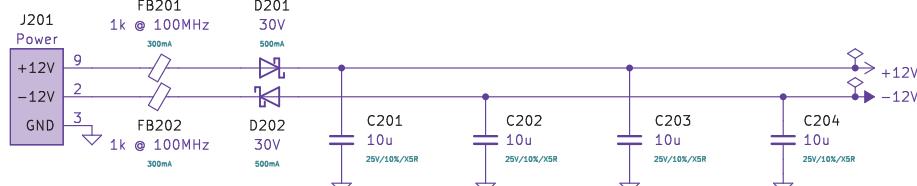
Source: <https://github.com/wntrblm/Neptune>



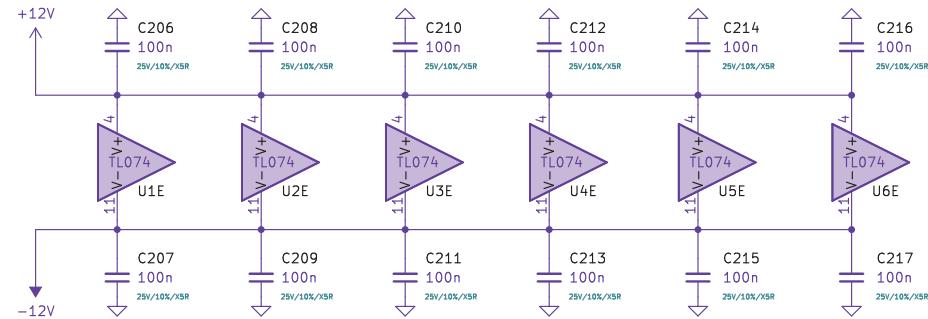
Power

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Power Input and Bulk Decoupling

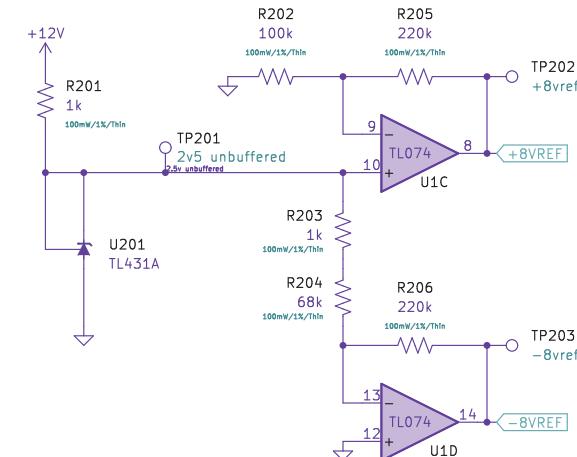


Op Amp Decoupling



±8V references

Sink or source roughly $\pm 10\text{mA}$
Absolute accuracy is not important, just stability



Input Drivers

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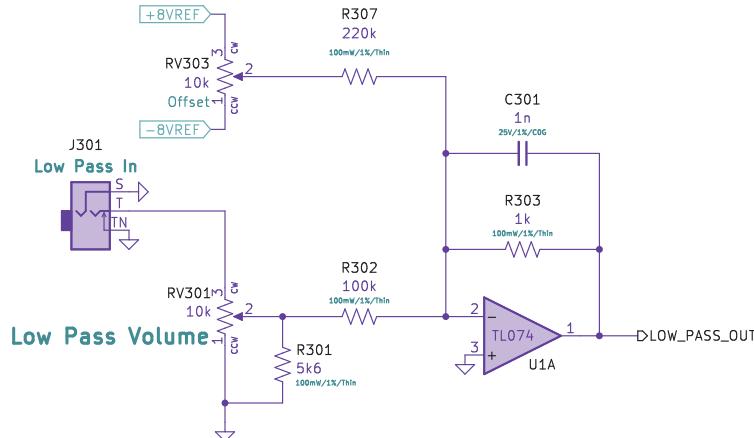
Reduces input amplitude, corrects signal inversion, and limits high frequencies into the filter core

Input amplitude: ± 5 V nominal
Output amplitude: ± 50 mV nominal
Cutoff frequency: ~ 150 kHz

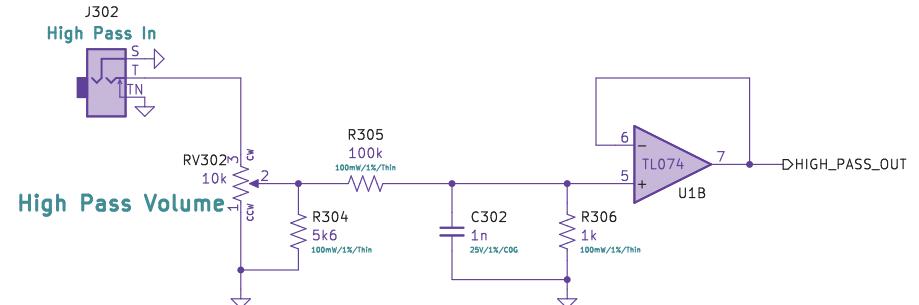
Notes:

- Resistor going from pot wiper to ground can be adjusted to change the volume curve

Low pass



High pass

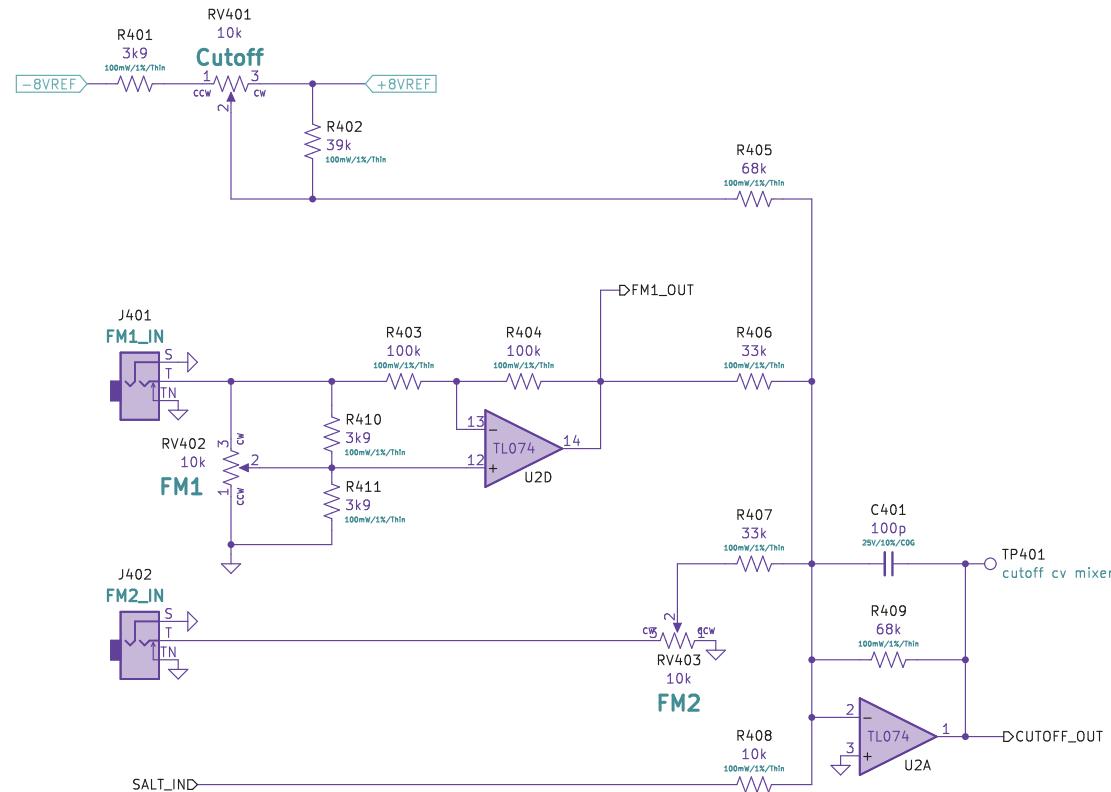


Cutoff CV Driver

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Mixes the various modulation sources for the cutoff frequency

CV input: 5 V nominal
CV Cutoff: ~15 kHz

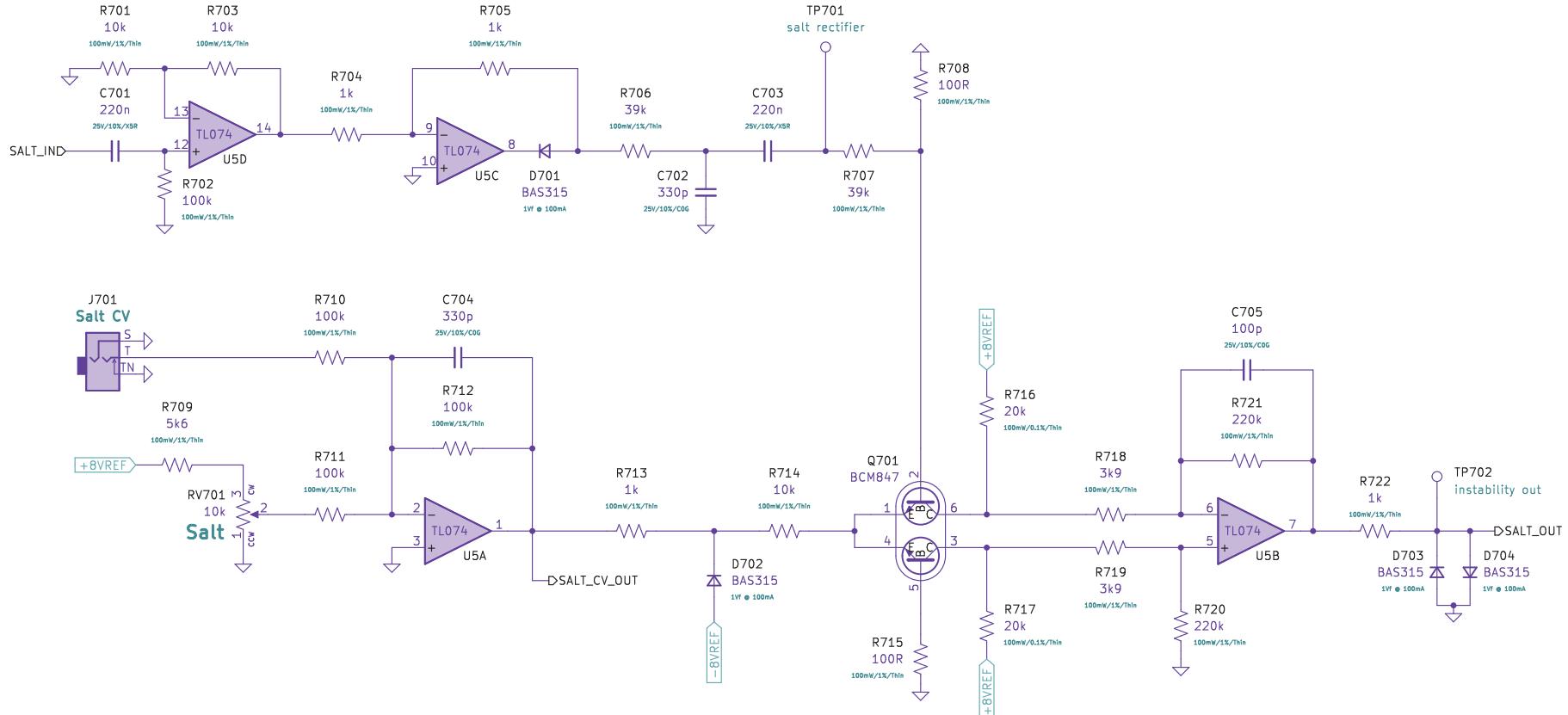


Salt VCA

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Controls the depth of the Salt feedback circuit.
Rectifies, AC couples, and clips filter output before using it to modulate the cutoff frequency

CV input: 5V nominal
CV cutoff: ~2.5 kHz
Salt in high pass cutoff frequency: TBD
Salt in high low cutoff frequency: TBD



Resonance VCA

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Controls the depth of the resonance feedback circuit

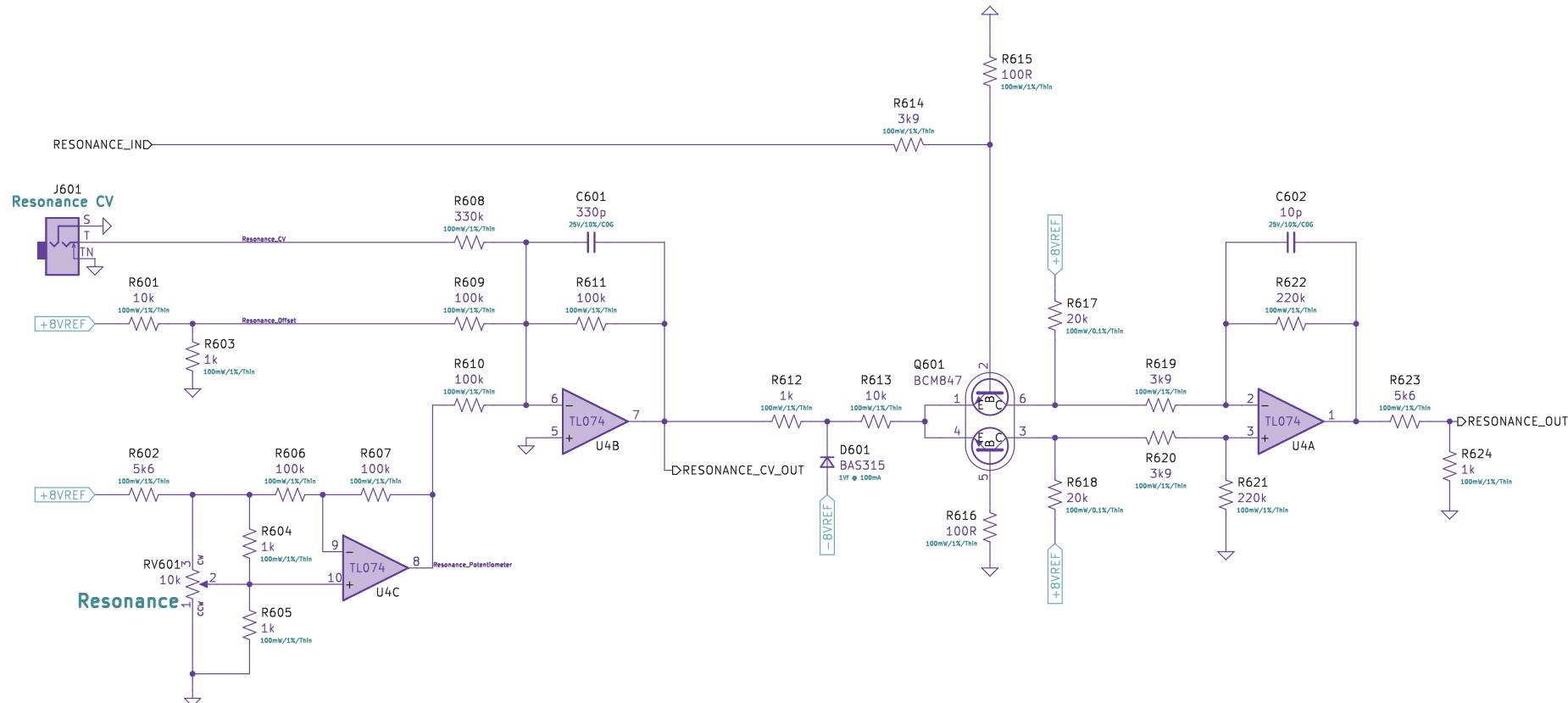
CV input: 5 V nominal

CV Cutoff: ~2.5 kHz

Self resonance gain threshold: -8 dB

Max self resonant frequency: ~16 kHz

Max gain: -5.5 dB



Filter Core

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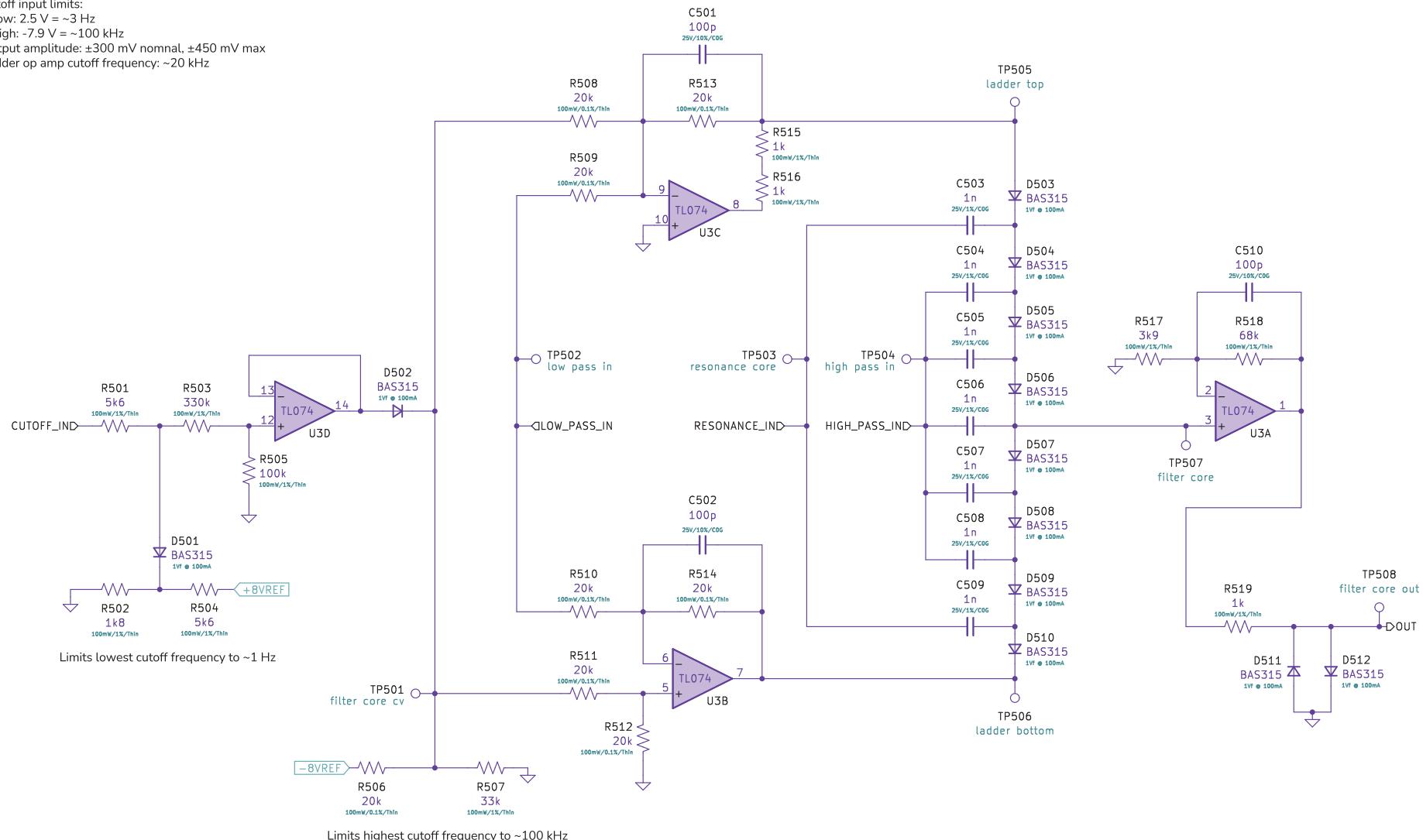
4-pole diode ladder filter topology

Low pass & high pass input amplitude: ± 50 mV nominal max
Resonance input self oscillation threshold: ~ 200 mV

Cutoff input limits:

- Low: 2.5 V = ~ 3 Hz
- High: -7.9 V = ~ 100 kHz

Output amplitude: ± 300 mV nominal, ± 450 mV max
Ladder op amp cutoff frequency: ~ 20 kHz

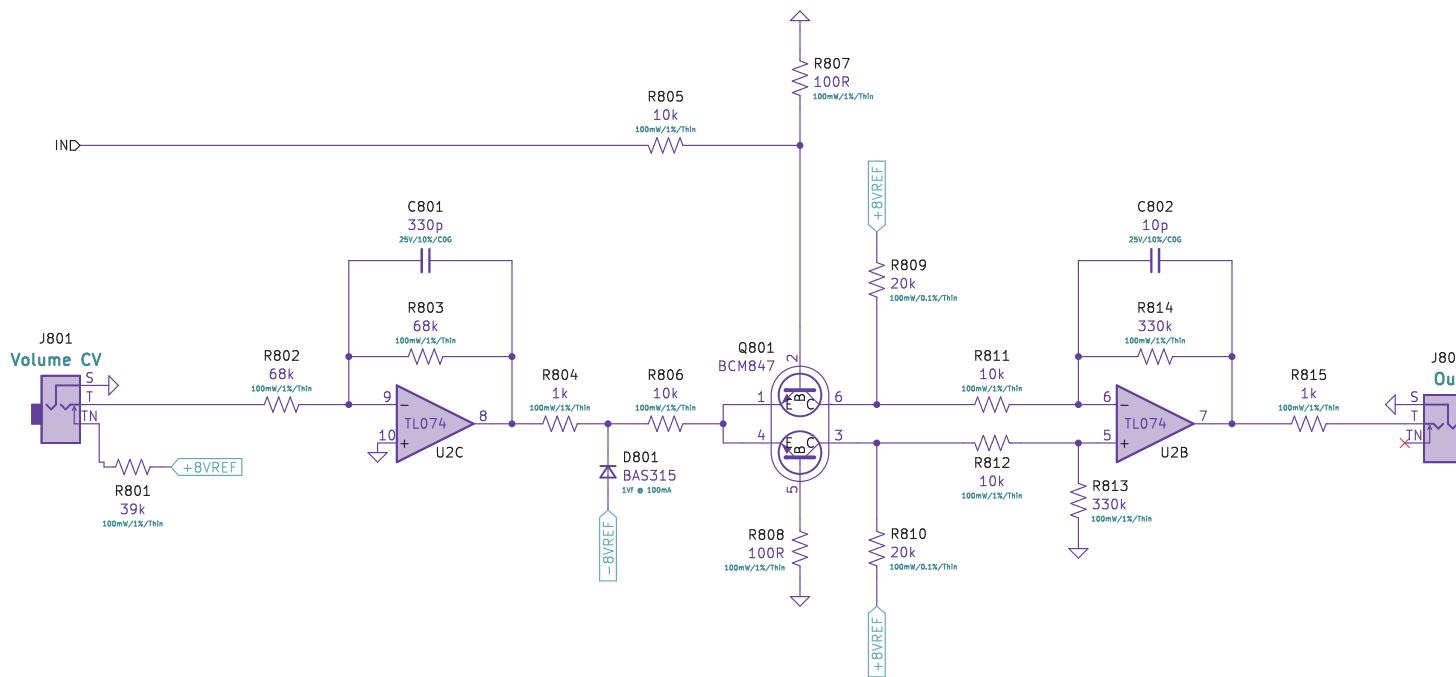


Output VCA

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Controls overall output volume

CV input: 5 V nominal
CV cutoff: ~2.5 kHz



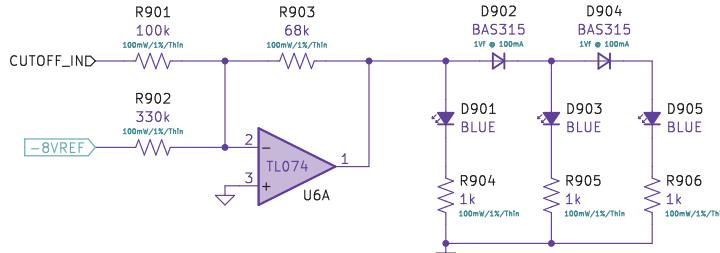
LED Drivers

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All LEDs target max brightness @ 5 mA

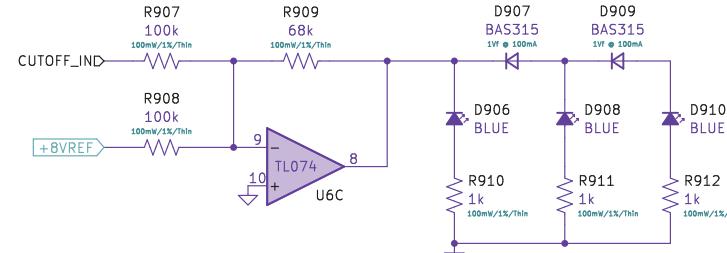
Cutoff low pass LEDs

Illuminates as low pass filter opens up

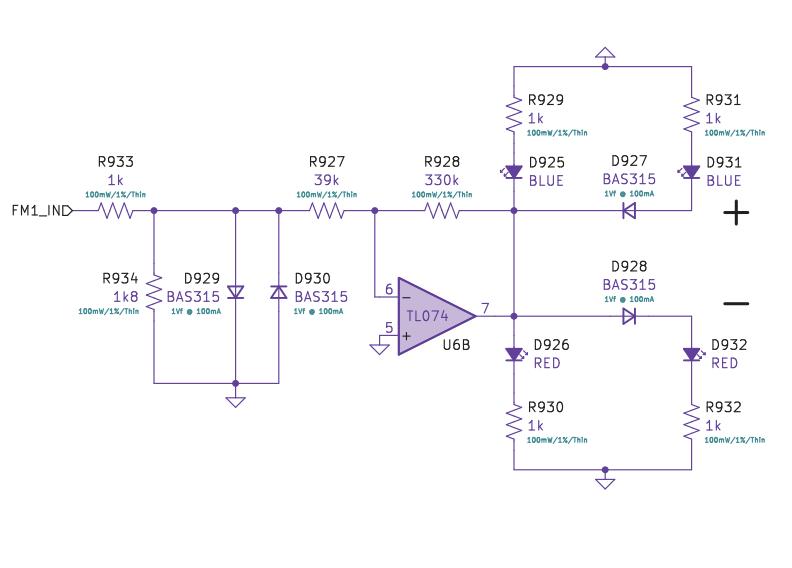


Cutoff high pass LEDs

Illuminates as high pass filter opens up

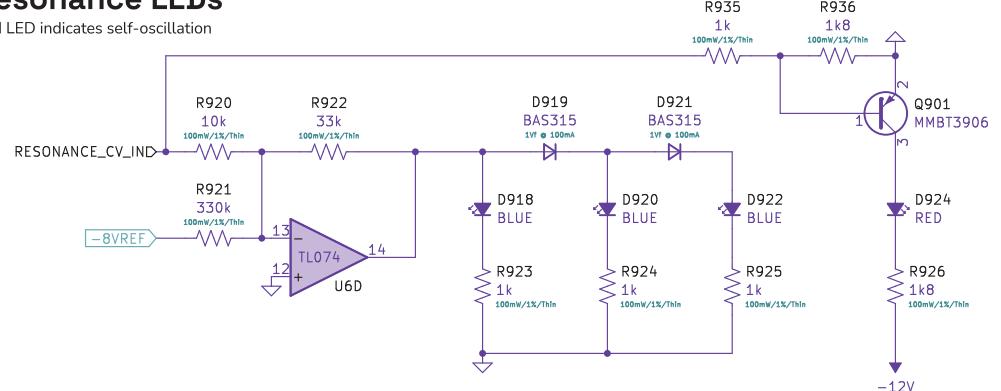


FM1 LEDs



Resonance LEDs

Red LED indicates self-oscillation



Salt LEDs

