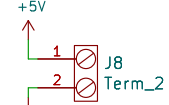
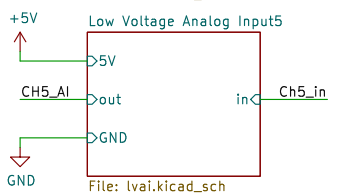
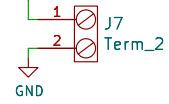
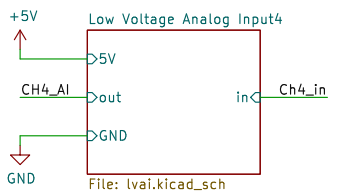
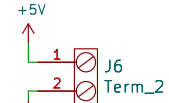
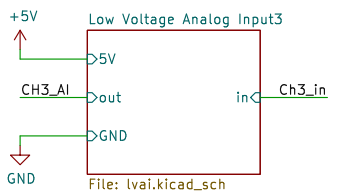
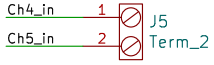
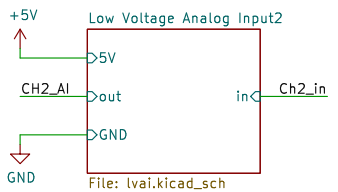
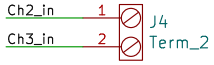
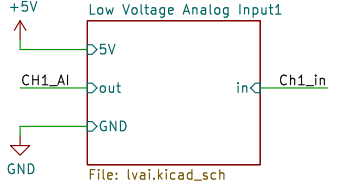
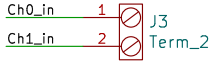
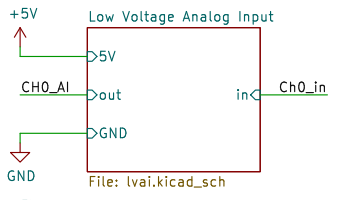
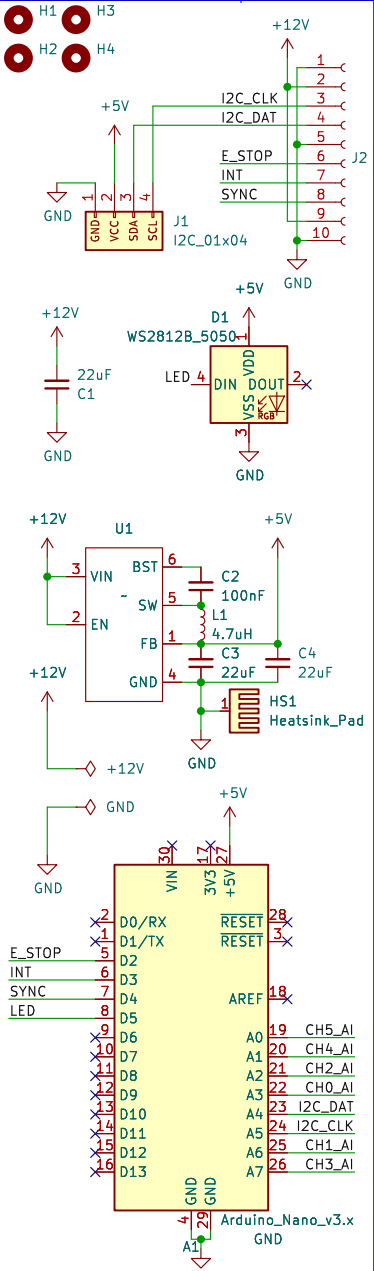
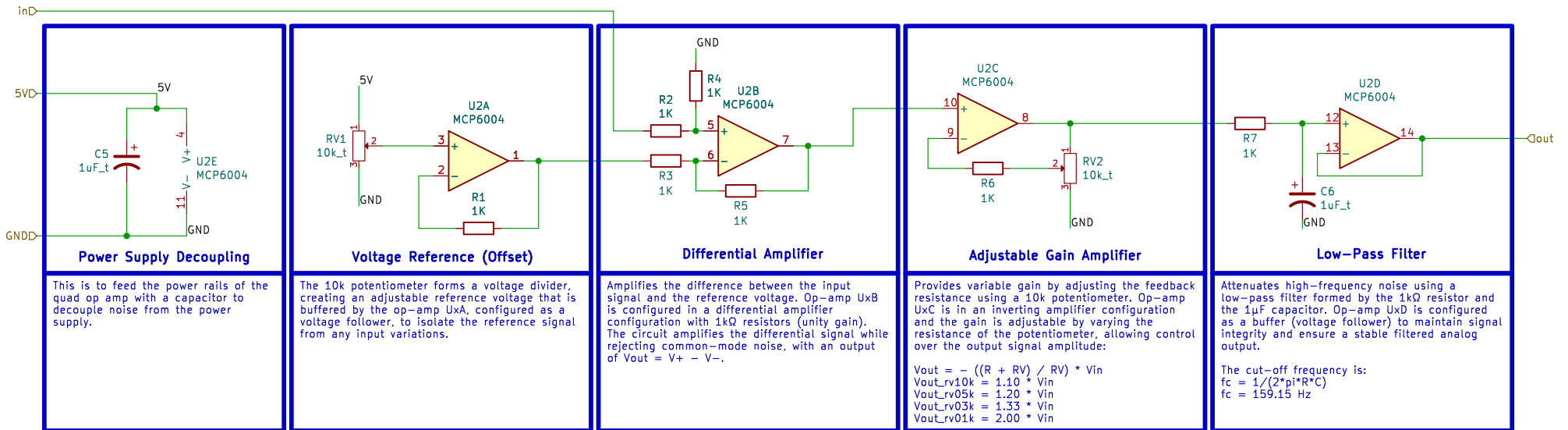


Core Slice Components



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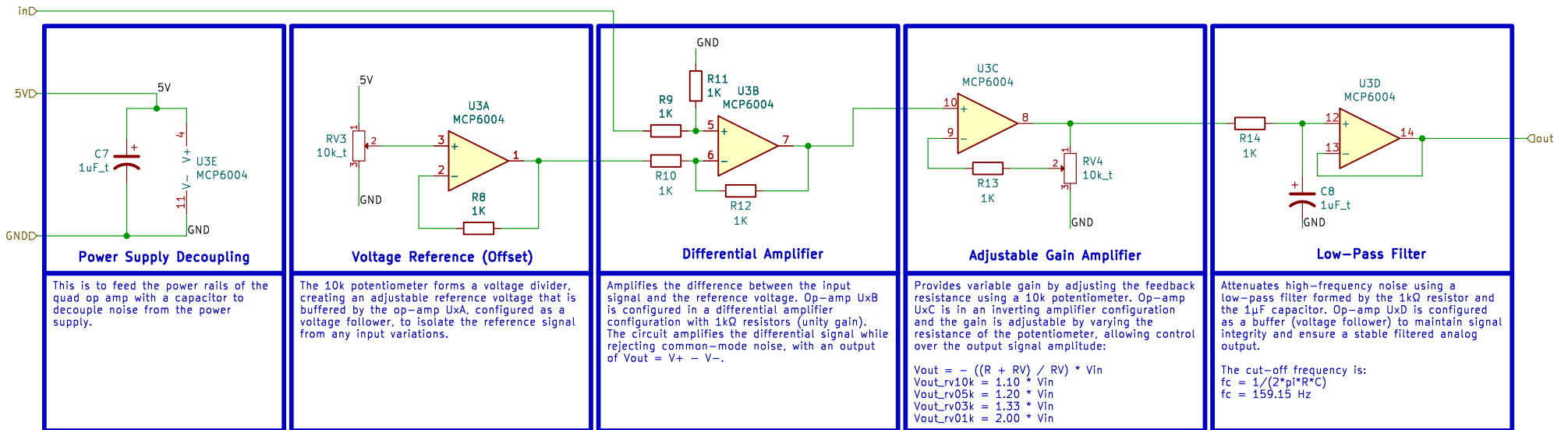
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This is to feed the power rails of the quad op amp with a capacitor to decouple noise from the power supply.

The 10k potentiometer forms a voltage divider, creating an adjustable reference voltage that is buffered by the op-amp UxA, configured as a voltage follower, to isolate the reference signal from any input variations.

Amplifies the difference between the input signal and the reference voltage. Op-amp UxB is configured in a differential amplifier configuration with 1kΩ resistors (unity gain). The circuit amplifies the differential signal while rejecting common-mode noise, with an output of $V_{out} = V_+ - V_-$.

Provides variable gain by adjusting the feedback resistance using a 10k potentiometer. Op-amp UxC is in an inverting amplifier configuration and the gain is adjustable by varying the resistance of the potentiometer, allowing control over the output signal amplitude:

$$V_{out} = - \left(\frac{R + RV}{RV} \right) * V_{in}$$

$V_{out_rv10k} = 1.10 * V_{in}$
 $V_{out_rv05k} = 1.20 * V_{in}$
 $V_{out_rv03k} = 1.33 * V_{in}$
 $V_{out_rv01k} = 2.00 * V_{in}$

Attenuates high-frequency noise using a low-pass filter formed by the 1kΩ resistor and the 1μF capacitor. Op-amp UxD is configured as a buffer (voltage follower) to maintain signal integrity and ensure a stable filtered analog output.

The cut-off frequency is:
 $f_c = 1 / (2 * \pi * R * C)$
 $f_c = 159.15 \text{ Hz}$

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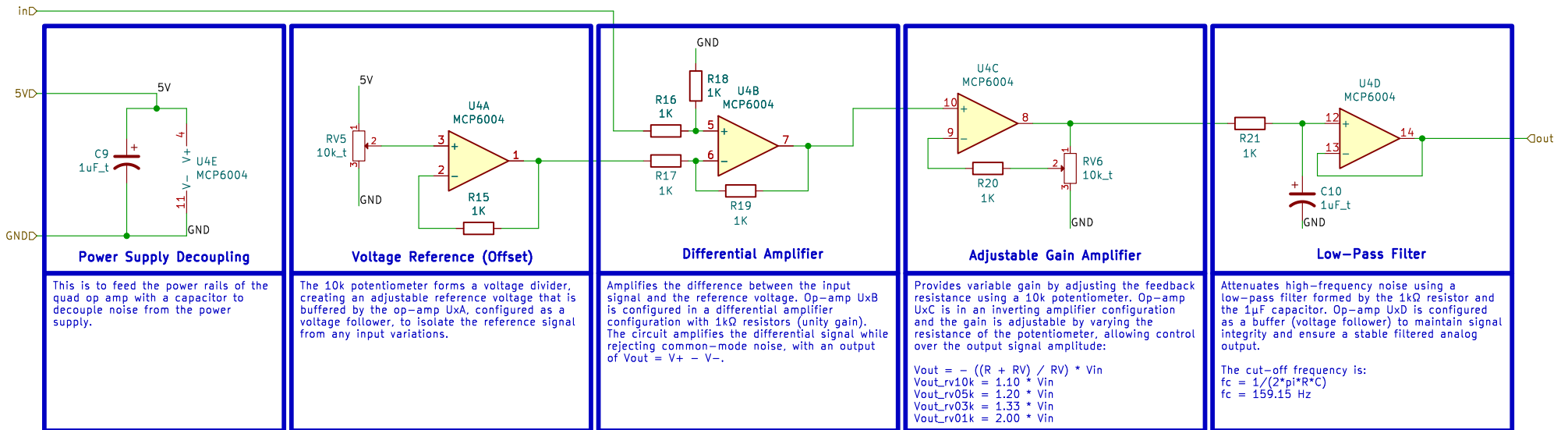
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Power Supply Decoupling

This is to feed the power rails of the quad op amp with a capacitor to decouple noise from the power supply.

Voltage Reference (Offset)

The 10k potentiometer forms a voltage divider, creating an adjustable reference voltage that is buffered by the op-amp UxA, configured as a voltage follower, to isolate the reference signal from any input variations.

Differential Amplifier

Amplifies the difference between the input signal and the reference voltage. Op-amp UxB is configured in a differential amplifier configuration with 1kΩ resistors (unity gain). The circuit amplifies the differential signal while rejecting common-mode noise, with an output of $V_{out} = V_+ - V_-$.

Adjustable Gain Amplifier

Provides variable gain by adjusting the feedback resistance using a 10k potentiometer. Op-amp UxC is in an inverting amplifier configuration and the gain is adjustable by varying the resistance of the potentiometer, allowing control over the output signal amplitude:

$$V_{out} = - \left(\frac{R + RV}{RV} \right) * V_{in}$$

$V_{out_rv10k} = 1.10 * V_{in}$
 $V_{out_rv05k} = 1.20 * V_{in}$
 $V_{out_rv03k} = 1.33 * V_{in}$
 $V_{out_rv01k} = 2.00 * V_{in}$

Low-Pass Filter

Attenuates high-frequency noise using a low-pass filter formed by the 1kΩ resistor and the 1μF capacitor. Op-amp UxD is configured as a buffer (voltage follower) to maintain signal integrity and ensure a stable filtered analog output.

The cut-off frequency is:
 $f_c = 1 / (2 * \pi * R * C)$
 $f_c = 159.15 \text{ Hz}$

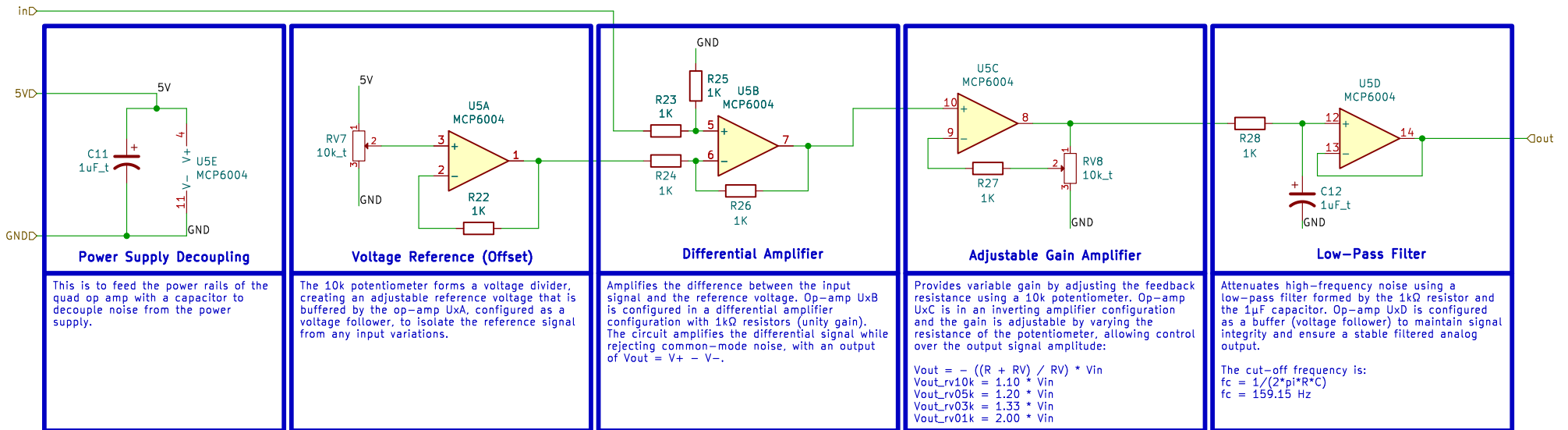
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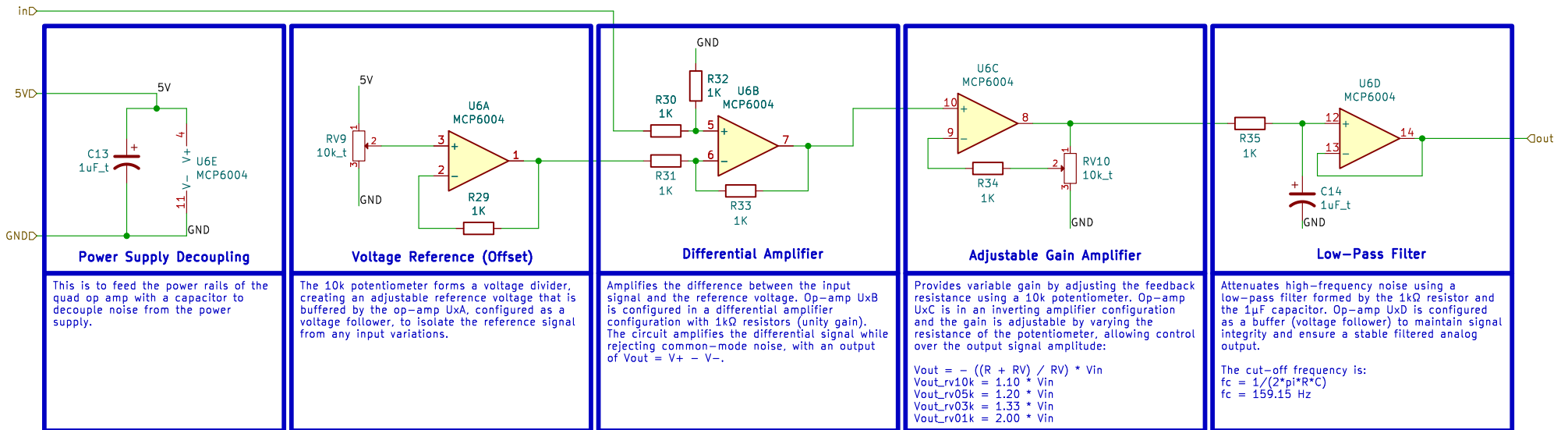
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This is to feed the power rails of the quad op amp with a capacitor to decouple noise from the power supply.

The 10k potentiometer forms a voltage divider, creating an adjustable reference voltage that is buffered by the op-amp UxA, configured as a voltage follower, to isolate the reference signal from any input variations.

Amplifies the difference between the input signal and the reference voltage. Op-amp UxB is configured in a differential amplifier configuration with 1kΩ resistors (unity gain). The circuit amplifies the differential signal while rejecting common-mode noise, with an output of $V_{out} = V_+ - V_-$.

Provides variable gain by adjusting the feedback resistance using a 10k potentiometer. Op-amp UxC is in an inverting amplifier configuration and the gain is adjustable by varying the resistance of the potentiometer, allowing control over the output signal amplitude:

$$V_{out} = - \left(\frac{R + RV}{RV} \right) * V_{in}$$

$V_{out_rv10k} = 1.10 * V_{in}$
 $V_{out_rv05k} = 1.20 * V_{in}$
 $V_{out_rv03k} = 1.33 * V_{in}$
 $V_{out_rv01k} = 2.00 * V_{in}$

Attenuates high-frequency noise using a low-pass filter formed by the 1kΩ resistor and the 1μF capacitor. Op-amp UxD is configured as a buffer (voltage follower) to maintain signal integrity and ensure a stable filtered analog output.

The cut-off frequency is:
 $f_c = 1 / (2 * \pi * R * C)$
 $f_c = 159.15 \text{ Hz}$

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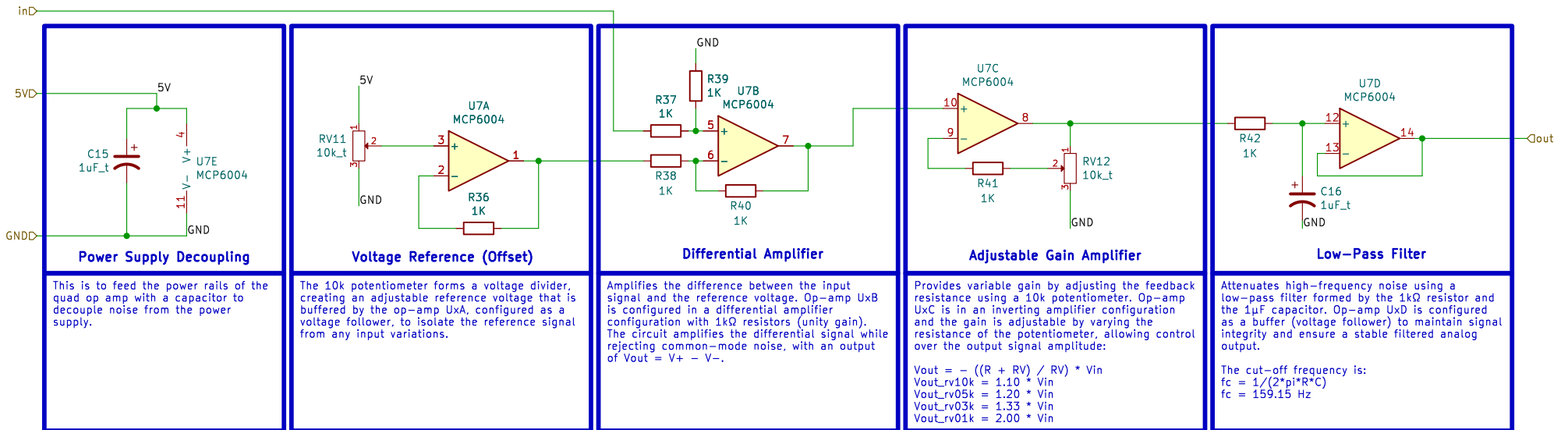
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