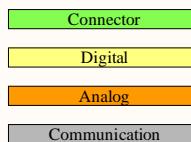


# ECSE478 - DAQ Device

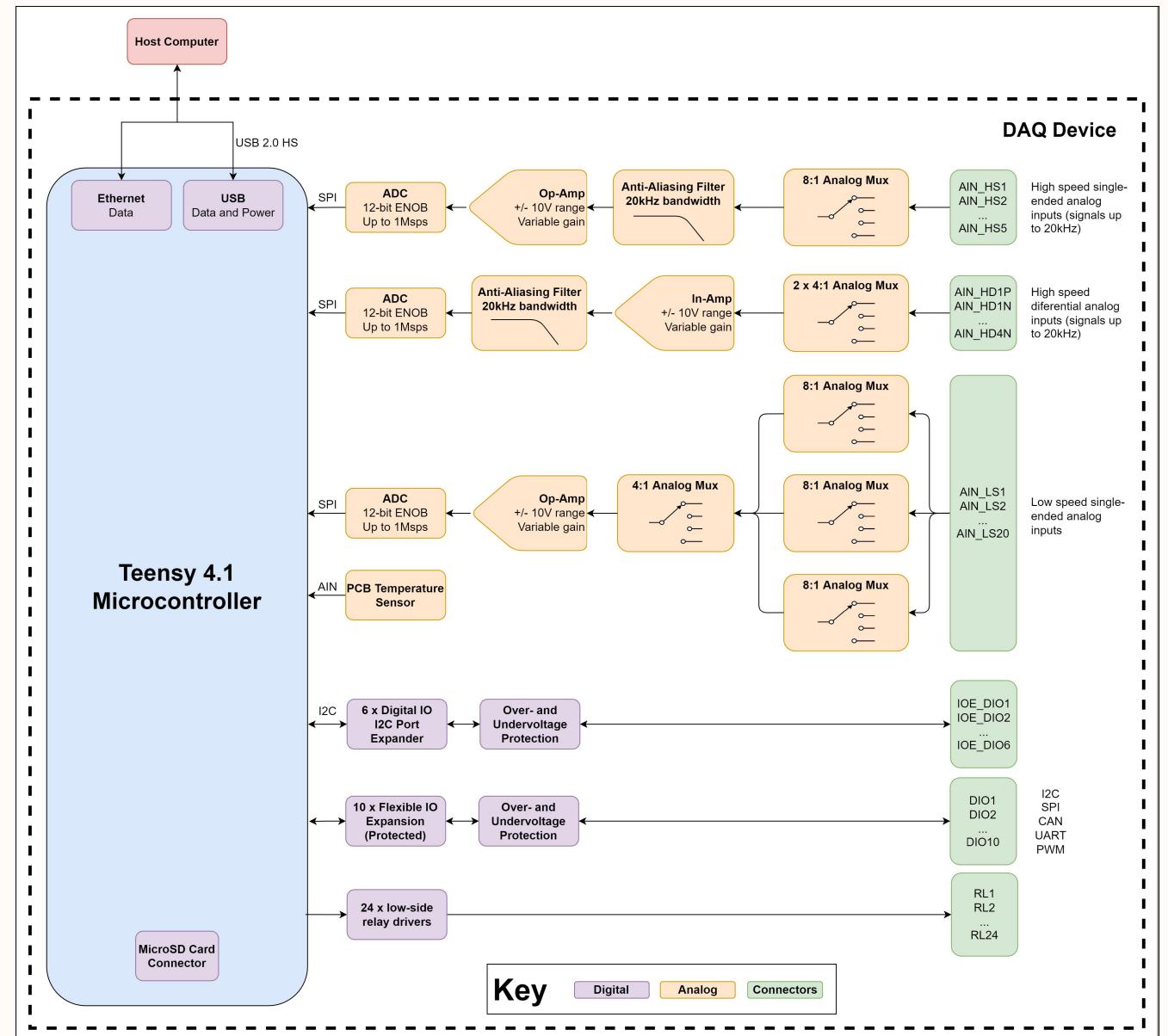
## Table of Contents

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- 11 Analog - Low Speed Single-Ended
- 12 ADC
- 13 Debug

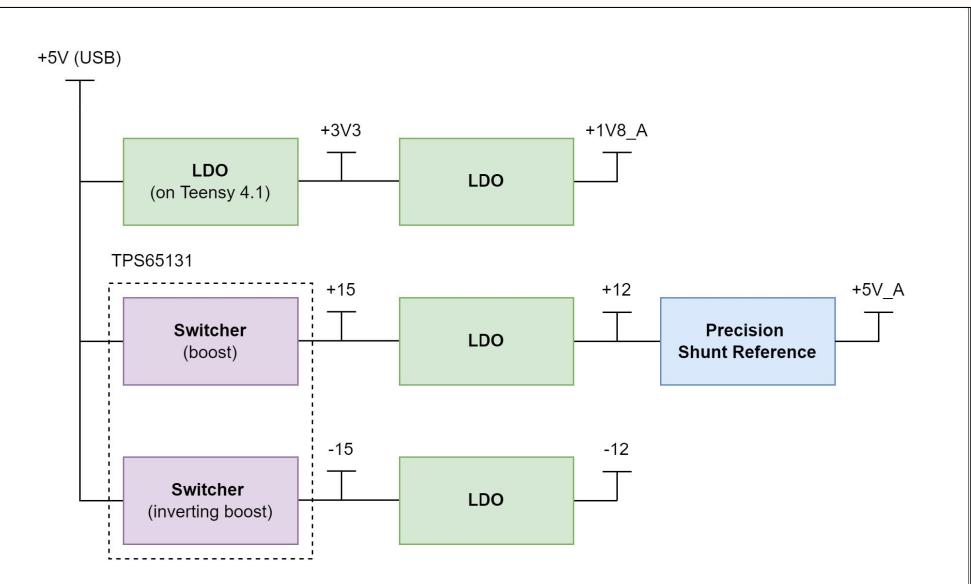
## Port Colors



## Main Block Diagram



## Power Architecture



DE = differential-ended  
SE = single-ended

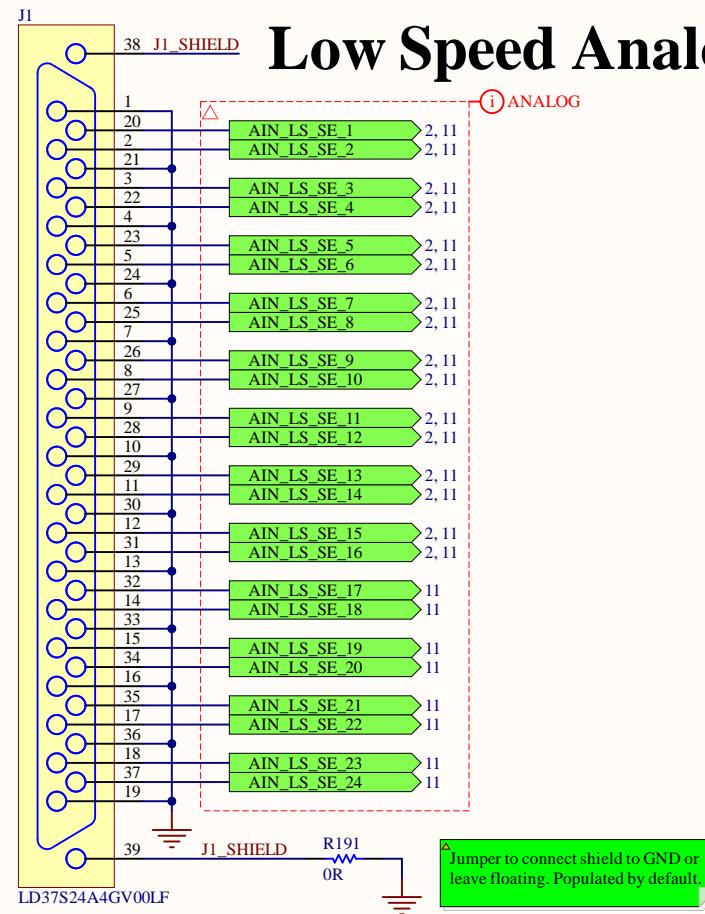
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B

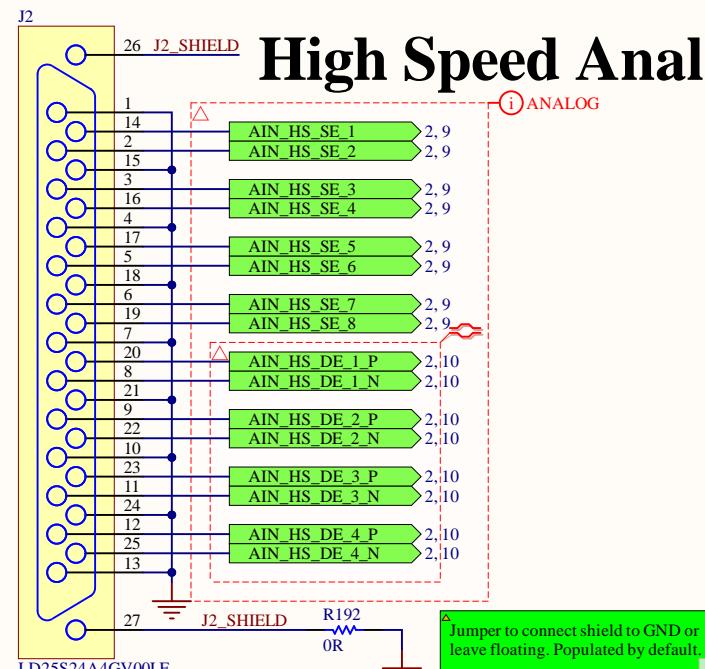
C

D

## Low Speed Analog

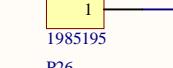
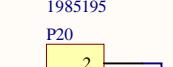
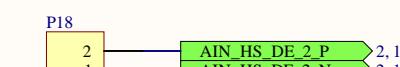
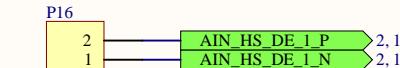
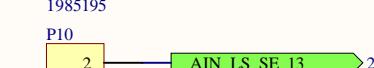
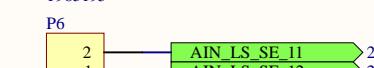
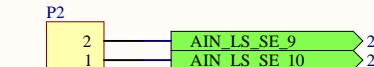
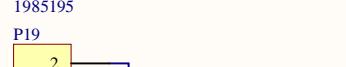
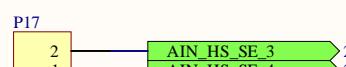
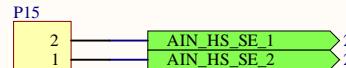
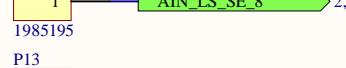
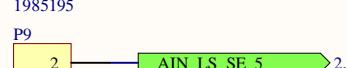
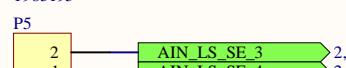
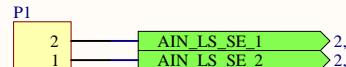


## High Speed Analog

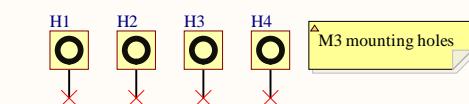
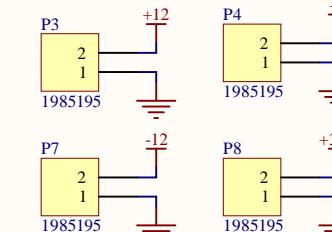


# Connectors - Analog

Terminal blocks are used alongside DB25 and DB37 connectors to allow quick connections, e.g. during prototyping, and full expansion use.



## Power



Title

### Connectors - Analog

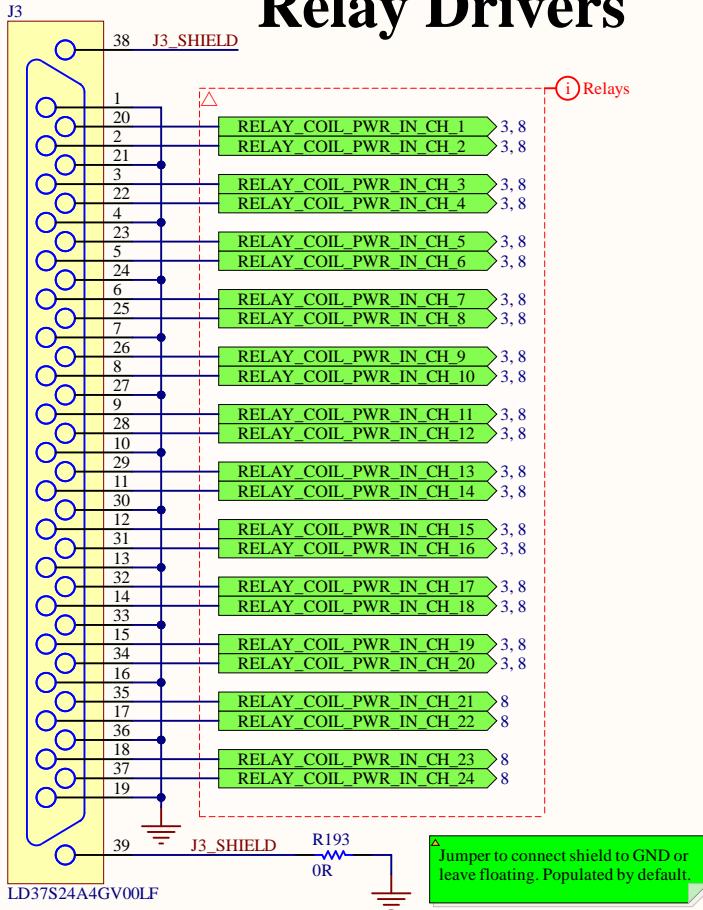
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Date: 2023-03-25 Time: 6:49:28 PM Sheet 2 of 13

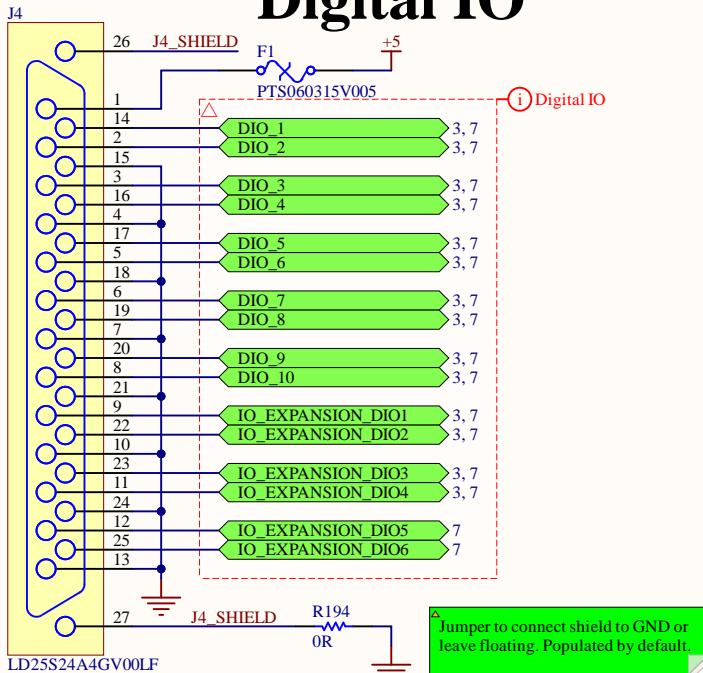
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## Relay Drivers

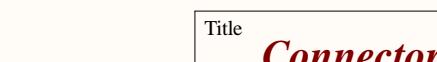
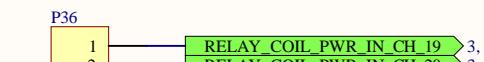
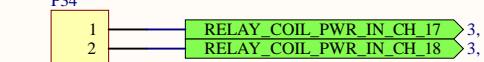
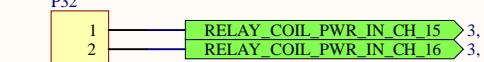
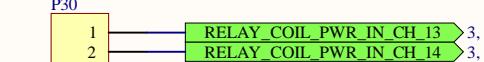
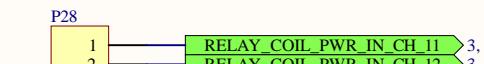
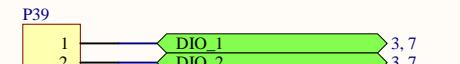
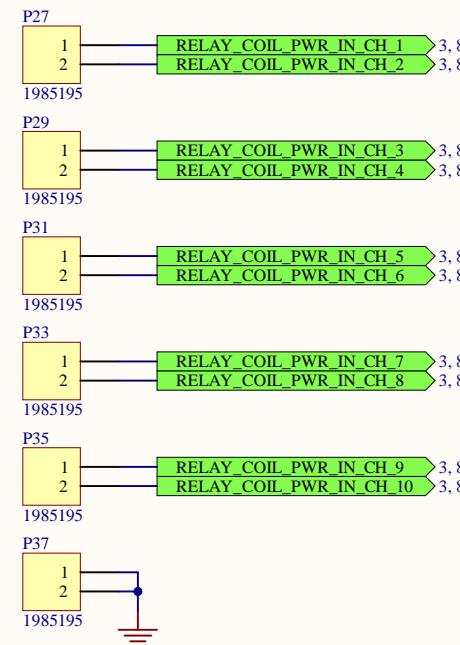


## Digital IO



# Connectors - Digital

Terminal blocks are used alongside DB25 and DB37 connectors to allow quick connections, e.g. during prototyping, and full expansion use.



Title **Connectors - Digital**

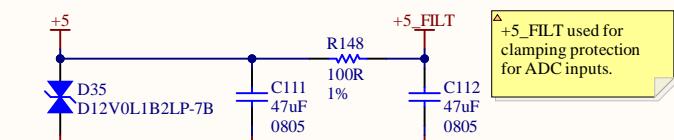
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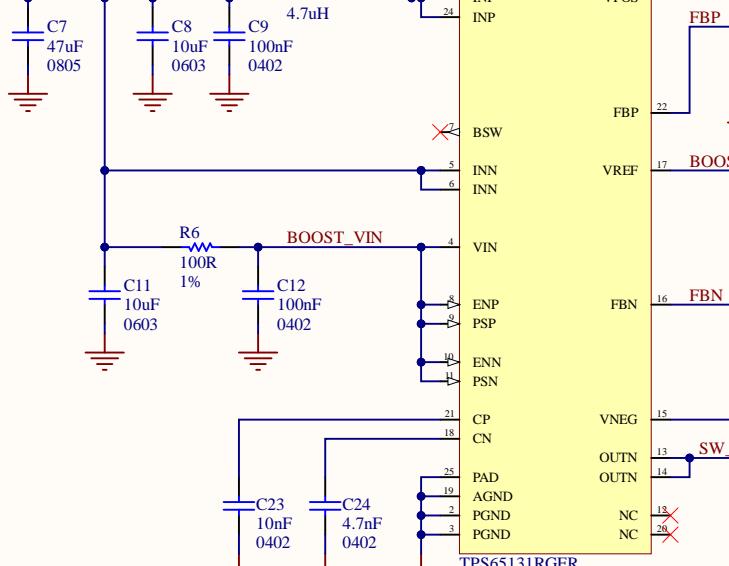
# Power



Place D35 close to connector.

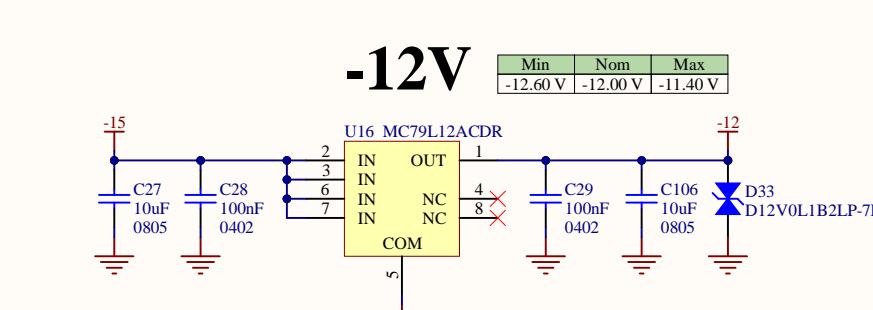
**+/- 15V**

Rail	Min	Nom	Max
+15 V	14.47 V	14.90 V	15.33 V
-15 V	-15.15 V	-14.71 V	-14.26 V



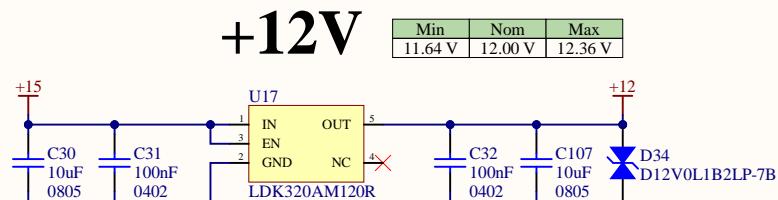
Place D35 close to connector.

**+/- 15V**



**-12V**

Min	Nom	Max
-12.60 V	-12.00 V	-11.40 V



**+12V**

Min	Nom	Max
11.64 V	12.00 V	12.36 V

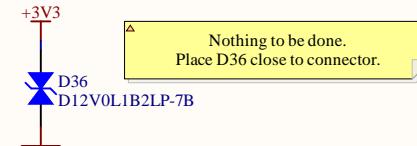
Place D33, D34 close to connector.

R82 + C78 form low-pass filter, cutoff around 225Hz. R82 may be depopulated to use external +15V supply.

**+5V (from USB port on Teensy :))**

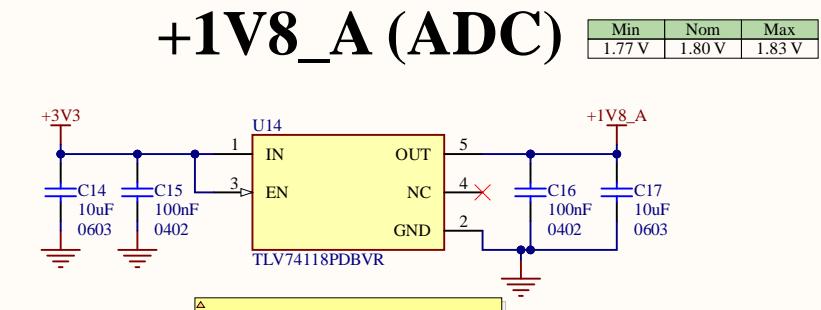
Nothing to be done.

**+3V3 (from Teensy :))**



Nothing to be done.  
Place D36 close to connector.

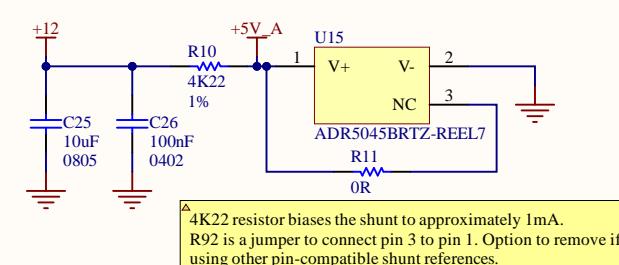
**+1V8\_A (ADC)**



Place +1V8\_A regulator close to ADCs.

**+5V\_A (Analog Reference)**

Voltage reference IC. Keep away from noisy sources and place close to ADCs.



4K22 resistor biases the shunt to approximately 1mA.  
R92 is a jumper to connect pin 3 to pin 1. Option to remove if using other pin-compatible shunt references.

Title  
**Power**

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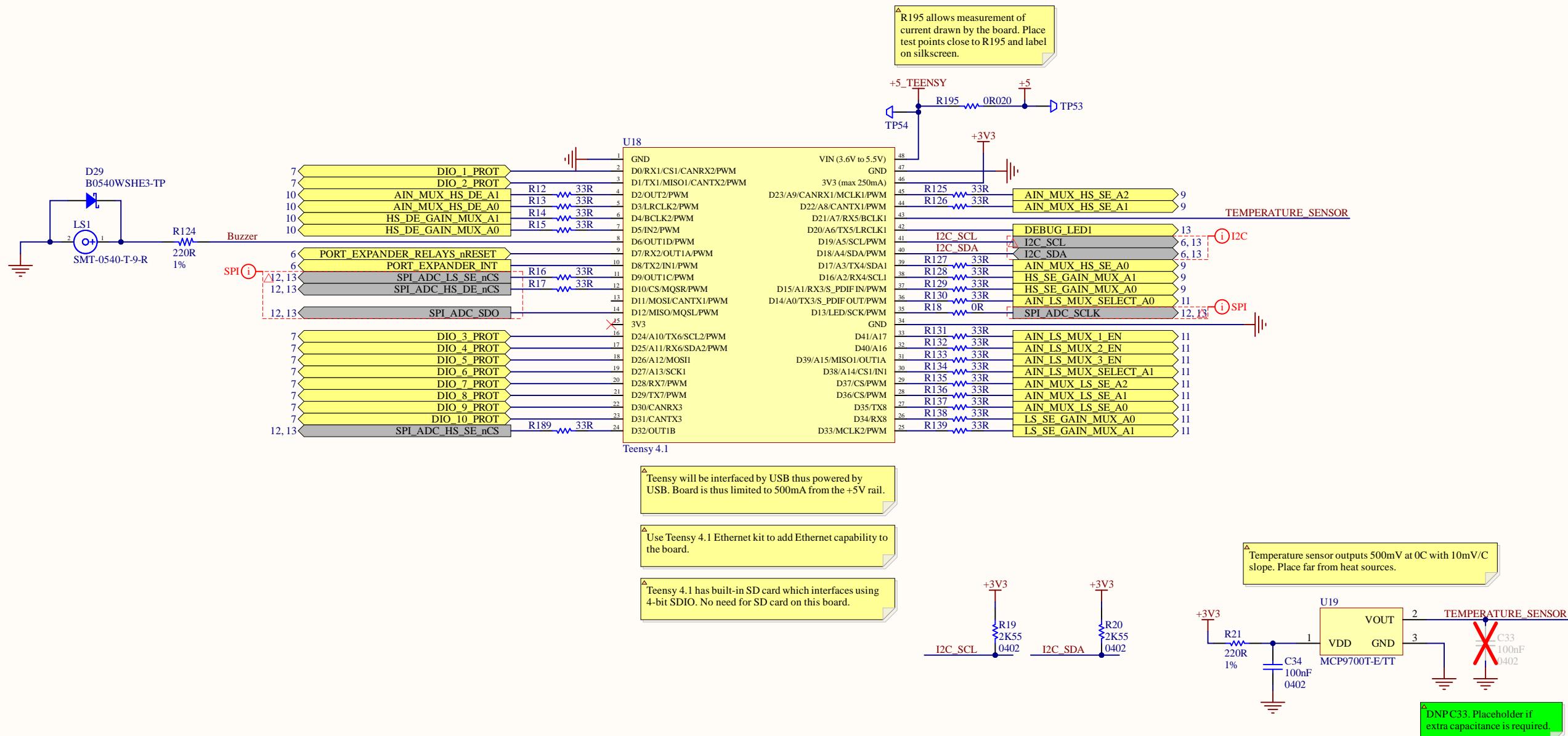
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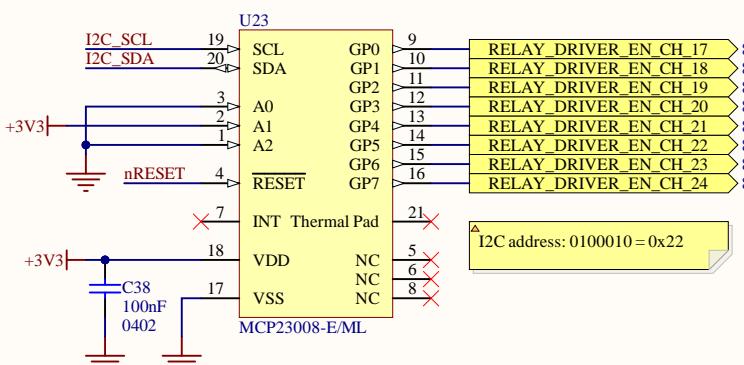
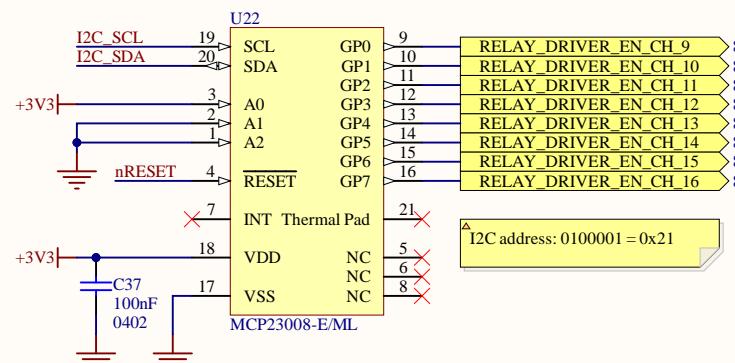
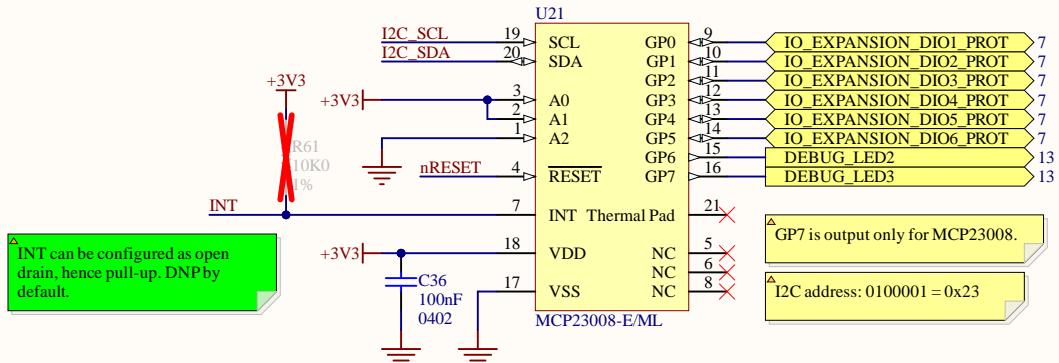
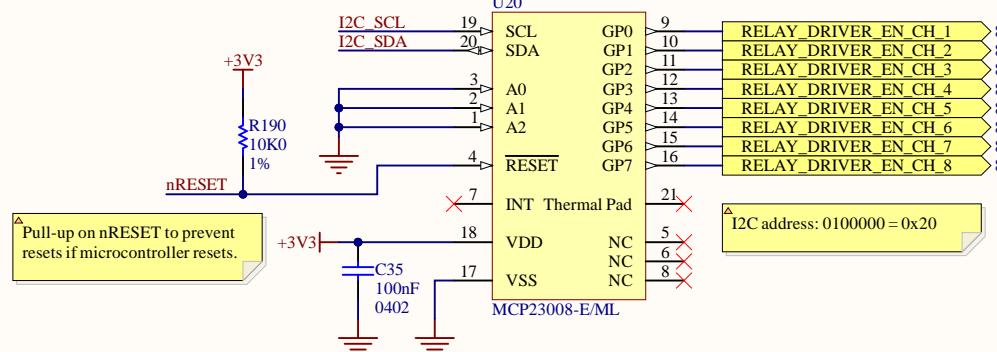
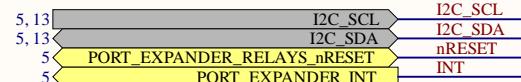
Avionics  
McGill Rocket Team  
McGill University  
Montreal, Quebec



# Microcontroller



# IO Expansion



These 24 IO expansion pins can be set as inputs or outputs. They will be configured as outputs only for relay driver control, as relay actuation does not require high speed actuation from microcontroller pins. Interrupts not needed.

GP7 is output-only on MCP23008.

I<sub>2</sub>C address is of format: 0100 (A2) (A1) (A0)

## Title *IO Expansion*

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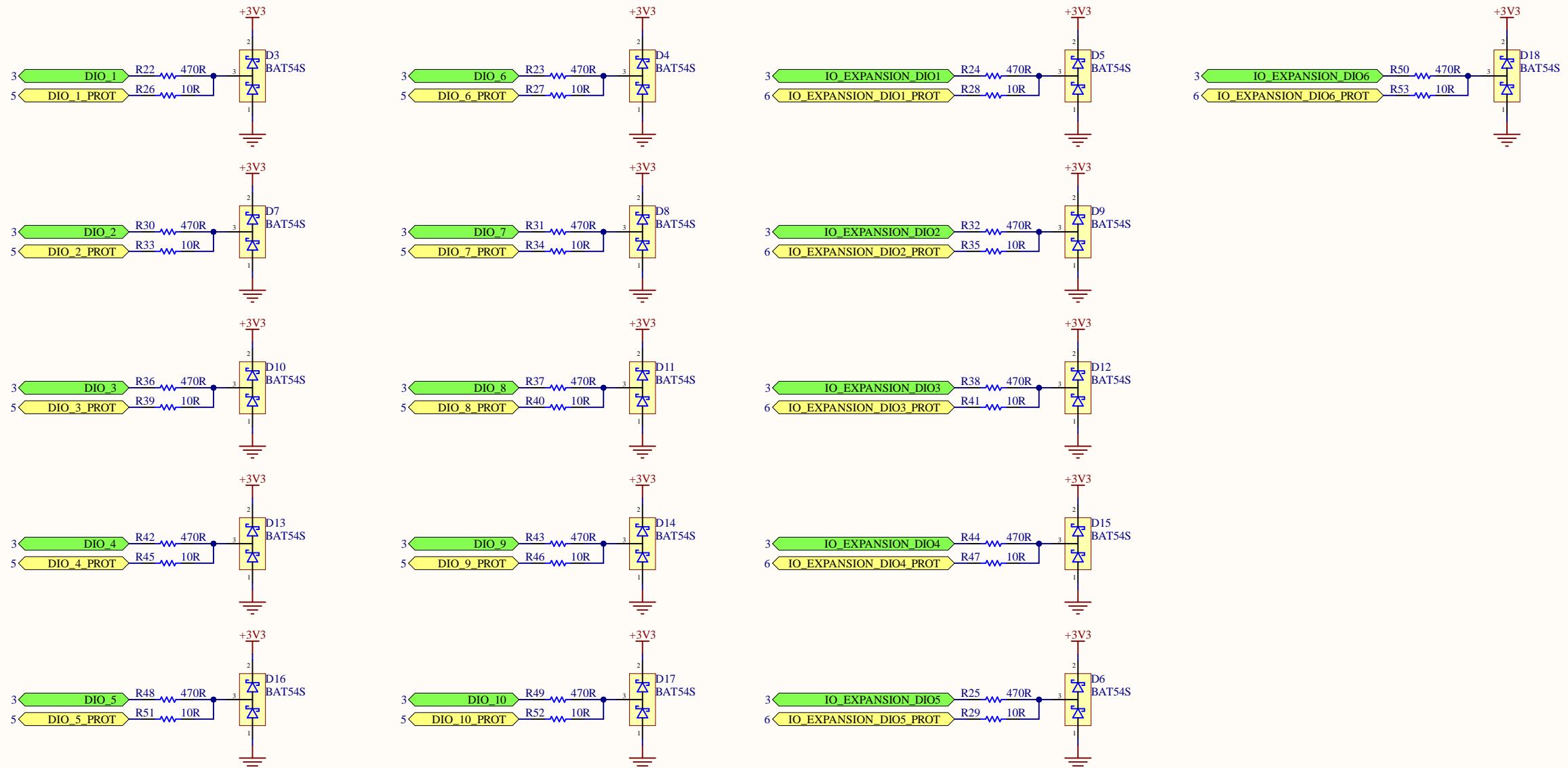
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McGill University  
Montreal, Quebec



# Digital IO Protection



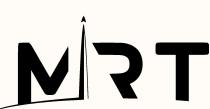
Title

**Digital IO Protection**

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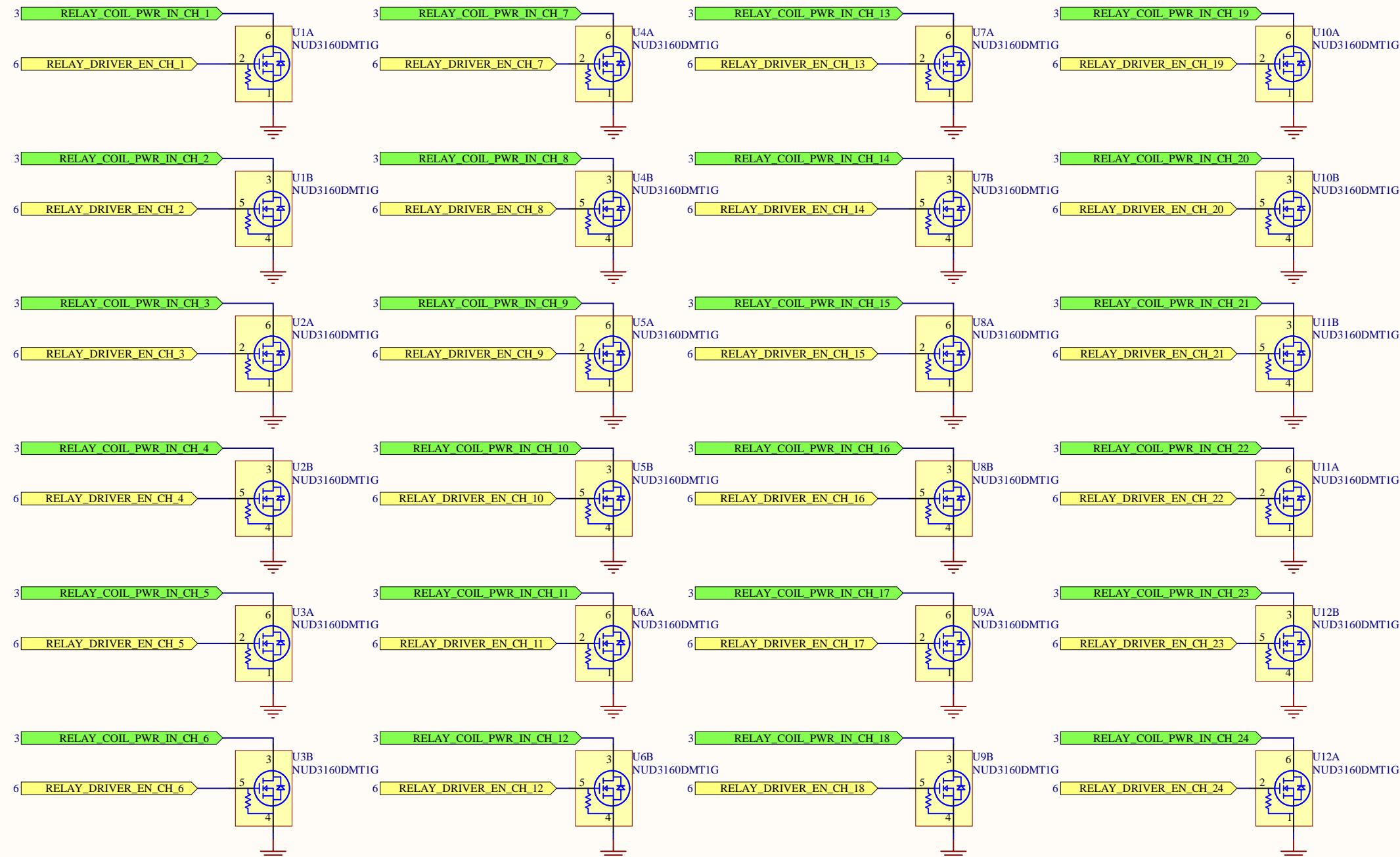
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McGill University  
Montreal, Quebec

# Relay Drivers

Relay drivers are low-side nFETs which are rated to 60V drain-source. Relay coil outputs are connected to RELAY\_COIL\_PWR\_IN\_CH\_XY.



Title

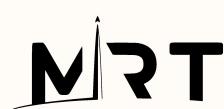
## Relay Drivers

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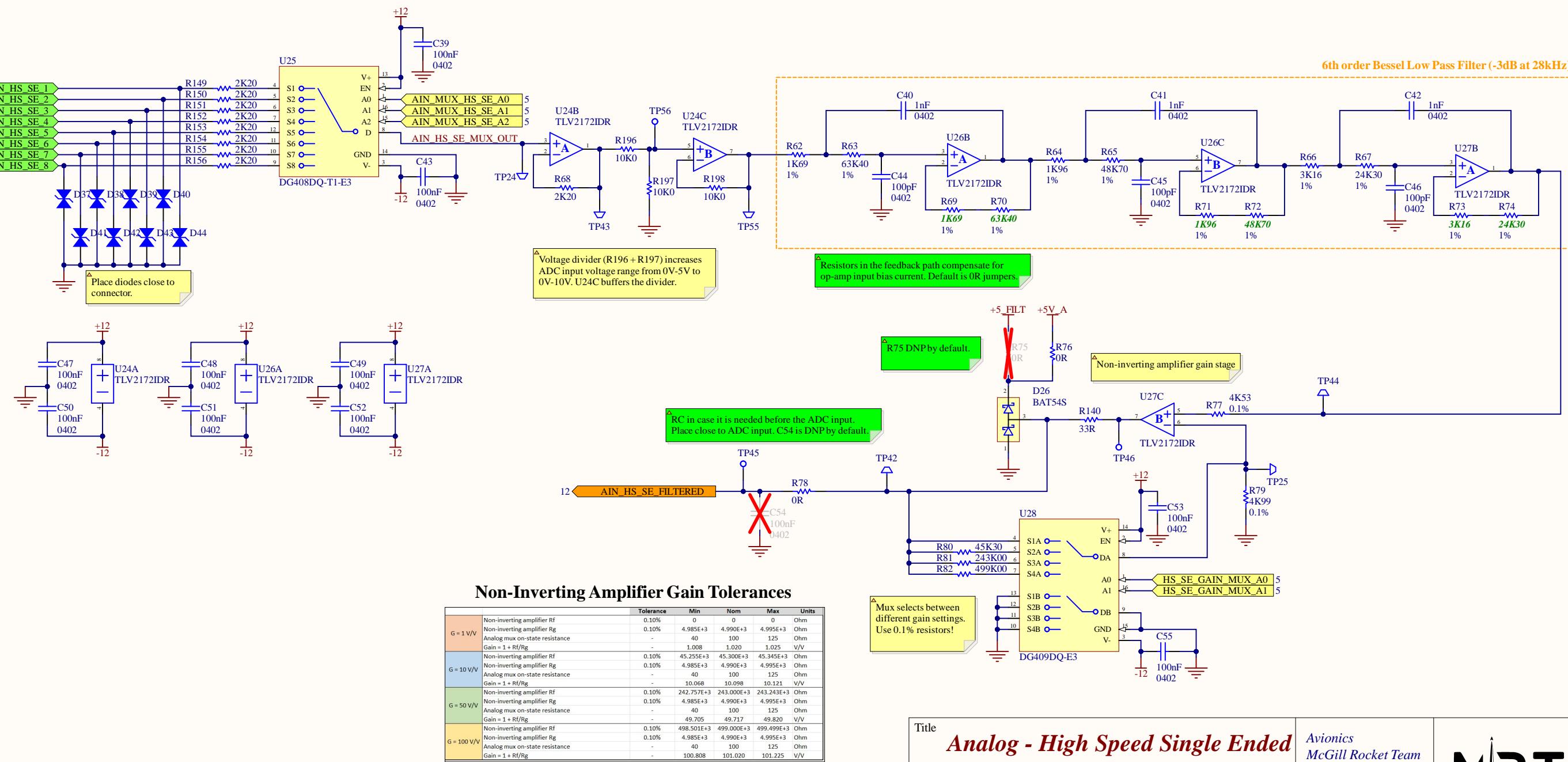
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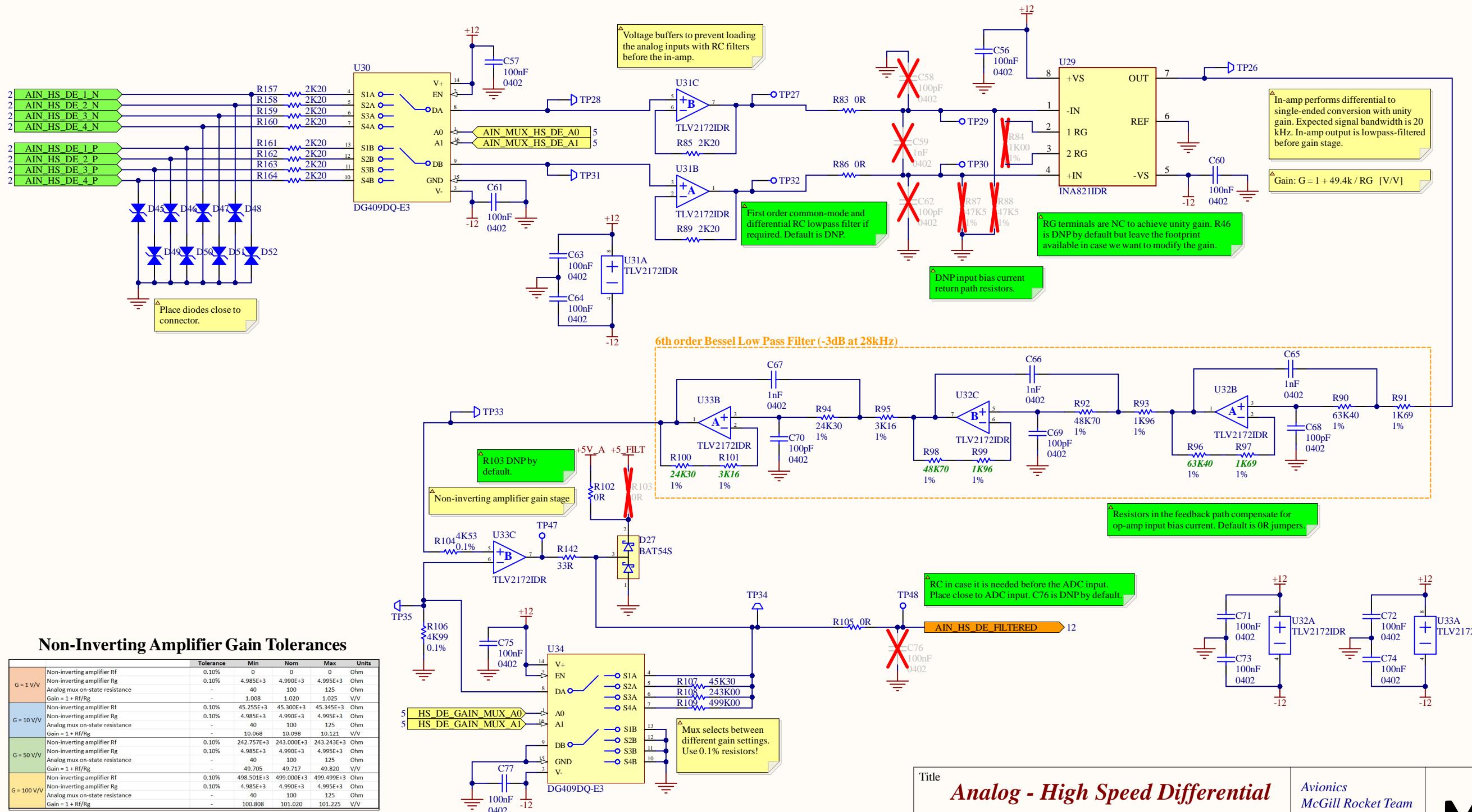
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McGill University  
Montreal, Quebec



# Analog - High Speed Single Ended



# Analog - High Speed Differential



Title **Analog - High Speed Differential**

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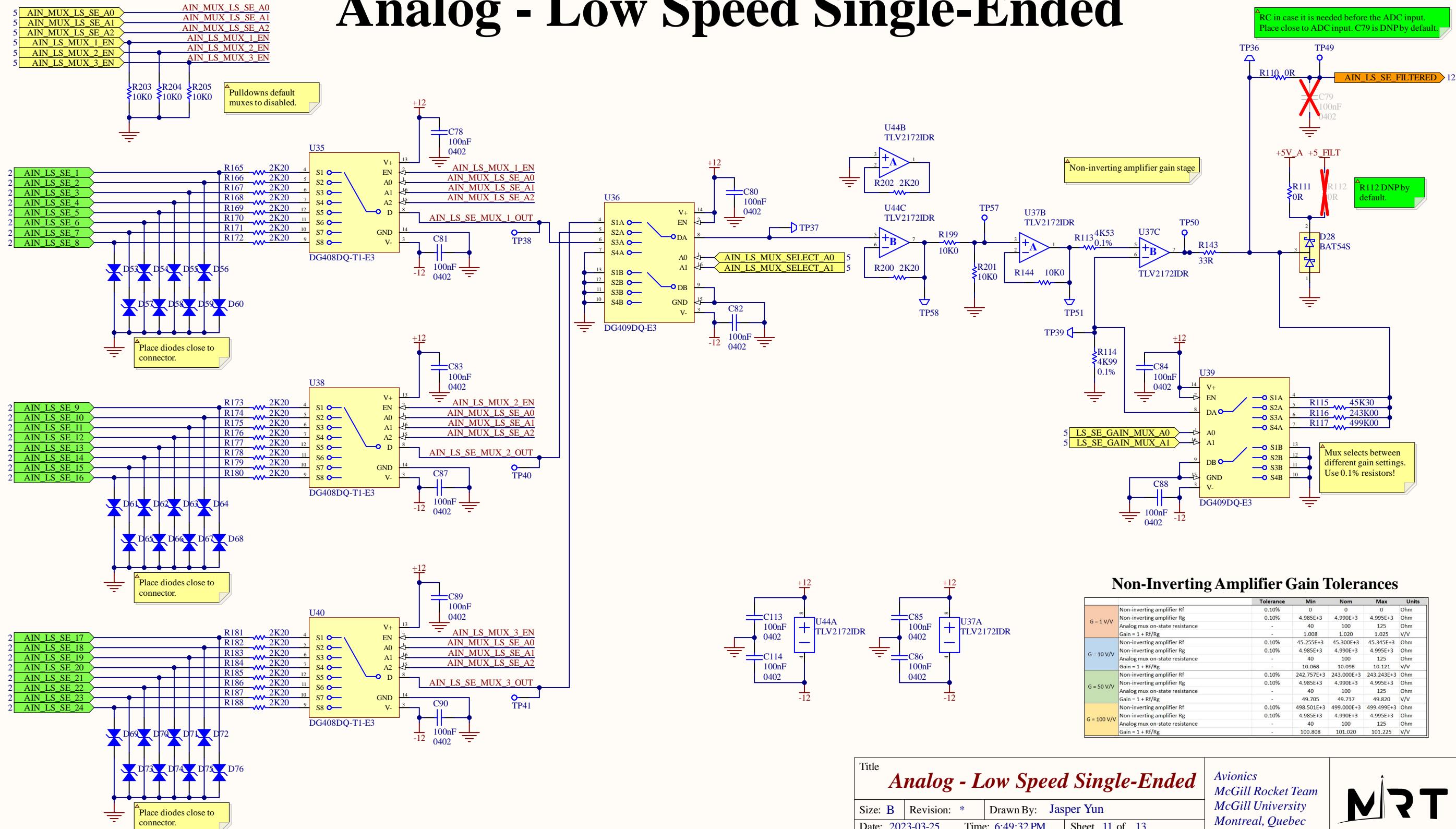
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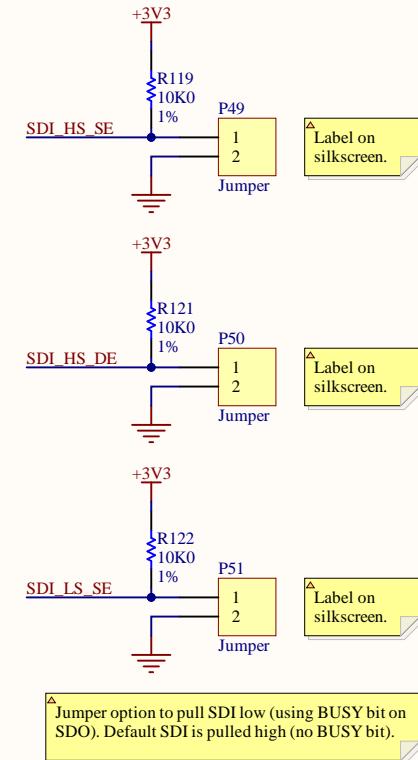
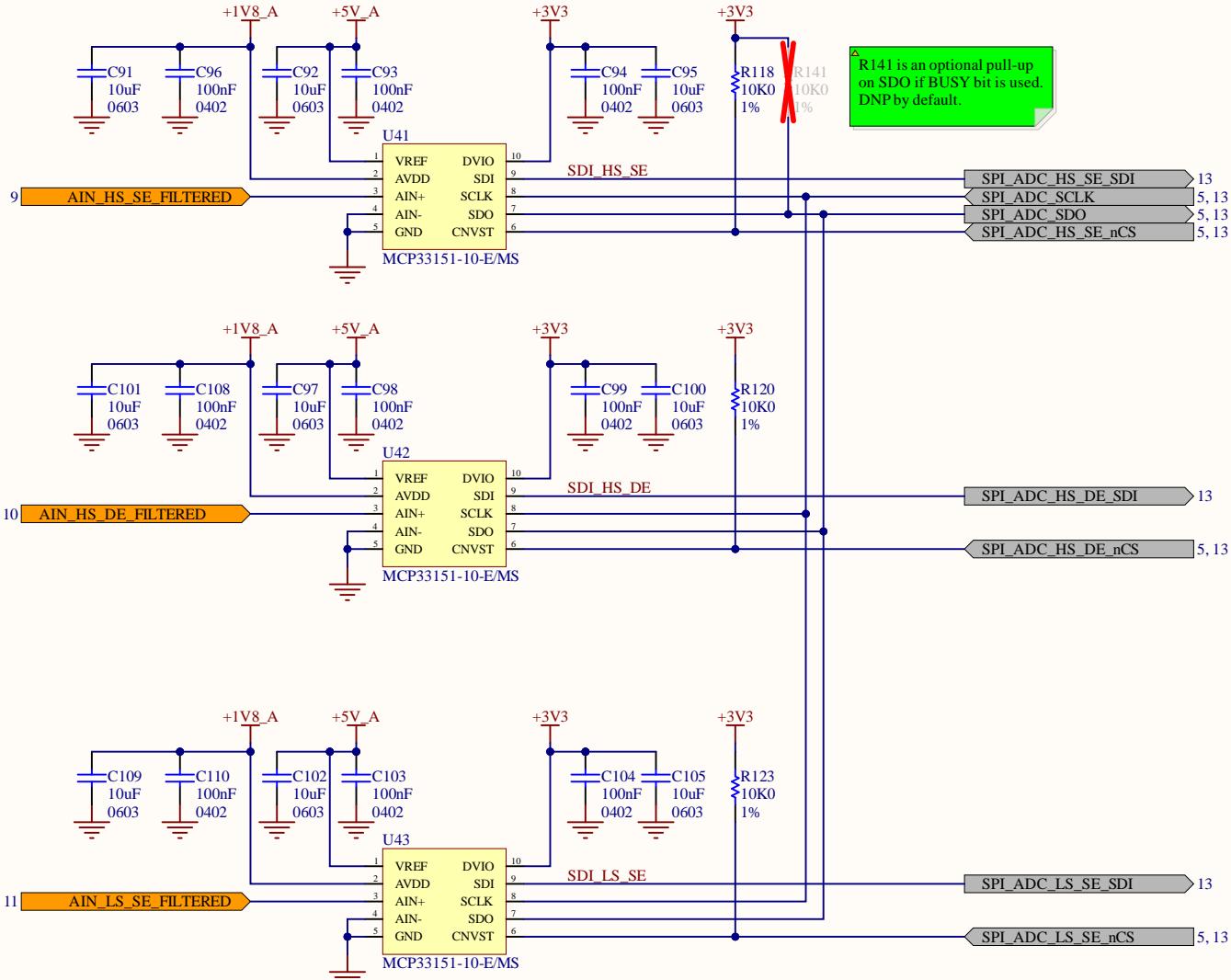
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Montreal, Quebec



# Analog - Low Speed Single-Ended



# Analog to Digital Conversion



Title

**Analog to Digital Conversion**

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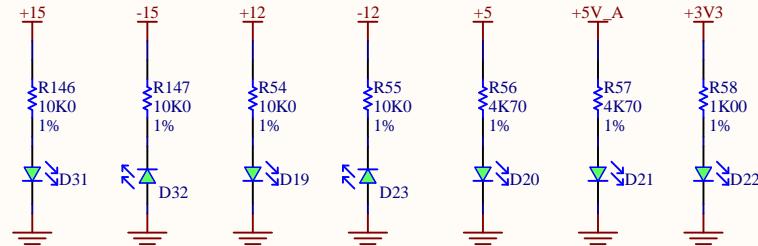
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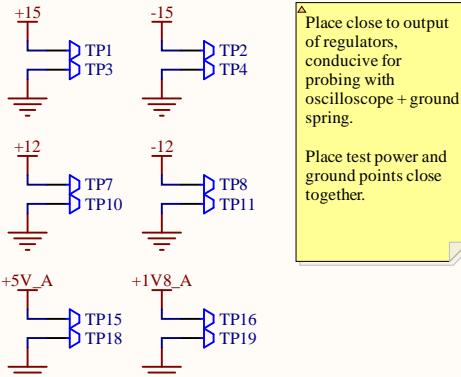
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McGill Rocket Team  
McGill University  
Montreal, Quebec

# Debug

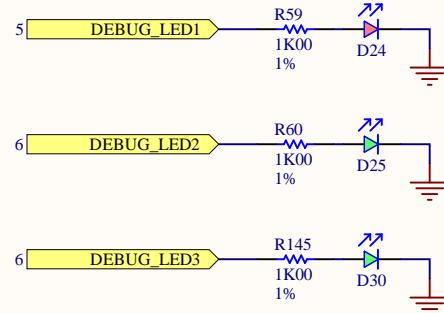
## Power LEDs



## Power Rails Test Points

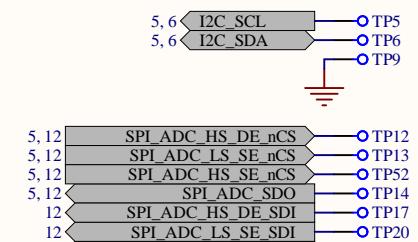


## Program Debug LEDs



## Analog Test Points

See analog sheets.



SMD test point pads.

