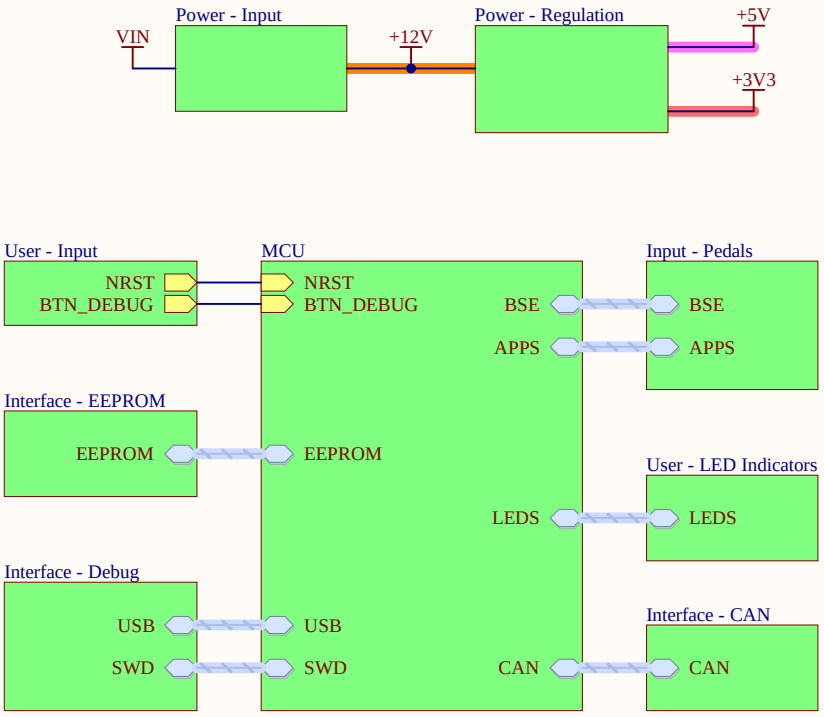
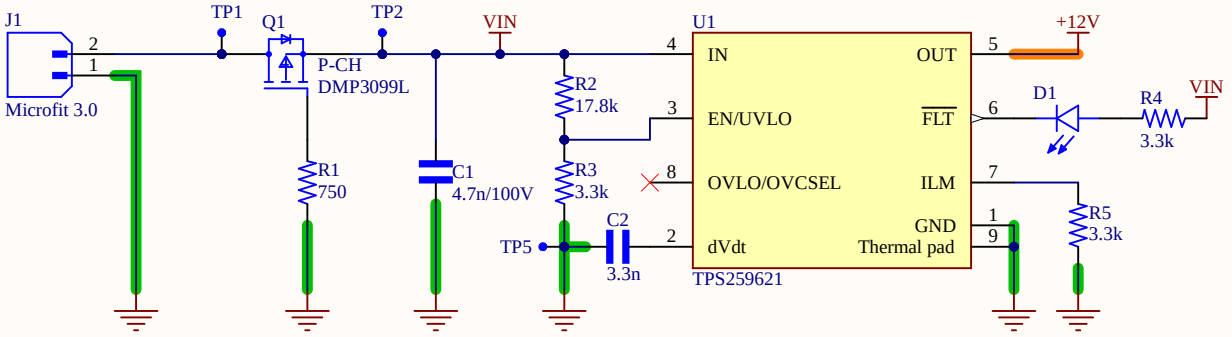
Schematic Overview



Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	Schematic Overview	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 2 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

Power - Input



Design Note:
UVLO set at 1.1V, resistor divider output is equal to 1.1V when VIN = 7V, causing undervoltage lock-out.

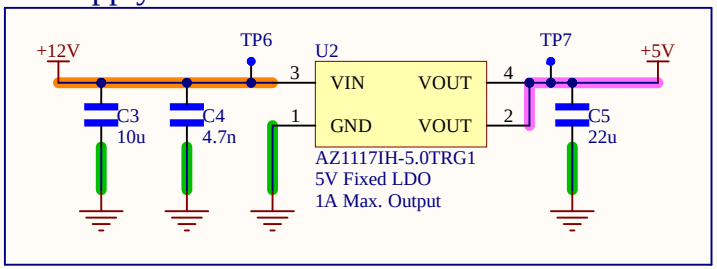
Design Note:
Current limit is set by:
R = 903/(I-0.0112). A 3.3K resistor sets current limit to 300mA.

Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	Power - Input	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 3 of 11

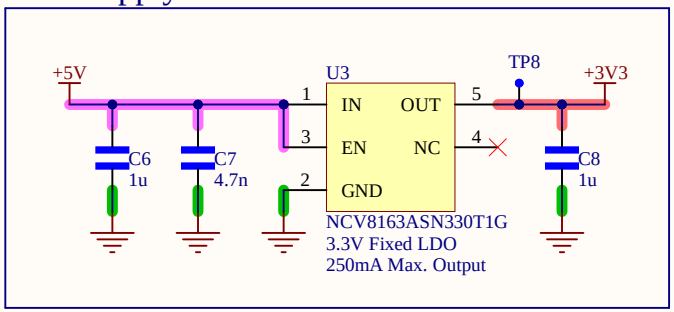
UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

Power - Regulation

5V Supply



3.3V Supply



Power Estimations:
3.3V Current Consumption:
MCU: ~30 mA
LEDs: 4 mA * 7 = 28 mA

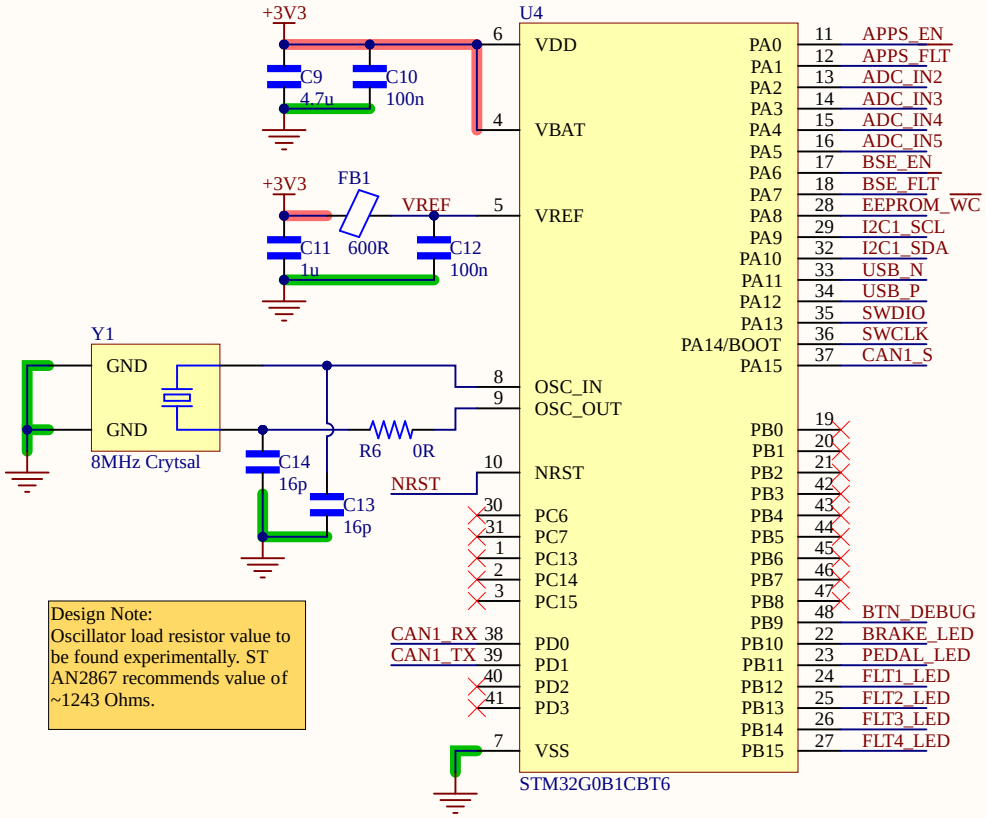
5V Current Consumption:
3.3V LDO: ~60 mA
CAN Trans: ~50 mA

Used Power: 120 mA * 5V = .6W
Power Supplied: .6W/.8 = 0.75 W
Input Current at 12V: 0.75 W / 12V = 63mA

Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	Power - Regulation	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 4 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

MCU - STM32G0



Design Note:
Oscillator load resistor value to be found experimentally. ST AN2867 recommends value of ~1243 Ohms.

APPS
ADC_IN2, ADC_IN3, APPS_EN, APPS_FLT → APPS_1, APPS_2, APPS_EN, APPS_FLT → APPS
Overview[3B], Input - Pedals[4B]

BSE
ADC_IN4, ADC_IN5, BSE_EN, BSE_FLT → BSE_1, BSE_2, BSE_EN, BSE_FLT → BSE
Overview[3B], Input - Pedals[4C]

LEDS
BRAKE_LED, PEDAL_LED, FLT1_LED, FLT2_LED, FLT3_LED, FLT4_LED → LEDS
Overview[3C], User - LED Indicators[1B]

CAN
CAN1_TX, CAN1_RX, CAN1_S → CAN_TX, CAN_RX, CAN_S → CAN
Overview[3C], Interface - CAN[3A]

SWD
SWDIO, SWCLK, NRST → SWD
Overview[2C], Interface - Debug[3B]

USB
USB_N, USB_P → USB
Overview[2C], Interface - Debug[3C]

EEPROM
I2C1_SCL, I2C1_SDA, EEPROM_WC → SCL, SDA, WC → EEPROM
Overview[2C], Interface - EEPROM[3B]

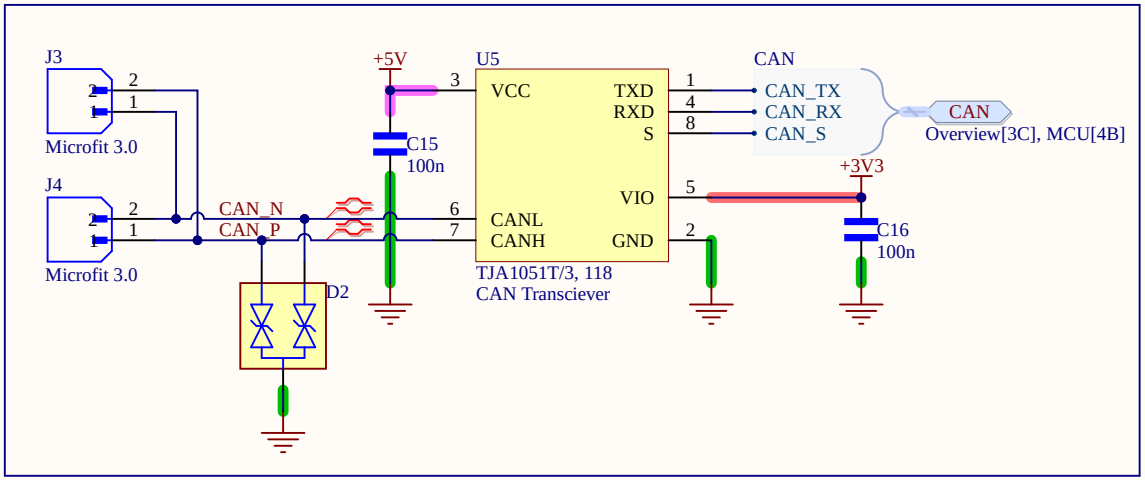
NRST, BTN_DEBUG
Overview[2B], User - Input[3B]
Overview[2B], User - Input[3B]

Project Title:	Electronic Throttle and Brake Controller
Sheet Title:	MCU - STM32G0
Revision: A	Date: 6/8/2024
Author: Ephren Manning	Sheet 5 of 11

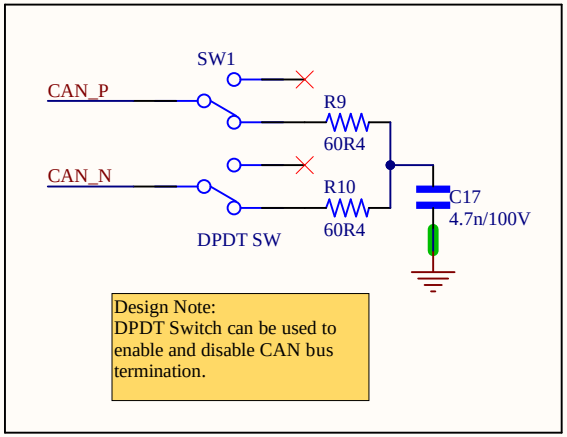
UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

Interface - CAN

CAN Transciever



120 Ohm Termination Switch

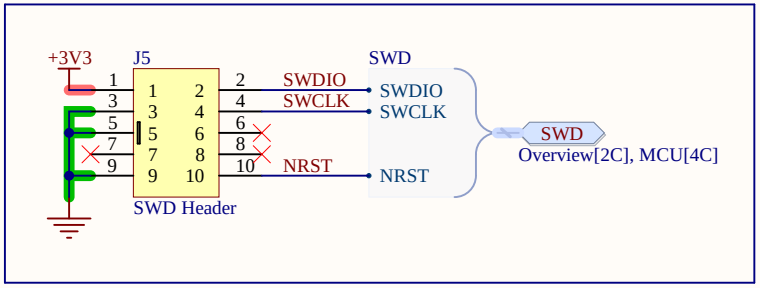


Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	Interface - CAN	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 6 of 11

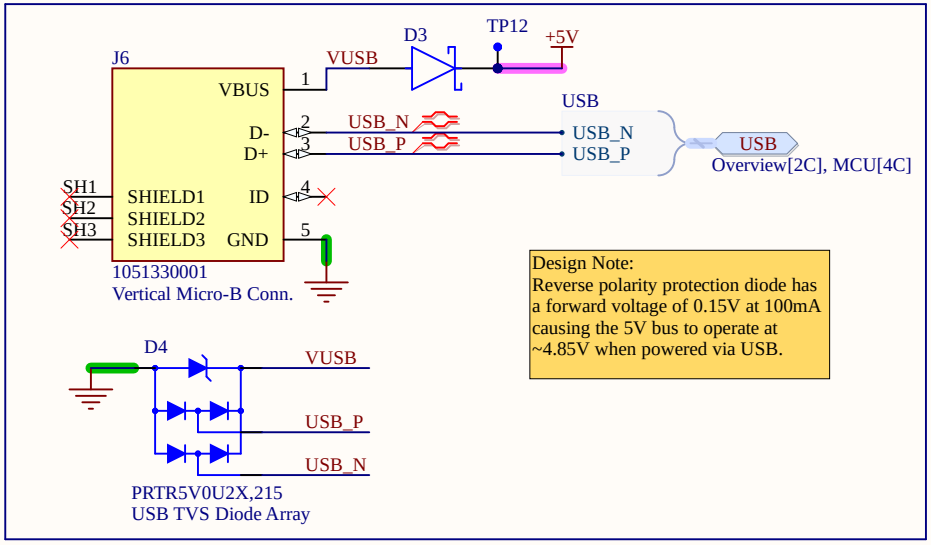
UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

Interface - Debug

SWD Header



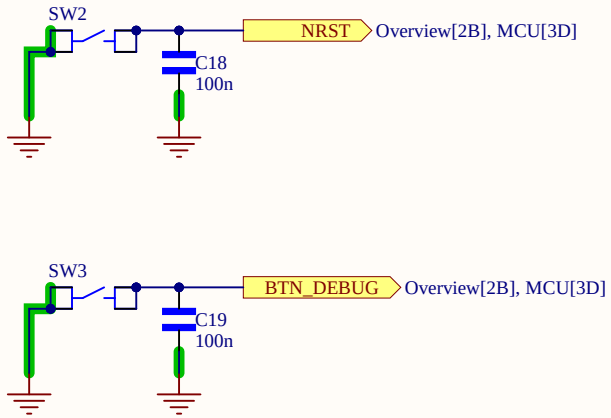
USB Micro-B Connector



Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	Interface - Debug	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 7 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

User - Input

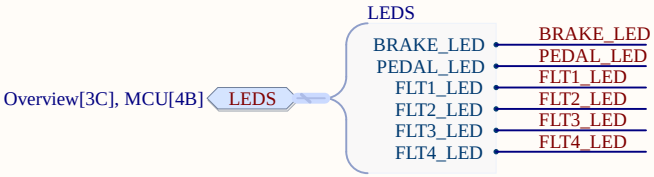


Design Note:
BTN_DEBUG is connected to a GPIO input and can be programmed for different purposes.

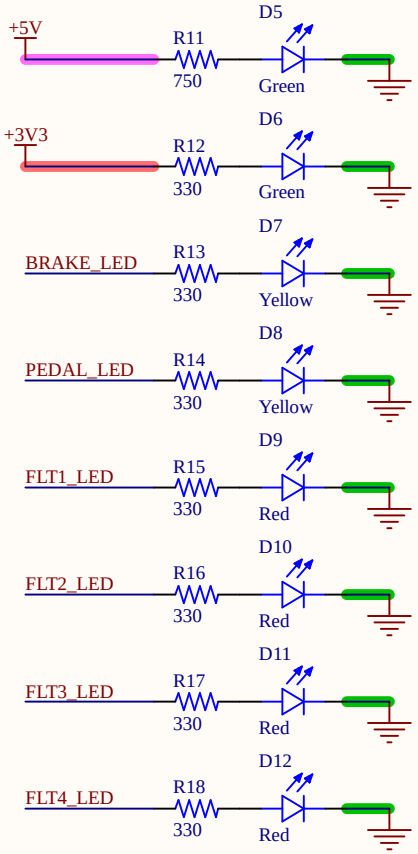
Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	User - Input	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 8 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

User - LED Indicators



Design Note:
All LEDs have a forward voltage of 2V and are configured for 4 mA of forward current.

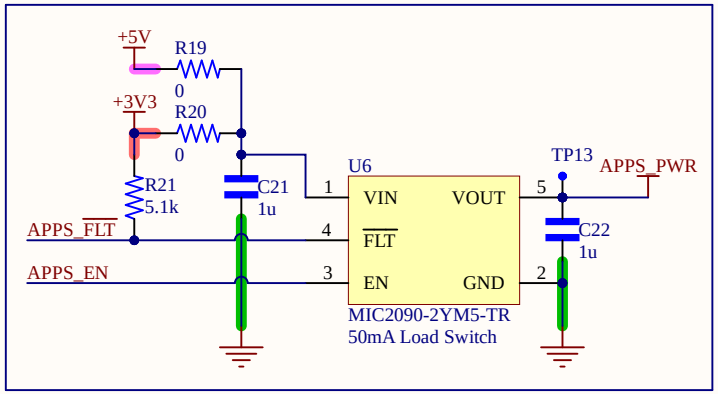


Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	User - LED Indicators	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 9 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

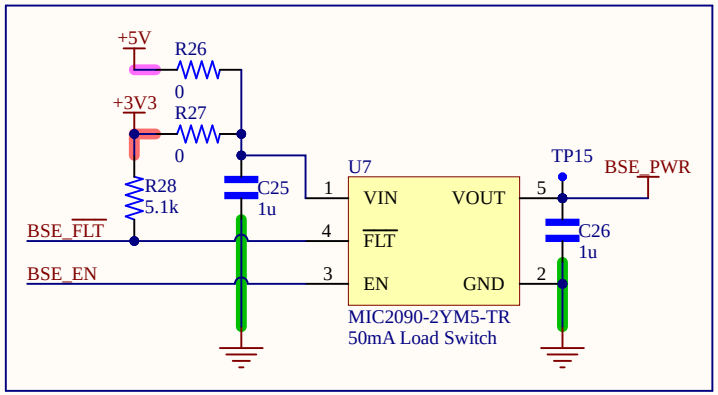
Input - Pedals

APPS Load Switch

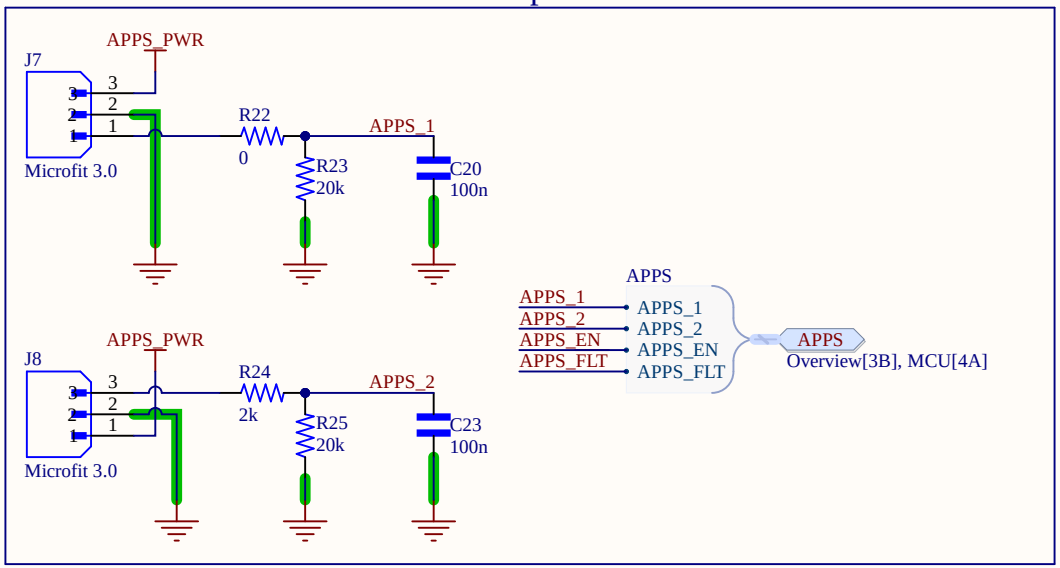


Design Note:
Use 0 ohm resistors to select sensor voltage. ADC pins are not 5V tolerant so resistor divider values will need to be adjusted.

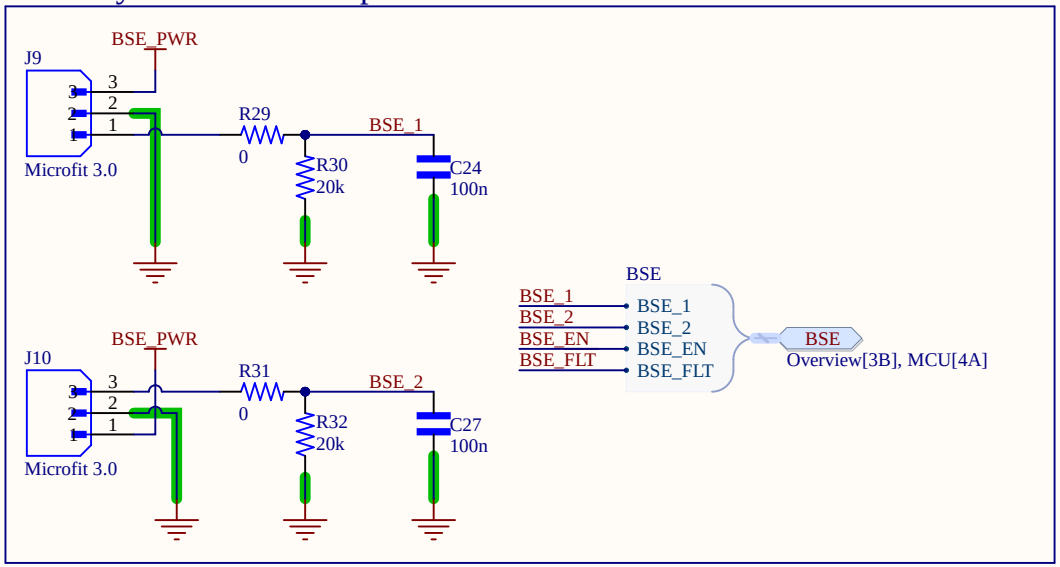
BSE Load Switch



Acceleration Pedal Position Sensor Inputs



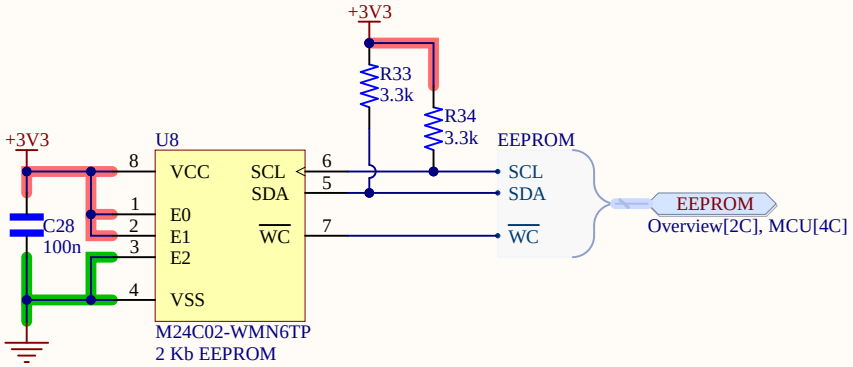
Brake System Encoder Inputs



Project Title:	Electronic Throttle and Brake Controller
Sheet Title:	Input - Pedals
Revision: A	Date: 6/8/2024
Author: Ephren Manning	Sheet 10 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

Interface - EEPROM



Design Note:
E2-E0 are used to set the LSBs of the I2C address. In this configuration address is 1010011 or 0x53. When WC is high writing data is disabled.

Project Title:	Electronic Throttle and Brake Controller	
Sheet Title:	Interface - EEPROM	
Revision: A		Date: 6/8/2024
Author: Ephren Manning		Sheet 11 of 11

UIC MOTORSPORTS
SOCIETY OF AUTOMOTIVE ENGINEERS

SAE @ UIC
Designed by
Ephren Manning
+12V GND
J1
J4
J3
CANH CANL
U1
U2
U3
U5
U8
SW1
RST
SWD
USB
D3
TP1
TP2
TP5
TP6
TP7
TP8
TP12
+5V
+3V3
GND
PWR
J7
J9
J10
A1
A2
B1
B2
D9
D10
D11
D12
R15
R16
R17
R18