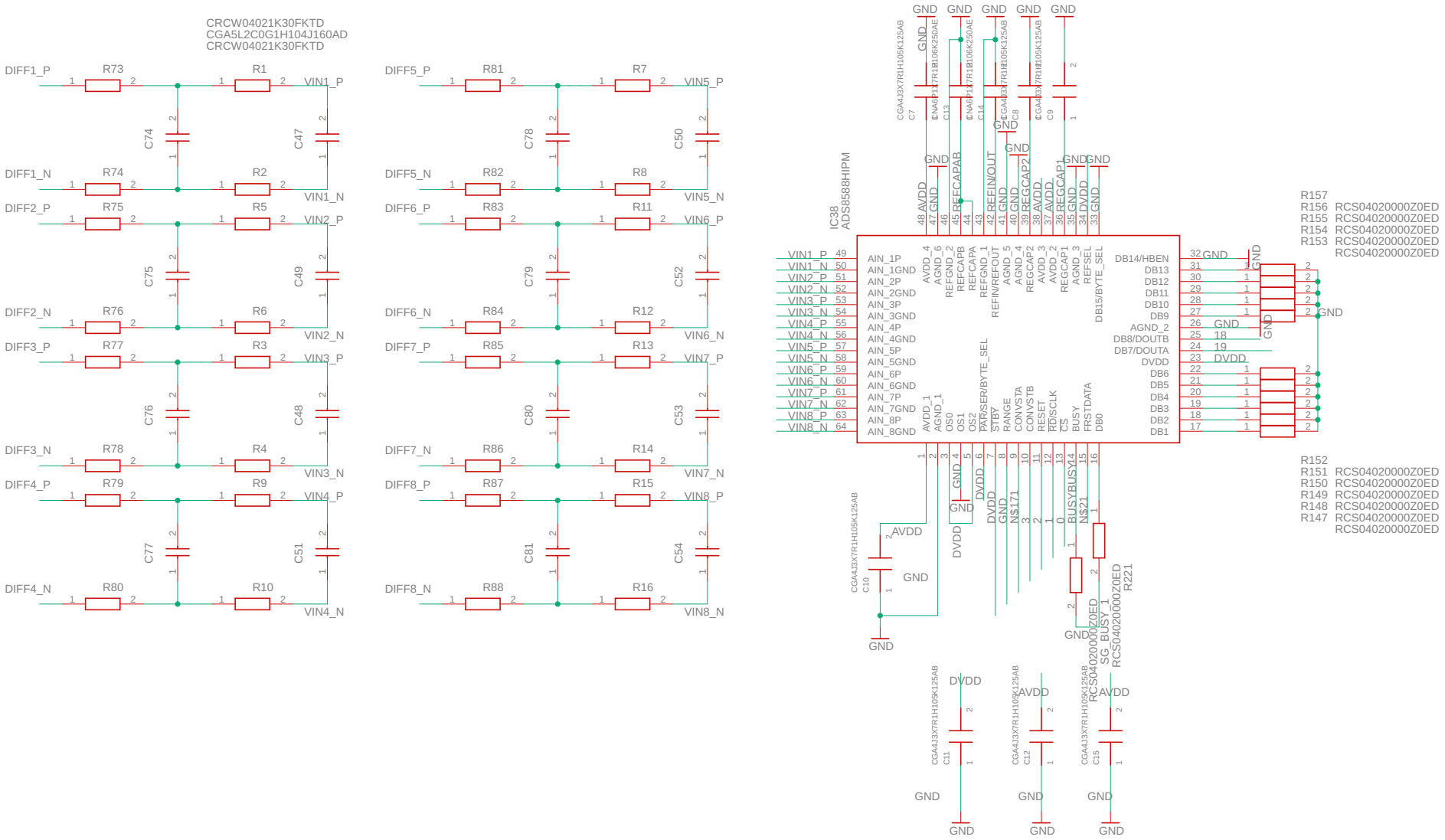
2x 16 bit differential single frame capture SAR ADCs that are dedicated for measuring simultaneous outputs from strain gauges.

Input signal flow
Analog signal -> High input impedance buffer -> Low pass filter BW@~200 hz -> High input impedance buffer -> Digitizing

The ADC also applies a 3rd order low pass filter with built in oversampling functionalty.

Communication occurs thorugh a serial line.

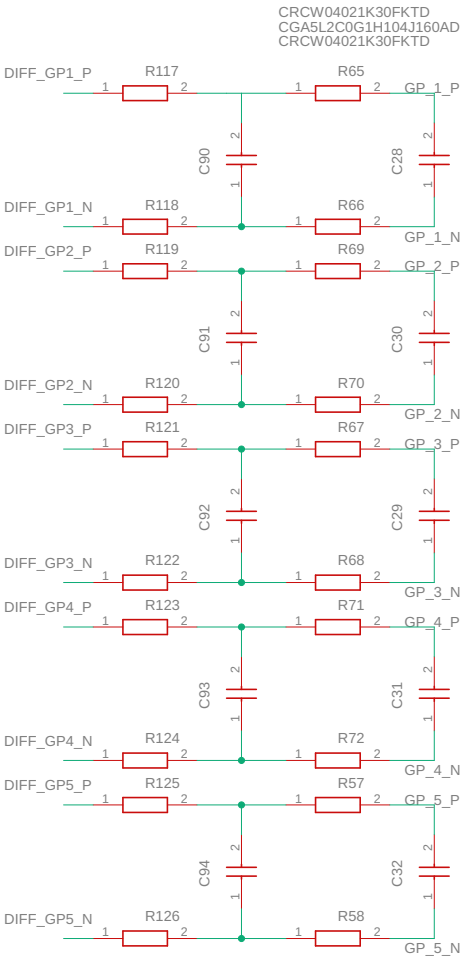


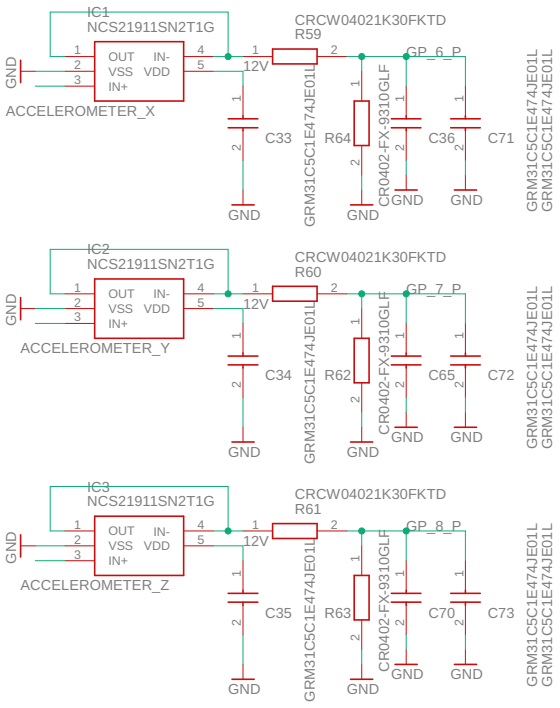
2x 16 bit differential single frame capture SAR ADCs that are dedicated for measuring simultaneous outputs from strain gauges.

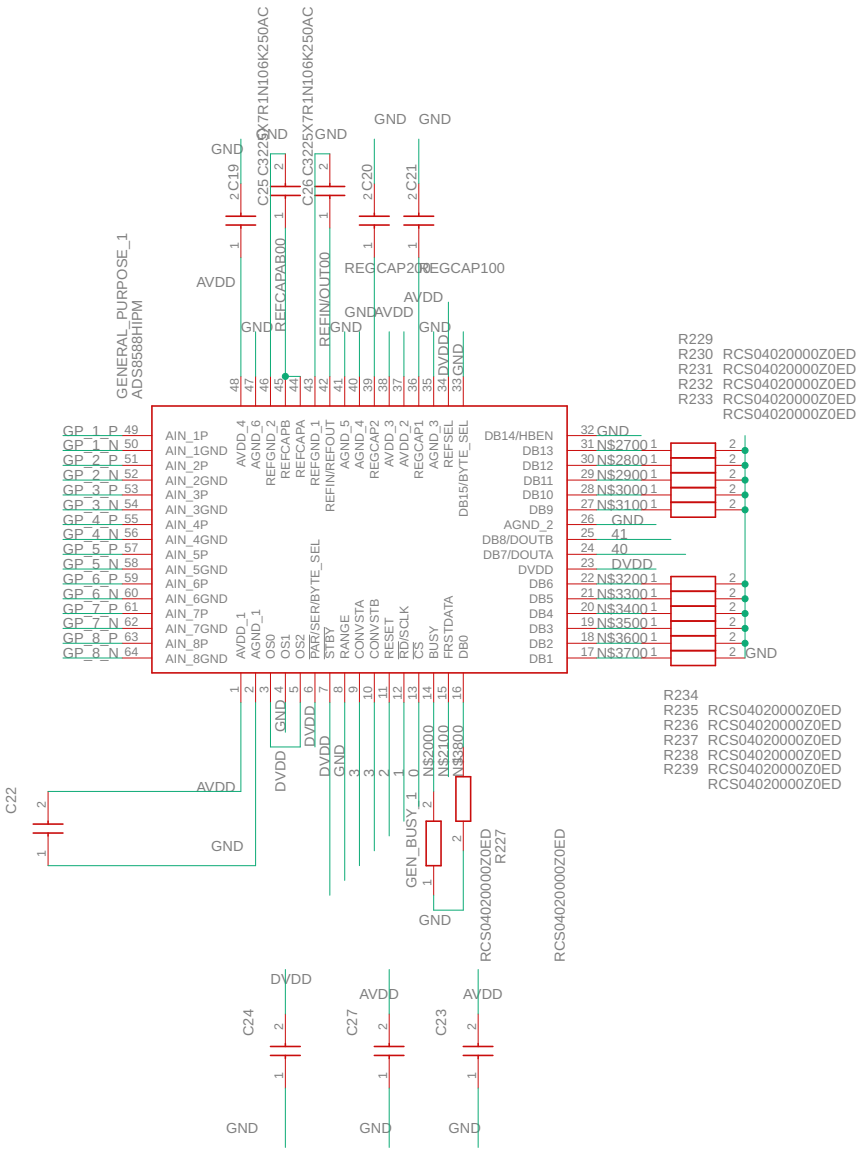
Input signal flow
Analog signal -> High input impedance buffer -> Low pass filter BW@~200 hz -> High input impedance buffer -> scale input within 5v range -> Digitizing

The ADC also applies a 3rd order low pass filter with built in oversampling functionalty.

Communication occurs thorugh a serial line.







This section is for taking in any digital input voltage from hall effects, status indicators or any sensor with spurious outputs that are not communication based.

Input to opto isolator has an inline resistor for current limiting and a pull down resistor.

Output would be directly connected to microcontroller and a pull down resistor.

Input

Current limiting gate resistor

Logic Level shifter

Switching surge supression cap
Drain current limiting resistor

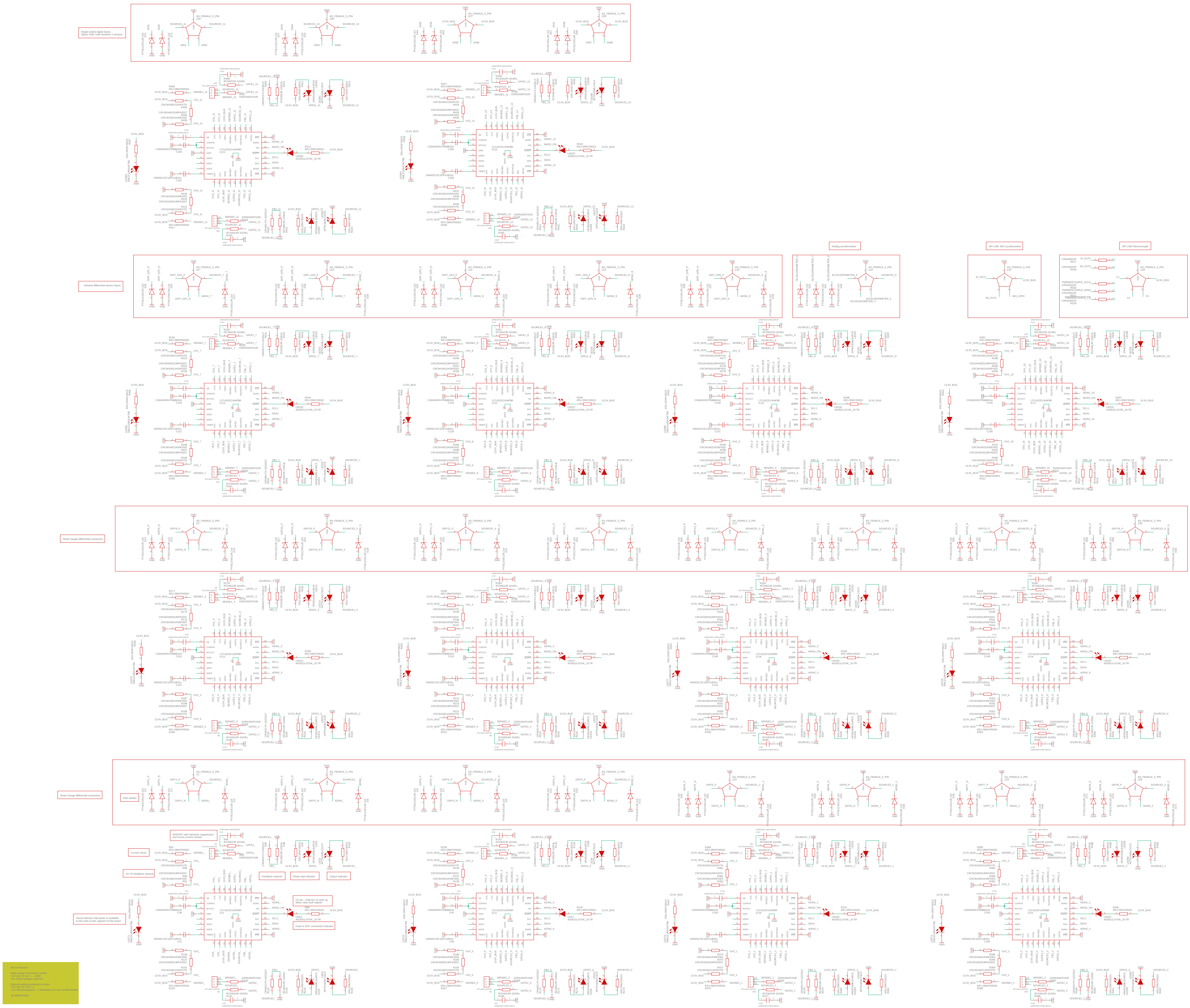
Output

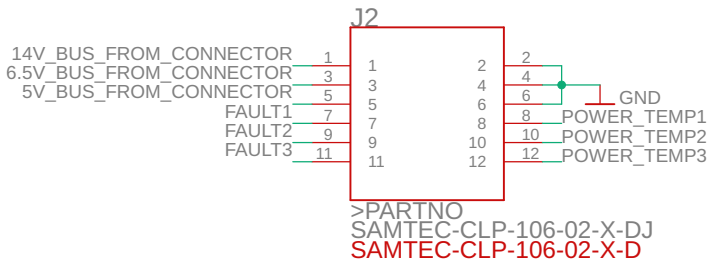
LED driver

Microcontroller drives Gate

LED current limiting resistor
LED Vf = 3V, Vsource = 3.3V, VR = 0.3V
I = 12.5mA
R = V/I
R = 24ohm

SAMTEC-SMM-104-02-X-DJ
J1


Single ended digital inputs
Splice GND node between 2 sensors
General differential sensor inputs
Analog accelerometer
SPI LINK 40G accelerometer
SPI LINK thermocouple
Strain Gauge differential connectors
Strain Gauge differential connectors
ESD diodes
MOSFET with harmonic suppression and inrush current resistor
Current shunt
UV OV feedback network
Feedback network
Power bad indicator
Output indicator
On pin - Hold low on start up
Mass clear fault register
Fault or ADC conversion indicator
Visual indicator that power is available to the node at this segment of the board
34x connectors
Strain guage connectors contain
-12V rail, 5V rail, +, -, GND
-16x Strain Gauges channels
General analog connectors contain
-12V rail, 5V, 3.3V, +, -
-12x General purpose - 2 dedicated to 3 axis accelerometers
-8x digital inputs



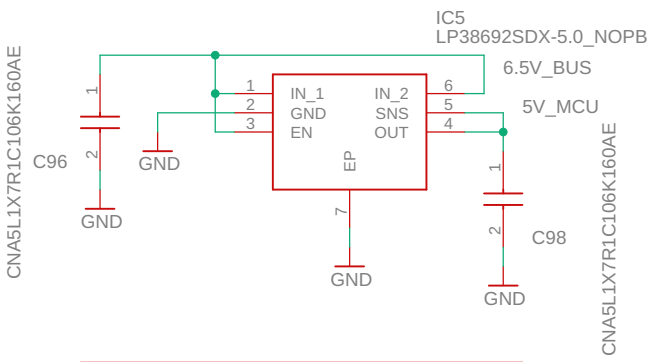
Power rails

-12V
-5V Dedicated to microcontroller and gps only
-5V Dedicated to strain gauge configurations and hardware
-5V Dedicated to general purpose sensors
-3.3V Dedicated to basic digital logic
-3.3V Dedicated to General sensors.

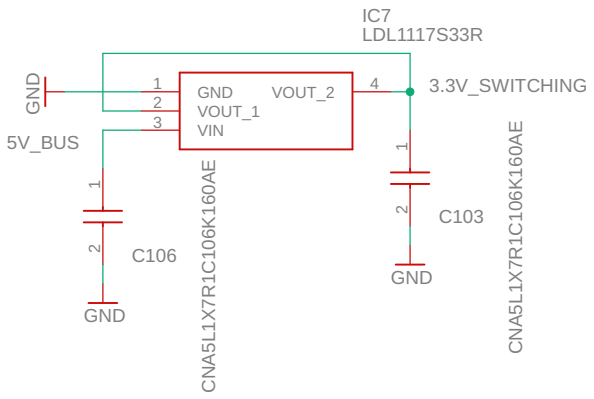
Input bus voltages
13.5V
6.5V
5V
Output on-board voltages
5V
3.3V

13.5V_BUS
6.5V_BUS
5V_BUS

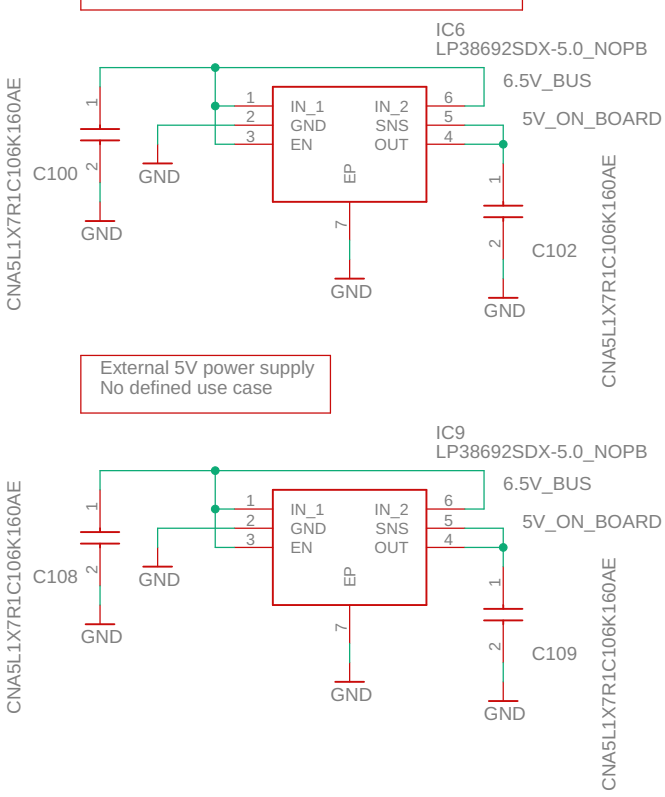
Supply power directly to MCU



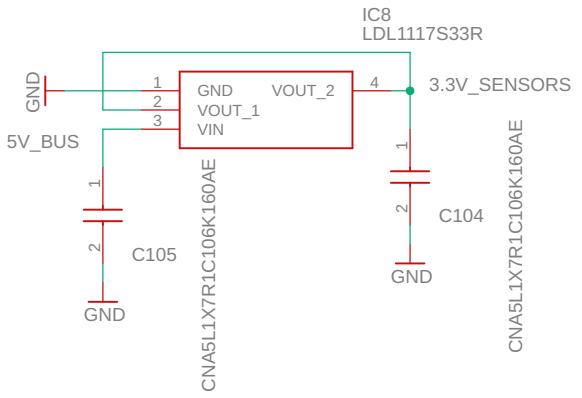
Supply power to digital logic switching components
Protects other hardware from constant surges



Supply power to accessory components on board

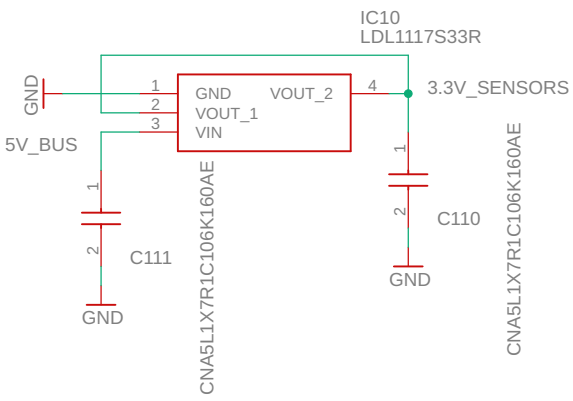


Supply power to Digital sensors on board

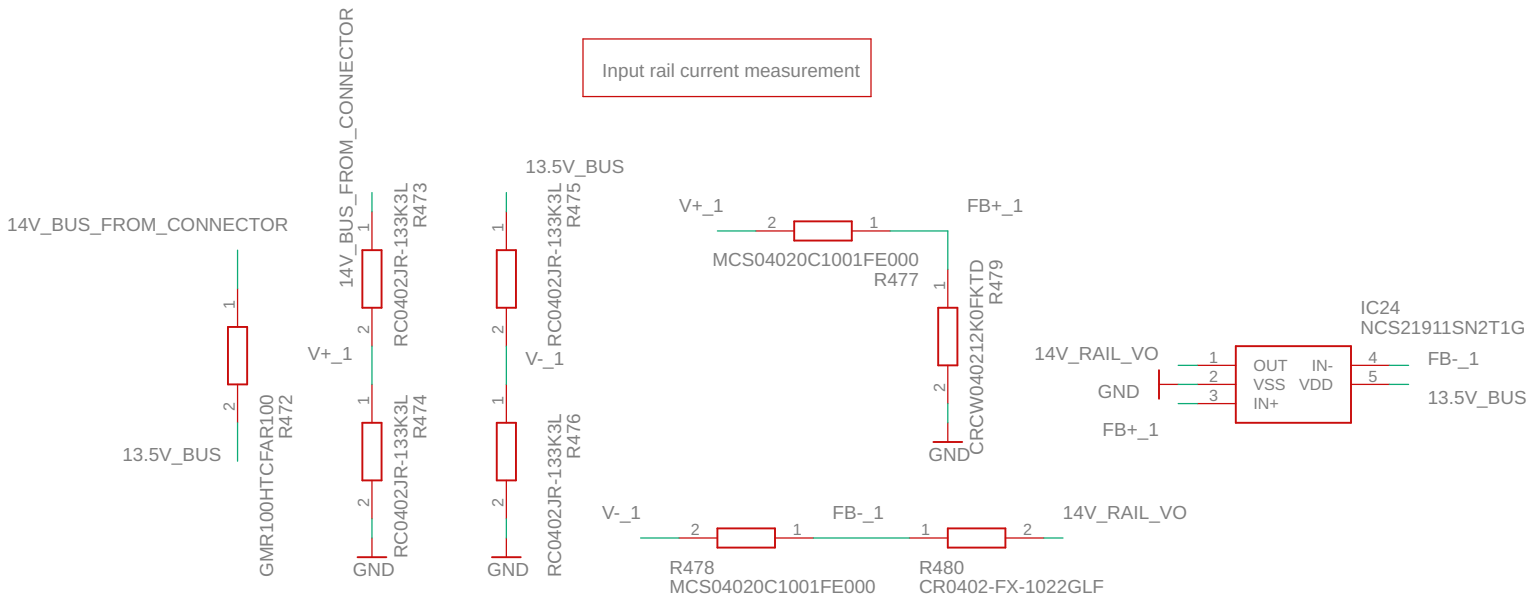


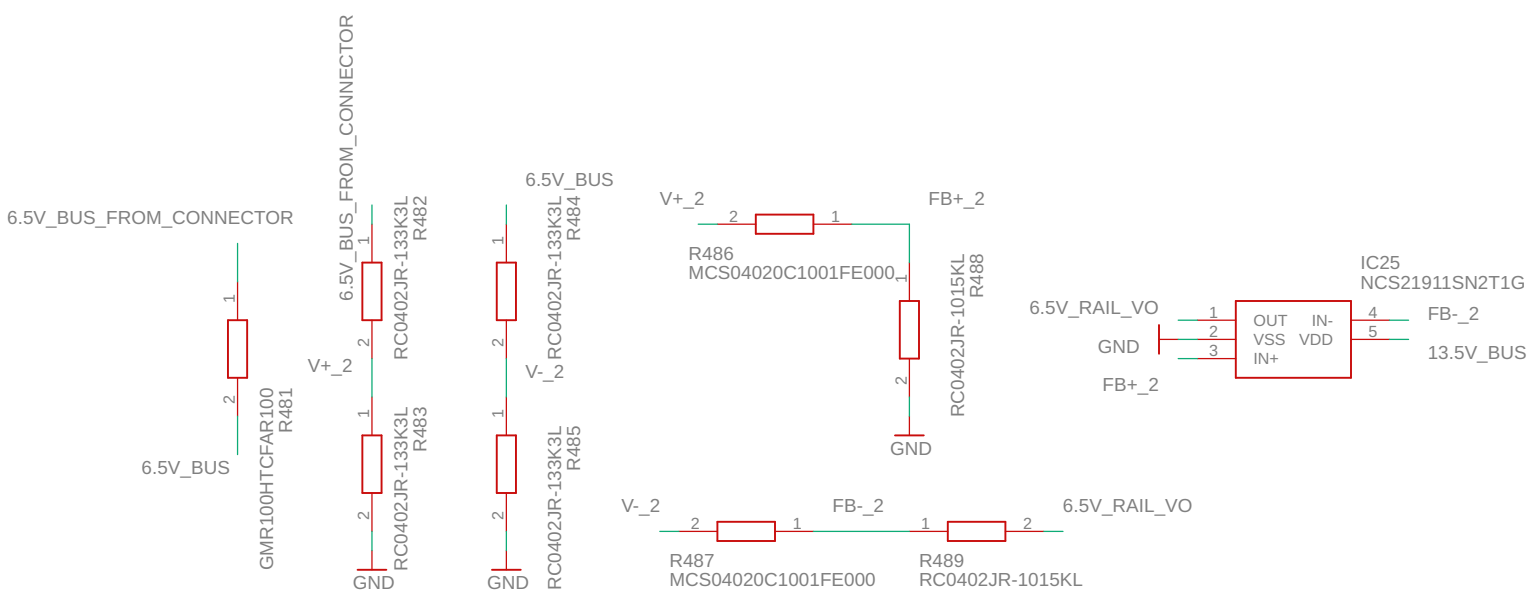
External 5V power supply
No defined use case

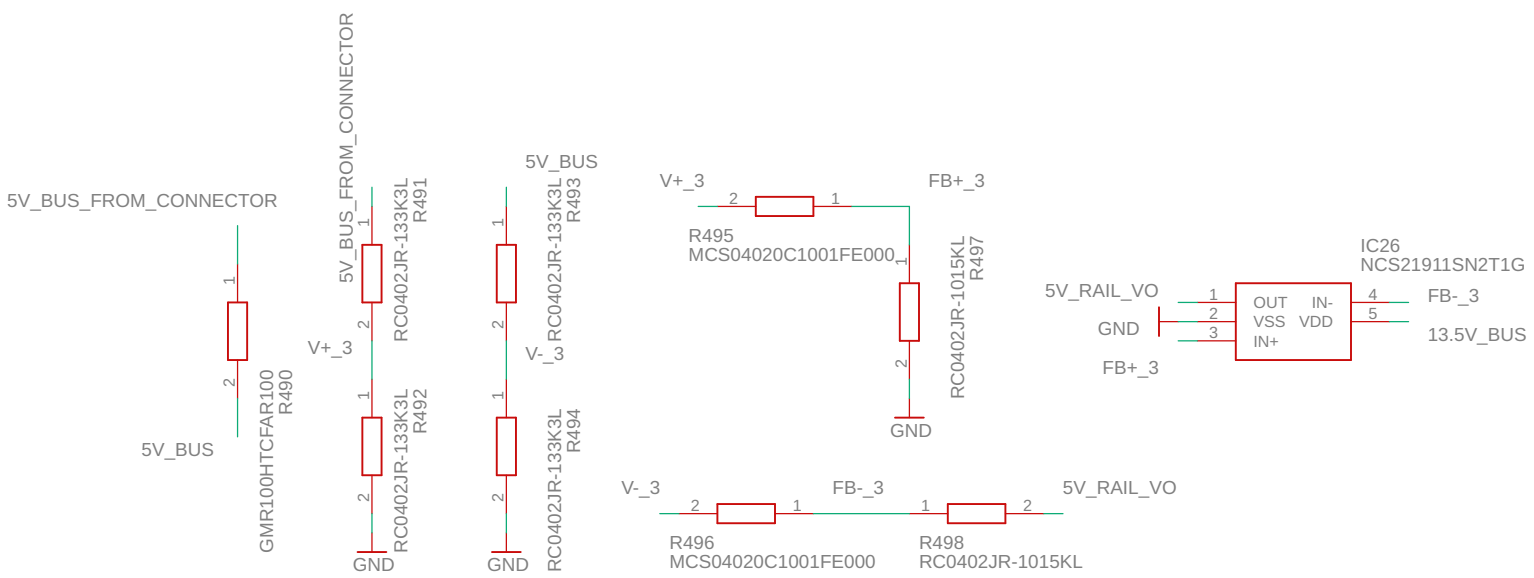
External 3V power supply
No defined use case



Input rail current measurement







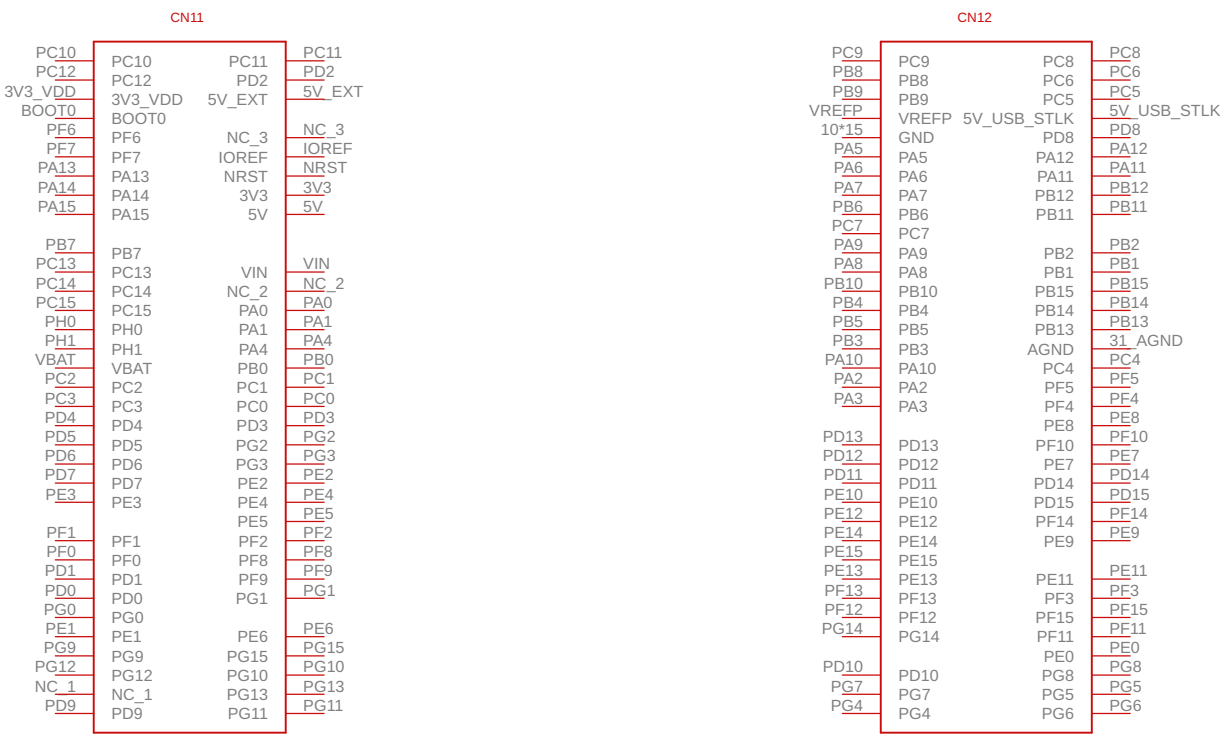
Board temperature sensors

apply gain to signal to increase used range

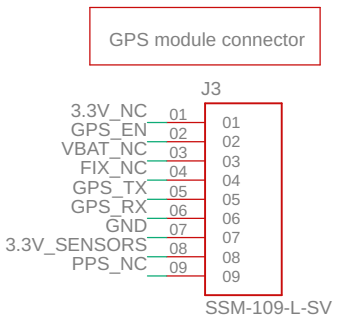
Board LED indicators

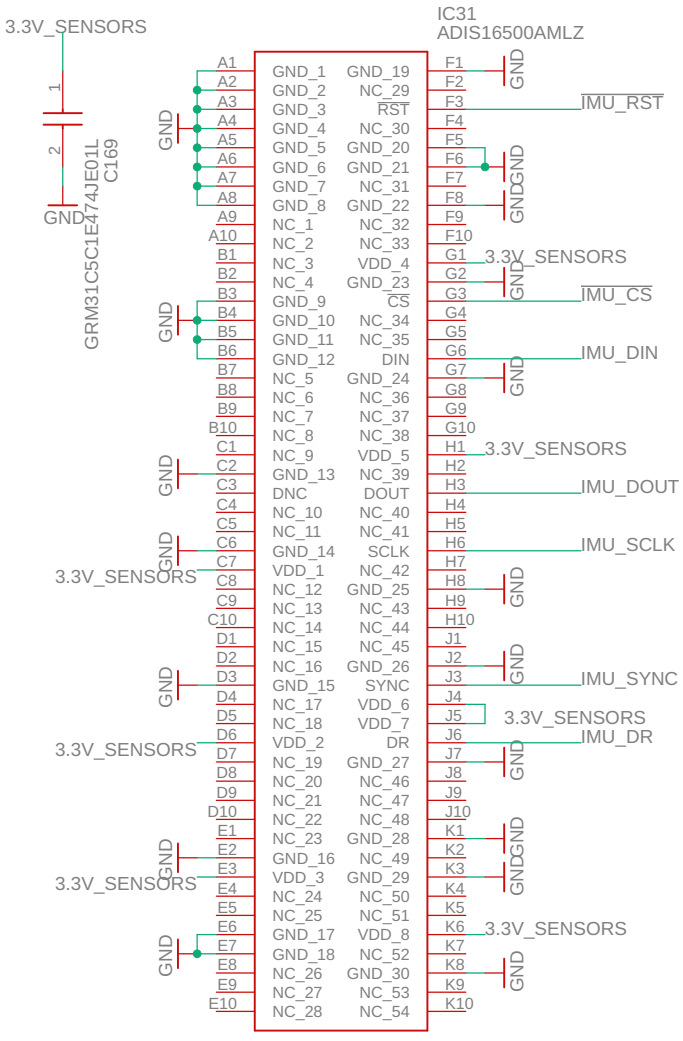
RED LED - There is an issue
YELLOW LED - Digital coms
GREEN LED - Power Good
BLUE LED - Power at location is available

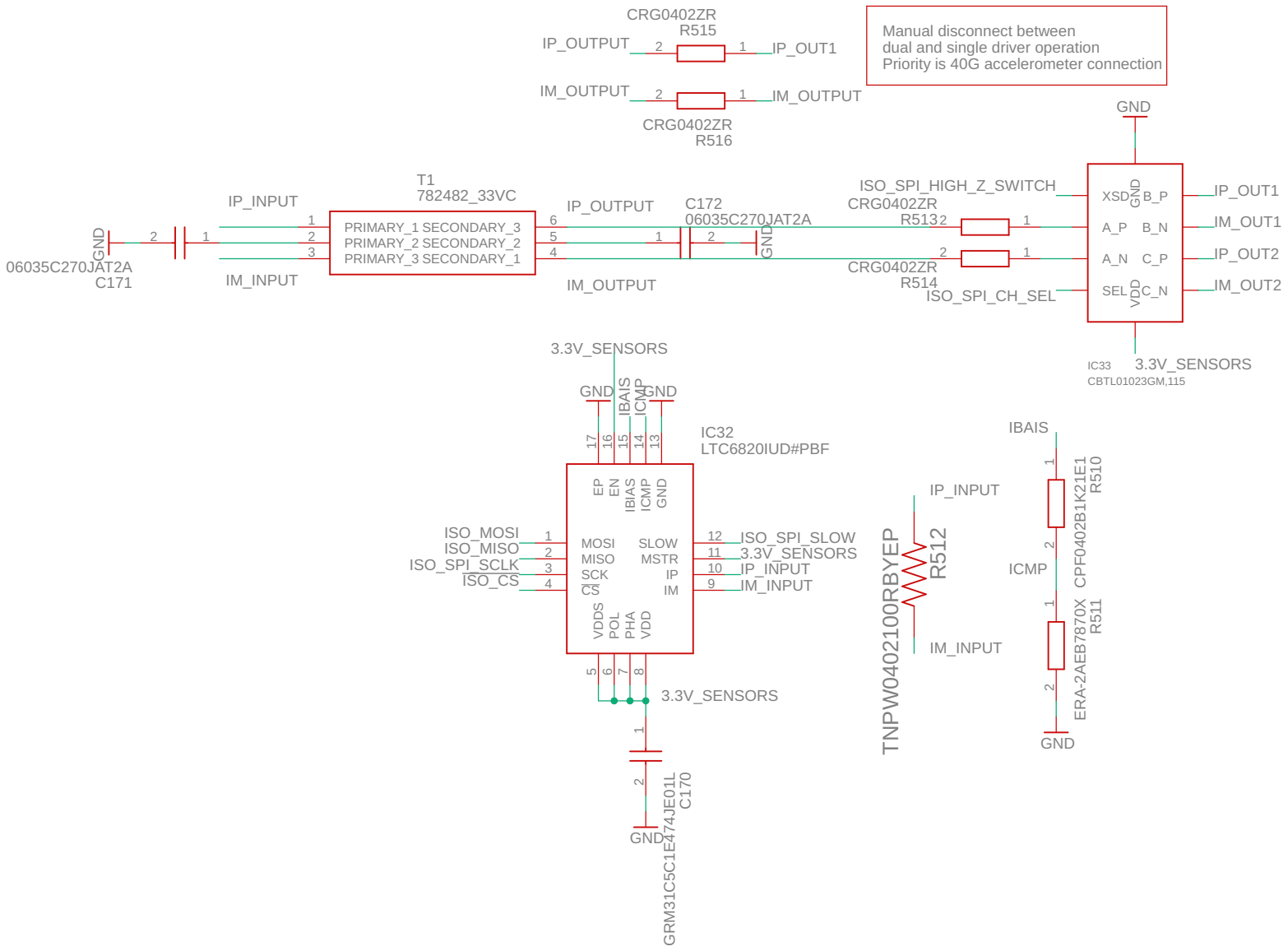
Pins labeled DNC _ # are pins connected for hardware on board



UC1
NUCLEO_H723ZG


GPS module connector
J3
3.3V_NC
GPS_EN
VBAT_NC
FIX_NC
GPS_TX
GPS_RX
GND
3.3V_SENSORS
PPS_NC
01
02
03
04
05
06
07
08
09
SSM-109-L-SV


IC31
ADIS16500AMLZ
3.3V_SENSORS
GRM31C5C1E474JE01L
C169
GND
IMU_RST
IMU_CS
IMU_DIN
IMU_DOUT
IMU_SCLK
IMU_SYNC
IMU_DR
GND_1 GND_19 RST CS DIN DOUT SCLK SYNC DR
NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 NC_7 NC_8 NC_9 NC_10 NC_11 NC_12 NC_13 NC_14 NC_15 NC_16 NC_17 NC_18 NC_19 NC_20 NC_21 NC_22 NC_23 NC_24 NC_25 NC_26 NC_27 NC_28 NC_29 NC_30 NC_31 NC_32 NC_33 NC_34 NC_35 NC_36 NC_37 NC_38 NC_39 NC_40 NC_41 NC_42 NC_43 NC_44 NC_45 NC_46 NC_47 NC_48 NC_49 NC_50 NC_51 NC_52 NC_53 NC_54
GND_2 GND_3 GND_4 GND_5 GND_6 GND_7 GND_8 GND_9 GND_10 GND_11 GND_12 GND_13 GND_14 GND_15 GND_16 GND_17 GND_18 GND_20 GND_21 GND_22 GND_23 GND_24 GND_25 GND_26 GND_27 GND_28 GND_29 GND_30
VDD_1 VDD_2 VDD_3 VDD_4 VDD_5 VDD_6 VDD_7 VDD_8


CRG0402ZR
R515
IP_OUTPUT
IP_OUT1
IM_OUTPUT
IM_OUTPUT
CRG0402ZR
R516
Manual disconnect between
dual and single driver operation
Priority is 40G accelerometer connection
GND
T1
782482_33VC
IP_INPUT
IM_INPUT
PRIMARY_1 SECONDARY_3
PRIMARY_2 SECONDARY_2
PRIMARY_3 SECONDARY_1
IP_OUTPUT
IM_OUTPUT
C172
06035C270JAT2A
GND
06035C270JAT2A
C171
ISO_SPI_HIGH_Z_SWITCH
CRG0402ZR
R513
CRG0402ZR
R514
ISO_SPI_CH_SEL
XSD
GND
B_P
A_P
B_N
A_N
C_P
SEL
VDD
C_N
IP_OUT1
IM_OUT1
IP_OUT2
IM_OUT2
IC33
CBTL01023GM,115
3.3V_SENSORS
3.3V_SENSORS
GND
IBAIS
ICMP
GND
IC32
LTC6820IUD#PBF
EP
EN
IBAIS
ICMP
GND
ISO_MOSI
ISO_MISO
ISO_SPI_SCLK
ISO_CS
MOSI
MISO
SCK
CS
SLOW
MSTR
IP
IM
ISO_SPI_SLOW
3.3V_SENSORS
IP_INPUT
IM_INPUT
VDDS
POL
PHA
VDD
3.3V_SENSORS
C1E474JE01L
C170
GND
GRM31C5
IP_INPUT
TNPW0402100RBYEP
R512
IM_INPUT
IBAIS
R510
CPF0402B1K21E1
ICMP
R511
ERA-2AEB7870X
GND