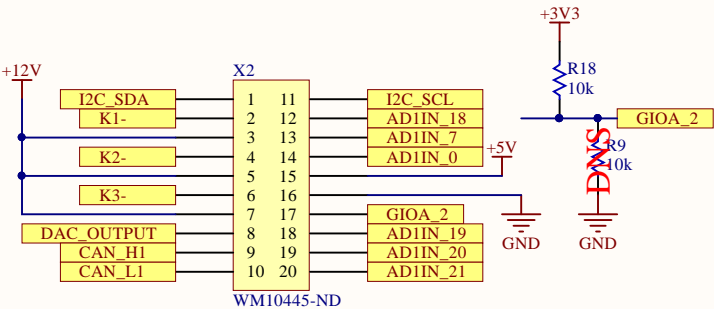
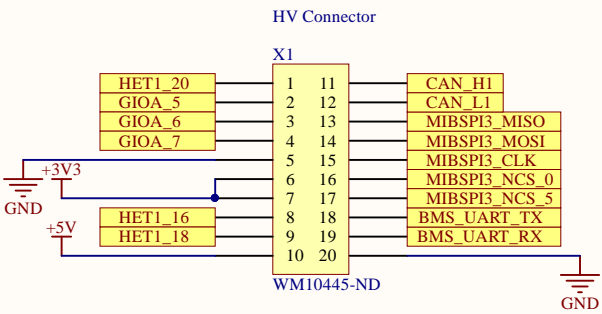


# CONNECTORS

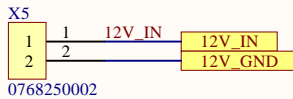
## DASHBOARD & FOOT PEDAL CONNECTOR



## HIGH VOLTAGE CONNECTOR

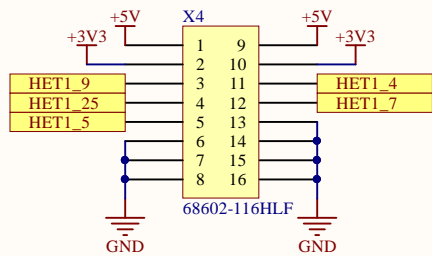


## LOW VOLTAGE POWER IN



GPIO PIN MUX : -----		
	VCU	
(INPUT)	GIOA[2] :	RTDS
(OUTPUT)	GIOA[5] :	(Pre_Charge)
(OUTPUT)	GIOA[6] :	(High_Voltage)
(OUTPUT)	GIOA[7] :	(Ground)
HET : -----		
HET1_4		
HET1_5		
HET1_7		
HET1_9		
HET1_20		
HET1_25		
ADC : -----		
ADIIN_0		
ADIIN_7		
ADIIN_18		
ADIIN_19		
ADIIN_20		
ADIIN_21		

## SIGNAL BREAKOUT CONNECTOR



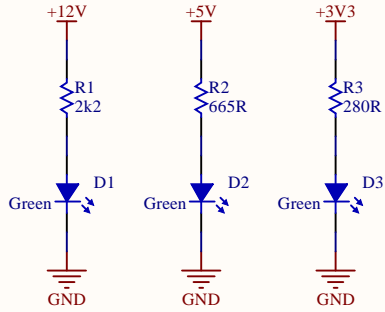
Add more analog inputs here

**DESIGN NOTE:**  
Breaking out rails to power external components (Voltage Transducer, Current Transducer, LCDs, Enable Switches)

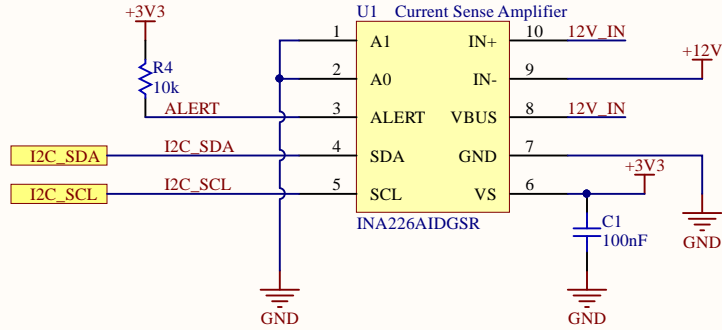
Title		
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File:	C:\Users\...\Connectors.SchDoc	Drawn By:

## POWER & CURRENT SENSING

## POWER GOOD LEDs



## LOW VOLTAGE POWER MONITOR

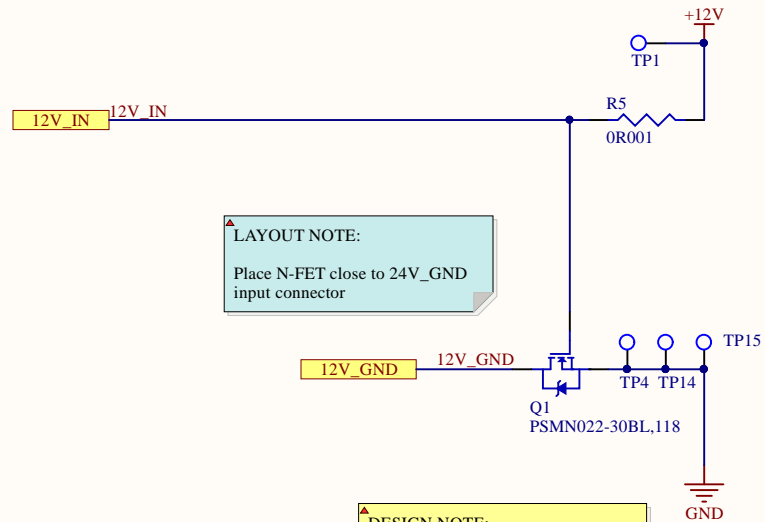


**LAYOUT NOTE:**

Place sensing wires (IN+, IN-) in a Kelvin connection to the shunt resistor  
Route sensing wires as a differential pair

DESIGN NOTE:

Add overvoltage protection on 5V, 3.3, and 1.2

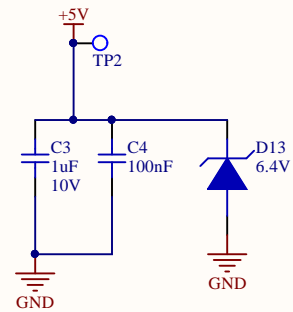


▲ LAYOUT NOTE:

Place N-FET close to 24V\_GND input connector

DESIGN NOTE:

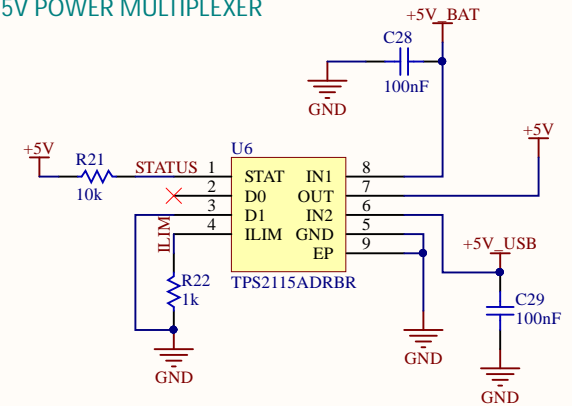
N-FET placed for reverse polarity protection. Will conduct at correct 24V input polarity, will not conduct when polarity reversed.



▲ DESIGN NOTE:

Autoswitching power mux, 5V from the power supply / battery will be automatically prioritized over 5V from USB. When 5V from supply is no longer present, USB power will take over

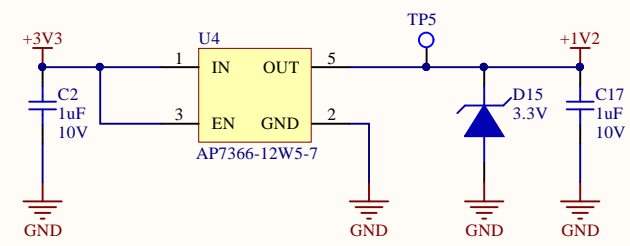
## 5V POWER MULTIPLEXER



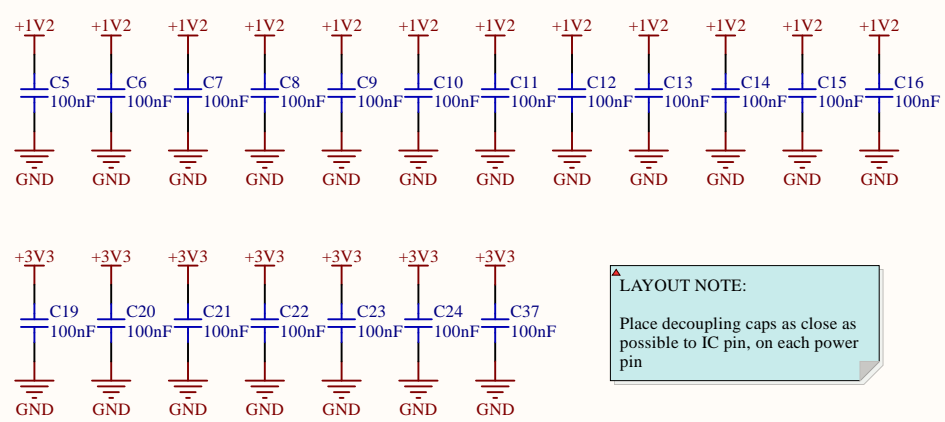
Title		
Size A4	Number	Revision
Date:	2020-10-17	Sheet of
File:	C:\Users\...\Power_Sensing_SchDoc	Drawn By:

# TMS570 POWER

## 1V2 LDO: 600mA



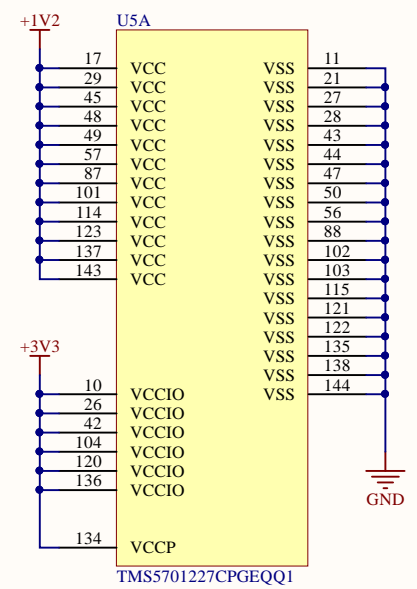
## DECOUPLING CAPACITORS



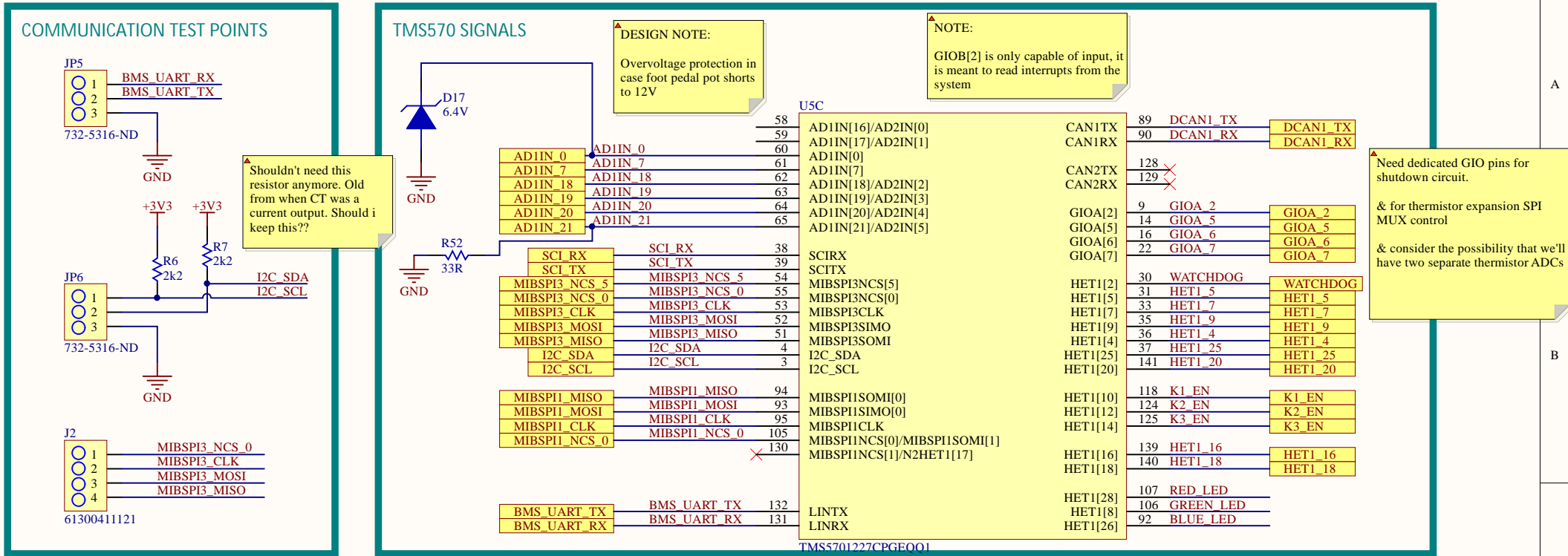
**LAYOUT NOTE:**  
Place decoupling caps as close as possible to IC pin, on each power pin

**DESIGN NOTE:**  
Decoupling capacitors help reduce the transients seen by the MCU on the power input pins

## MICROCONTROLLER POWER PINS



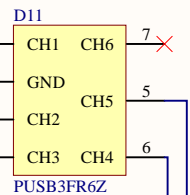
Title		
Size	Number	Revision
A4		
Date:	2020-10-17	Sheet of
File:	C:\Users\...\Power_MCU.SchDoc	Drawn By:



Title		
Size	Number	Revision
A4		
Date:	2020-10-17	Sheet of
File:	C:\Users\...\VCU_Schematic.SchDoc	Drawn By:

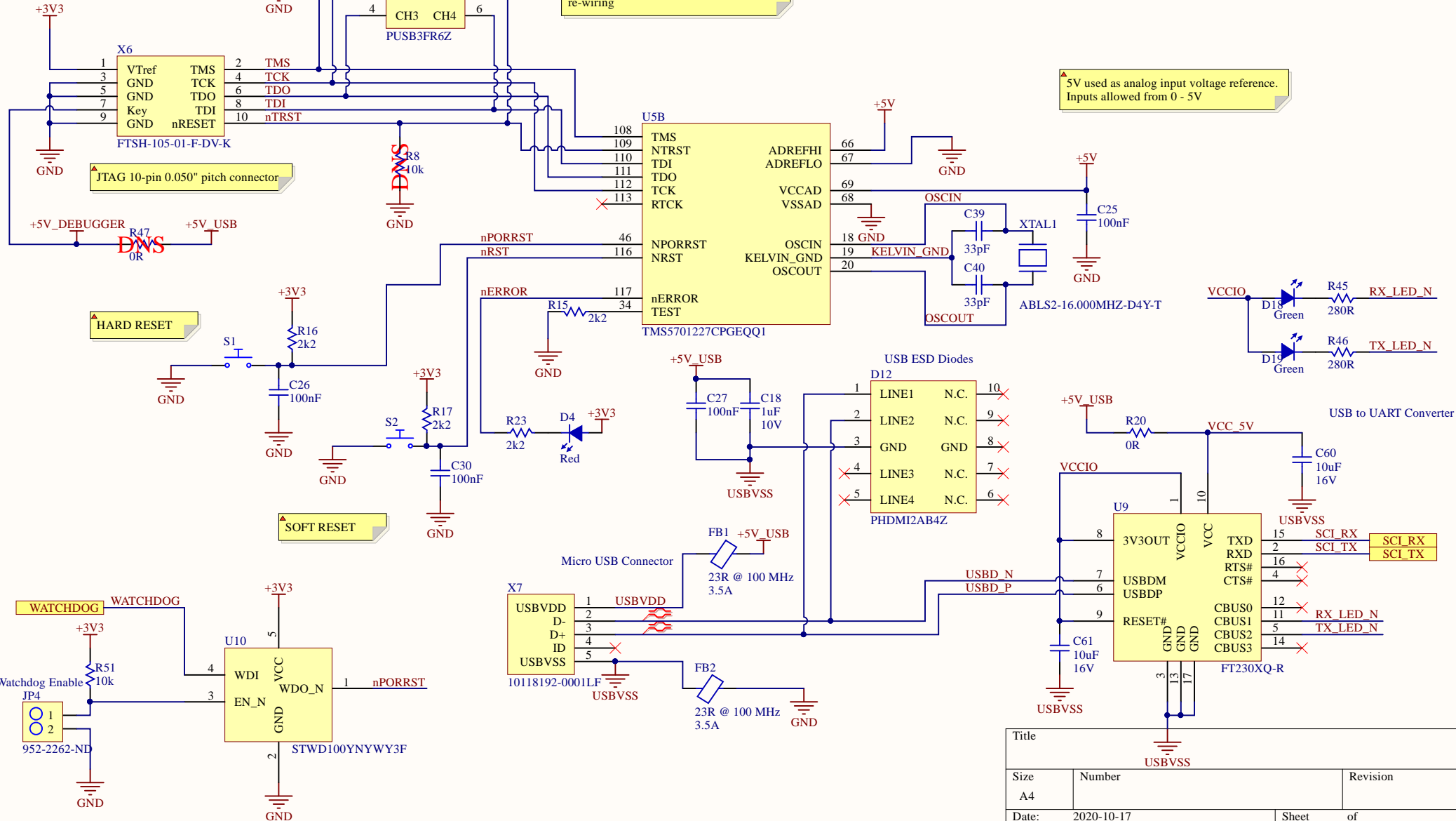
DESIGN NOTE:  
JTAG connection allows programming & debugging the MCU, which needs external power to turn on

JTAG ESD Diodes



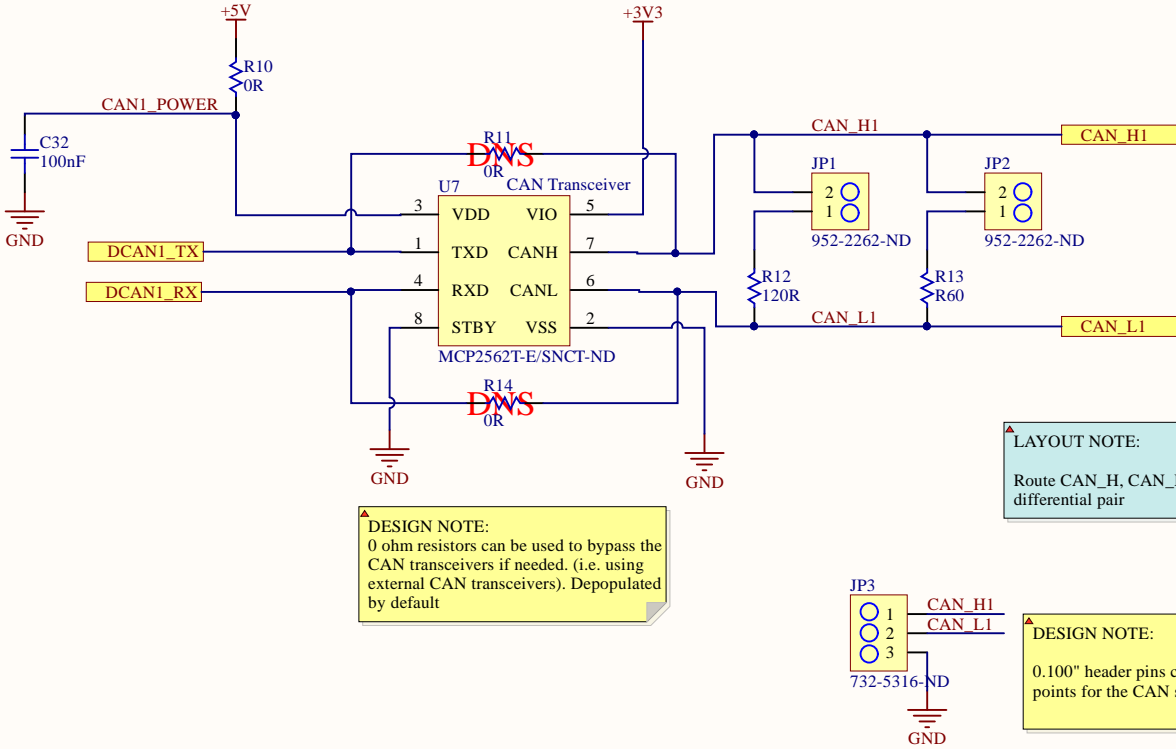
DESIGN NOTE:  
0 ohm resistors and unstuffed resistors allow for pull-ups/downs if needed or re-wiring

5V used as analog input voltage reference.  
Inputs allowed from 0 - 5V



Title		
Size	Number	Revision
A4		
Date:	2020-10-17	Sheet of
File:	C:\Users\...\MCU_Signals.SchDoc	Drawn By:

# CAN TRANSCEIVER



DESIGN NOTE:

0 ohm resistors allow IC's to be unpowered and unused if needed. (i.e. don't need them or they draw too much power)

**LAYOUT NOTE:**

Place decoupling caps as close as possible to IC pin

**LAYOUT NOTE:**

Route CAN\_H, CAN\_L signals as differential pair

**DESIGN NOTE:**

0.100" header pins can be used as test points for the CAN signals

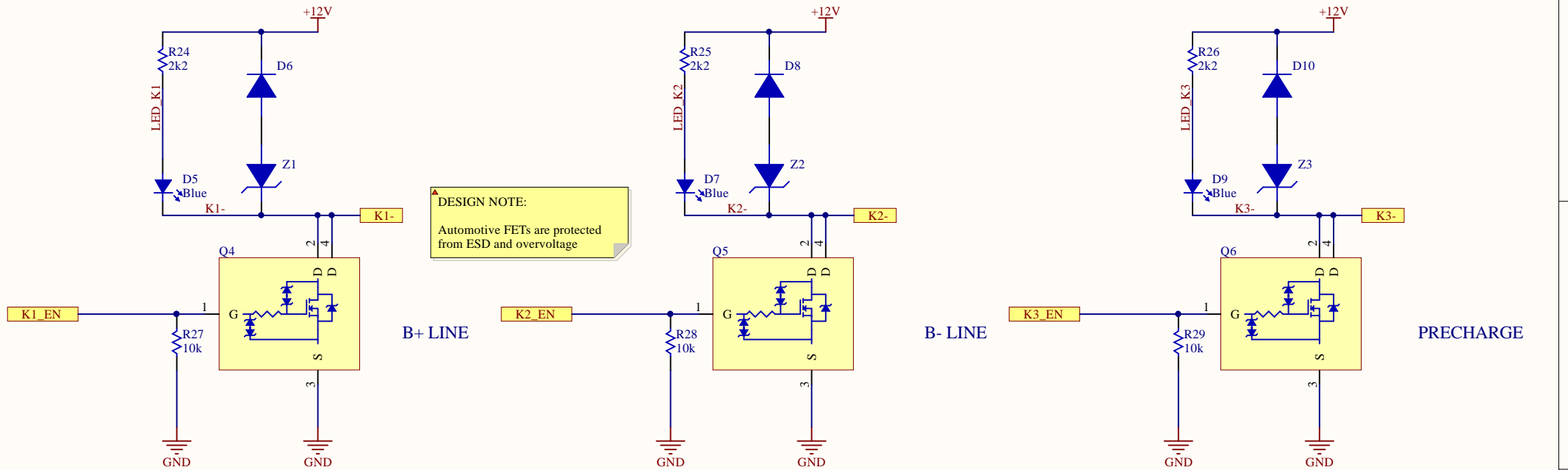
Title			
Size A4	Number		Revision
Date:	2020-10-17	Sheet	of
File:	C:\Users\...\CAN.SchDoc	Drawn By:	

# LOW SIDE CONTACTOR SWITCHING

DESIGN NOTE:  
Diode-Zener snubber acts as a good way to dissipate inductive voltage kicks when the contactor opens

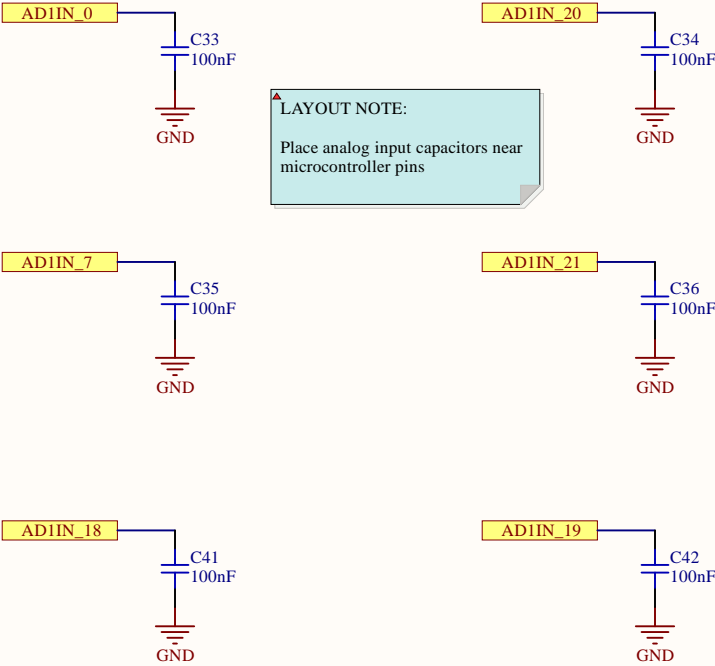
DESIGN NOTE:  
These low-side switches go out to the rest of the shutdown circuit. The snubber circuit and LED remain for backwards compatibility with the go kart, where the contactors connect directly to the VCU.

DESIGN NOTE:  
Automotive FETs are protected from ESD and overvoltage



Title		
Size	Number	Revision
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Date:	2020-10-17	Sheet of
File:	C:\Users\...\Contactor_Switching.SchDoc	Drawn By:

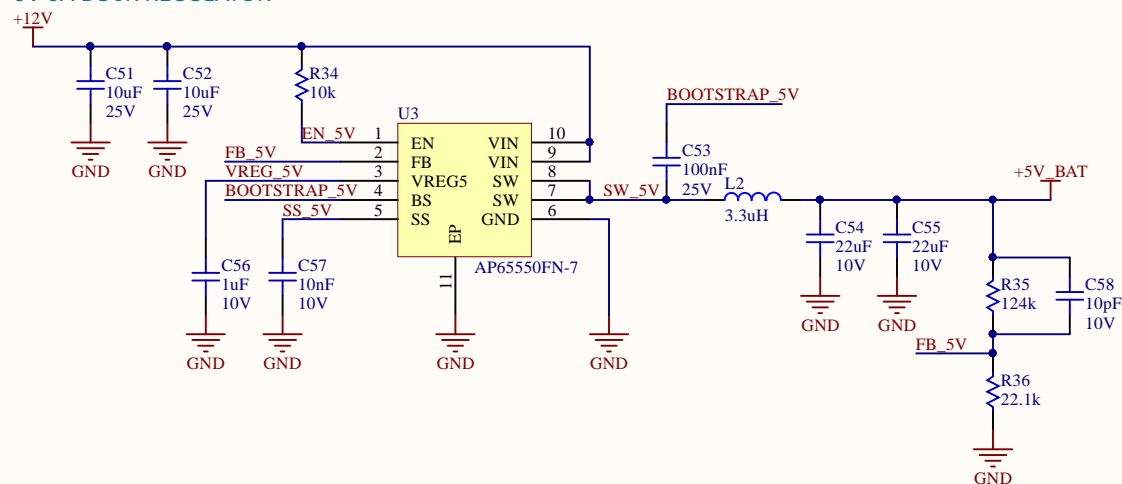
# ADC DECOUPLING



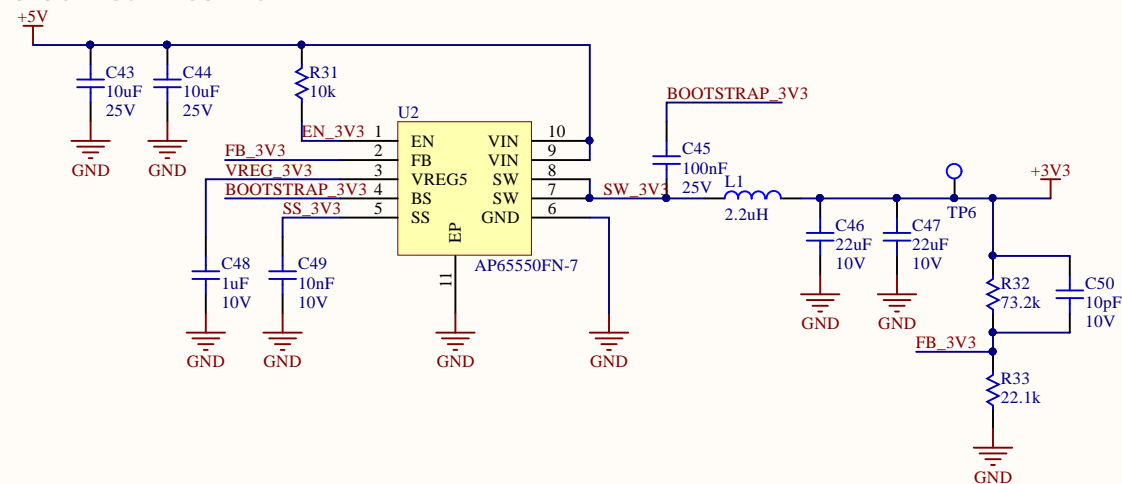
Title			
Size	Number		Revision
A4			
Date:	2020-10-17	Sheet	of
File:	C:\Users\...\ADC_Decoupling.SchDoc	Drawn By:	



## 5V 5A BUCK REGULATOR



### 3V3 5A BUCK REGULATOR



Title		
Size A4	Number	Revision
Date:	2020-10-17	Sheet of
File:	C:\Users\...\BUCK_CONVERTERS.SchDoc	Drawn By:

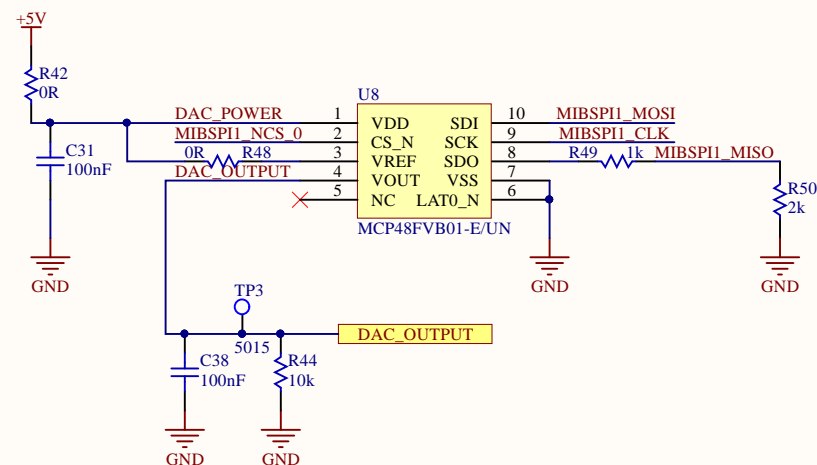
## ▲ DESIGN NOTE:

0 ohm resistors allow IC's to be unpowered and unused if needed. (i.e. don't need them or they draw too much power)  
They also provide a footprint for a resistor, in case an RC filter is needed

## ▲ LAYOUT NOTE:

Place decoupling caps as close as possible to IC pin

## DIGITAL TO ANALOG CONVERTER



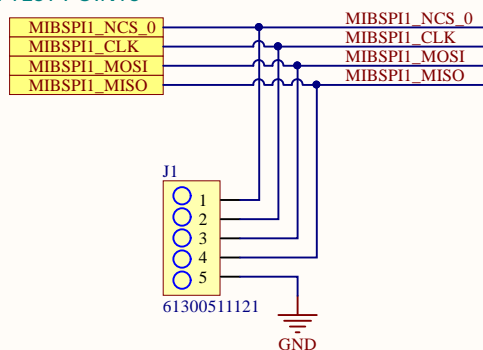
## ▲ DESIGN NOTE:

Unstuffing the 0 ohm resistors can also allow for current to be measured using a DMM

## ▲ LAYOUT NOTE:

Place output filter cap near connector

## SPI TEST POINTS



Title			
Size	Number		Revision
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File:	C:\Users\...\DAC.SchDoc		Drawn By:

