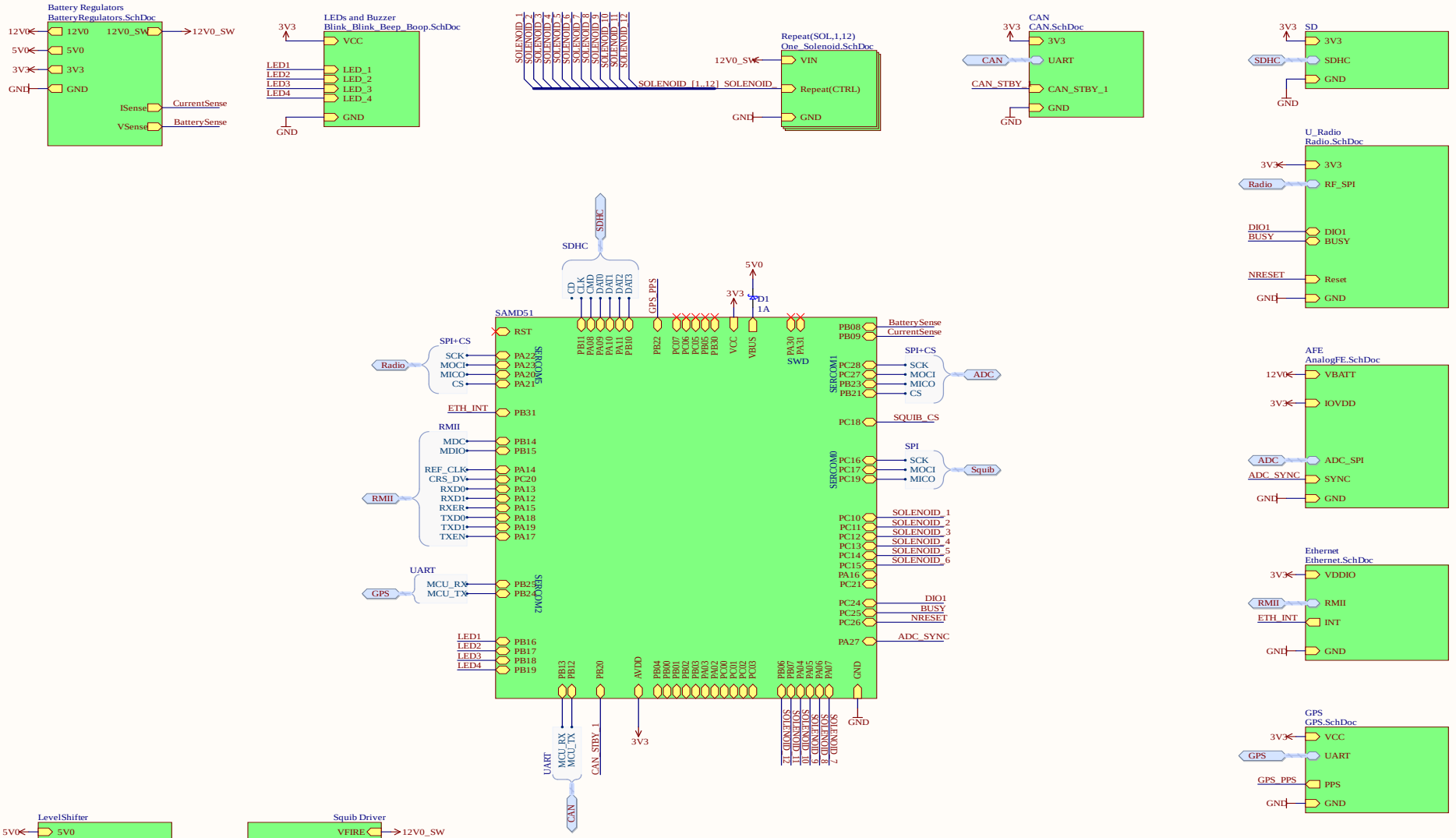
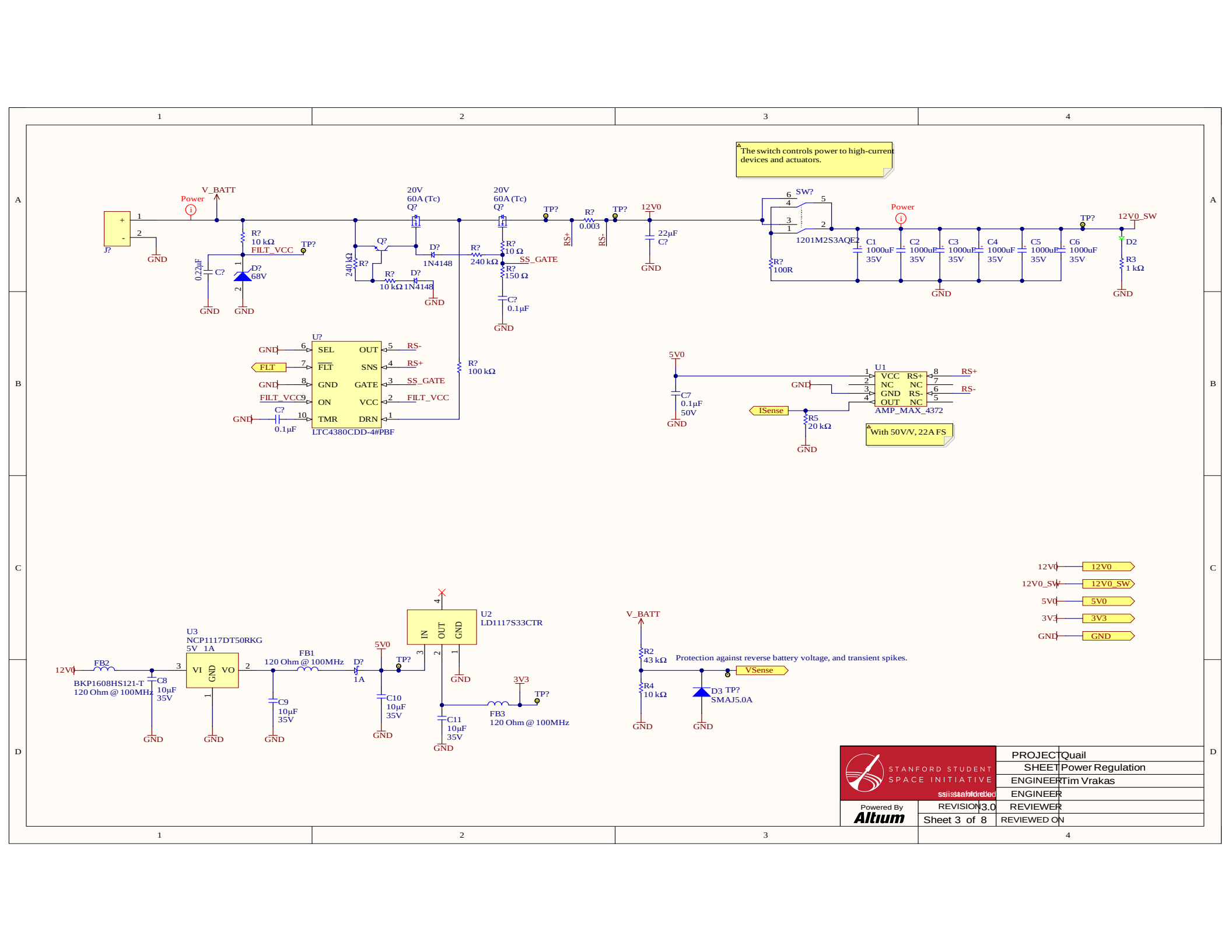
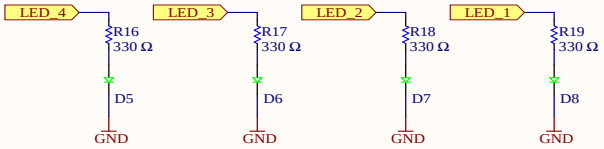
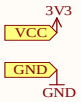
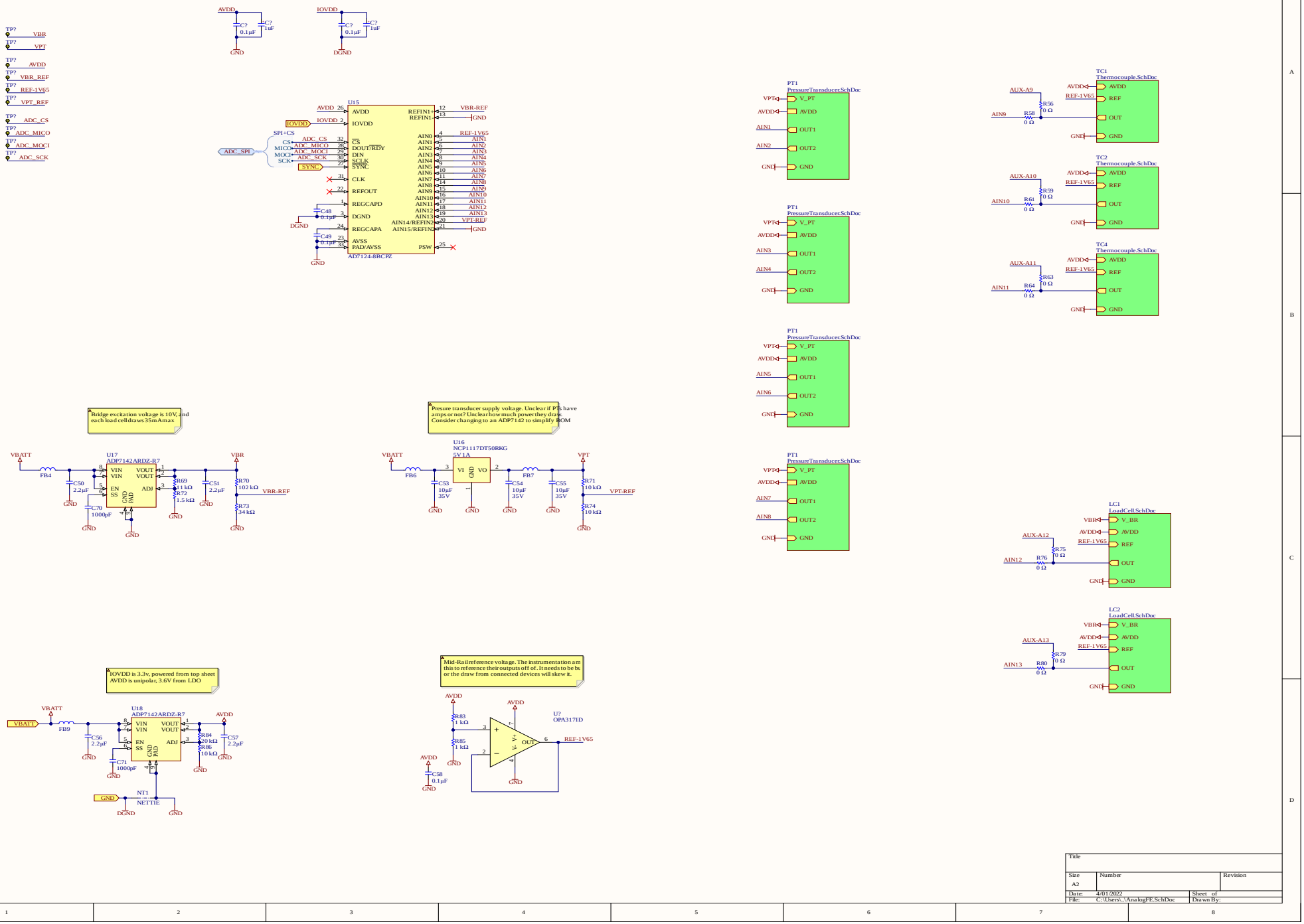

Battery Regulators
BatteryRegulators.SchDoc
12V0
5V0
3V3
GND
12V0_SW
ISense
VSense
CurrentSense
BatterySense
LEDs and Buzzer
Blink_Blink_Beep_Boop.SchDoc
VCC
LED1
LED2
LED3
LED4
Repeat(SOL,1,12)
One_Solenoid.SchDoc
SOLENOID_1
SOLENOID_2
SOLENOID_3
SOLENOID_4
SOLENOID_5
SOLENOID_6
SOLENOID_7
SOLENOID_8
SOLENOID_9
SOLENOID_10
SOLENOID_11
SOLENOID_12
SOLENOID_[1..12]
VIN
Repeat(CTRL)
CAN
CAN.SchDoc
UART
CAN_STBY
CAN_STBY_1
SD
SDHC
U_Radio
Radio.SchDoc
RF_SPI
DIO1
BUSY
NRESET
Reset
AFE
AnalogFE.SchDoc
VBATT
IOVDD
ADC_SPI
SYNC
ADC_SYNC
Ethernet
Ethernet.SchDoc
VDDIO
RMII
INT
ETH_INT
GPS
GPS.SchDoc
PPS
GPS_PPS
SAMD51
RST
SPI+CS
SCK
MOCI
MICO
CS
SERCOM5
ETH_INT
RMII
MDC
MDIO
REF_CLK
CRS_DV
RXD0
RXD1
RXER
TXD0
TXD1
TXEN
UART
MCU_RX
MCU_TX
SERCOM2
LED1
LED2
LED3
LED4
SDHC
CD
CLK
CMD
DAT0
DAT1
DAT2
DAT3
GPS_PPS
5V0
3V3
D1
1A
VCC
VBUS
SWD
BatterySense
CurrentSense
SERCOM1
ADC
SQUIB_CS
SPI
SERCOM0
Squib
SOLENOID_1
SOLENOID_2
SOLENOID_3
SOLENOID_4
SOLENOID_5
SOLENOID_6
DIO1
BUSY
NRESET
ADC_SYNC
AVDD
CAN_STBY_1
CAN
LevelShifter
SQUIB_CS
CS_3V3
CS_5V0
SPI_3V3
SPI_5V0
Squib Driver
VFIRE
CS
M4 Screw
H1
H2
H3
H4
H5
H6
STANFORD STUDENT SPACE INITIATIVE
Powered By
Altium
PROJECT Quail
SHEET Top Sheet
ENGINEER Tim Vrakas
ENGINEER
REVISION 3.0
REVIEWER
Sheet 1 of 8
REVIEWED ON

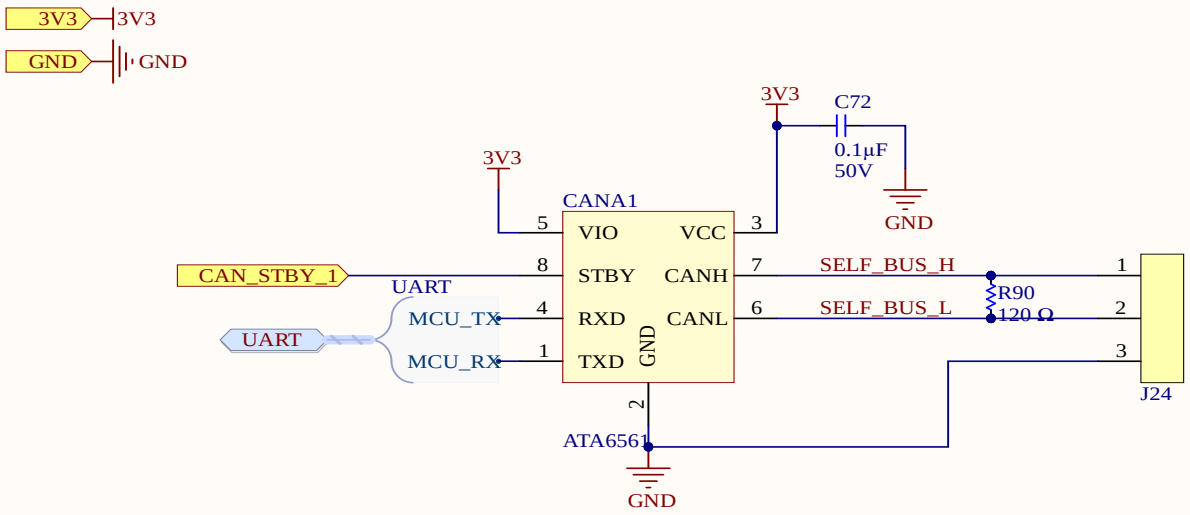

The switch controls power to high-current devices and actuators.
V_BATT
Power
J?
GND
R?
10 kΩ
FILT_VCC
TP?
C?
0.22µF
D?
68V
20V
60A (Tc)
Q?
240 kΩ
1N4148
10 kΩ
R?
240 kΩ
10 Ω
SS_GATE
150 Ω
0.1µF
R?
0.003
RS+
RS-
12V0
22µF
SW?
1201M2S3AQE2
100R
C1 1000uF 35V
C2 1000uF 35V
C3 1000uF 35V
C4 1000uF 35V
C5 1000uF 35V
C6 1000uF 35V
12V0_SW
D2
R3
1 kΩ
U?
LTC4380CDD-4#PBF
SEL
FLT
GND
ON
TMR
OUT
SNS
GATE
VCC
DRN
100 kΩ
5V0
C7
0.1µF
50V
U1
AMP_MAX_4372
VCC
NC
GND
OUT
RS+
RS-
ISense
R5
20 kΩ
With 50V/V, 22A FS
12V0
12V0_SW
5V0
3V3
GND
U3
NCP1117DT50RKG
5V 1A
VI
VO
FB2
BKP1608HS121-T
120 Ω @ 100MHz
C8
10µF
35V
FB1
120 Ω @ 100MHz
C9
10µF
35V
U2
LD1117S33CTR
IN
OUT
C10
10µF
35V
C11
10µF
35V
FB3
120 Ω @ 100MHz
R2
43 kΩ
R4
10 kΩ
Protection against reverse battery voltage, and transient spikes.
VSense
D3
SMAJ5.0A
STANFORD STUDENT SPACE INITIATIVE
Powered By
Altium
PROJECT Quail
SHEET Power Regulation
ENGINEER Tim Vrakas
ENGINEER
REVISION 3.0
REVIEWER
Sheet 3 of 8
REVIEWED ON



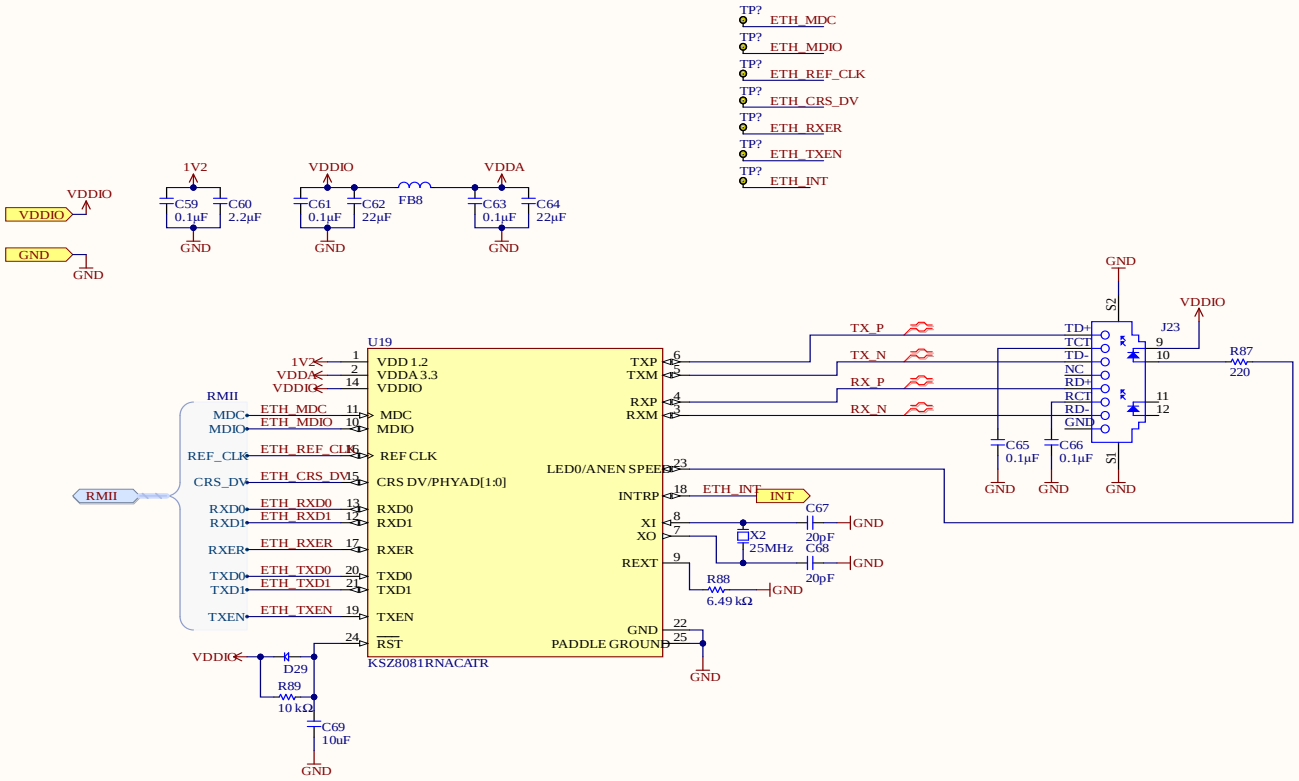


STANFORD STUDENT SPACE INITIATIVE	PROJECT	Quail
	SHEET	Blinks and Boops
	ENGINEER	Tim Vrakas
	ENGINEER	
Powered By Altium	REVISION	3.0
	REVIEWER	
Sheet 8 of 8	REVIEWED ON	

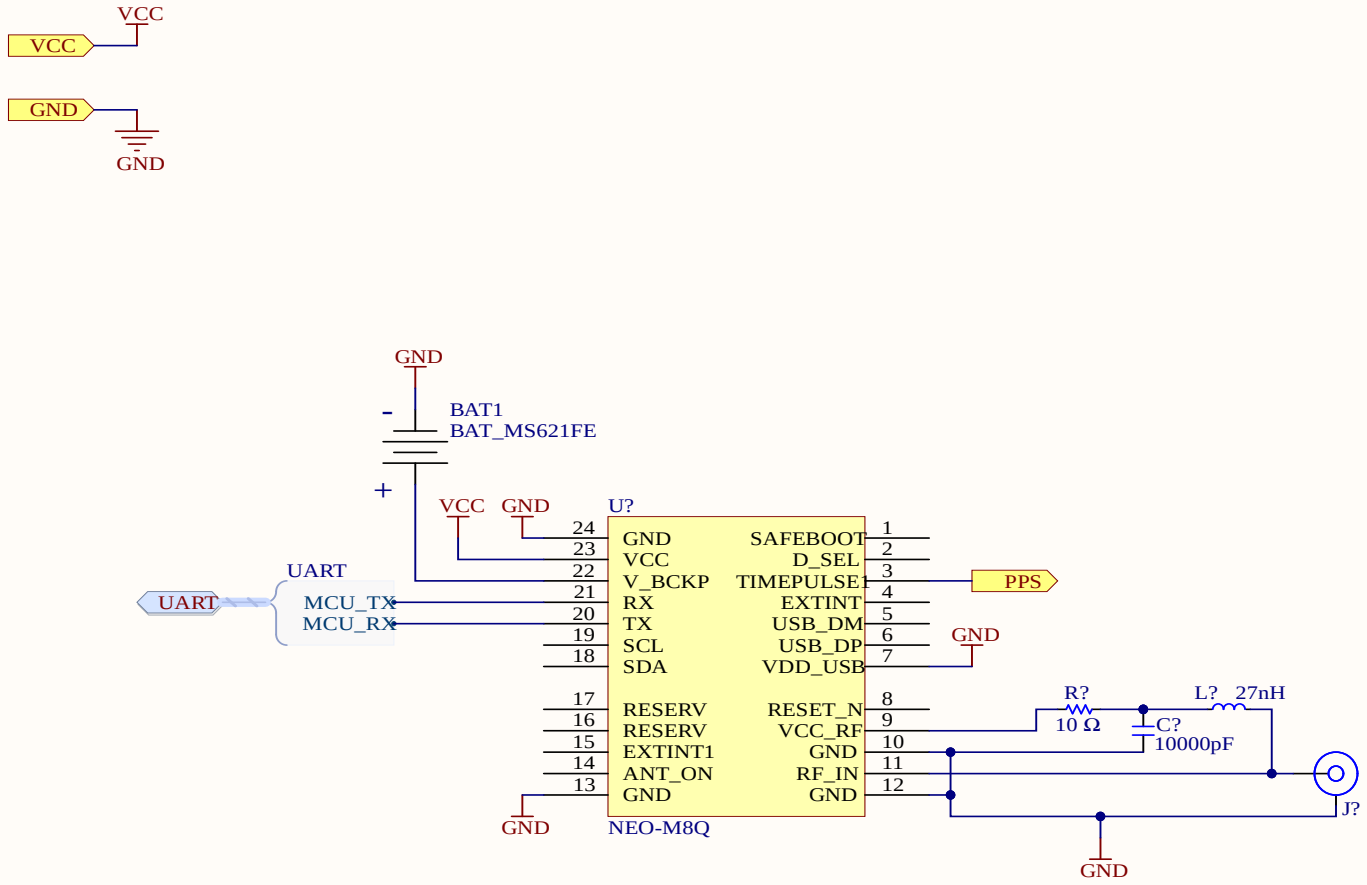

TP? VBR
TP? VPT
TP? AVDD
TP? VBR_REF
TP? REF-1V65
TP? VPT_REF
TP? ADC_CS
TP? ADC_MICO
TP? ADC_MOCI
TP? ADC_SCK
AVDD
IOVDD
GND
DGND
U15
AD7124-8BCPZ
ADC_SPI
SPI+CS
SYNC
VBR-REF
REF-1V65
VPT-REF
PT1
PressureTransducer.SchDoc
V_PT
AVDD
OUT1
OUT2
GND
TC1
TC2
TC4
Thermocouple.SchDoc
REF
OUT
AUX-A9
AUX-A10
AUX-A11
AIN9
AIN10
AIN11
R56
R58
R59
R61
R63
R64
0 Ω
Bridge excitation voltage is 10V, and each load cell draws 35mAmax
U17
ADP7142ARDZ-R7
VBATT
VBR
VBR-REF
FB4
C50 2.2µF
C51 2.2µF
C70 1000pF
R69 11 kΩ
R72 1.5 kΩ
R70 102 kΩ
R73 34 kΩ
Presure transducer supply voltage. Unclear if PTs have amps or not? Unclear how much power they draw. Consider changing to an ADP7142 to simplify BOM
U16
NCP1117DT50RKG
5V 1A
VPT
VPT-REF
FB6
FB7
C53 10µF 35V
C54 10µF 35V
C55 10µF 35V
R71 10 kΩ
R74 10 kΩ
LC1
LC2
LoadCell.SchDoc
V_BR
R75 0 Ω
R76 0 Ω
R79 0 Ω
R80 0 Ω
AUX-A12
AUX-A13
AIN12
AIN13
IOVDD is 3.3v, powered from top sheet AVDD is unipolar, 3.6V from LDO
U18
ADP7142ARDZ-R7
FB9
C56 2.2µF
C57 2.2µF
C71 1000pF
R84 10 kΩ
R86 10 kΩ
NT1
NETTIE
Mid-Rail reference voltage. The instrumentation amp this to reference their outputs off of. It needs to be bu or the draw from connected devices will skew it.
U7
OPA317ID
R83 1 kΩ
R85 1 kΩ
C58 0.1µF
Title
Size A2
Number
Revision
Date: 4/01/2022
Sheet of
File: C:\Users\...\AnalogFE.SchDoc
Drawn By:



Title		
Size: A	Number:	Revision:
Date: 4/01/2022		Sheet of
File: C:\Users\..\CAN.SchDoc		Drawn By:



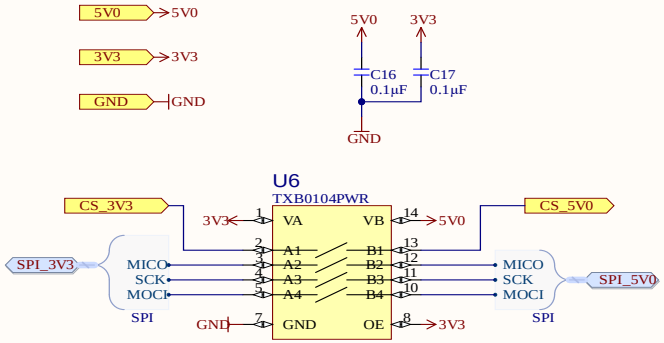
Title		
Size: A3	Number	Revision
Date: 4/01/2022		Sheet of
File: C:\Users\..\Ethernet.SchDoc		Drawn By:



Title		
Size A	Number	Revision
Date: 4/01/2022		Sheet of
File: C:\Users\..\GPS.SchDoc		Drawn By:

Level Shifters

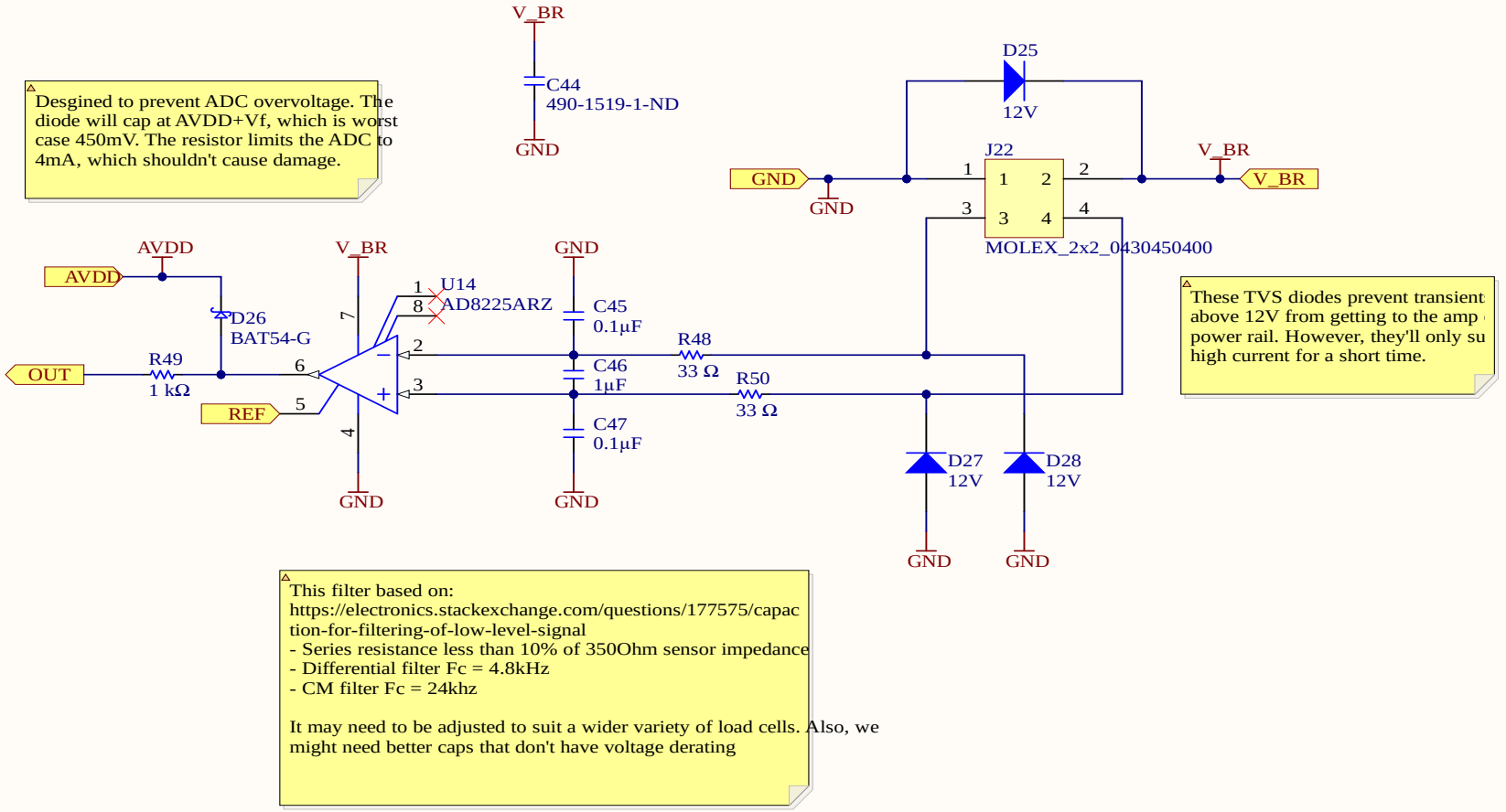
The Squib Drivers operates using 5V logic, the MCU (SAMD51) uses 3.3V so the SPI interface between them needs to be converted



PROJECT	Quail
SHEET	Misc
ENGINEER	Tim Vrakas
ENGINEER	
REVISION	3.0
REVIEWER	
Sheet n of m	REVIEWED ON

STANFORD STUDENT SPACE INITIATIVE

Powered By Altium

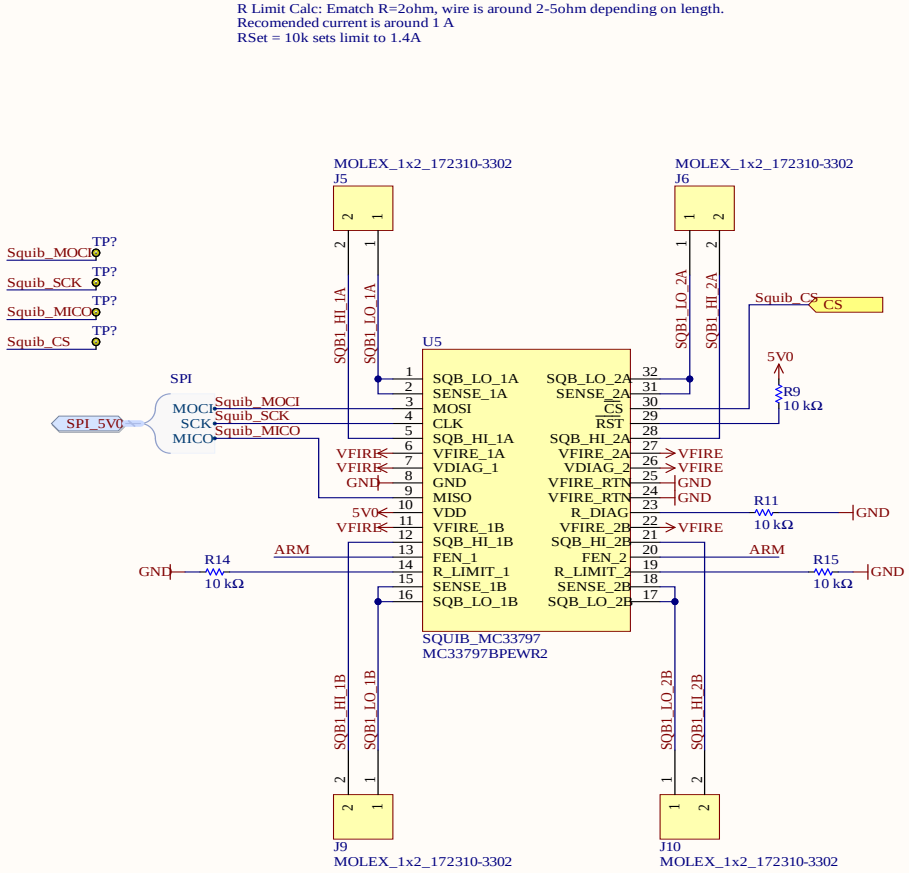


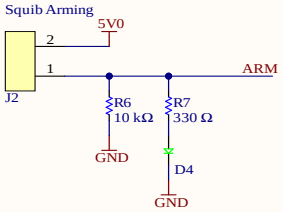
Title		
Size A	Number	Revision
Date: 4/01/2022		Sheet of
File: C:\Users\..\LoadCell.SchDoc		Drawn By:

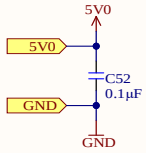
Squib Drivers

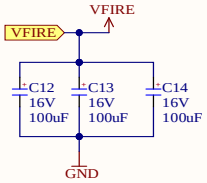
Pin 2 is Lo and Pin 1 is High on all connectors

R Limit Calc: Ematch R=2ohm, wire is around 2-5ohm depending on length.
Recomended current is around 1 A
RSet = 10k sets limit to 1.4A

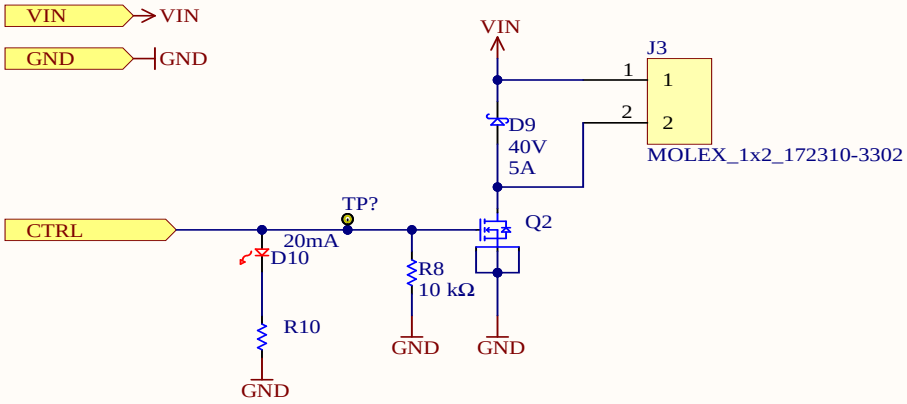




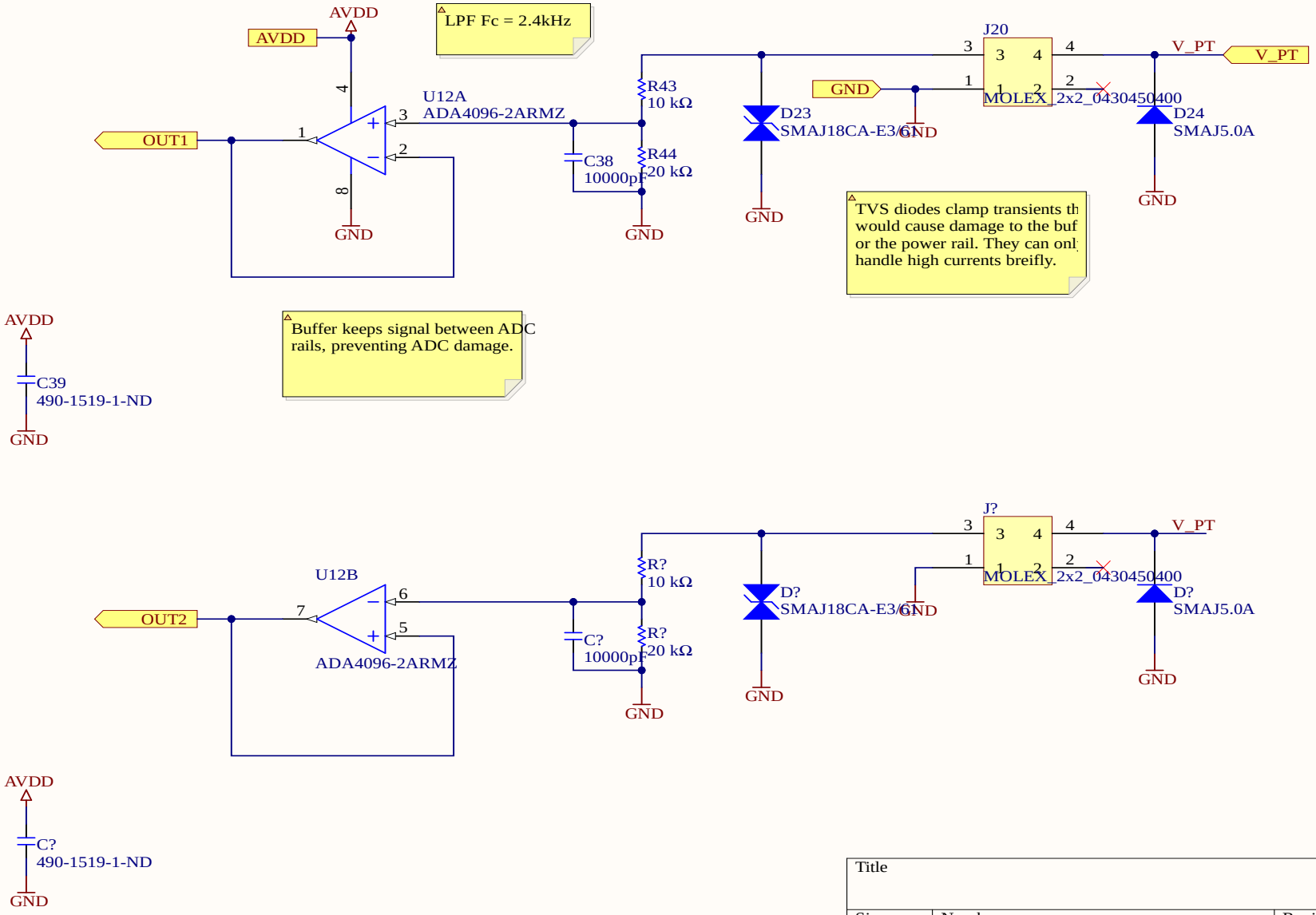




STANFORD STUDENT SPACE INITIATIVE	PROJECT Quail
	SHEET Squibs
	ENGINEER Tim Vrakas
	ENGINEER
Powered By Altium	REVISION 3.0
	REVIEWER
Sheet n of m	REVIEWED ON



Title		
Size: A	Number	Revision
Date: 4/01/2022		Sheet of
File: C:\Users\..\One_Solenoid.SchDoc		Drawn By:

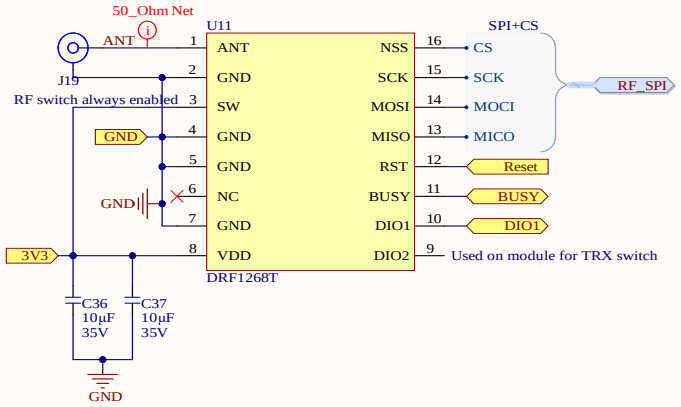

AVDD
AVDD
LPF Fc = 2.4kHz
U12A
ADA4096-2ARMZ
OUT1
R43
10 kΩ
R44
20 kΩ
C38
10000pF
GND
GND
GND
J20
MOLEX_2x2_0430450400
V_PT
V_PT
GND
GND
D23
SMAJ18CA-E3/5
D24
SMAJ5.0A
GND
GND
TVS diodes clamp transients th
would cause damage to the buf
or the power rail. They can onl
handle high currents breifly.
Buffer keeps signal between ADC
rails, preventing ADC damage.
AVDD
C39
490-1519-1-ND
GND
U12B
ADA4096-2ARMZ
OUT2
R?
10 kΩ
R?
20 kΩ
C?
10000pF
GND
GND
J?
MOLEX_2x2_0430450400
V_PT
GND
D?
SMAJ18CA-E3/5
D?
SMAJ5.0A
GND
GND
AVDD
C?
490-1519-1-ND
GND
Title
Size
A
Number
Revision
Date: 4/01/2022
Sheet of
File: C:\Users\..\PressureTransducer.SchDoc
Drawn By:

Radio Module

TODO

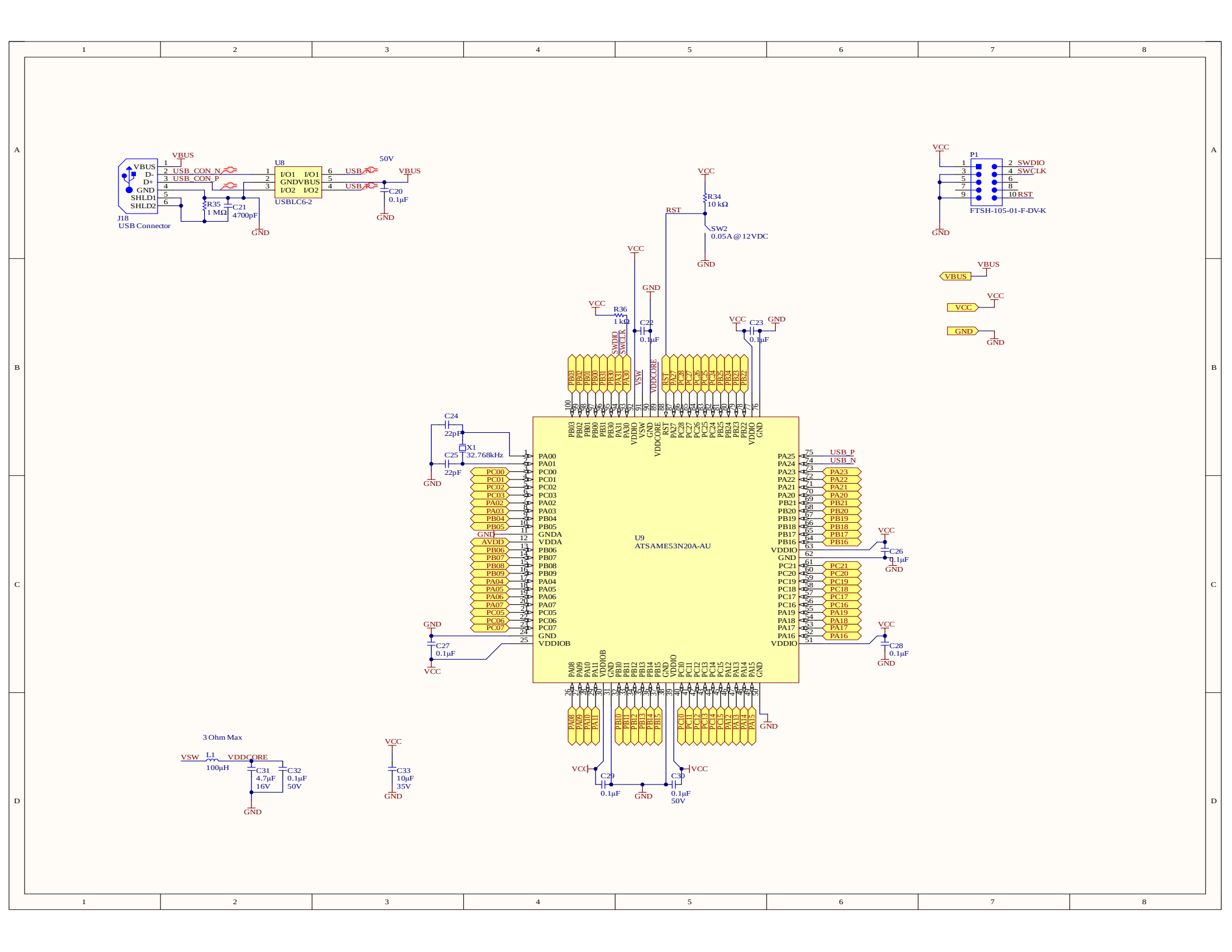
Swap Out with DRF Module

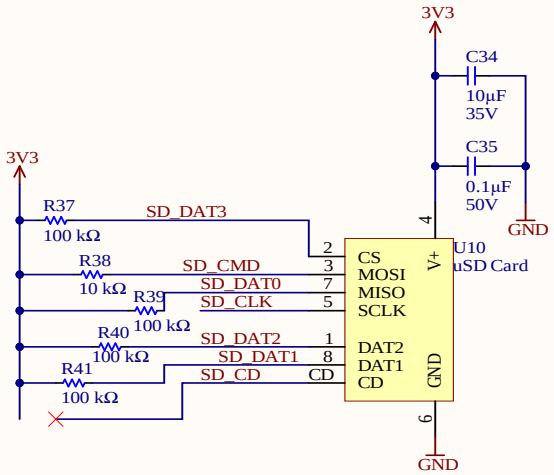
Radio for wireless communiactions
Dorji DRF1268T being used
Mainly on Tims Recomendation

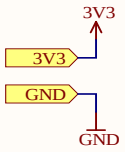


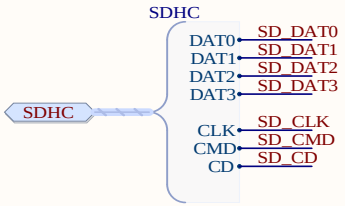
(G)FSK/4(G)FSK/LoRa Modulation
433Mhz transceiver
Max.22dBm output power
-147dBm sensitivity
Standard SPI interface
Low RX current: 5.7 mA
Automatic RF sense and CAD monitc
Data Rate: <300 kbps
Standby current: <1uA
Supply voltage: 3.3V

STANFORD STUDENT SPACE INITIATIVE	PROJECT Quail
	SHEET *
	ENGINEER Tim Vrakas
	ENGINEER
Powered By Altium	REVISION 3.0
	REVIEWER
Sheet * of *	REVIEWED ON

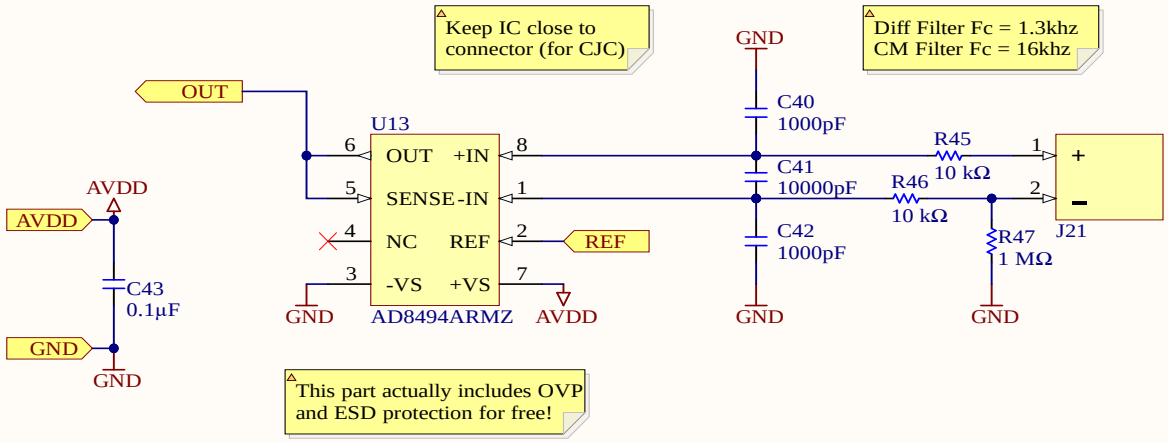

J18
USB Connector
VBUS
USB_CON_N
USB_CON_P
GND
SHLD1
SHLD2
R35
1 MΩ
C21
4700pF
U8
I/O1 I/O1
GNDVBUS
I/O2 I/O2
USBLC6-2
USB_N
USB_P
50V
C20
0.1µF
P1
SWDIO
SWCLK
RST
FTSH-105-01-F-DV-K
R34
10 kΩ
SW2
0.05A@12VDC
R36
1 kΩ
C22
0.1µF
C23
0.1µF
C24
22pF
X1
32.768kHz
C25
22pF
U9
ATSAME53N20A-AU
C26
0.1µF
C27
0.1µF
C28
0.1µF
C29
0.1µF
C30
0.1µF
50V
L1
100µH
3 Ohm Max
C31
4.7µF
16V
C32
0.1µF
50V
C33
10µF
35V







Title *			
Size: A4	Number: *	Revision: *	
Date: 4/1/2022	Time: 1:59:05 AM	Sheet * of *	
File: C:\Users\timv\Documents\Quail_Hardware\SD.SchDoc			



Title		
Size: A	Number	Revision
Date: 4/01/2022		Sheet of
File: C:\Users\..\Thermocouple.SchDoc		Drawn By: