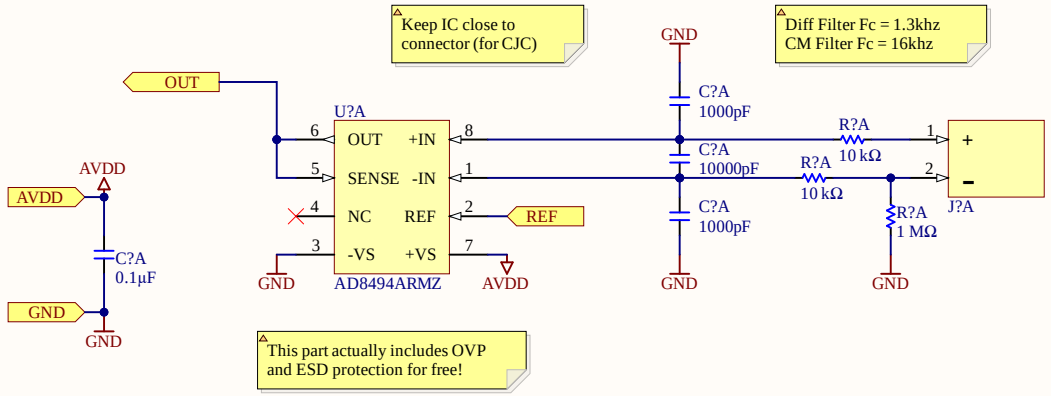

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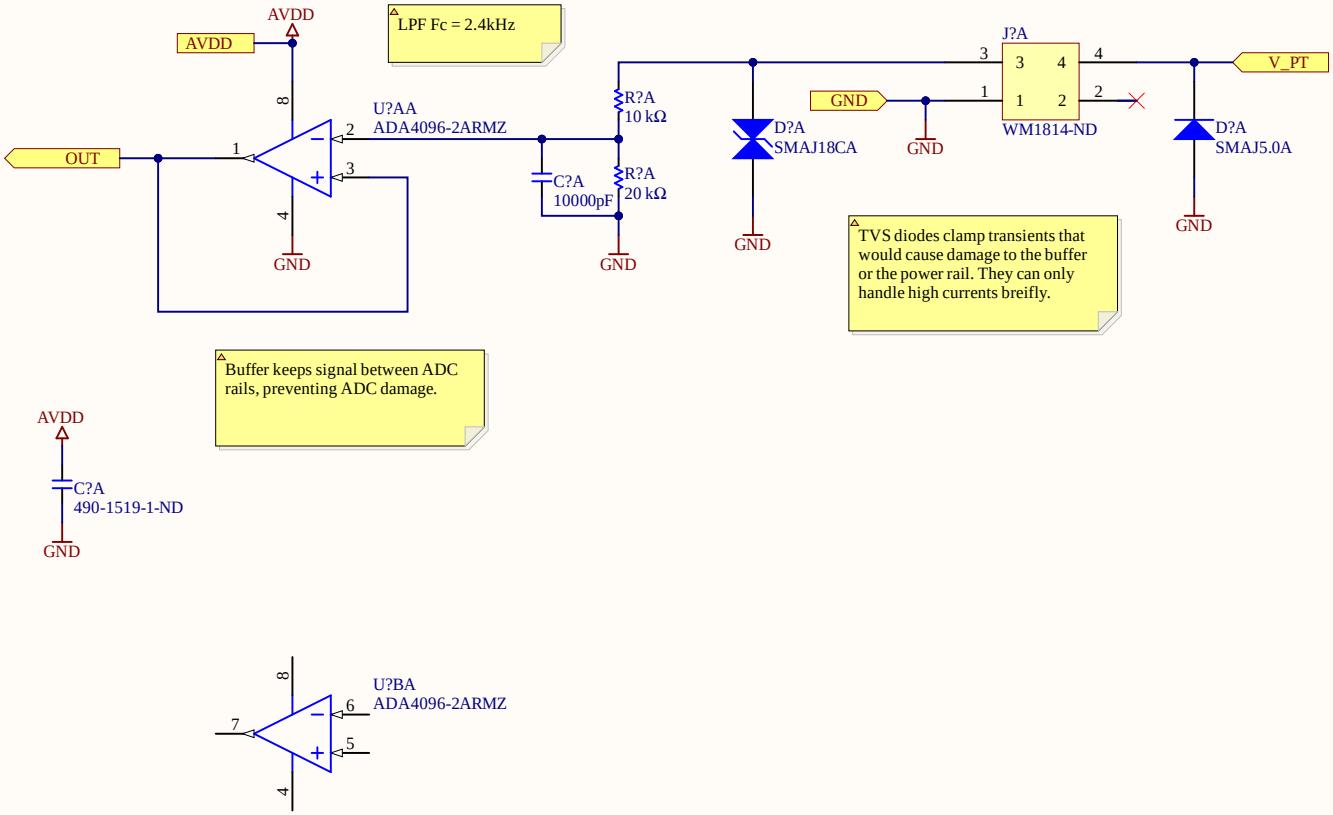

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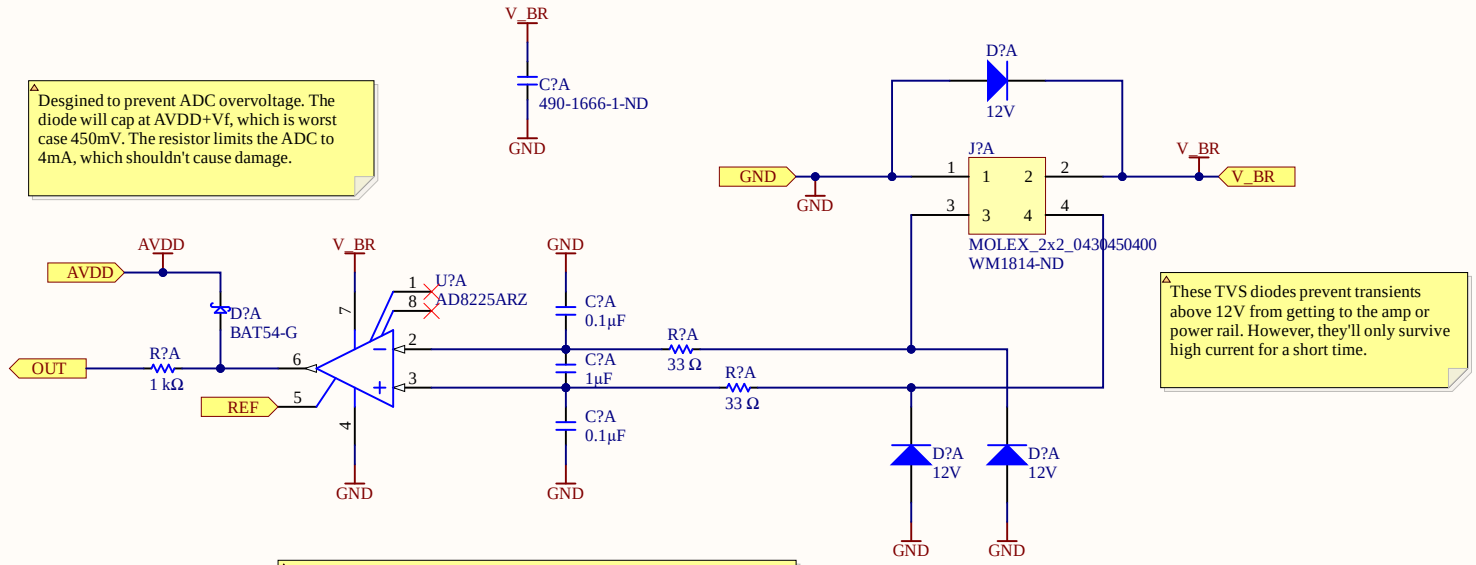

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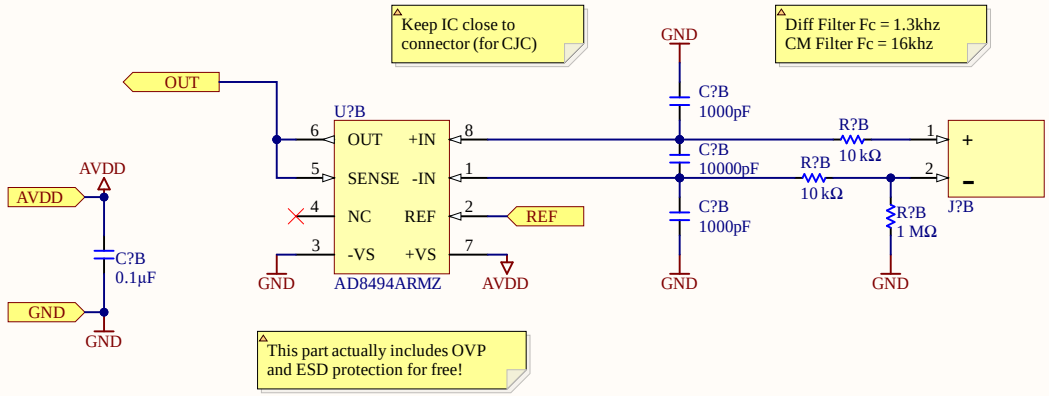

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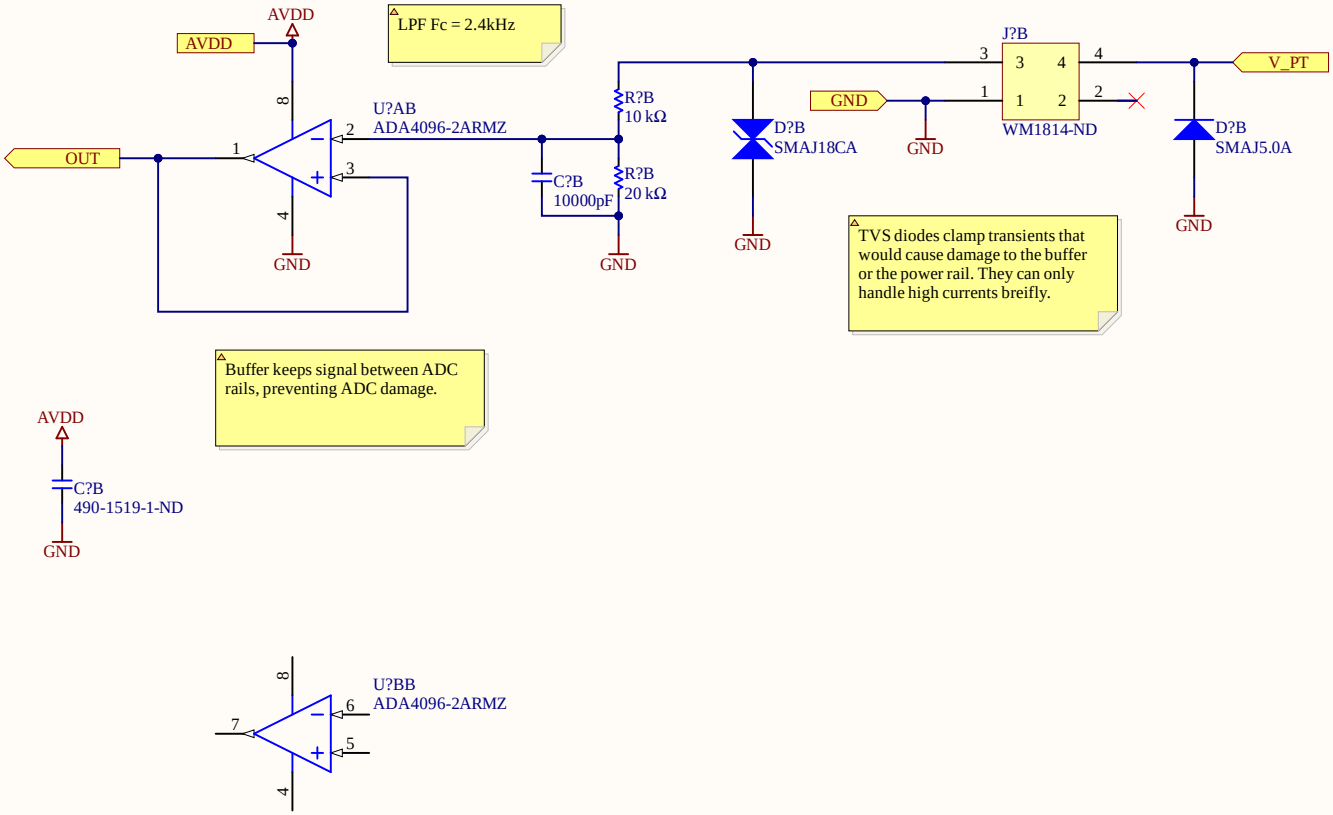

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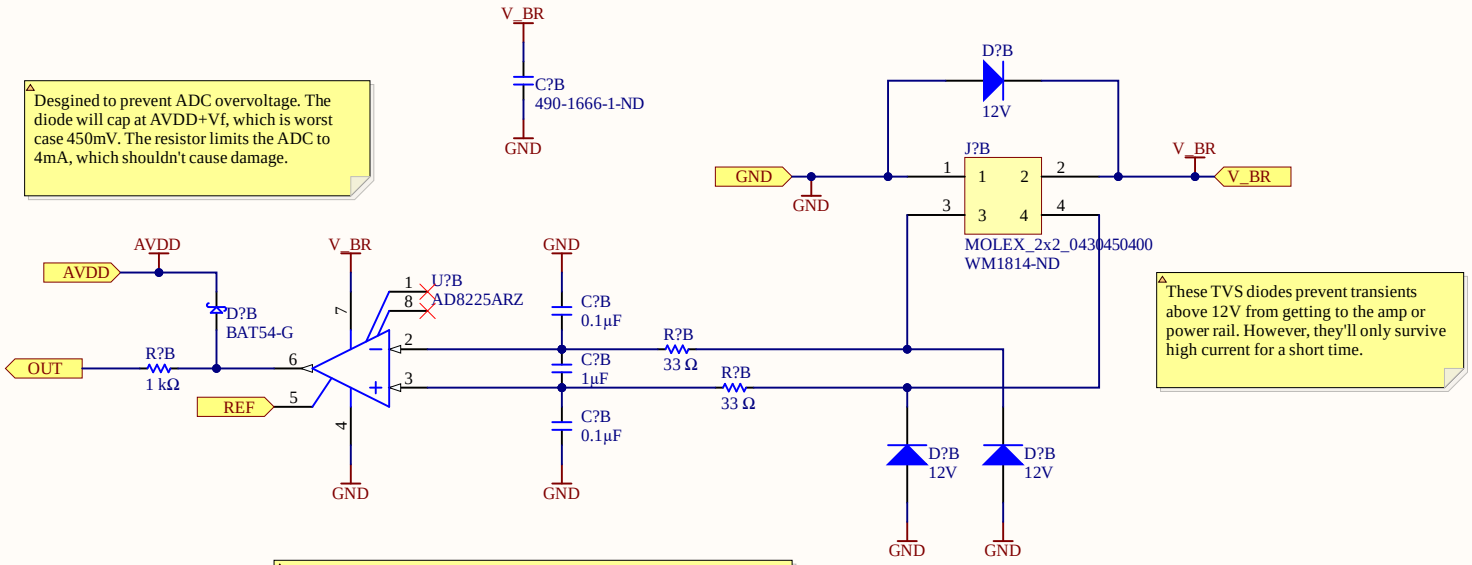

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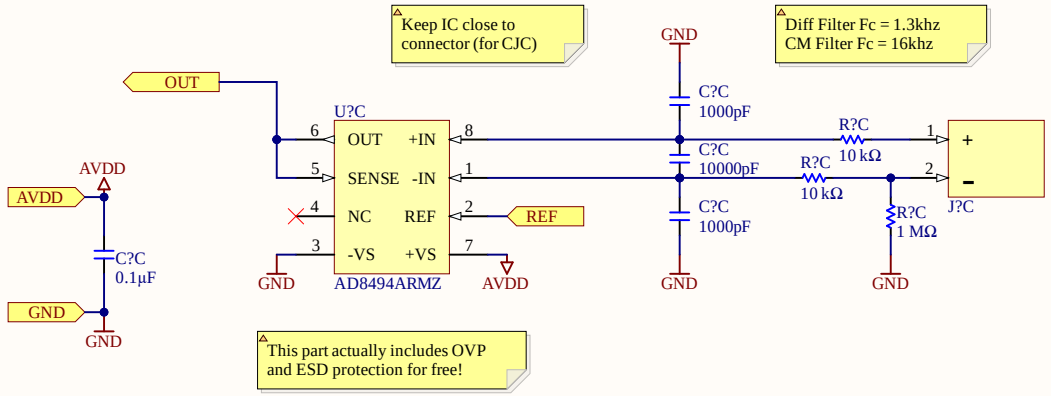

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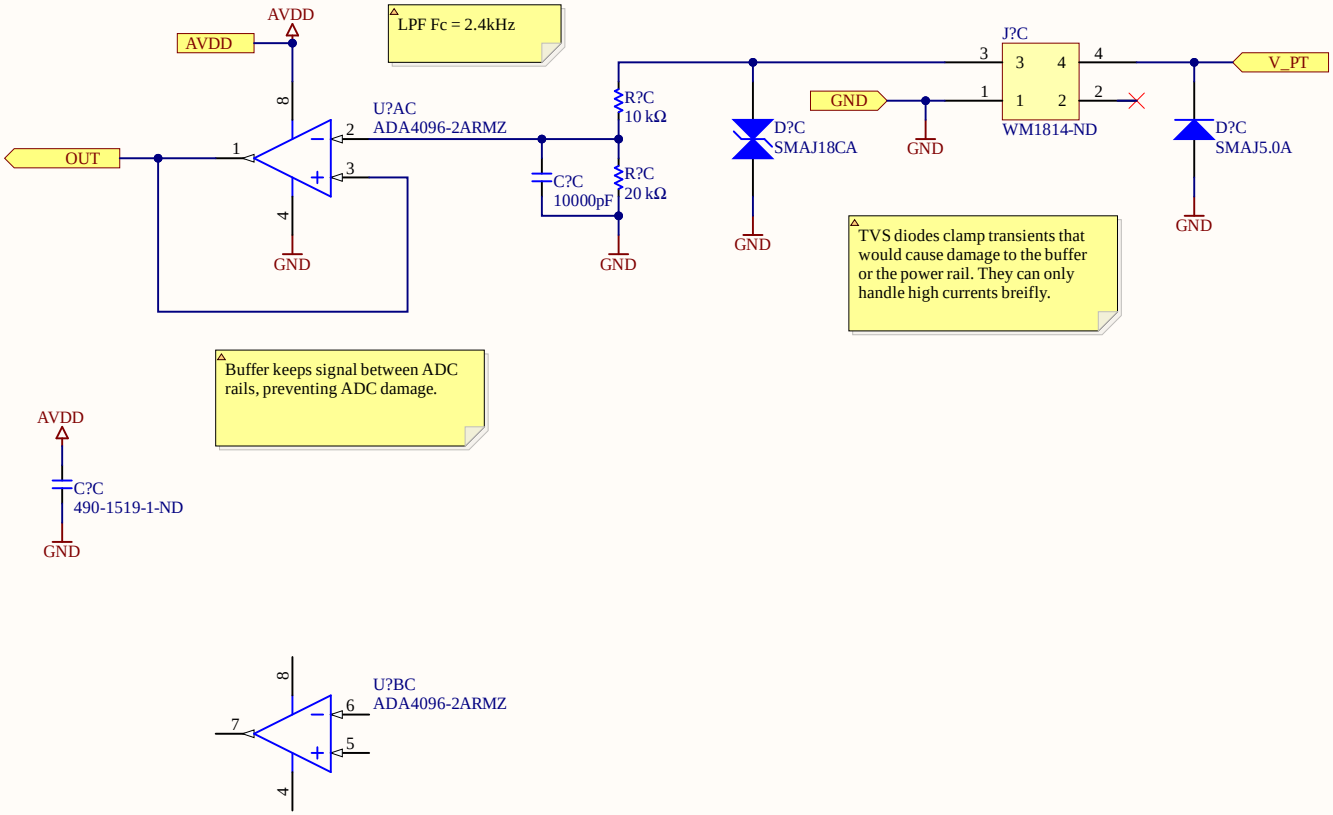

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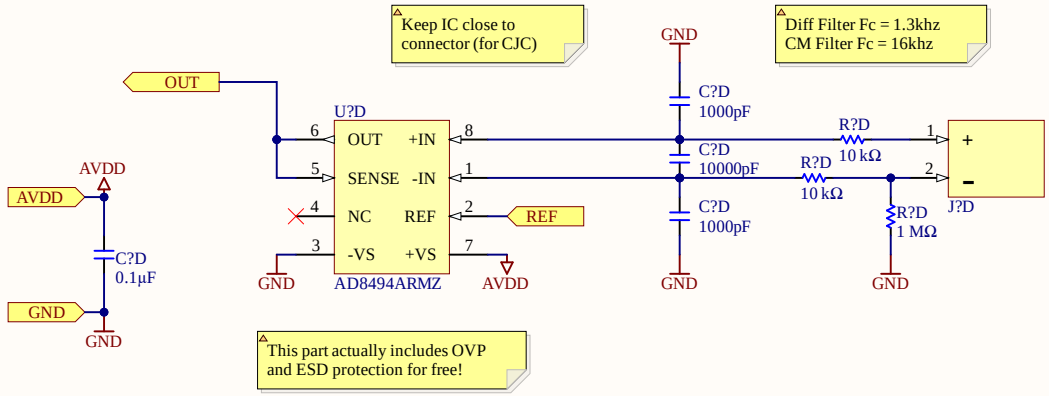

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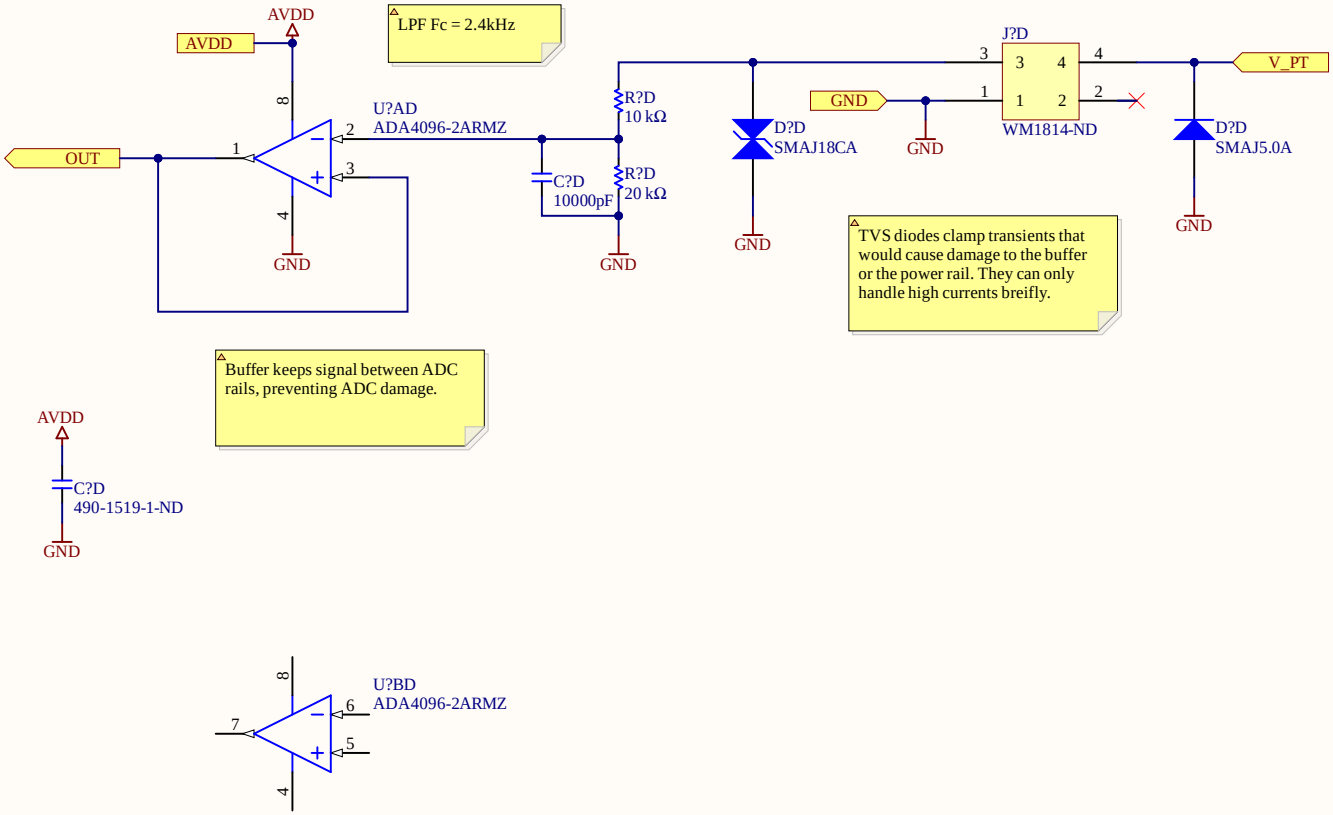

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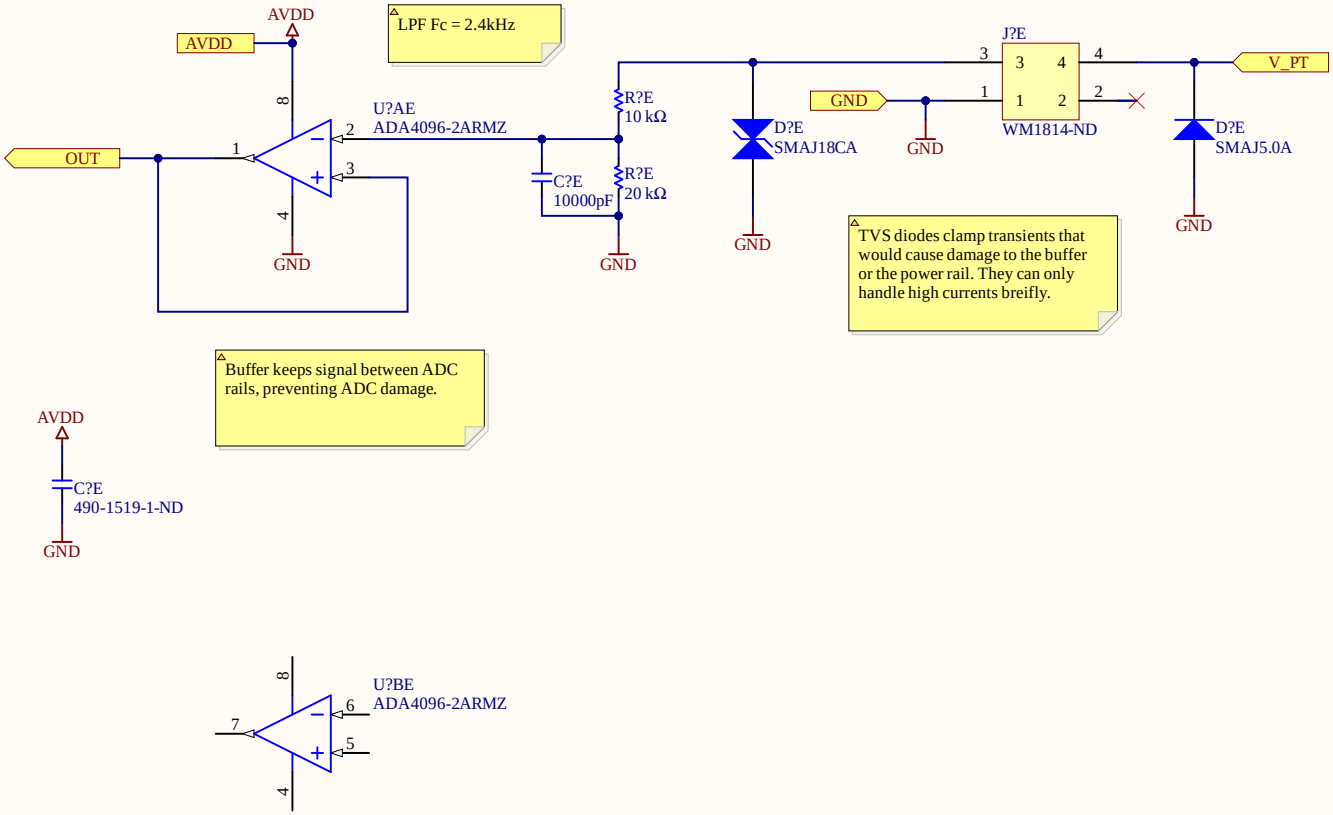

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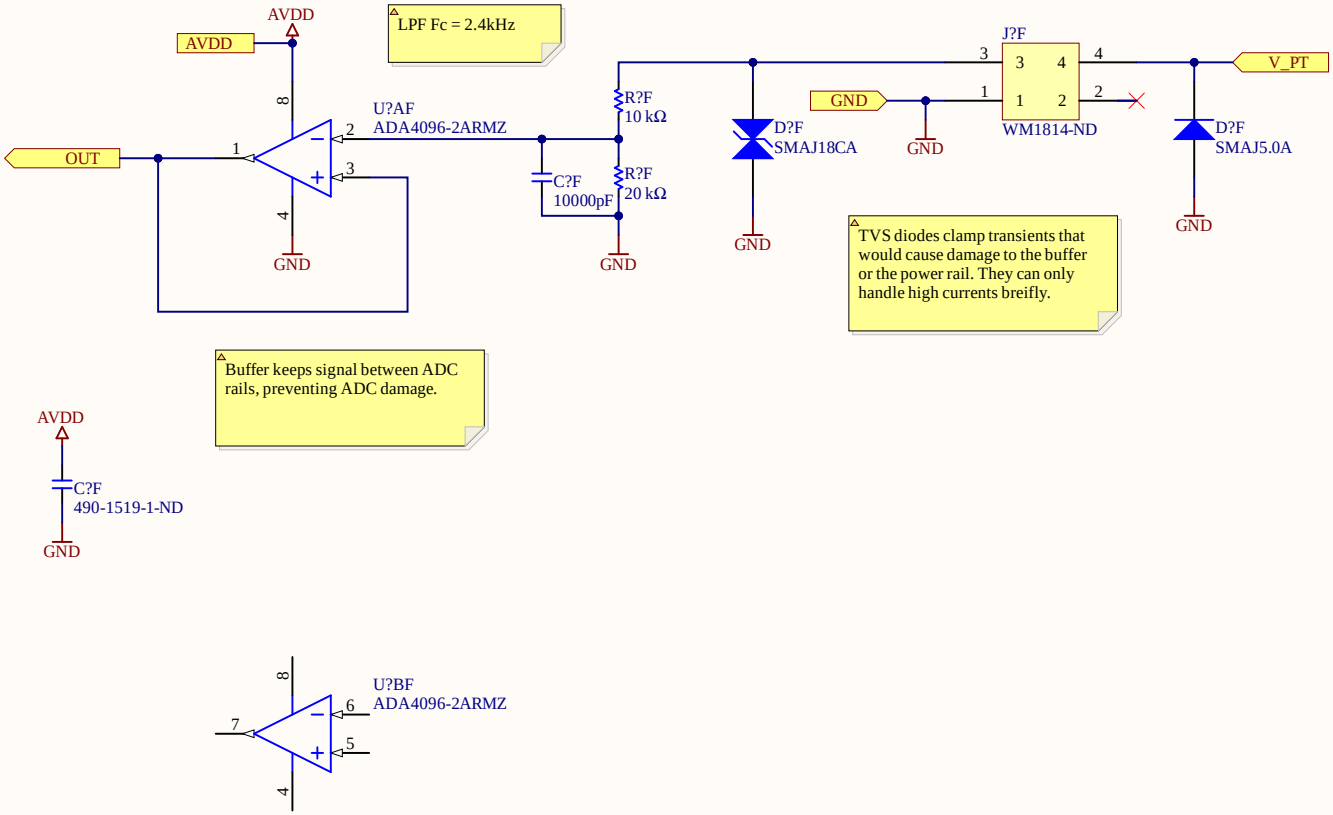

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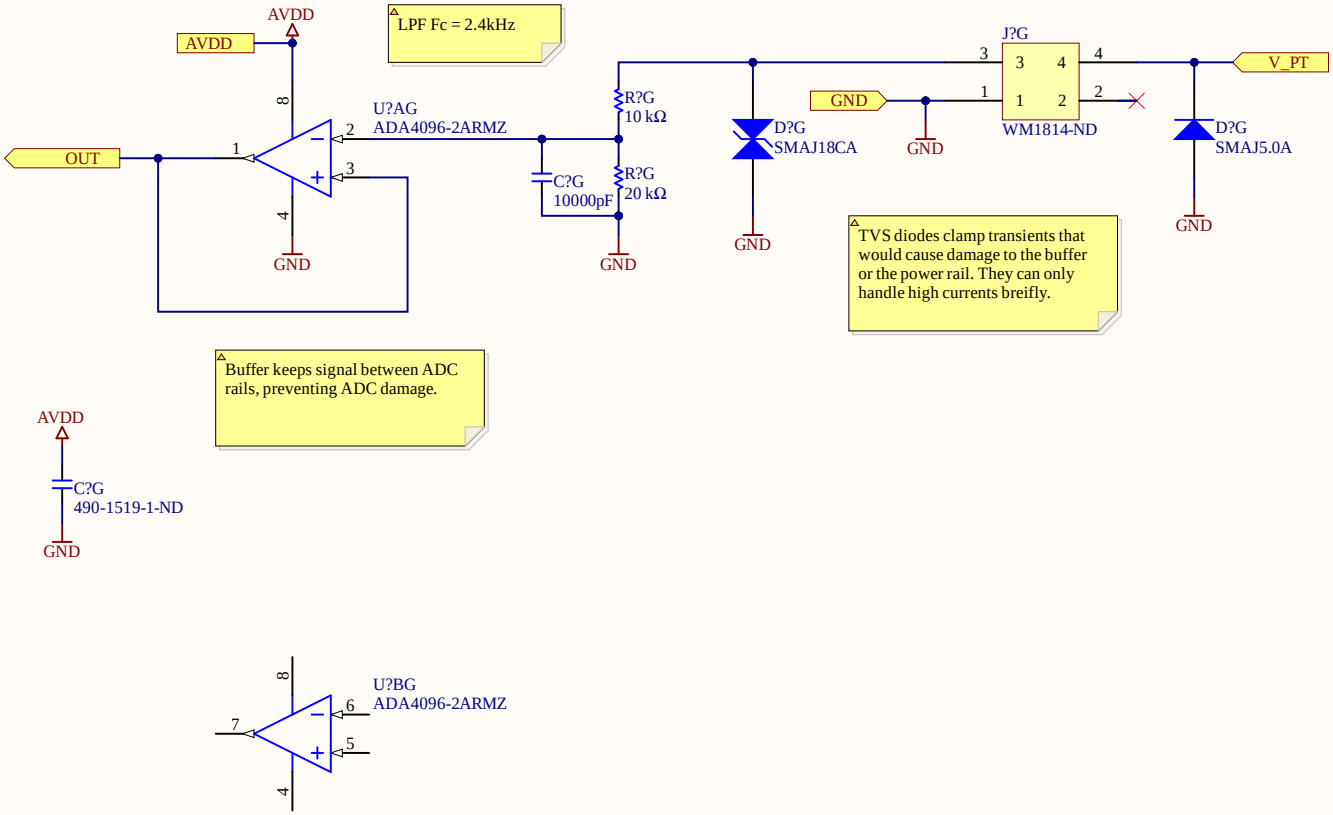

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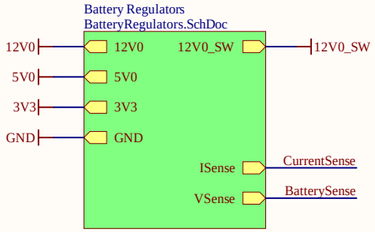
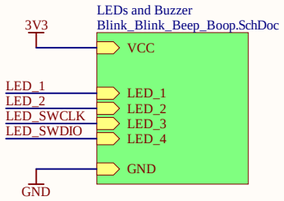
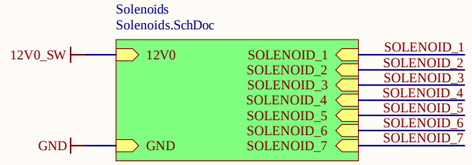
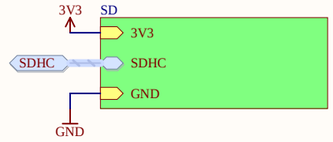
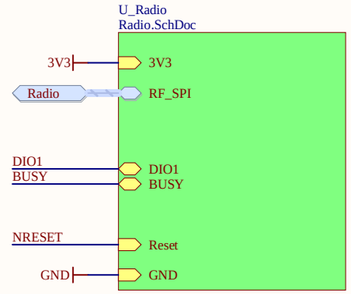
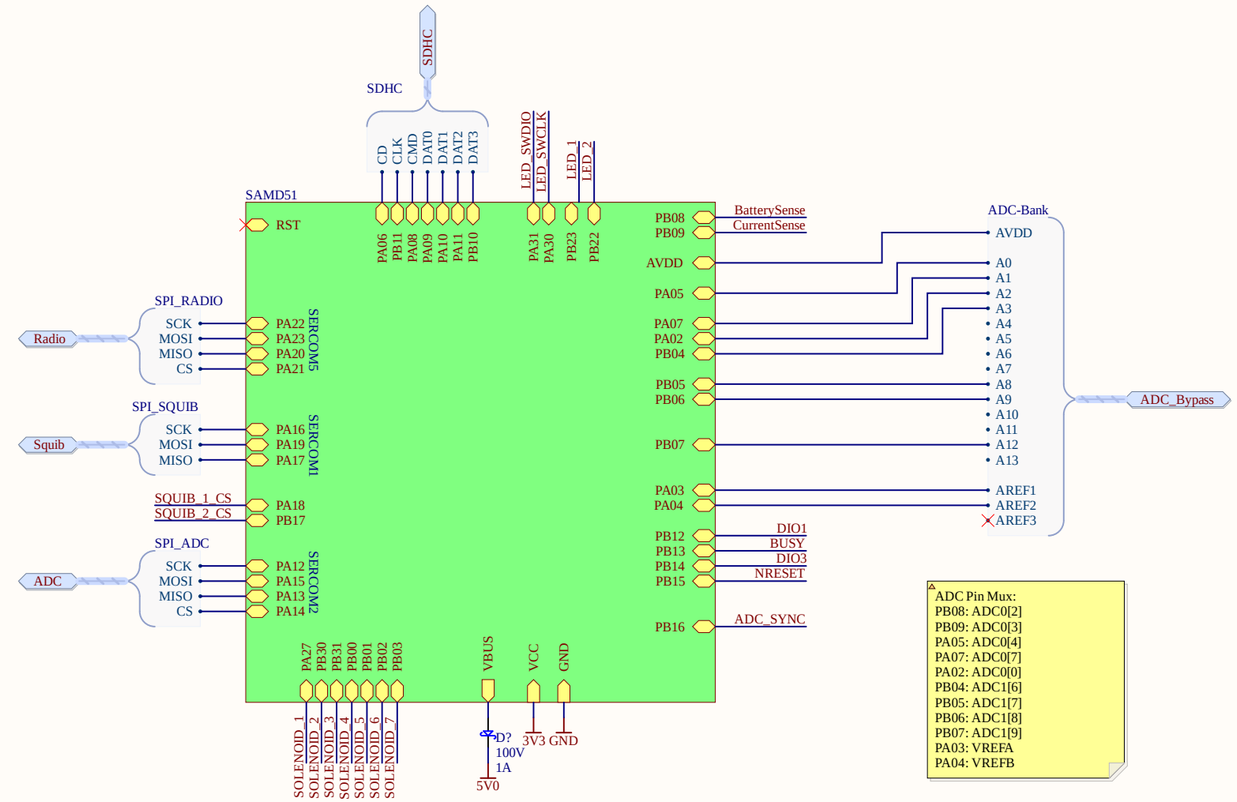


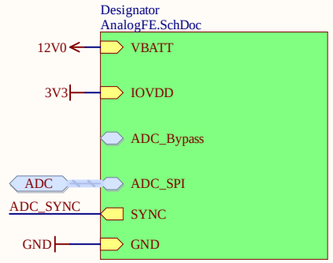




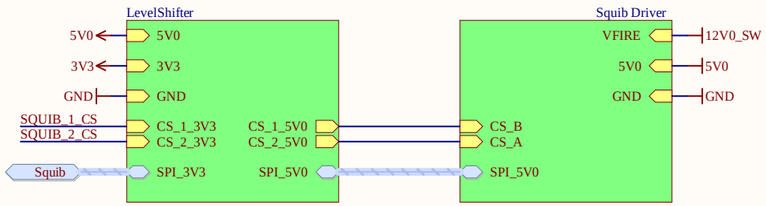


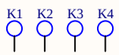




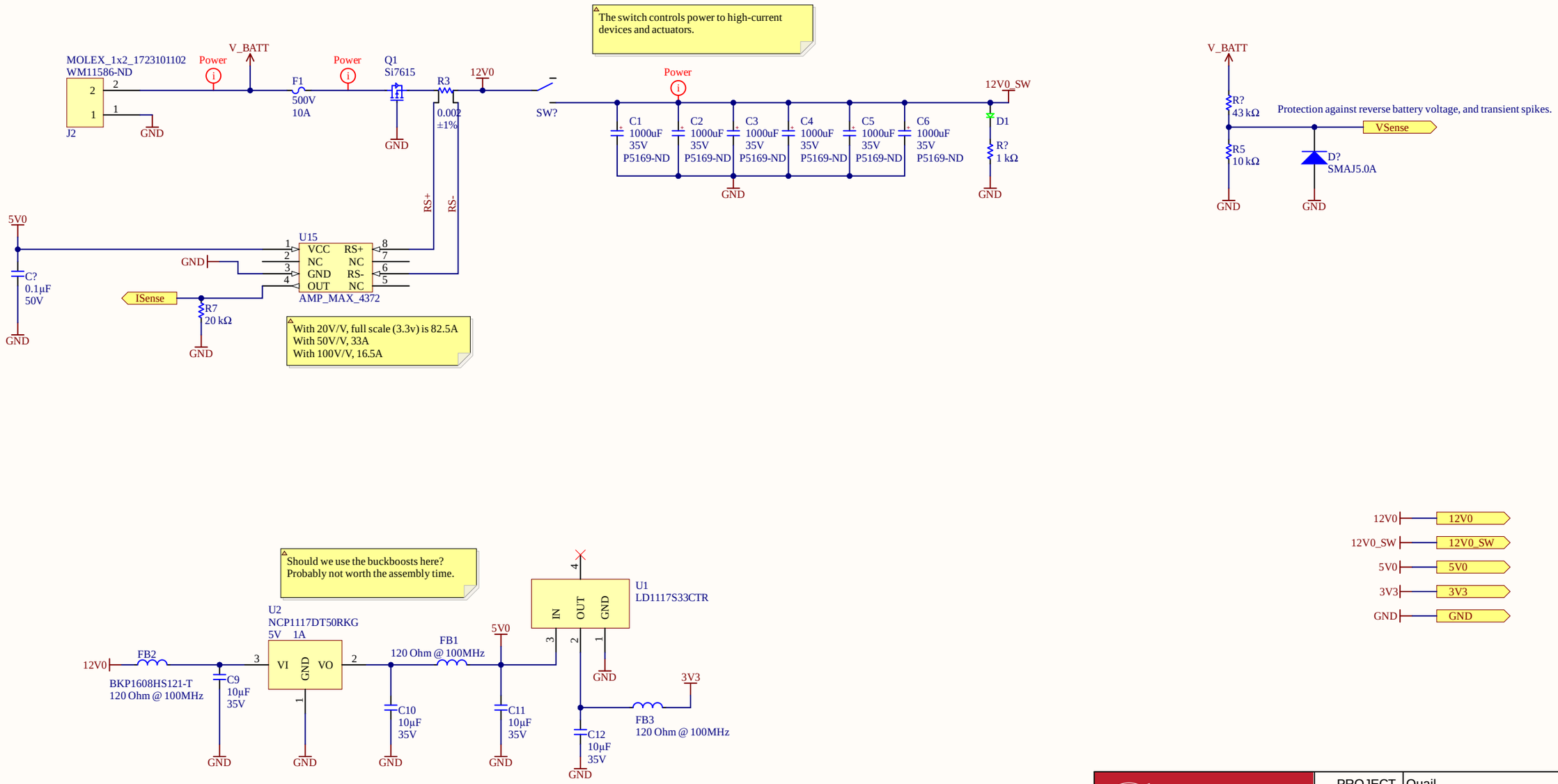


ADC Pin Mux:
PB08: ADC0[2]
PB09: ADC0[3]
PA05: ADC0[4]
PA07: ADC0[7]
PA02: ADC0[0]
PB04: ADC1[6]
PB05: ADC1[7]
PB06: ADC1[8]
PB07: ADC1[9]
PA03: VREFA
PA04: VREFB





STANFORD STUDENT SPACE INITIATIVE ssi.stanford.edu	PROJECT	Quail	
	SHEET	Top Sheet	
	ENGINEER	Damian Loya	
	ENGINEER	Matthew Pauly	
Powered By Altium	REVISION 1.0	REVIEWER	
	Sheet 1 of 8	REVIEWED ON	



PROJECT	Quail
SHEET	Power Regulation
ENGINEER	Damian Loya
ENGINEER	Matthew Pauly
REVISION	1.0
REVIEWER	
Sheet 3 of 8	REVIEWED ON

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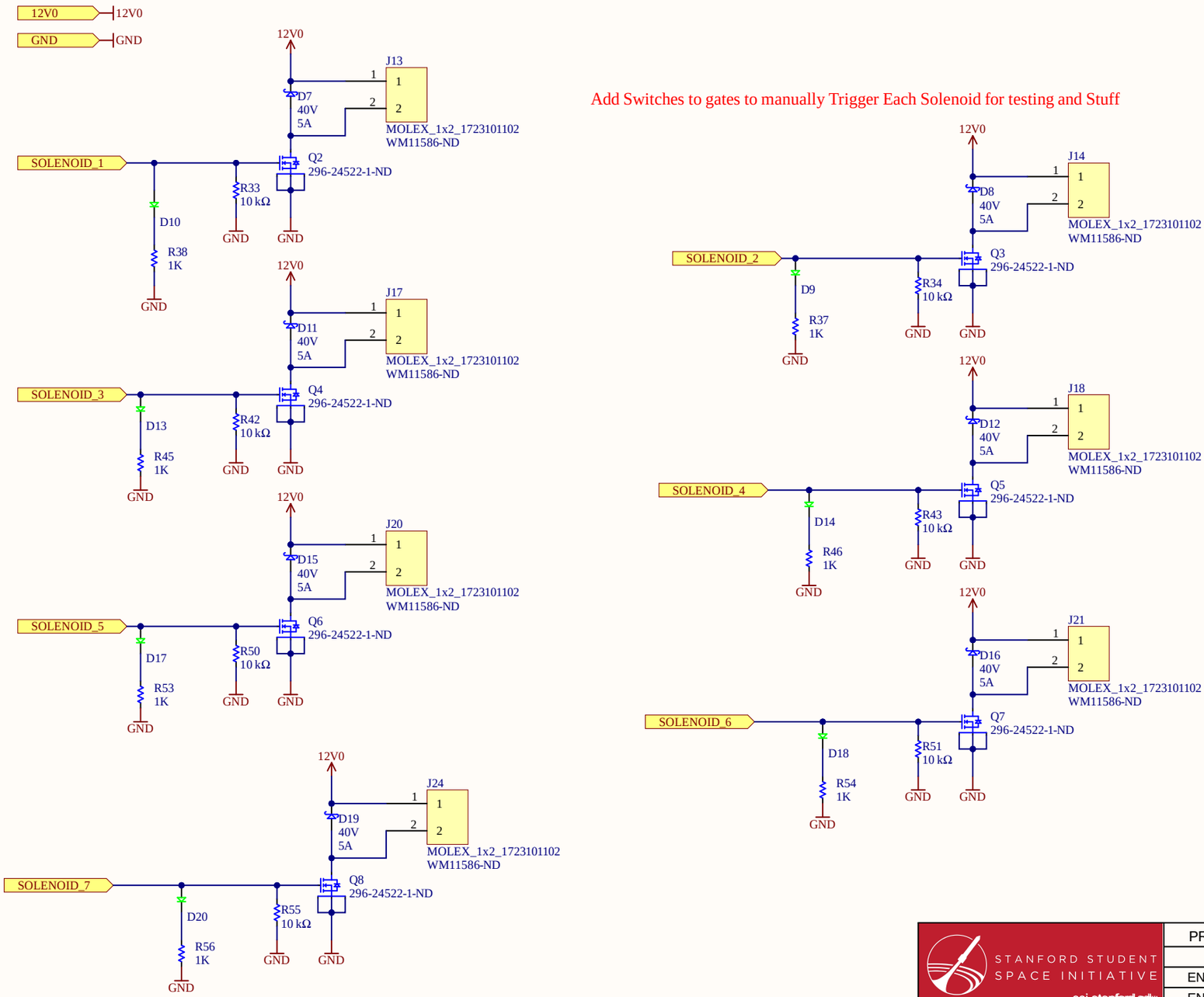

Add Switches to gates to manually Trigger Each Solenoid for testing and Stuff

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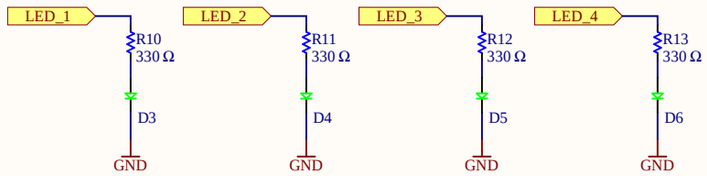
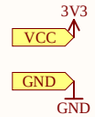
PROJECT	Quail
SHEET	Solenoids & Pressure Transducers
ENGINEER	Damian Loya
ENGINEER	Matthew Pauly
REVISION	1.0
REVIEWER	
Sheet 8 of 8	
REVIEWED ON	





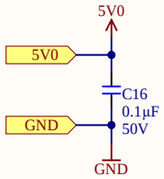
STANFORD STUDENT SPACE INITIATIVE ssi.stanford.edu		PROJECT	Quail
		SHEET	Blinks and Boops
		ENGINEER	Damian Loya
		ENGINEER	Matthew Pauly
Powered By Altium	REVISION 1.0	REVIEWER	
	Sheet 8 of 8	REVIEWED ON	

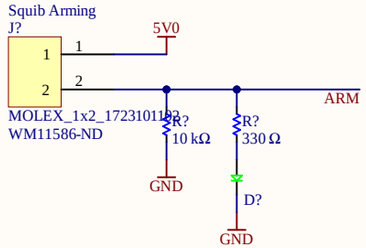
Squib Drivers

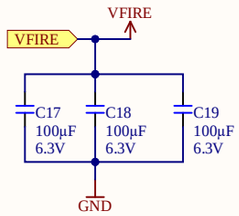
Two Chips (MC33797) for 8 total channels

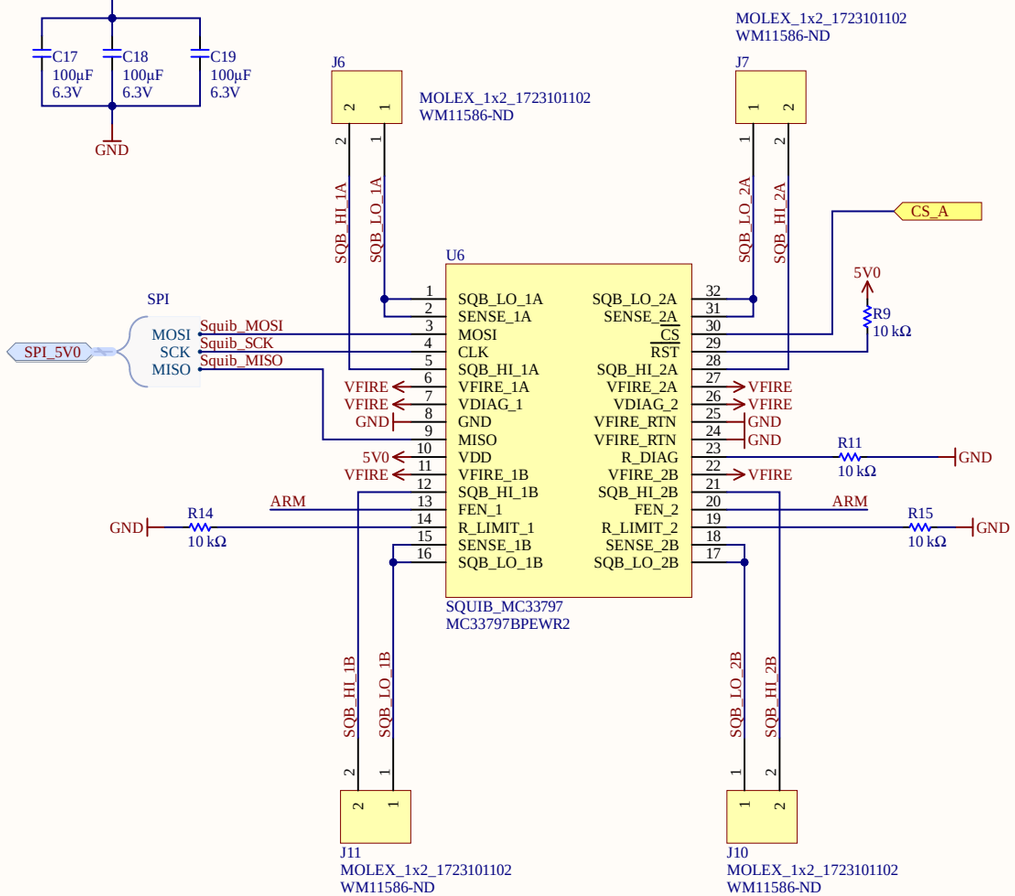
Pin 2 is Lo and Pin 1 is High on all connectors

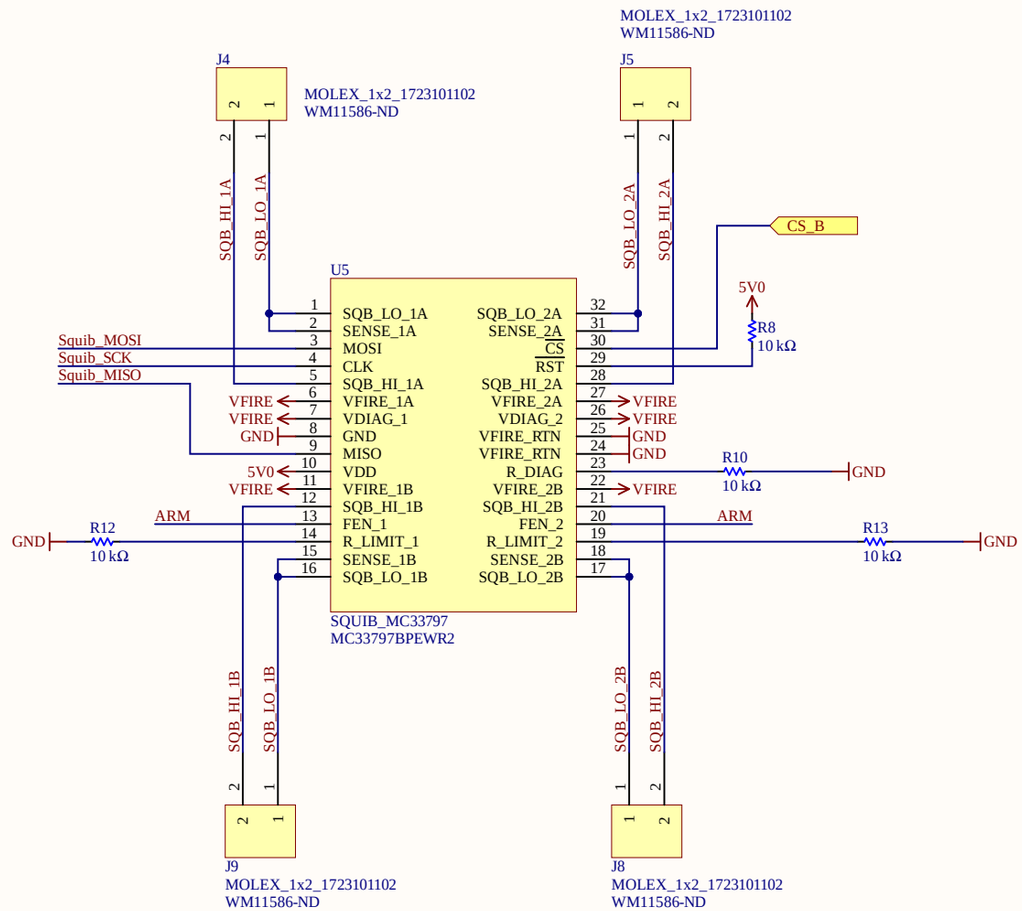
R Limit Calc: Ematch R=2ohm, wire is around 2-5ohm depending on length.
Recomended current is around 1 A
RSet = 10k sets limit to 1.4A











PROJECT	Quail
SHEET	Squibs
ENGINEER	Damian Loya
ENGINEER	Matthew Pauly
REVISION	1.0
REVIEWER	
Sheet n of m	REVIEWED ON

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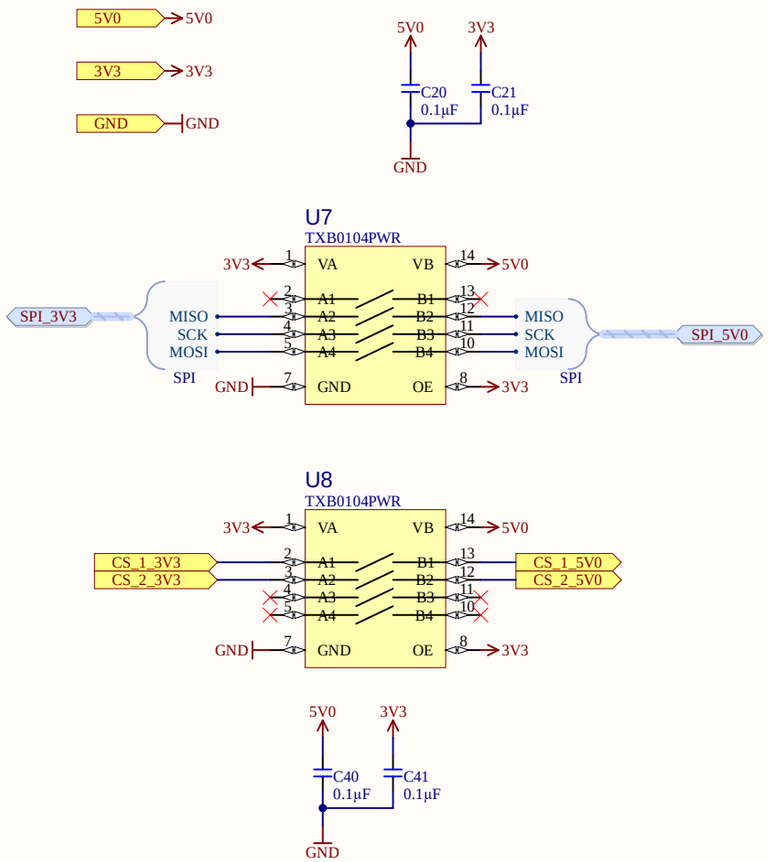
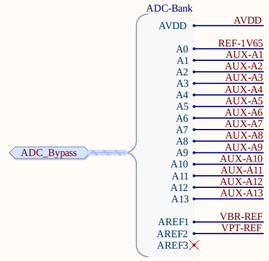
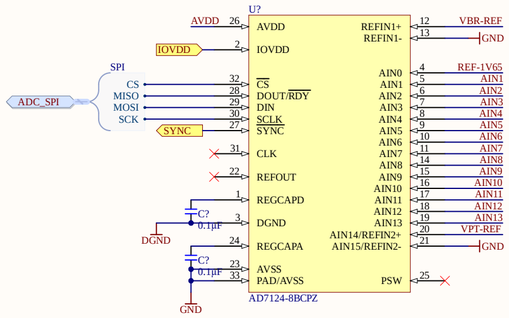
Level Shifters

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

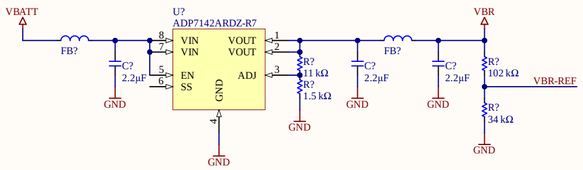


STANFORD STUDENT SPACE INITIATIVE ssi.stanford.edu		PROJECT	Quail
		SHEET	Misc
		ENGINEER	Damian Loya
		ENGINEER	Matthew Pauly
Powered By Altium	REVISION 1.0	REVIEWER	
	Sheet n of m	REVIEWED ON	

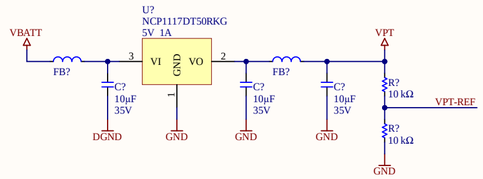




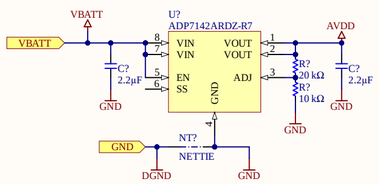
Bridge excitation voltage is 10V, and each load cell draws 35mA max



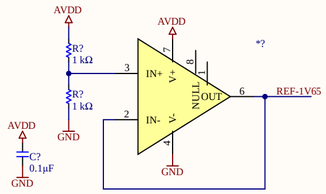
Presure transducer supply voltage. Unclear if PTs have amps or not? Unclear how much power they draw. Consider changing to an ADP7142 to simplify BOM

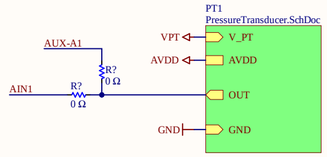


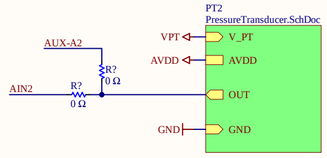
IOVDD is 3.3v, powered from top sheet
AVDD is unipolar, 3.6V from LDO

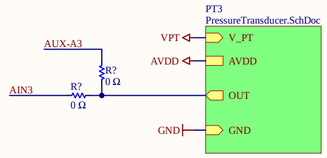


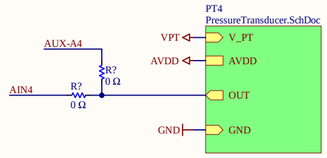
Mid-Rail reference voltage. The instrumentation amps need this to reference their outputs off of. It needs to be buffered, or the draw from connected devices will skew it.

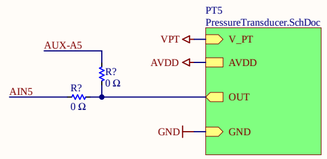


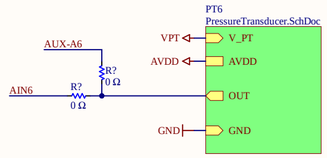


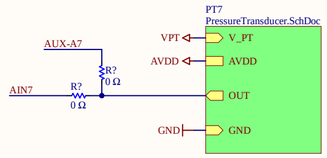


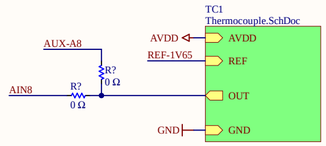


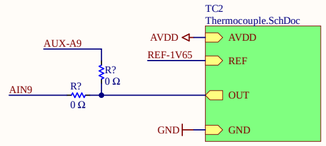


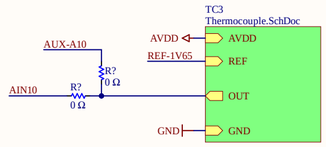


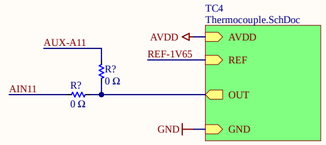


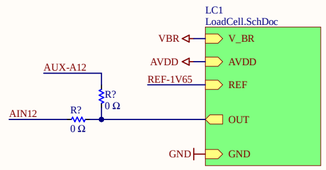


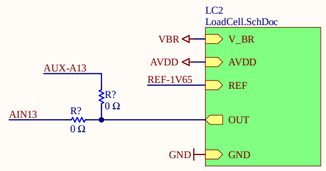












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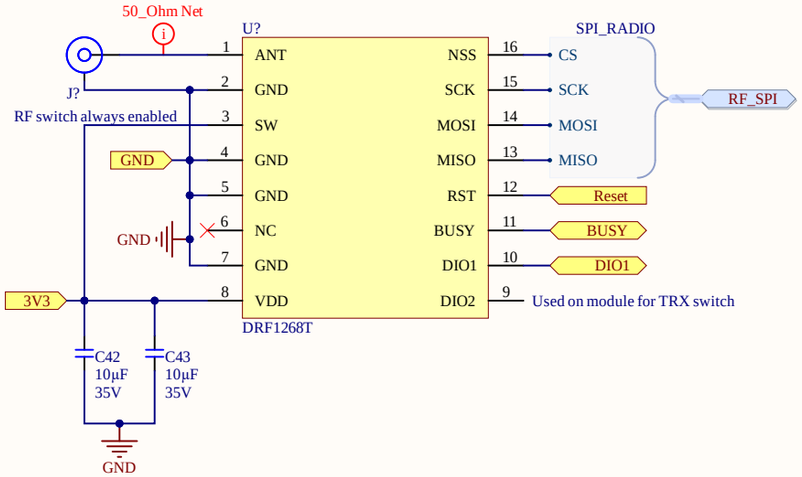
Radio Module

TODO

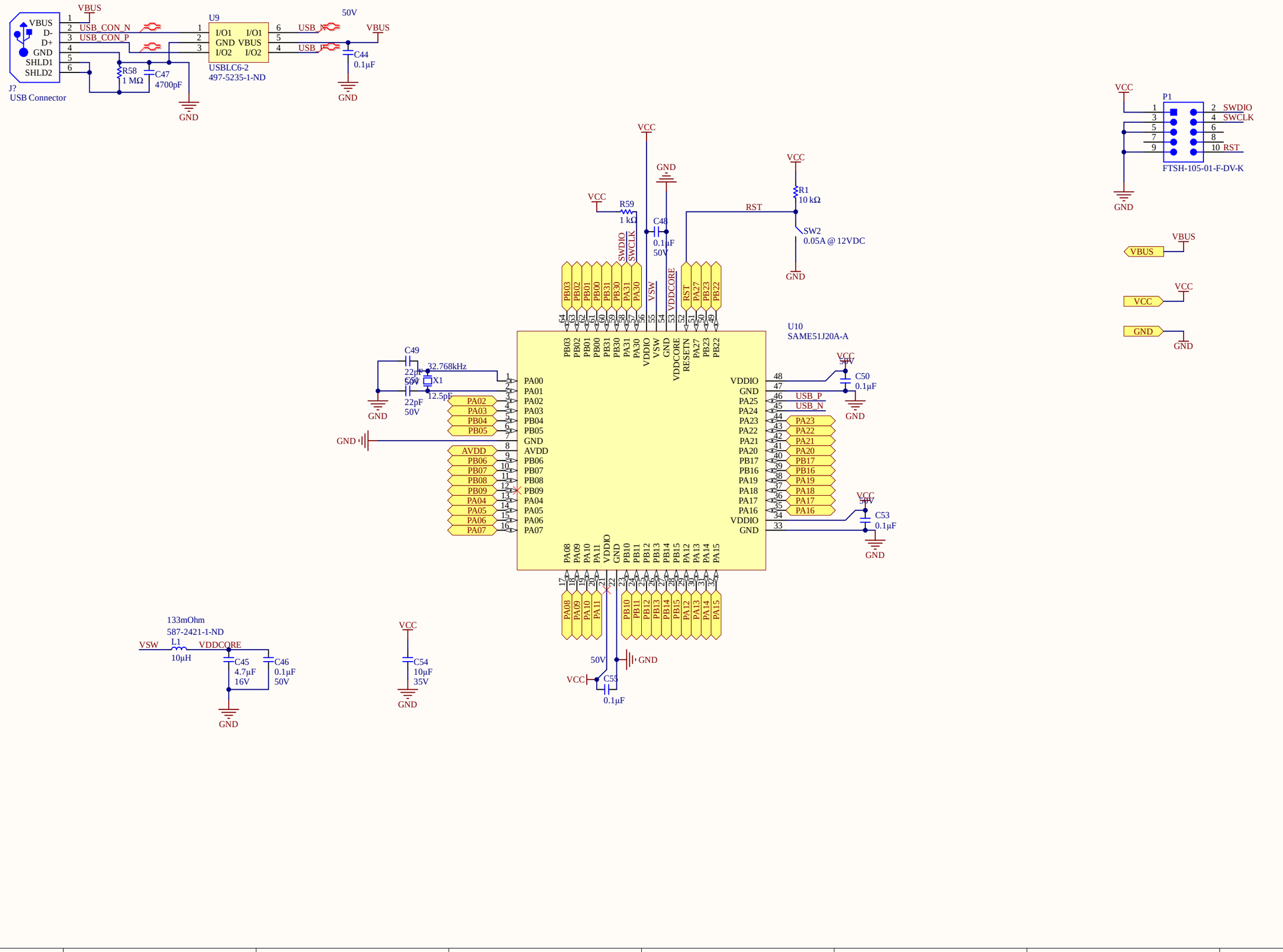
Swap Out with DRF Module

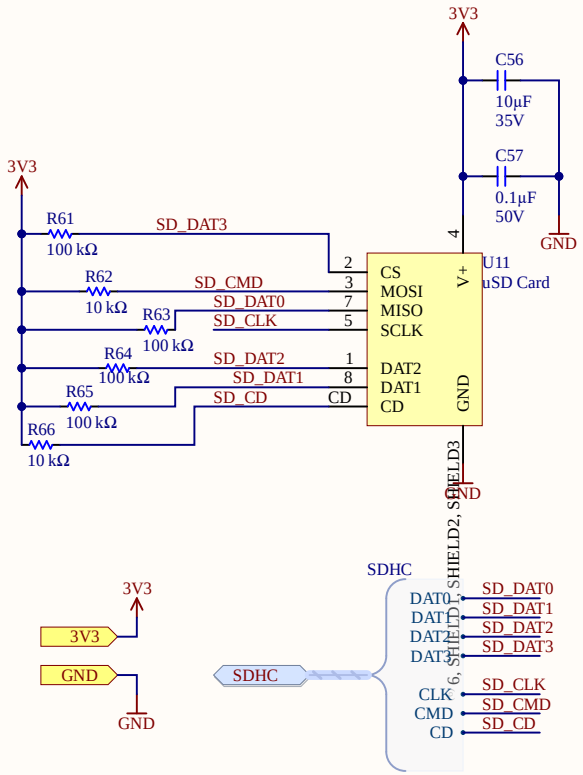
Radio for wireless communiactions
Dorji DRF1268T being used
Mainly on Tims Recomendation



(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 monitor
Data Rate: <300 kbps
Standby current: <1uA
Supply voltage: 3.3V

STANFORD STUDENT SPACE INITIATIVE ssi.stanford.edu		PROJECT	Quail
		SHEET	*
		ENGINEER	Damian Loya
		ENGINEER	Matthew Pauly
Powered By Altium	REVISION 1.0	REVIEWER	
	Sheet * of *	REVIEWED ON	


VBUS
VBUS
D-
D+
GND
SHLD1
SHLD2
USB_CON_N
USB_CON_P
J?
USB Connector
R58
1 MΩ
C47
4700pF
GND
U9
I/O1
GND
I/O2
I/O1
VBUS
I/O2
USBLC6-2
497-5235-1-ND
USB_N
USB_P
50V
VBUS
C44
0.1µF
GND
VCC
GND
VCC
R59
1 kΩ
C48
0.1µF
50V
SWDIO
SWCLK
VCC
R1
10 kΩ
RST
SW2
0.05A @ 12VDC
GND
PB03
PB02
PB01
PB00
PB31
PB30
PA31
PA30
VSW
VDDCORE
RST
PA27
PB23
PB22
U10
SAME51J20A-A
PB03
PB02
PB01
PB00
PB31
PB30
PA31
PA30
VDDIO
VSW
GND
VDDCORE
RESETN
PA27
PB23
PB22
C49
22pF
50V
32.768kHz
X1
12.5pF
22pF
50V
GND
PA00
PA01
PA02
PA03
PB04
PB05
GND
AVDD
PB06
PB07
PB08
PB09
PA04
PA05
PA06
PA07
PA02
PA03
PB04
PB05
GND
VDDIO
GND
PA25
PA24
PA23
PA22
PA21
PA20
PB17
PB16
PA19
PA18
PA17
PA16
VDDIO
GND
USB_P
USB_N
PA23
PA22
PA21
PA20
PB17
PB16
PA19
PA18
PA17
PA16
VCC
5V
C50
0.1µF
GND
VCC
5V
C53
0.1µF
GND
PA08
PA09
PA10
PA11
VDDIO
GND
PB10
PB11
PB12
PB13
PB14
PB15
PA12
PA13
PA14
PA15
PA08
PA09
PA10
PA11
PB10
PB11
PB12
PB13
PB14
PB15
PA12
PA13
PA14
PA15
50V
VCC
C55
0.1µF
GND
133mOhm
587-2421-1-ND
VSW
L1
10µH
VDDCORE
C45
4.7µF
16V
C46
0.1µF
50V
GND
VCC
C54
10µF
35V
GND
P1
SWDIO
SWCLK
RST
FTSH-105-01-F-DV-K
VCC
GND
VBUS
VBUS
VCC
VCC
GND
GND



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Description	Designator	Footprint	Quantity	Supplier Part Number 1	Manufacturer Part Number	Supplier Part Number	value	package	Package / Case
	*?	8MSOP65	1		AD8675ARMZ				8-TSSOP, 8-MSOP (0.118", 3.00mm Width)
	C1, C2, C3, C4, C5, C6	ALUM_CAP_5mm-Leads	6	P5169-ND			1000uF		
	C45	C0603P	1	311-1785-1-ND					
	C47	C0603P	1	490-1506-1-ND					
	C49, C51	C0603P	2	490-1411-1-ND					
	J?	SMA_SAMTEC_SMA-J-P-X-RA-TH1	1						
	R37, R38, R45, R46, R53, R54, R56	R0603	7				1K		
	R58	R0603	1	311-1.00MHRCT-ND	RC0603FR-071ML				
	R59	R0603	1	311-1.00KHRCT-ND	RC0603FR-071KL				
	R61, R63, R64, R65	R0603	4	311-100KHRCT-ND	RC0603FR-07100KL				
	U5, U6	SOT1762-1	2	MC33797BPEWR2CT-ND	MC33797BPEWR2				32-SOIC (0.295", 7.50mm Width)
	U9	6SOT23	1	497-5235-1-ND	USBLC6-2SC6				SOT-23-6
4 Pin Bidirectional levelshifter 5v-3.3v	U7, U8	14TSSOP65	2	296-21929-1-ND	TXB0104PWR				14-TSSOP (0.173", 4.40mm Width)
100UF SMD CAP CERAMIC	C17, C18, C19	C1206	3	490-10525-1-ND	GRM31CD80J107ME39L				1206 (3216 Metric)
CAP CER 0.1UF 100V X7S 0603	C?A, C?B	C0603	4		C1608X7S2A104K080AB				0603 (1608 Metric)
CAP CER 2.2UF 16V X5R 0603 10%, CAP CER 0603 0.1µF X7R 50V 10%, CAP CER 0.1UF 50V X7R 0805, CAP CER 0603 1µF X7R 16V 10%, CAP CER 0603 10000pF X7R 50V 10%, CAP CER 0603 1000pF X7R 50V 10%, BOURNS - SMAJ5.0A - TVS Diode, SMAJ Series, Unidirectional, 5 V, 9.2 V, DO-214AC (SMA), 2 Pins, VISHAY - SMAJ12A-E3/61 - TVS-diod, TVS, SMAJ1 Serien, Enkelriktad, 12 V, 19.9 V, DO-214AC (SMA), 2 Stift, Diode TVS Single Bi-Dir 18V 400W 2-Pin SMA T/R, Conn USB F 4 POS 2.5mm Solder RA Thru-Hole 4 Terminal 1 Port Tray, THERMOCOUPLE CONN, K TYPE, RCPT; Gender: Receptacle; Thermocouple Type: K; Product Range: PCC SMP Series, Press-Fit Unthreaded Spacers, 7/32" OD, 1/8" Long, Atmel SAM ARM Cortex M4, [NoValue], IC REG LIN POS ADJ 200MA 8SOIC, ANALOG DEVICES - AD7124-8BCPZ - ADC, 24BIT, 19.2KSPS, SPI, LFCSP-32, Dorji DRF1268T LoRa Module with SX1262 IC and TCXO, SP Amp INSTR Amp Single ±18V/36V 8-Pin SOIC N Tube, Operational Amplifier, Dual, 501 kHz, 2, 0.25 V/ s, 3V to 30V, MSOP, 8 ;RoHS Compliant: Yes, IC THRMOCPLE COLD JNC COMP 8MSOP	C?, C?A, C?B, C?C, C?D, C?E, C?F, C?G, D?, D?A, D?B, D?C, D?D, D?E, D?F, D?G, J?, J?A, J?B, J?C, J?D, K1, K2, K3, K4, U10, U15, U?, U?A, U?B, U?C, U?D, U?E, U?F, U?G	C0603, C0805, BOURNS-SMA-2_V, VISH-DO-214AC-2_M, SMTC-USBR-TH-4_V, PCC-SMP-V-K-Footprint-1, #4_PRESSFIT_FOOT_1/8, SAMD TQFP-64, 8SOIC150E, SOIC127P600X175_HS-9N, QFN50P500X500X75_HS-33N, DRF1268T, ADI-R-8_N, ADI-RM-8_M, ADI-RM-8_N	98						
CAP CER 10UF 35V X5R 0603 20%	C9, C10, C11, C12, C42, C43, C54, C56, C?	C0603, C0603P	11	490-13248-1-ND					
CAP CER 0603 0.1µF X7R 50V 10%	C16, C20, C21, C40, C41, C44, C46, C48, C50, C53, C55, C57, C?	C0603, C0603P	13	490-1519-1-ND					
CRYSTAL 32.768 KHZ 12.5 PF SMD	X1	XTAL_TXC_9HT10	1	887-1507-1-ND	9HT10-32.768KEZF-T				2-SMD
Diode Schottky 100V 1A Surface Mount SMA (DO-214AC)	D?	SMA	1		CD214A-B1100LF				DO-214AC, SMA
DIODE SCHOTTKY 40V 5A SMC	D7, D8, D11, D12, D15, D16, D19	SMC	7	B540C-FDICT-ND	B540C-13-F				DO-214AB, SMC
DIODE SCHOTTKY 200MA 30V SOT-23	D?A, D?B	3SOT23	2		BAT54-G				TO-236-3, SC-59, SOT-23-3
FERRITE BEAD 120 OHM @ 100 MHz	FB1, FB2, FB3, FB?	C0603	7	587-1923-1-ND	BKP1608HS121-T				0603 (1608 Metric)
FUSEHOLDER BLACK FOR SMD 5X20MM	F1	SCHURTER_OGNSMD	1	486-1260-ND	0031.8221				
IC REG LDO 5V 1A DPAK	U2, U?	DPAK	2	NCP1117DT50RKGOSCT-ND	NCP1117DT50RKG				TO-252-3, DPak (2 Leads + Tab), SC-63
IC VOLTAGE REG 3.3V 800MA SOT223 INDUSTRIAL TEMP	U1	4SOT223	1	497-1241-1-ND	LD1117S33CTR				TO-261-4, TO-261AA
INDUCTOR 100UH 270MA 1210 SMD	L1	C1210	1	587-2421-1-ND	BRL3225T101K				1210 (3225 Metric)
LED GREEN CLEAR 5MM ROUND T/H	D1, D3, D4, D5, D6, D9, D10, D13, D14, D17, D18, D20, D?	LED_TH_5MM	13	C503B-GCS-CB0C0781-ND	C503B-GCS-CB0C0781				
Male Header, Pitch 1.27 mm, 2 x 5 Position, Height 6.12 mm, RoHS, Tube	P1	SMTC-FTSH-105-01-L-DV-K_V	1						
MICROFIT CONN HEADER R/A 4POS 3MM	J?A, J?B, J?C, J?D, J?E, J?F, J?G	MOLEX_2x2_0430450400	9	WM1814-ND					
MICROSD CARD HOLDER, PUSH-PUSH	U11	MICROSD_CARD_SOCKET	1	3M5607CT-ND	2908-05WB-MG				
MOSFET N-CH 25V 3.3X3.3 8-SON	Q2, Q3, Q4, Q5, Q6, Q7, Q8	8-VSON	7	296-24522-1-ND	CSD16323Q3				8-PowerTDFN
MOSFET P-CH 20V 35A PPK	Q1	POWERPAK_1212-8_SINGLE	1	SI7615ADN-T1-GE3CT-ND	SI7615ADN-T1-GE3				PowerPAK® 1212-8
RES .002OHM 1W 1% 1206 SMD	R3	R1206_SHUNT	1	CSNL1206FT2L00CT-ND	CSNL1206FT2L00				1206 (3216 Metric)
RES SMD 0 OHM JUMPER 1/10W 0603	R?	R0603	26		RC0603FR-070RL				
RES SMD 1K OHM 1% 1/10W 0603	R?, R?A, R?B	R0603	5		RC0603FR-071KL				
RES SMD 1M OHM 1% 1/10W 0603	R?A, R?B, R?C, R?D	R0603	4		RC0603FR-071ML				
RES SMD 1.5K OHM 1% 1/10W 0603	R?	R0603	1		RC0603FR-071K5L				
RES SMD 10K OHM 1% 1/10W 0603	R?, R?A, R?B, R?C, R?D	R0603	11		RC0603FR-0710KL				
RES SMD 10K OHM 1% 1/10W 0603, [NoValue]	R1, R5, R8, R9, R10, R11, R12, R13, R14, R15, R33, R34, R42, R43, R50, R51, R55, R62, R66, R?, R?A, R?B, R?C, R?D, R?E, R?F, R?G	R0603	27	311-10.0KHRCT-ND	RC0603FR-0710KL				
RES SMD 11K OHM 1% 1/10W 0603	R?	R0603	1		RC0603FR-0711KL				
RES SMD 20K OHM 1% 1/10W 0603	R?, R?A, R?B, R?C, R?D, R?E, R?F, R?G	R0603	8	311-20.0KHRCT-ND	RC0603FR-0720KL				
RES SMD 20K OHM 1% 1/10W 0603	R?	R0603	1		RC0603FR-0720KL				
RES SMD 33 OHM 1% 1/10W 0603	R?A, R?B	R0603	4		RC0603FR-0733RL				
RES SMD 34K OHM 1% 1/10W 0603	R?	R0603	1		RC0603FR-0734KL				
RES SMD 43K OHM 1% 1/10W 0603	R?	R0603	1		RC0603FR-0743KL				
RES SMD 102K OHM 1% 1/10W 0603	R?	R0603	1		RC0603FR-07102KL				
RES SMD 330 OHM 1% 1/10W 0603	R10, R11, R12, R13, R?	R0603	5	311-330HRCT-ND	RC0603FR-07330RL				
SWITCH SLIDE SPDT R/A 5A	SW?	SWITCH_500SSP1S1M6QEA	1	EG2478-ND	500SSP1S1M6QEA				
SWITCH TACTILE SPST-NO 0.05A 12V	SW2	SWITCH_FSM4JSMATR	1	450-1759-1-ND	FSM4JSMATR				
ULTRAFIT CONN HEADER R/A 2POS 3.5MM	J2, J4, J5, J6, J7, J8, J9, J10, J11, J13, J14, J17, J18, J20, J21, J24, J?	MOLEX_1x2_1723101102	17	WM11586-ND					