

A

A

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D

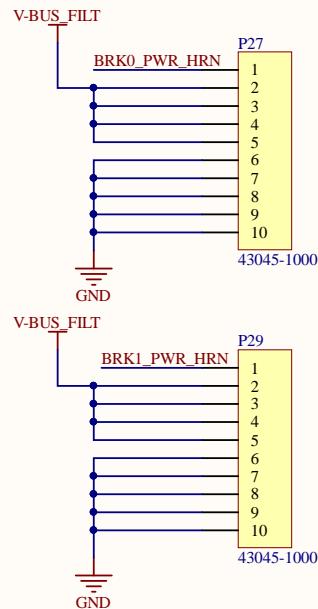
MAIN IO

POD 5

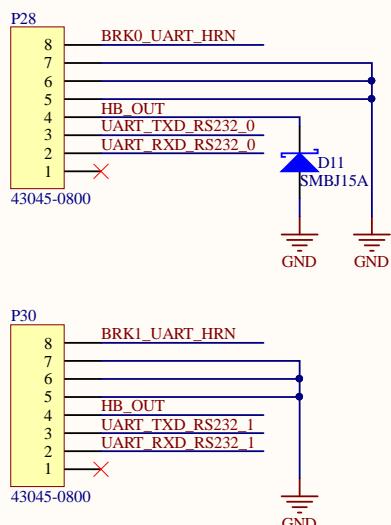
REV 1

Title Main IO		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, Wi 53706	BADGER LOOP
Engineer:	Revision:	Date: 3/6/2021 Time: 10:51:50 PM Sheet 1 of	

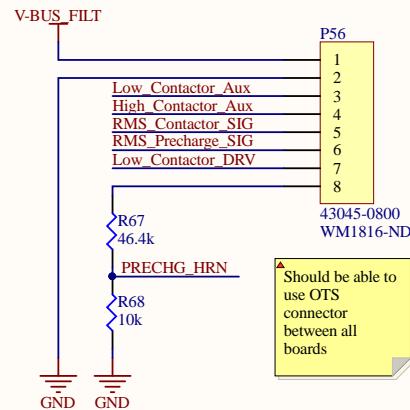
BrakingIO PWR



BrakingIO UART



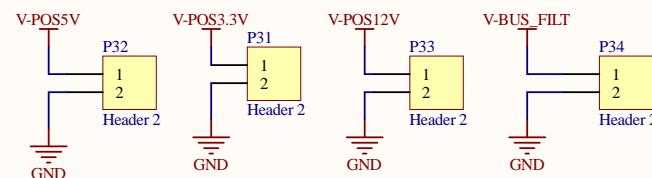
Precharge Board



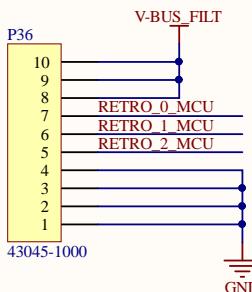
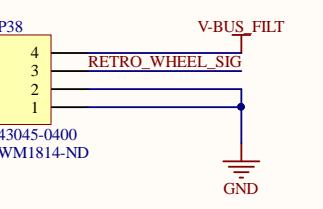
BMS & RMS

See respective schematics

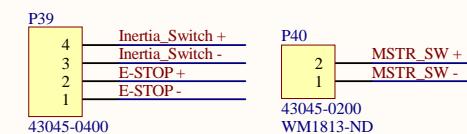
Debug



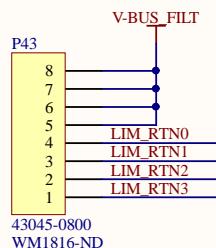
Retro Sensors



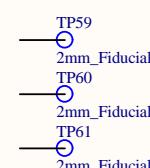
Shutdown Circuit Inputs



Limit Switches

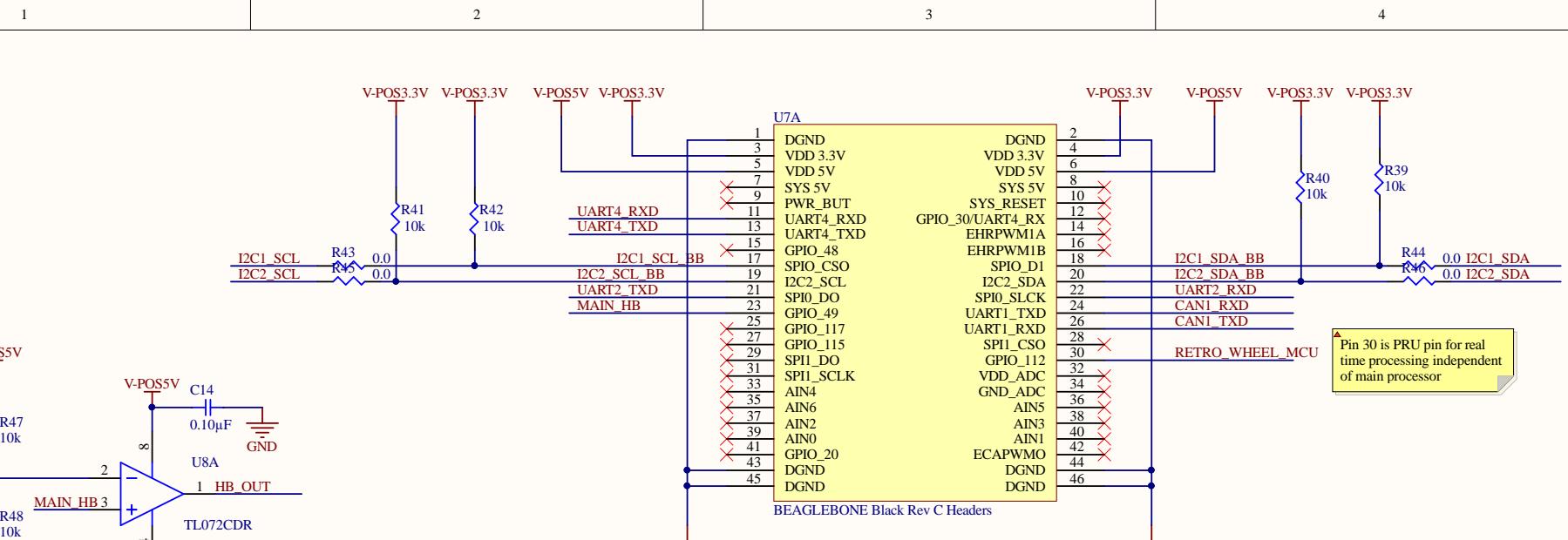


Fiducials

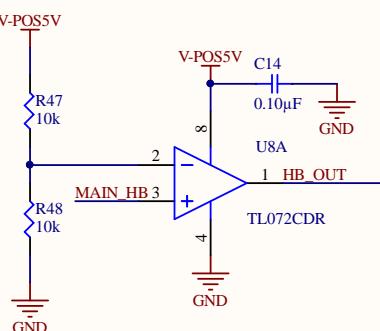


Connectors

Engineer:	Revision:	Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, Wi 53706
Date: 3/6/2021	Time: 10:51:50 PM	Sheet 2 of
File: connectors.SchDoc		BADGER LOOP



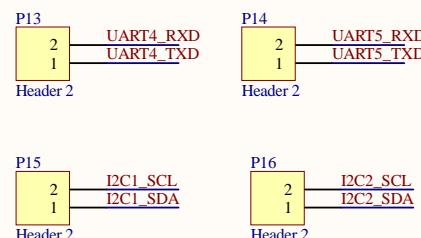
Pin 30 is PRU pin for real time processing independent of main processor



U7B	
101	DGND
103	MMC1_DAT6
105	MMC1_DAT2
107	GPIO_66
109	GPIO_69
111	GPIO_45
113	EHRPWM2B
115	GPIO_47
117	GPIO_46
119	GPIO_27
121	EHRPWM2A
123	MMC1_CMD
125	MMC1_CLK
127	MMC1_DAT4
129	MMC1_DAT0
131	LCD_VSYNC
133	LCD_HSYNC
135	LCD_DATA14
137	LCD_DATA13
139	LCD_DATA12
141	LCD_DATA8
143	LCD_DATA6
145	LCD_DATA4
146	LCD_DATA2
147	LCD_DATA0
148	LCD_DATA1
102	MMC1_DAT7
104	MMC1_DAT3
106	GPIO_67
108	GPIO0_RST_n
110	GPIO1_RST_n
112	RETRO_0 MCU
114	RETRO_1 MCU
116	RETRO_2 MCU
118	
120	
122	
124	
126	
128	
130	
132	
134	
136	
138	UART5_RXD

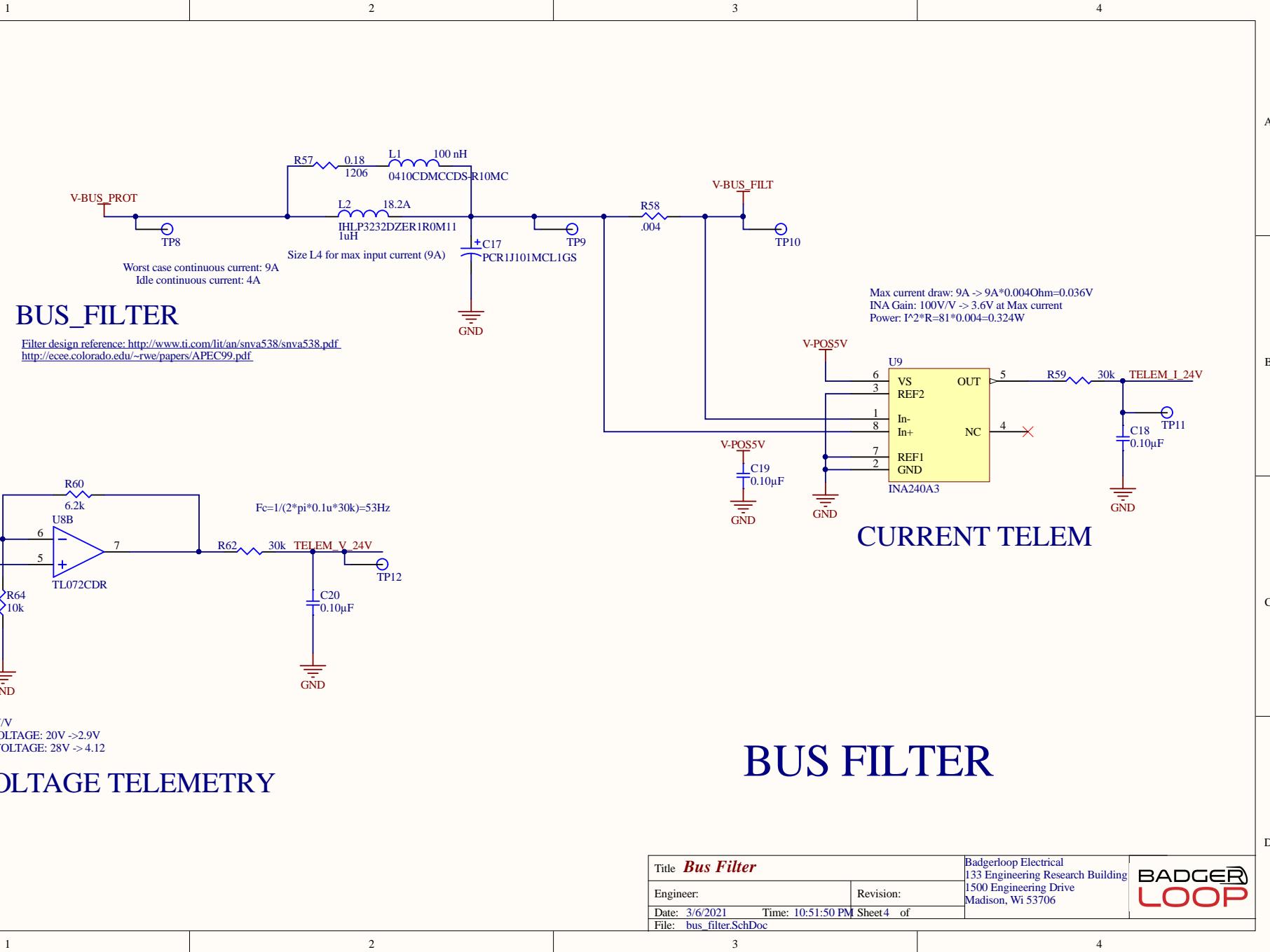
BEAGLEBONE Black Rev C Headers

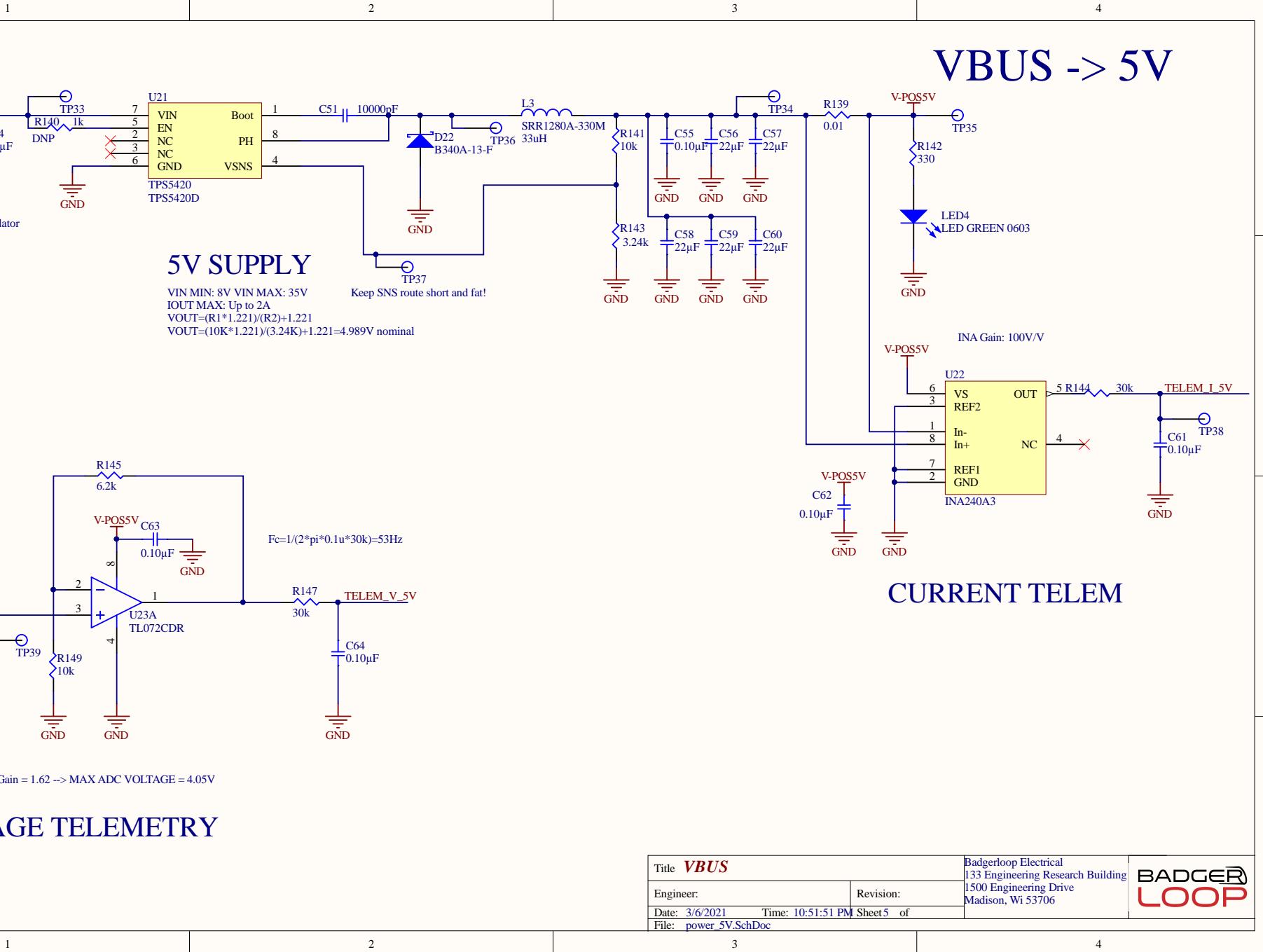
Beaglebone Headers



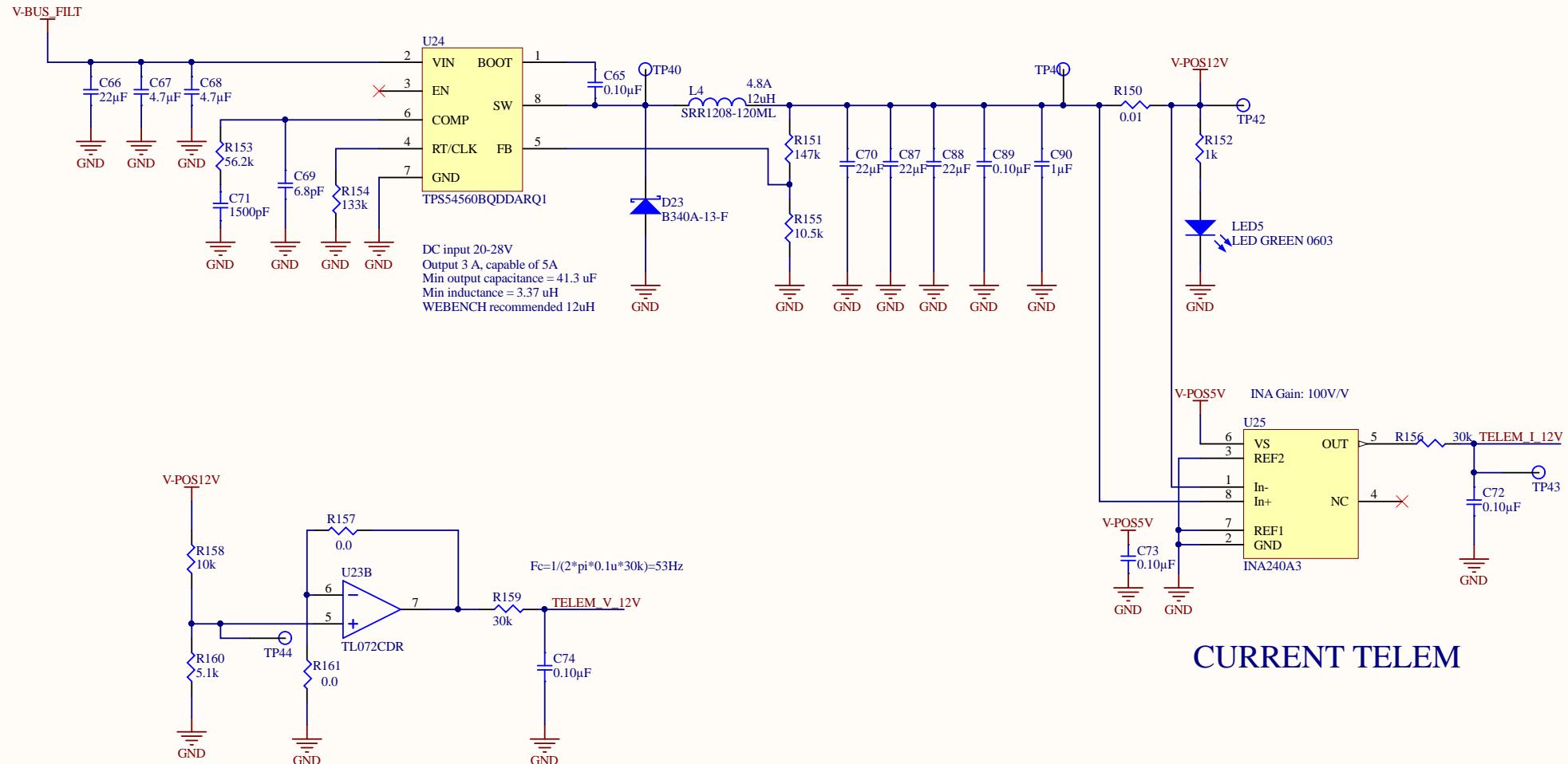
Debug Header

Title: Beaglebone	Badgerloop Electrical
Engineer:	Revision:
Date: 3/6/2021	Time: 10:51:50 PM Sheet 3 of
File: beaglebone.SchDoc	BADGER LOOP





VBUS -> 12V



VOLTAGE TELEMETRY

Title 12V PWR		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, Wi 53706
Engineer:	Revision:	
Date: 3/6/2021	Time: 10:51:51 PM	Sheet 6 of
File: power_12V.SchDoc		BADGER LOOP

1

2

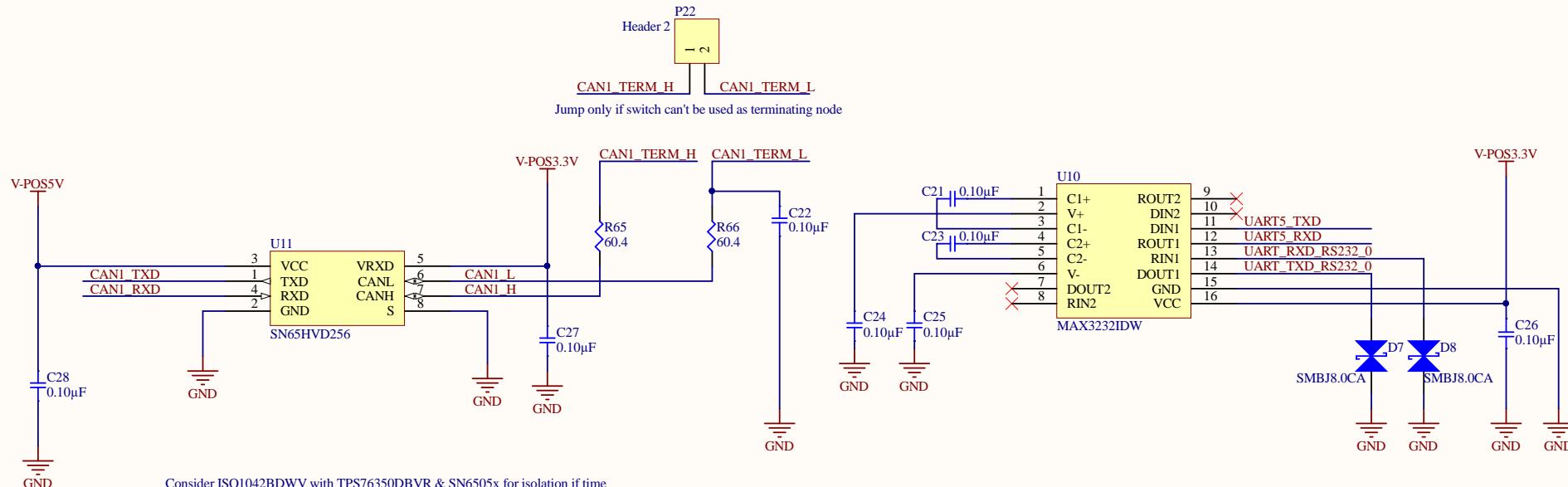
3

4

CAN**UART (x2)**

A

A



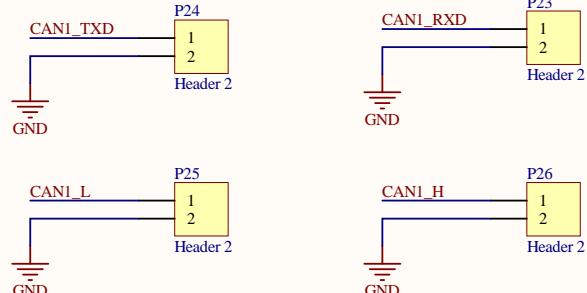
B

B

Consider ISO1042BDWV with TPS76350DBVR & SN6505x for isolation if time

C

C



D

D

Title CAN and UART Interfaces		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, Wi 53706
Engineer:	Revision:	
Date: 3/6/2021	Time: 10:51:51 PM	Sheet 7 of
File: can_uart.SchDoc		BADGER LOOP

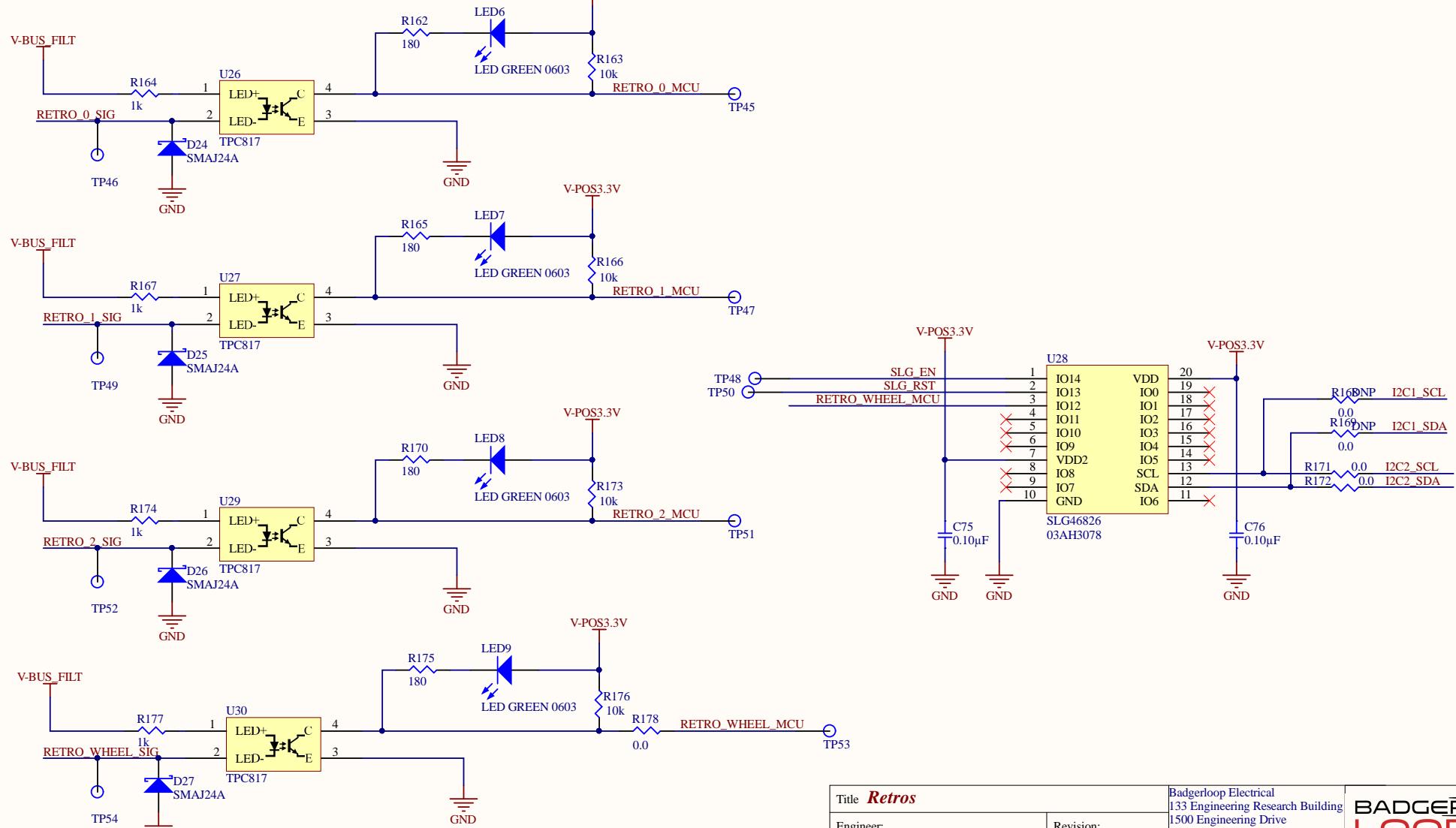
1

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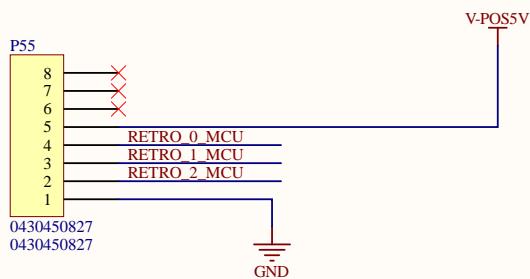
Retros & Non-driven Wheel Sensor



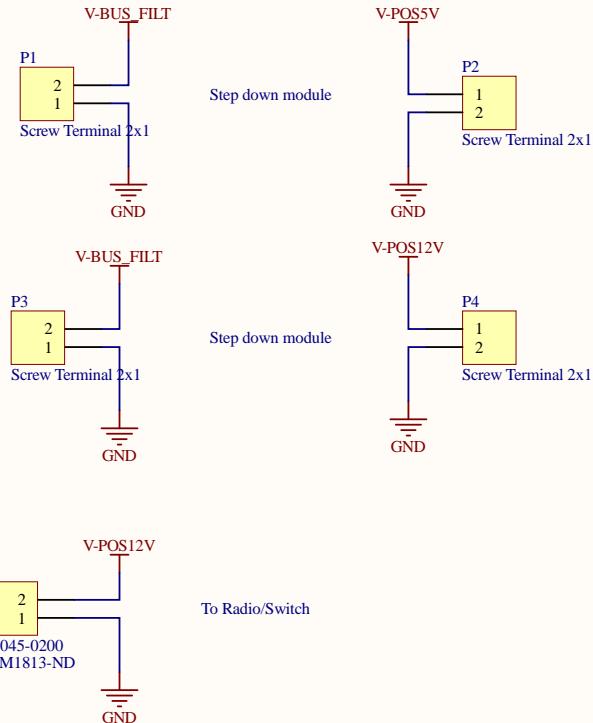
Title Retros		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, Wi 53706
Engineer:	Revision:	
Date: 3/6/2021	Time: 10:51:51 PM	Sheet 8 of
File: retros.SchDoc		BADGER LOOP

Arduino Interface

Only if SX still requires this

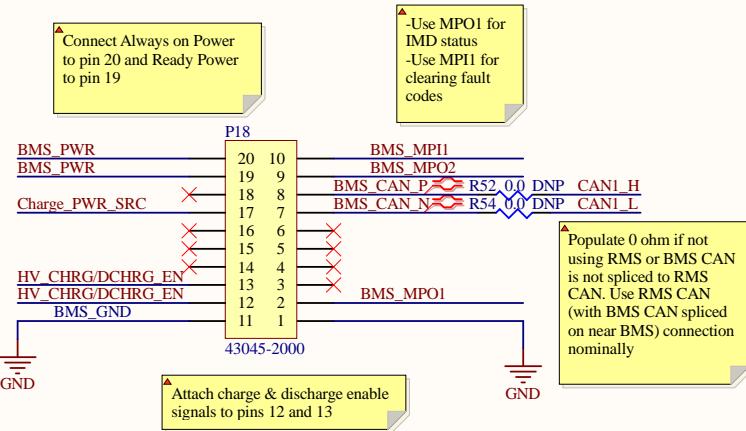


OTS Device Connections

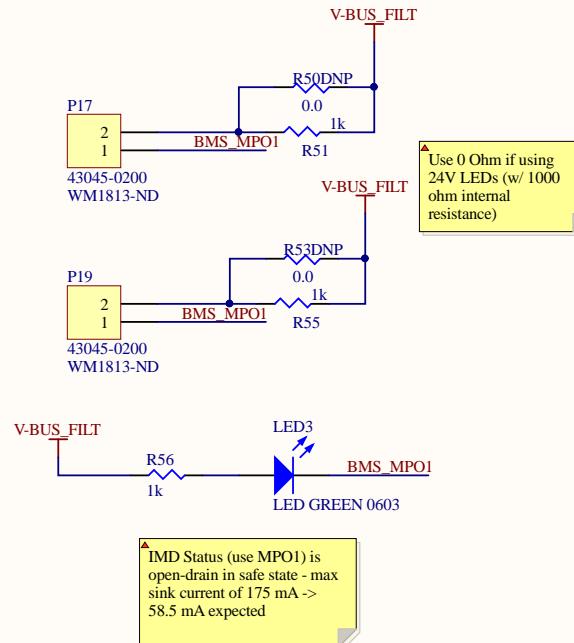


BMS Interface

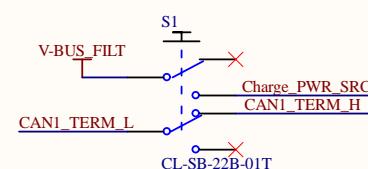
BMS/Term Main Connectors



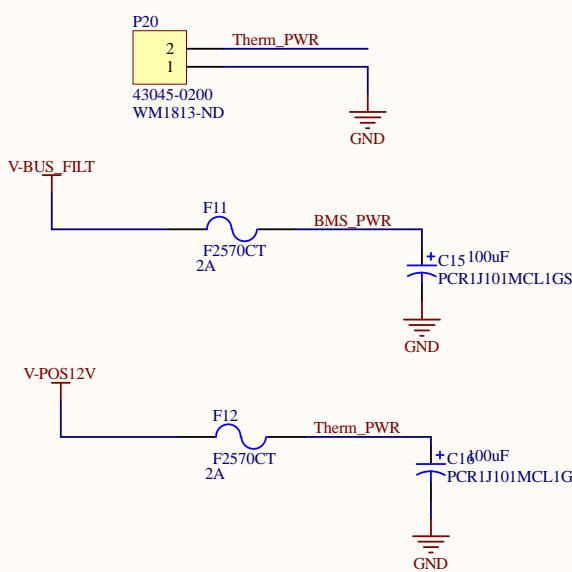
IMD Light circuit



Charge Enable & Termination Resistors



-Turn on in defined charging/balancing state
-When not in charging state, board is end node and has term. res.
-When in charging state, charger is end node and should house term. res.



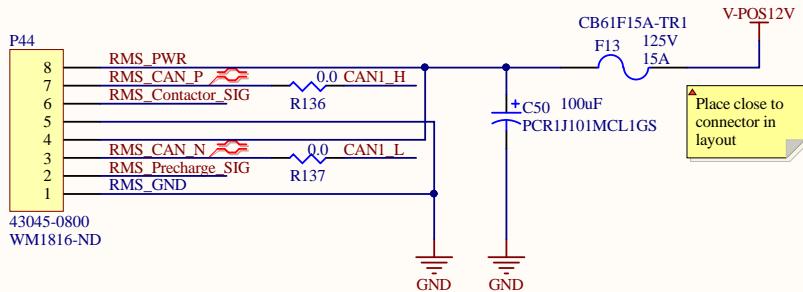
Charger Connector

Title BMS Interface		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, Wi 53706
Engineer: Shelby Riggelman	Revision:A	
Date: 3/6/2021	Time: 10:51:51 PM	Sheet 10 of
File: bms_interface.SchDoc		BADGER LOOP

A

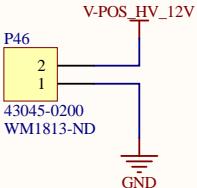
A

Motor Controller Interface



B

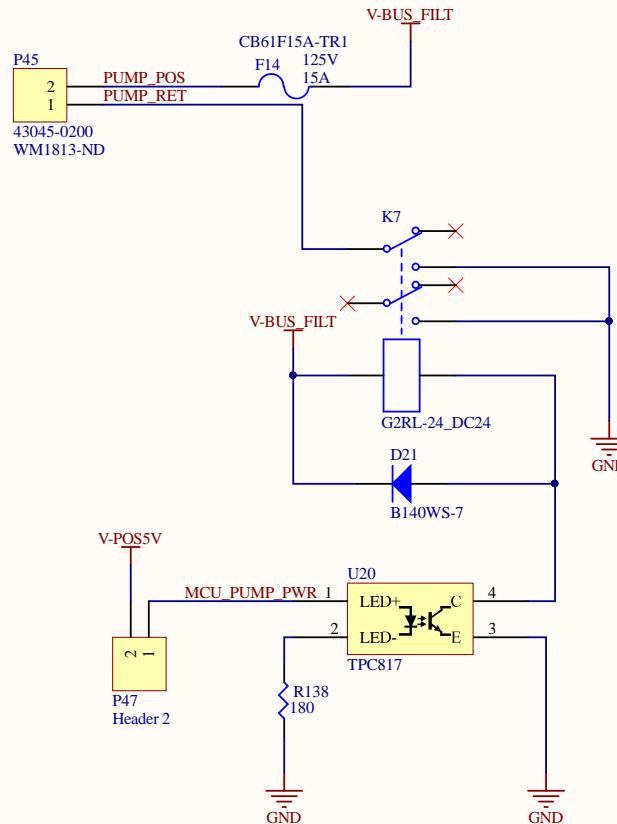
B



C

C

Pump Power



D

D

Title **RMS & Precharge Interface**

Engineer: Shelby Riggleman

Date: 3/6/2021 Time: 10:51:52 PM

File: motor_controller_interface.SchDoc

Badgerloop Electrical
133 Engineering Research Building
1500 Engineering Drive
Madison, Wi 53706

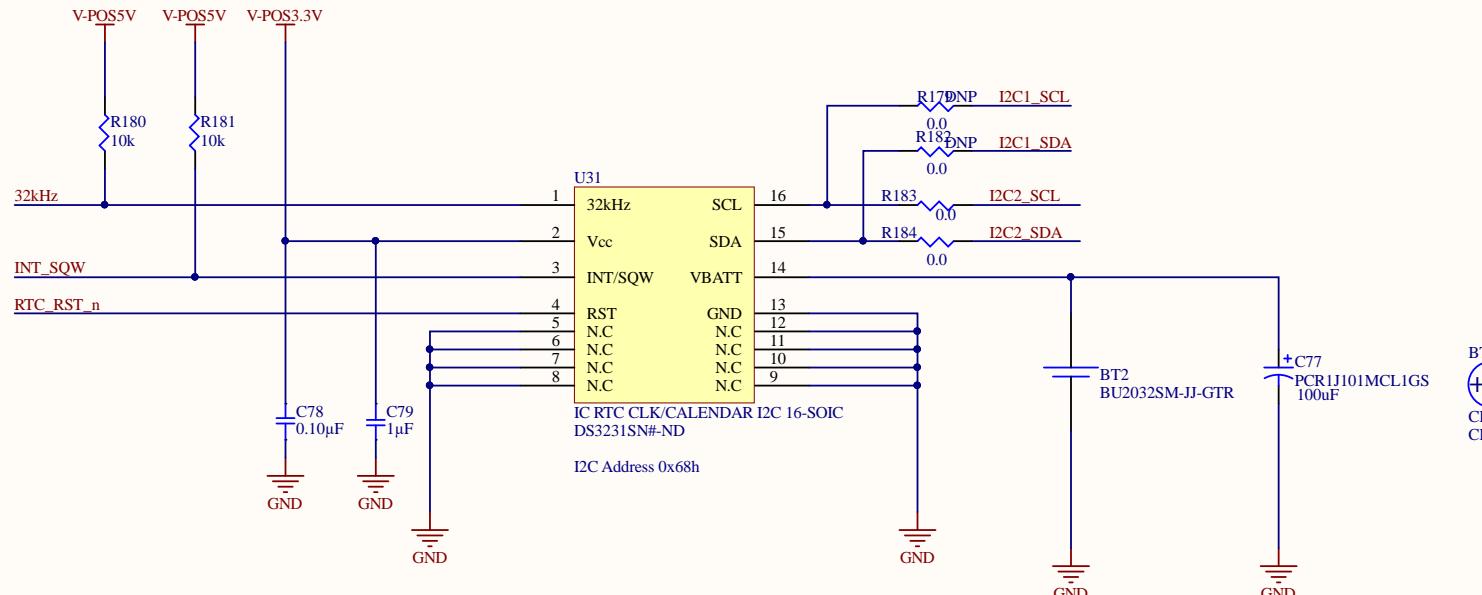


Real Time Clock & Coin Cell

A

A

Function determined by INTCN bit in OEh - SQW if 0, Active low interrupt if 1 and alarm enabled
Default = interrupt, but alarm is disabled



B

B

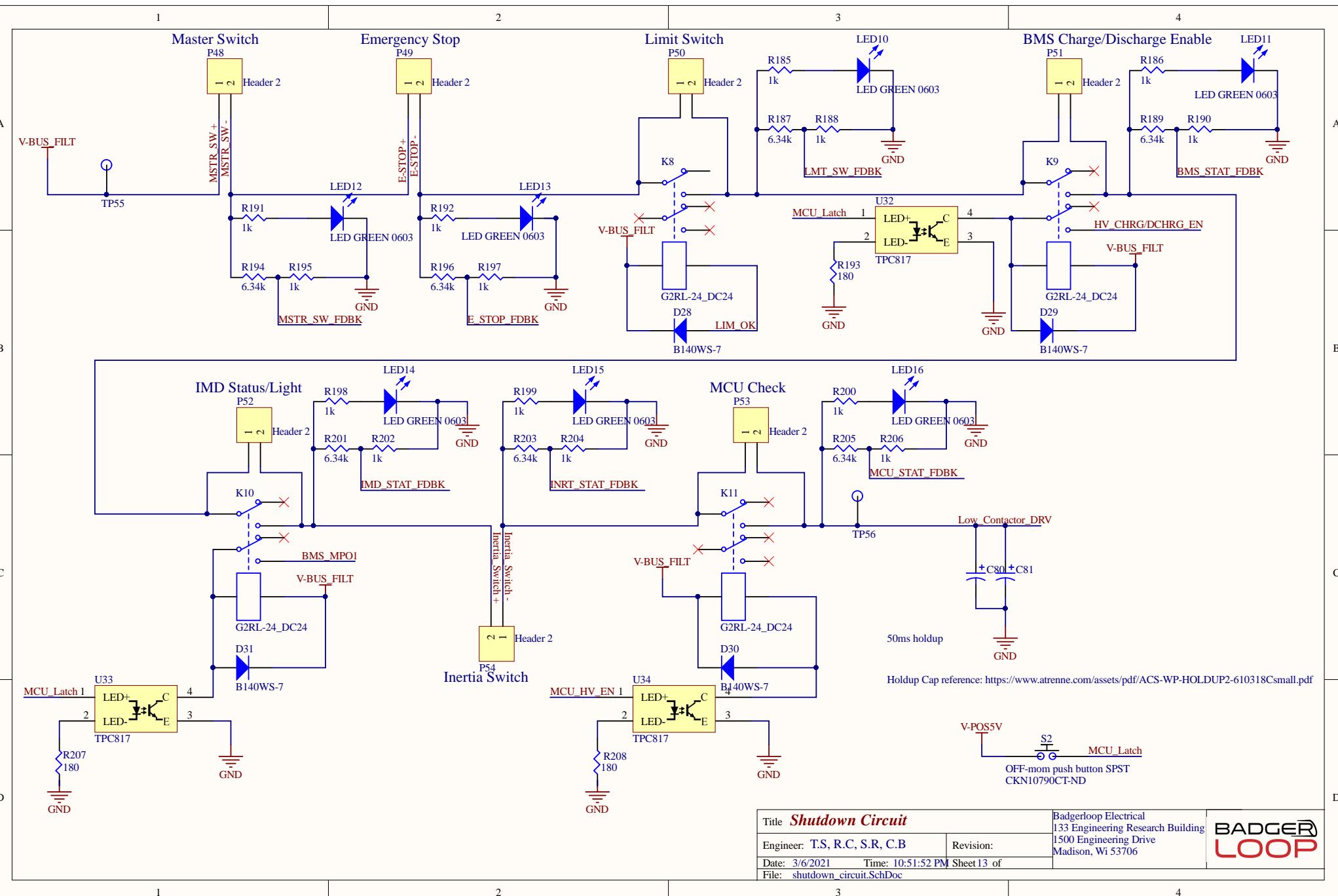
C

C

D

D

Title RTC			<i>Badgerloop</i> 133 Engineering Research Building Madison, WI 53715
Size: A4	Number:	Revision:	BADGER LOOP
Date: 3/6/2021	Time: 10:51:52 PM	Sheet 12 of	
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\RTC.SchDoc			

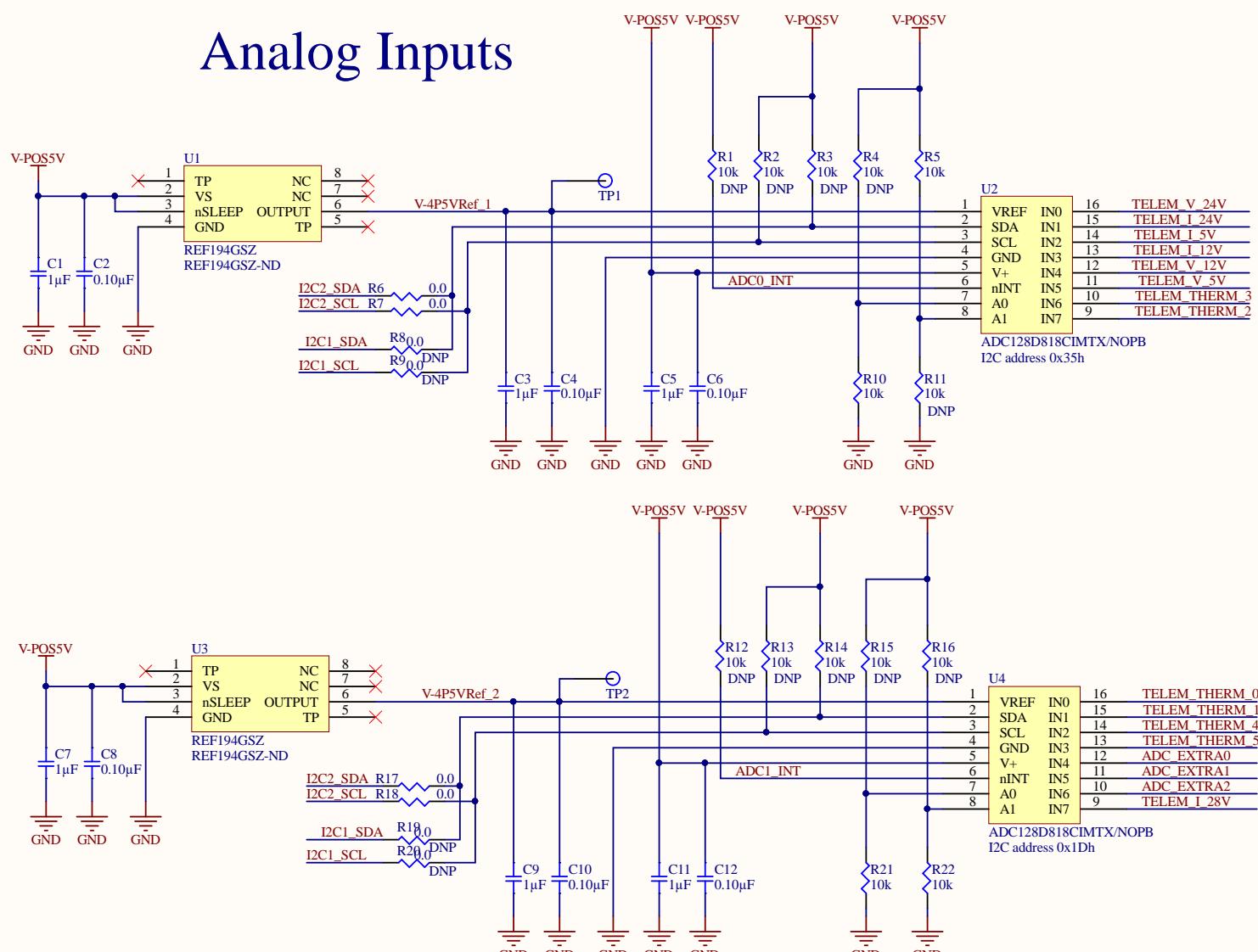


Title **Shutdown Circuit**

Engineer: T.S, R.C, S.R, C.B	Revision:
Date: 3/6/2021	Time: 10:51:52 PM Sheet 13 of
File: shutdown_circuit.SchDoc	

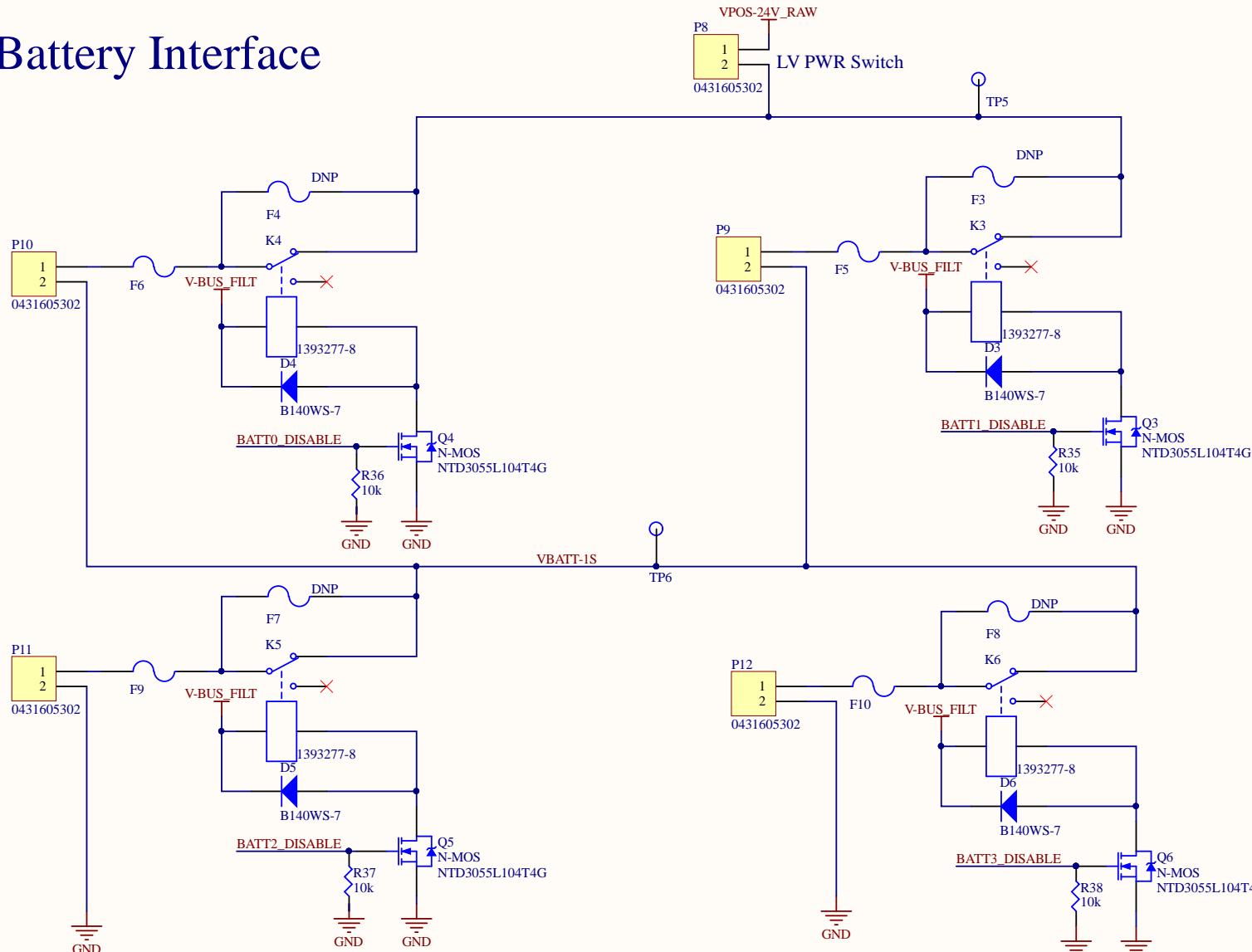
BADGER LOOP

Analog Inputs



Title ADC			<i>Badgerloop 133 Engineering Research Building Madison, WI 53715</i>
Size: A4	Number:	Revision:	
Date: 3/6/2021	Time: 10:51:52 PM	Sheet 14 of	
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\adc.SchDoc			

LV Battery Interface



Title LV Battery Interface			Badgerloop 133 Engineering Research Building Madison, WI 53715	BADGER LOOP
Size: A4	Number:	Revision:		
Date: 3/6/2021	Time: 10:51:52 PM	Sheet 15 of		
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\battery_interface.SchDoc				

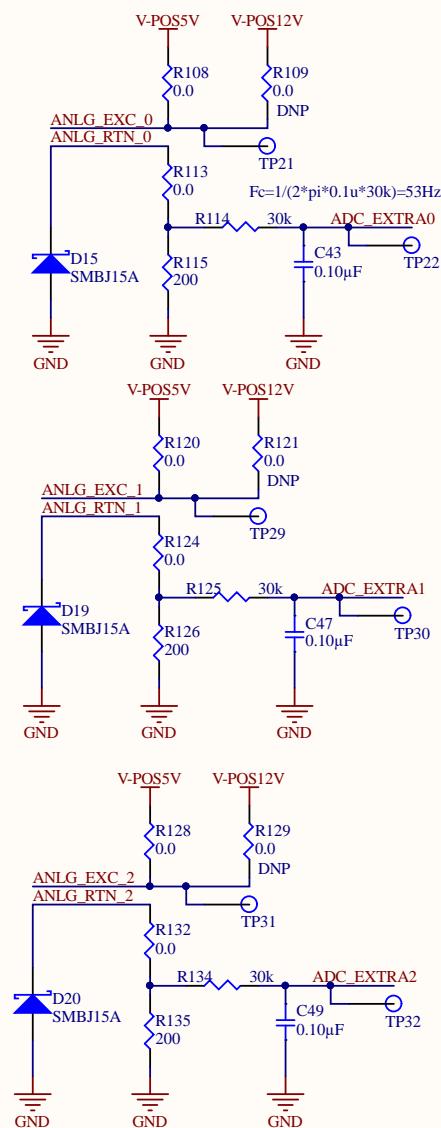
1

2

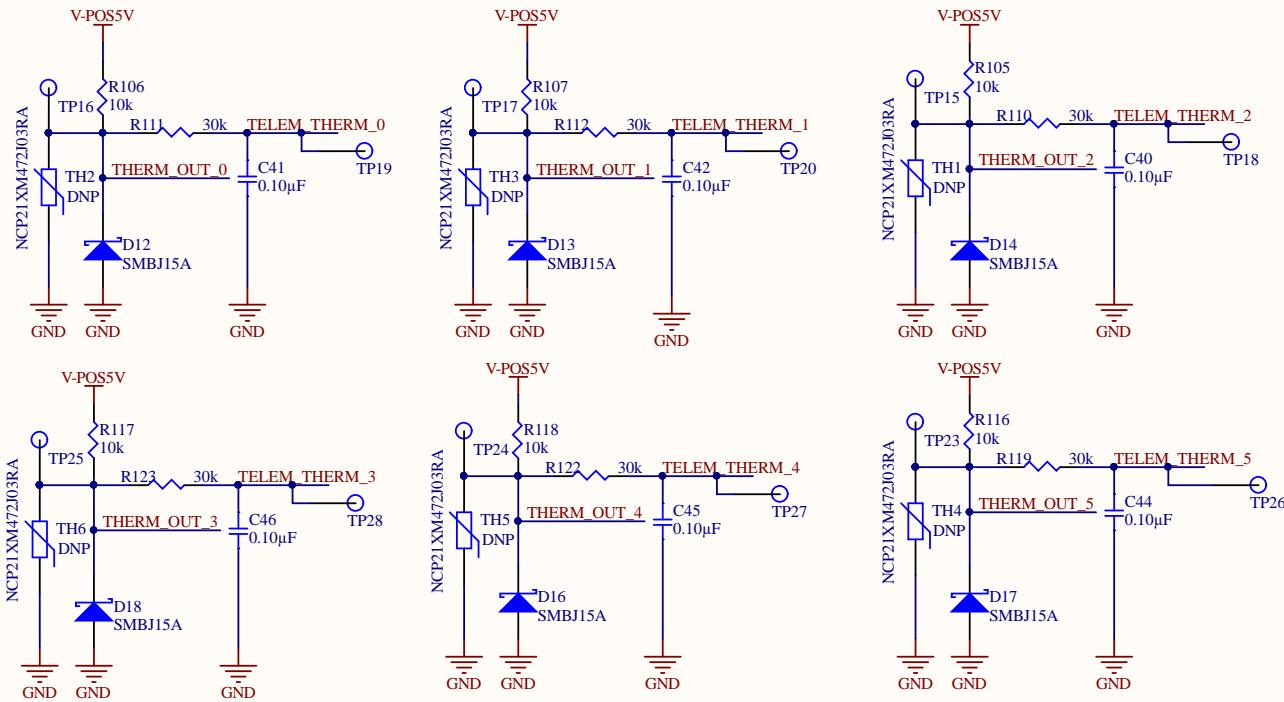
3

4

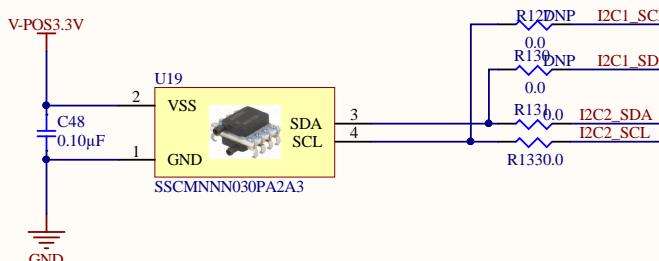
Extra Analog Sensors



Thermistors



Ambient Pressure Sensor



Title: Sensors	Badgerloop 133 Engineering Research Building Madison, WI 53715
Size: A4	Number:
Date: 3/6/2021	Revision:
Time: 10:51:53 PM	Sheet 16 of
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\misc_sensors.SchDoc	

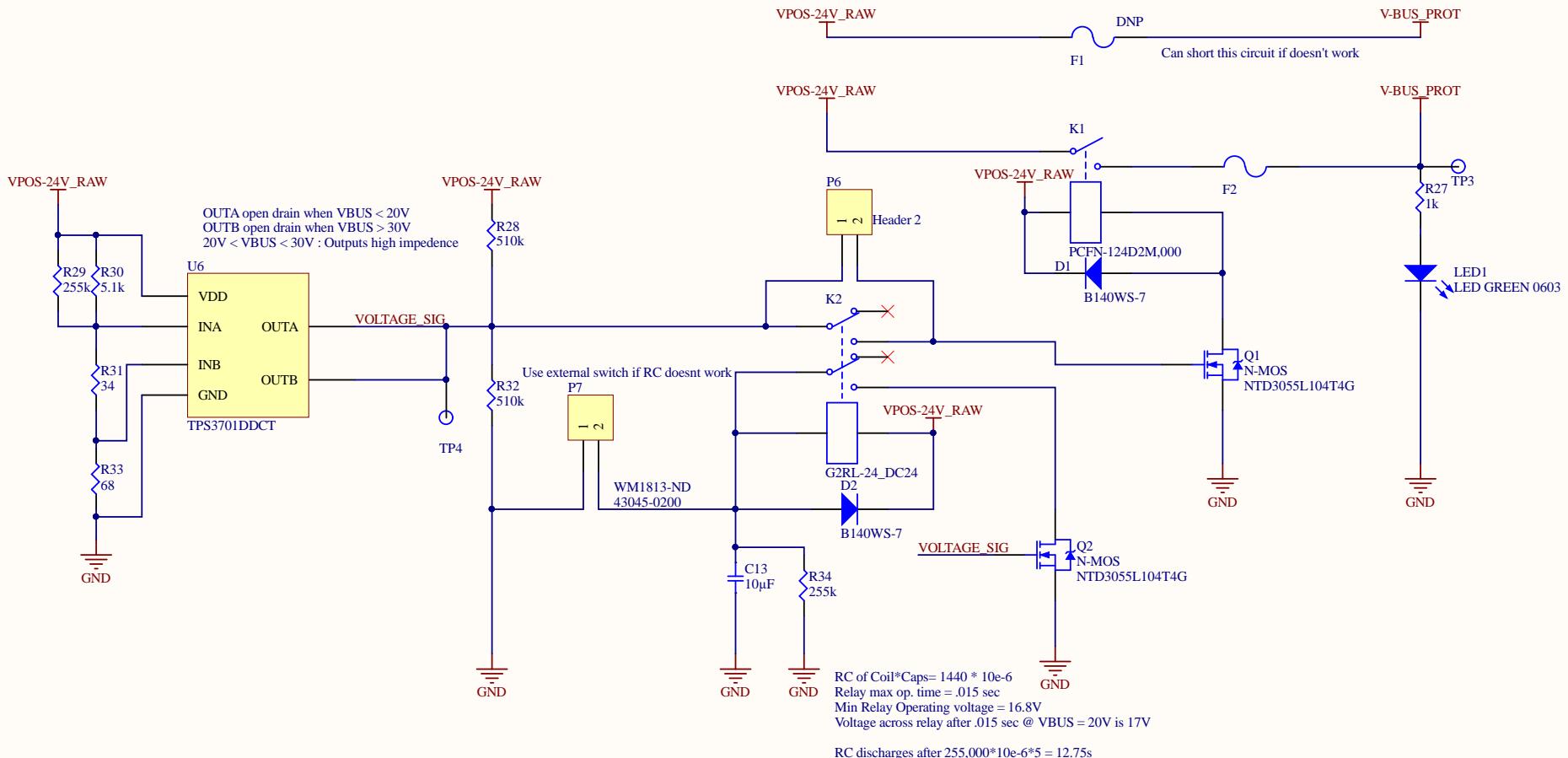
1

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BATTERY PROTECTION



Title Battery Protection			Badgerloop 133 Engineering Research Building Madison, WI 53715	BADGER LOOP
Size: A4	Number:	Revision:		
Date: 3/6/2021	Time: 10:51:53 PM	Sheet 17 of		
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\batt_protection.SchDoc				

1

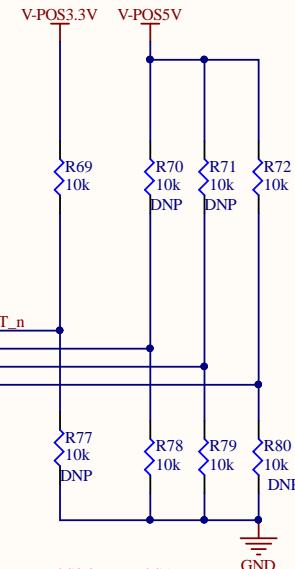
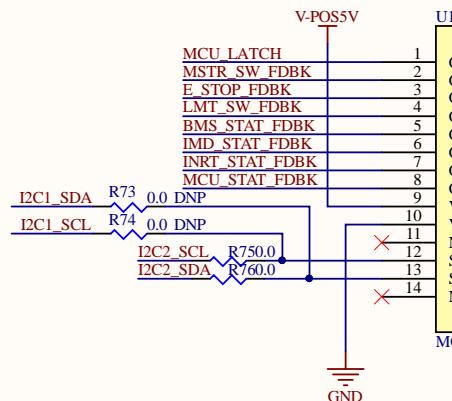
2

3

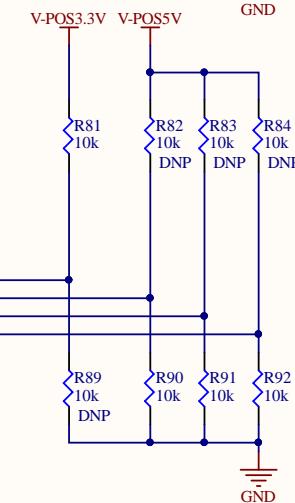
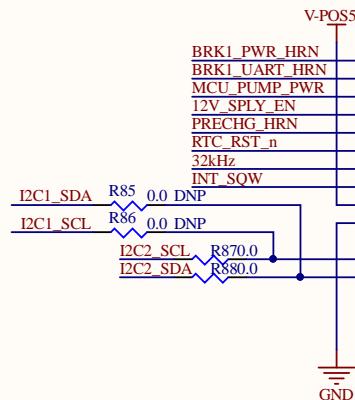
4

GPIO

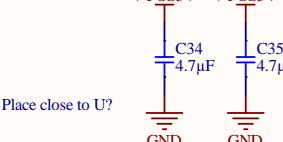
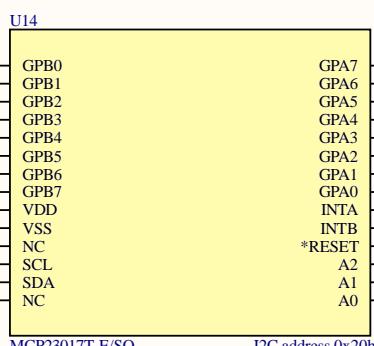
A



B



C



D

Title: GPIO	Badgerloop 133 Engineering Research Building Madison, WI 53715	BADGER LOOP
Size: A4	Number:	Revision:
Date: 3/6/2021	Time: 10:51:53 PM	Sheet 18 of
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\gpio.SchDoc		

1

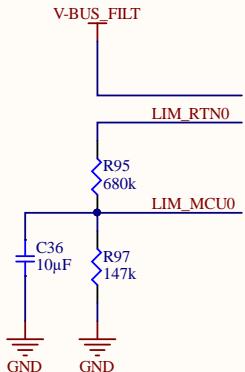
2

3

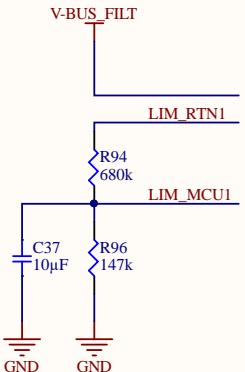
4

Limit Switch Feedback

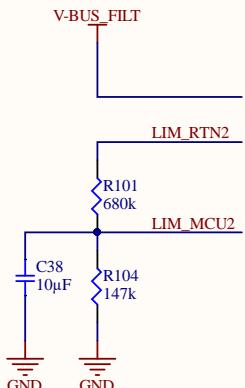
A



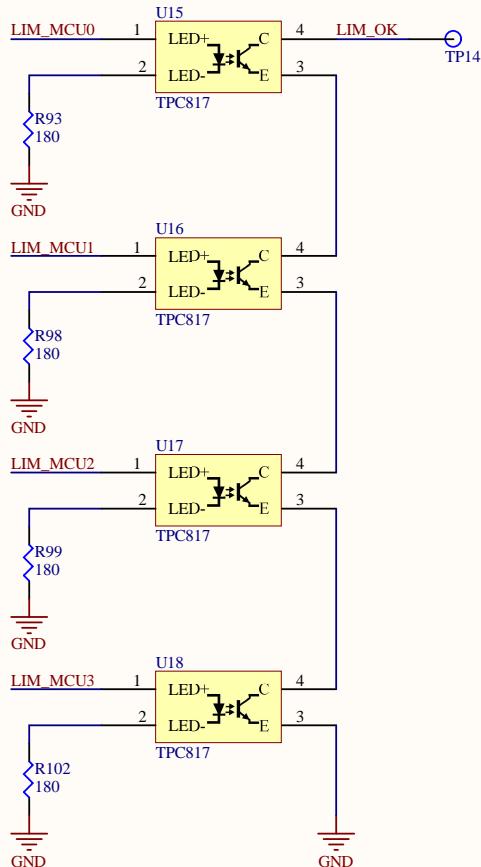
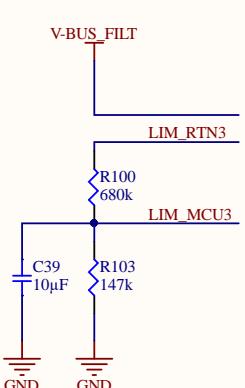
B



C

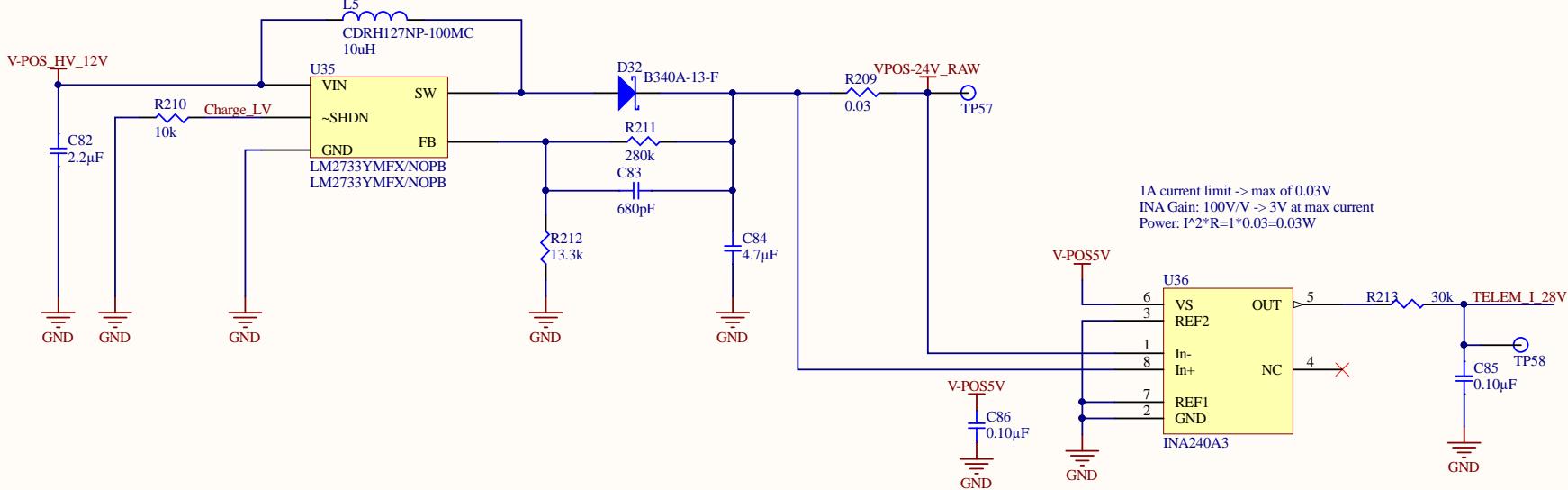


D



Title: Limit Switches	Badgerloop 133 Engineering Research Building Madison, WI 53715	BADGERLOOP
Size: A4	Number:	Revision:
Date: 3/6/2021	Time: 10:51:53 PM	Sheet 19 of
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\limit_switches.SchDoc		

HV Batt 12V -> 28V



CURRENT TELEM

Title 28V Boost	Badgerloop 133 Engineering Research Building Madison, WI 53715
Size: A4	Number:
Date: 3/6/2021	Revision:
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\power_28V.SchDoc	Time: 10:51:53 PM Sheet 20 of

BADGER LOOP

