

A

A

B

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D

D

MAIN IO

POD 5

REV B

Title Main IO		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, WI 53706	BADGER LOOP
Engineer:	Revision:	Date: 3/7/2021 Time: 12:16:11 PM Sheet 1 of	

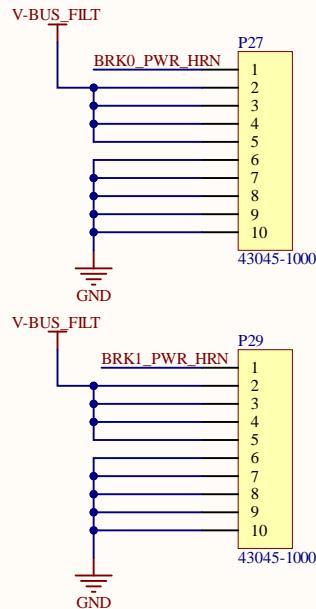
1

2

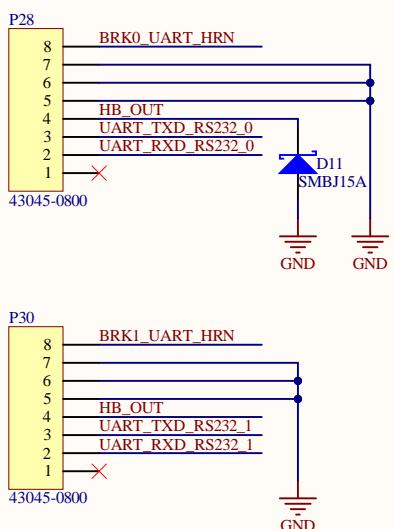
3

4

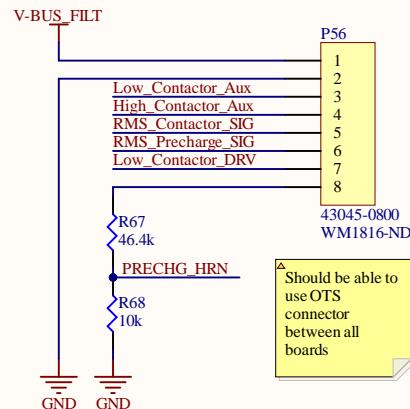
BrakingIO PWR



BrakingIO UART



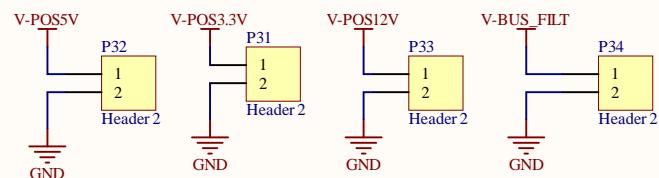
Precharge Board



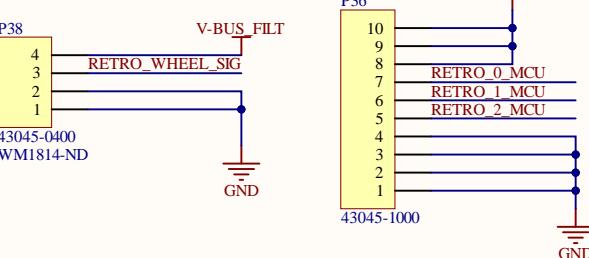
BMS & RMS

See respective schematics

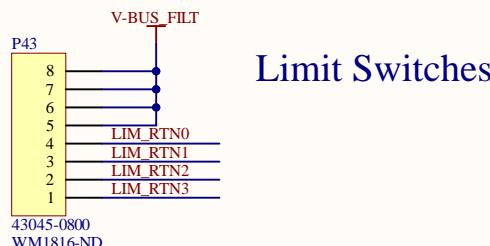
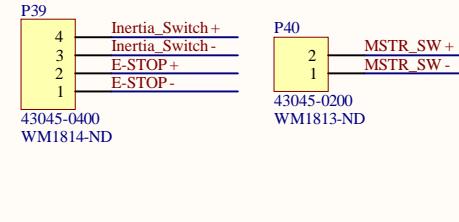
Debug



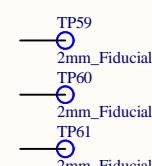
Retro Sensors



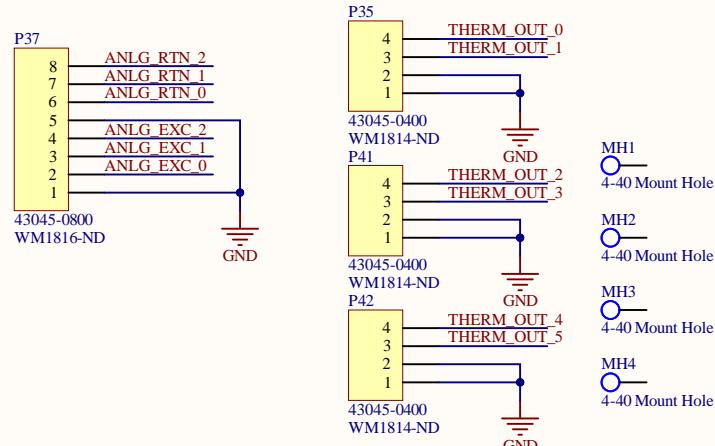
Shutdown Circuit Inputs



Fiducials



Analog Sensors



Title Connectors

Engineer:

Revision:

Date: 3/7/2021

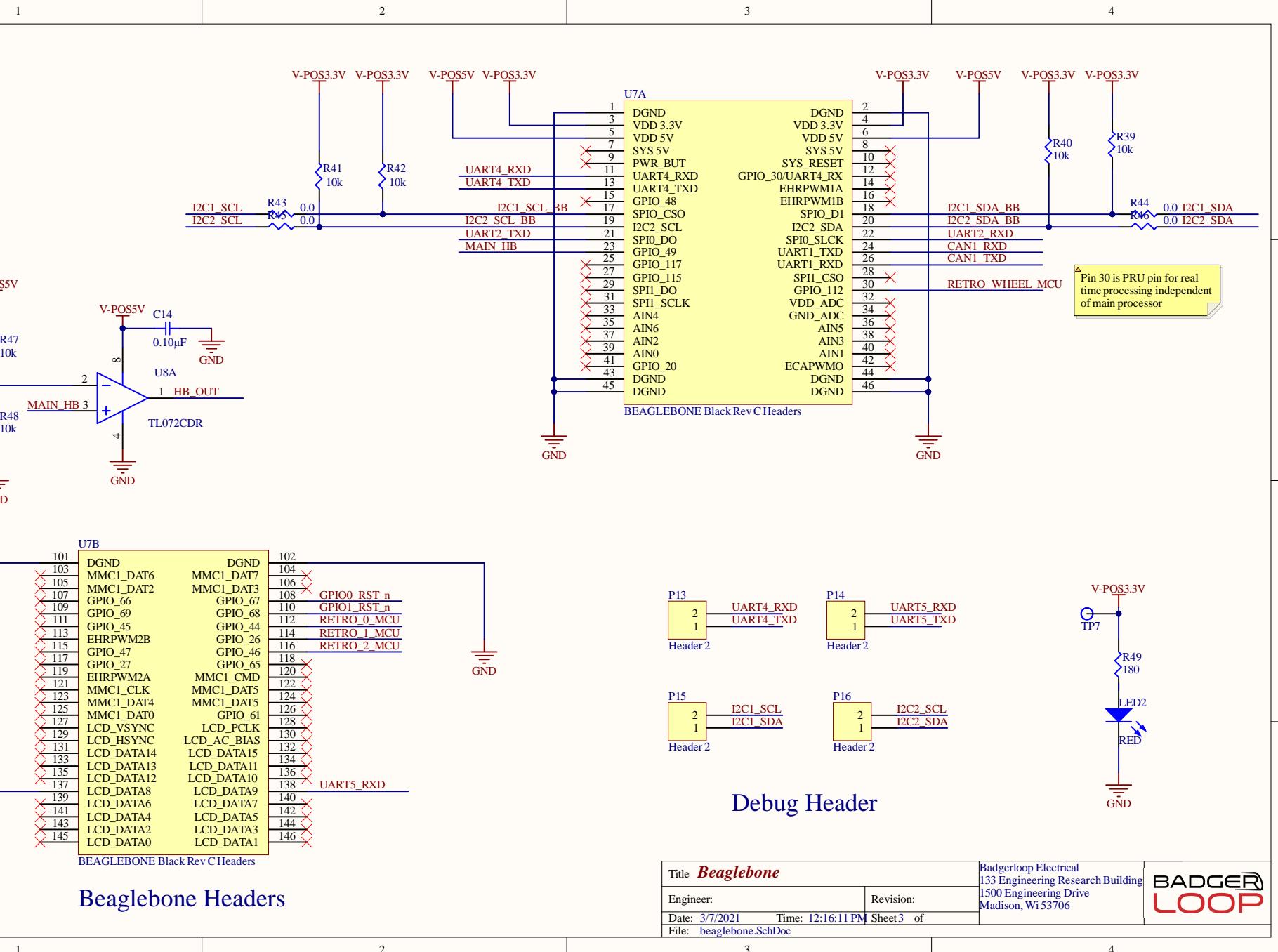
Time: 12:16:11 PM

Sheet 2 of

File: connectors.SchDoc

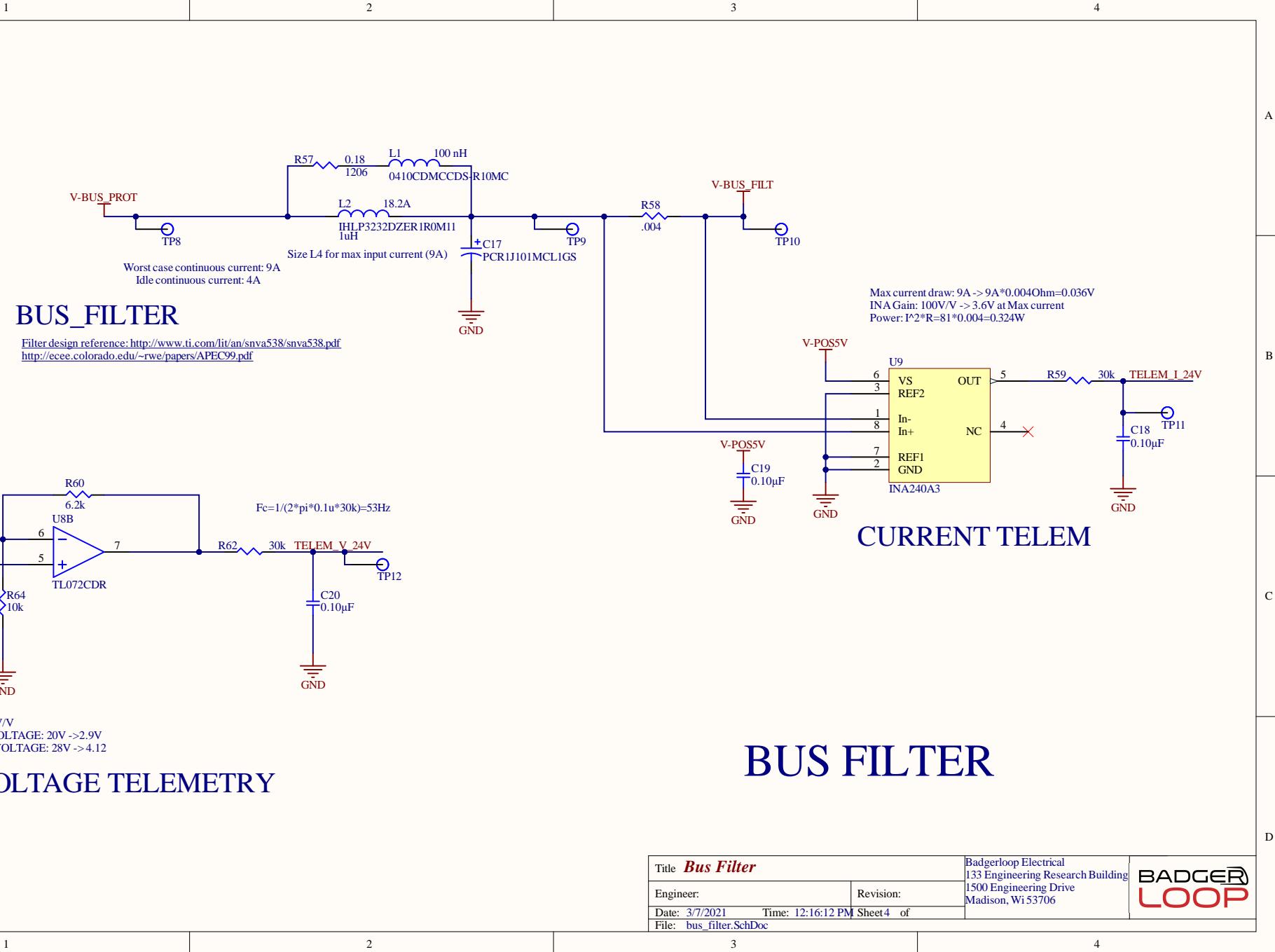
Badgerloop Electrical
133 Engineering Research Building
1500 Engineering Drive
Madison, WI 53706

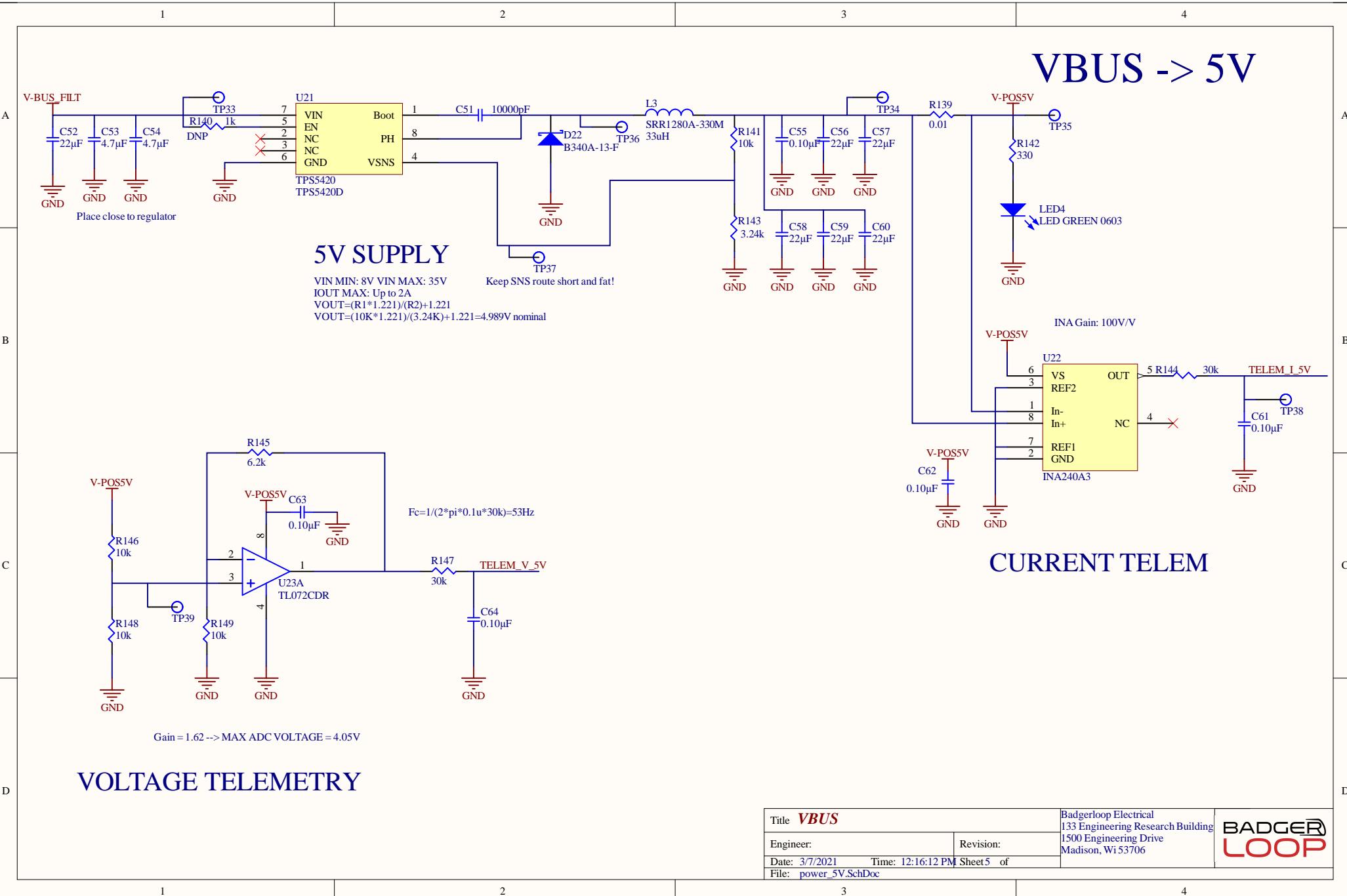
BADGER
LOOP



Title Beaglebone		Badgerloop Electrical
Engineer:	Revision:	133 Engineering Research Building
Date: 3/7/2021	Time: 12:16:11 PM	1500 Engineering Drive
File: beaglebone.SchDoc		Madison, Wi 53706

**BADGER
LOOP**





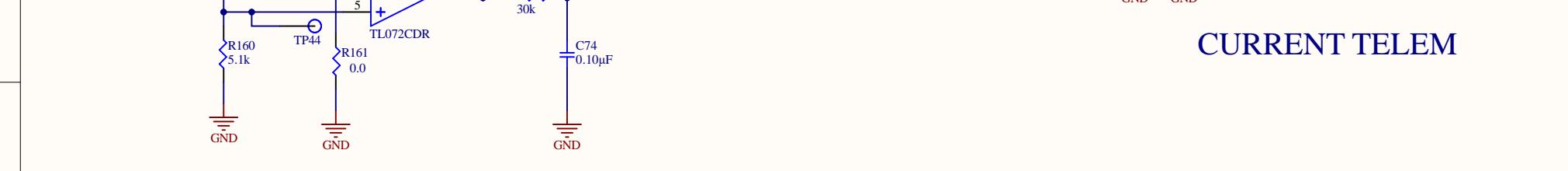
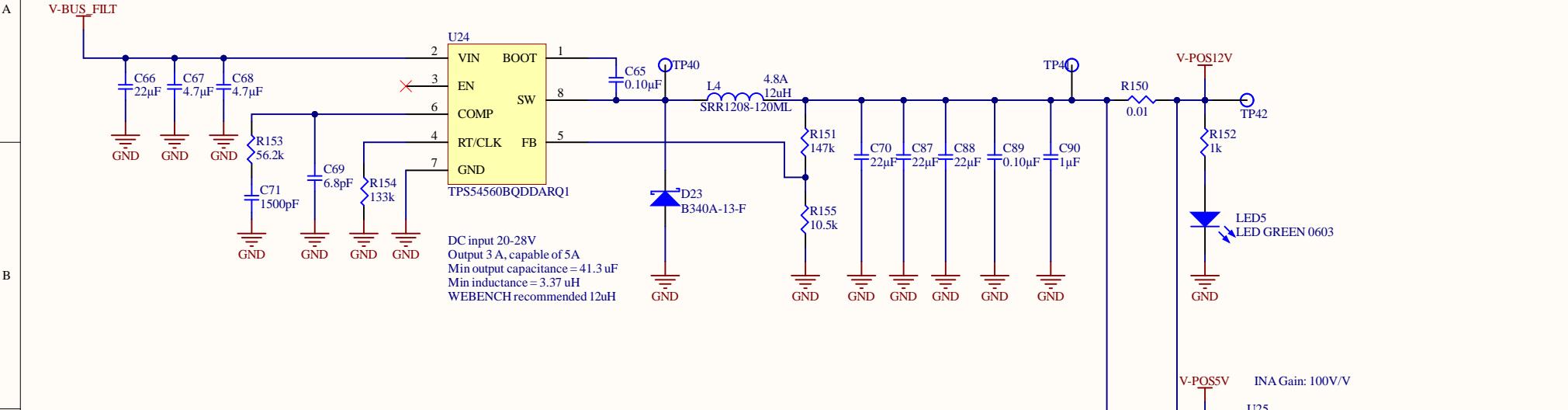
1

2

3

4

VBUS -> 12V



Gain = 1--> MAX ADC VOLTAGE = 4.05V

VOLTAGE TELEMETRY

Title 12V PWR		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, WI 53706
Engineer:	Revision:	
Date: 3/7/2021	Time: 12:16:12 PM	Sheet 6 of
File: power_12V.SchDoc		BADGER LOOP

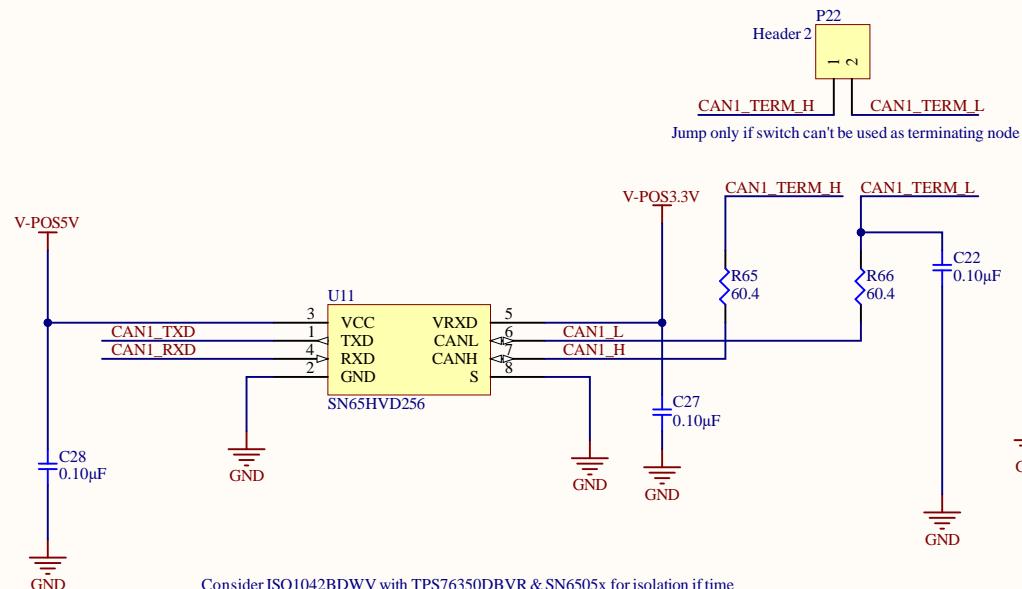
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2

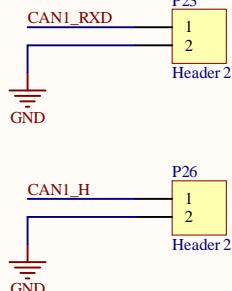
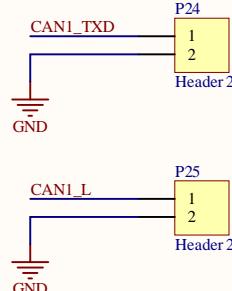
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4

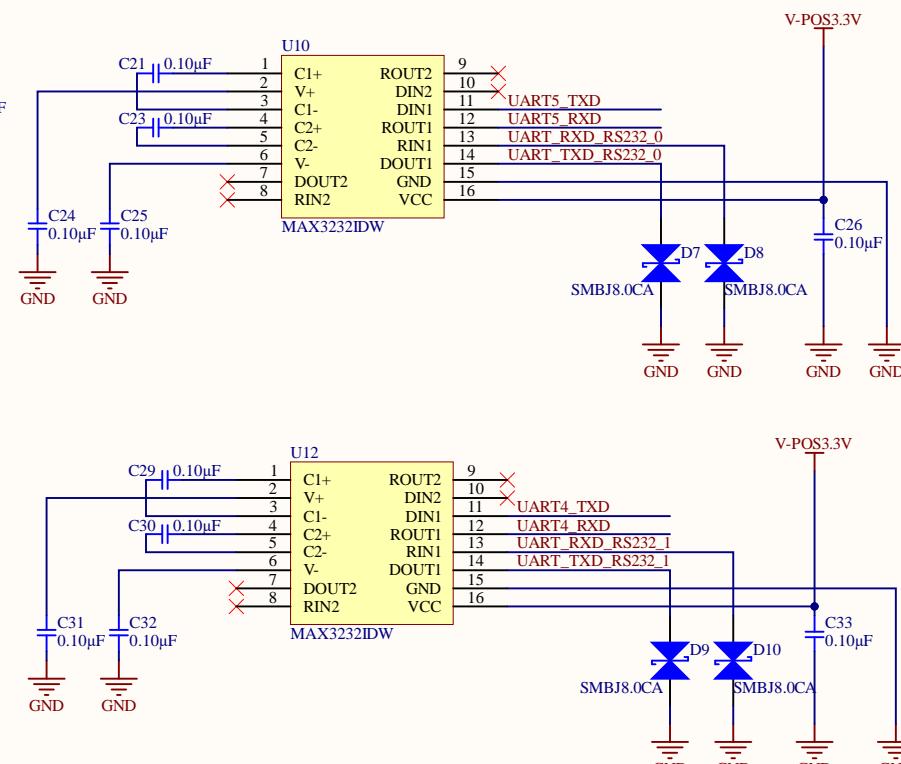
CAN



Consider ISO1042BDWV with TPS76350DBVR & SN6505x for isolation if time



UART (x2)



Title **CAN and UART Interfaces**

Engineer:

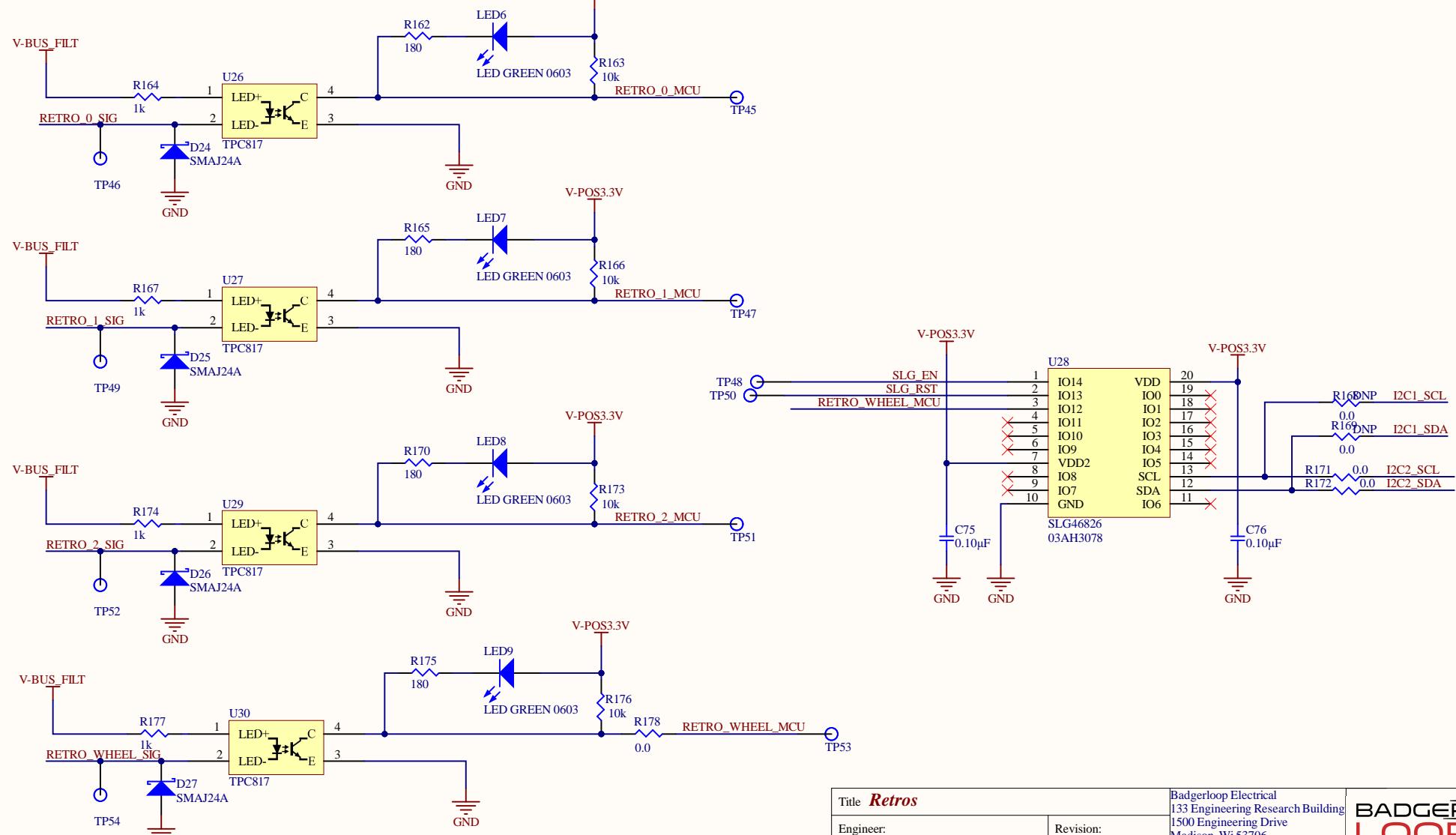
Date: 3/7/2021 Time: 12:16:12 PM

File: can_uart.SchDoc

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1500 Engineering Drive
Madison, WI 53706

BADGER
LOOP

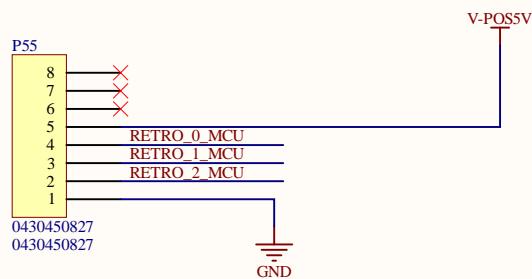
Retros & Non-driven Wheel Sensor



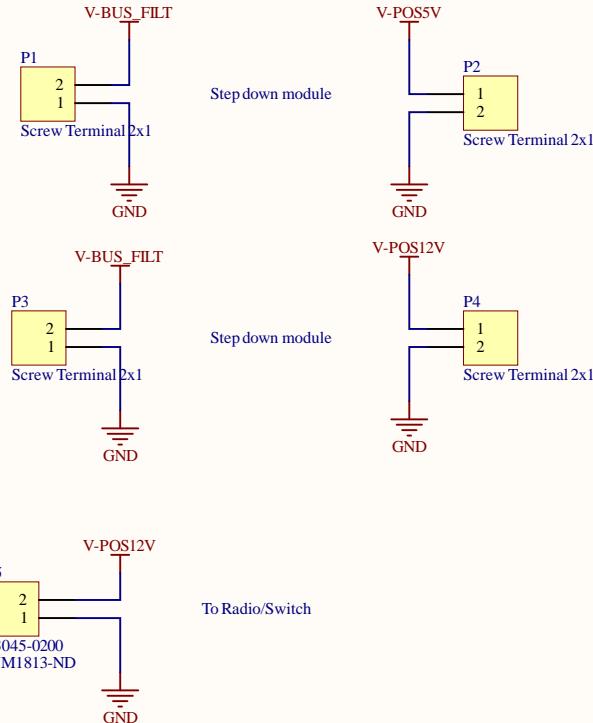
Title Retros		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, WI 53706
Engineer:	Revision:	
Date: 3/7/2021	Time: 12:16:12 PM	Sheet 8 of
File: retros.SchDoc		BADGER LOOP

Arduino Interface

Only if SX still requires this

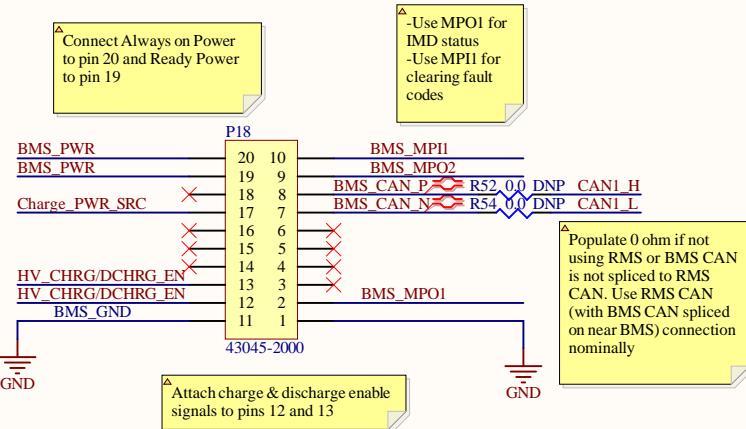


OTS Device Connections

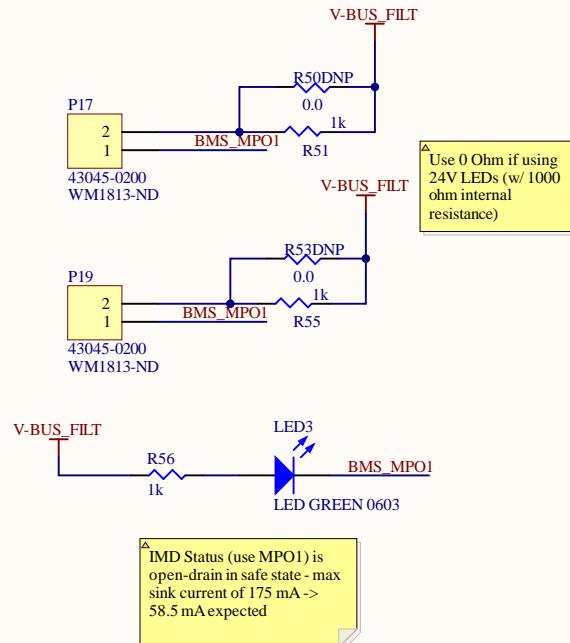


BMS Interface

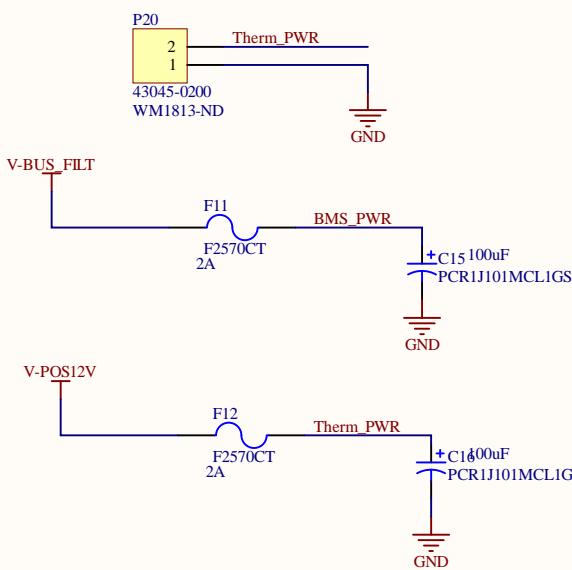
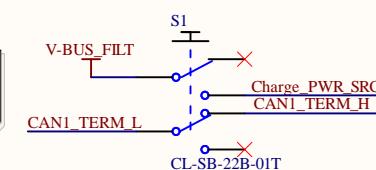
BMS/Therm Main Connectors



IMD Light circuit



Charge Enable & Termination Resistors



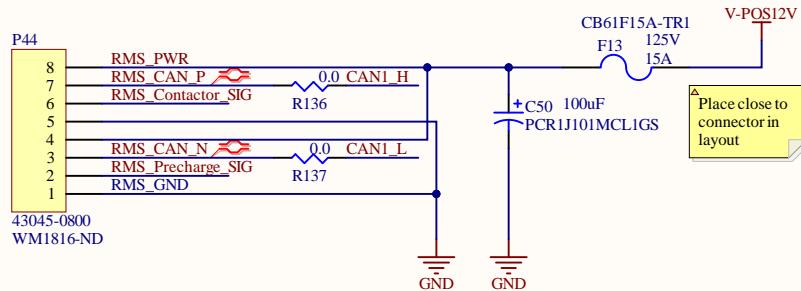
Charger Connector

Title BMS Interface		Badgerloop Electrical 133 Engineering Research Building 1500 Engineering Drive Madison, WI 53706
Engineer: Shelby Riggelman	Revision: A	
Date: 3/7/2021	Time: 12:16:13 PM	Sheet 10 of
File: bms_interface.SchDoc		BADGER LOOP

A

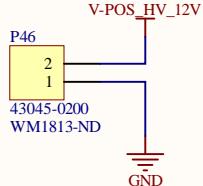
A

Motor Controller Interface



B

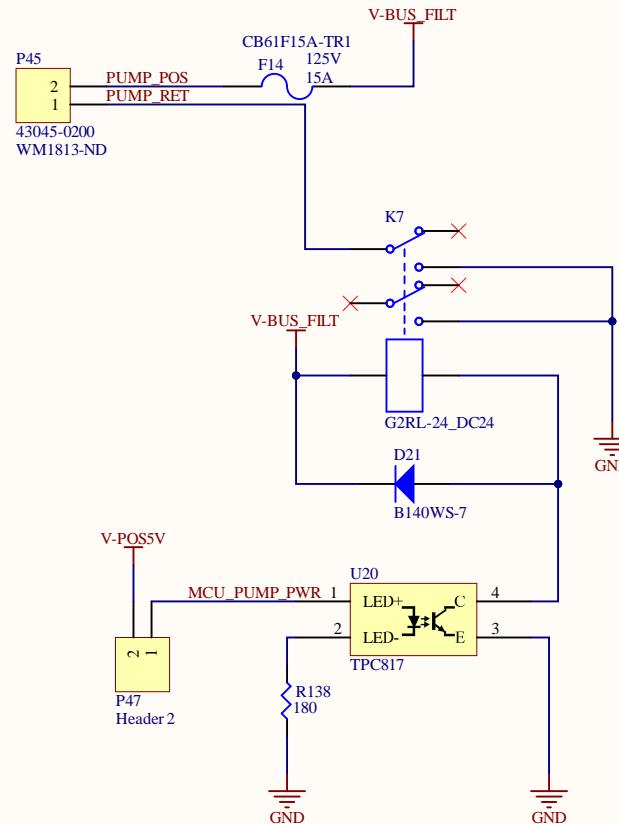
B



C

C

Pump Power



D

D

Title **RMS & Precharge Interface**

Engineer: Shelby Riggelman

Revision: A

Date: 3/7/2021 Time: 12:16:13 PM

File: motor_controller_interface.SchDoc

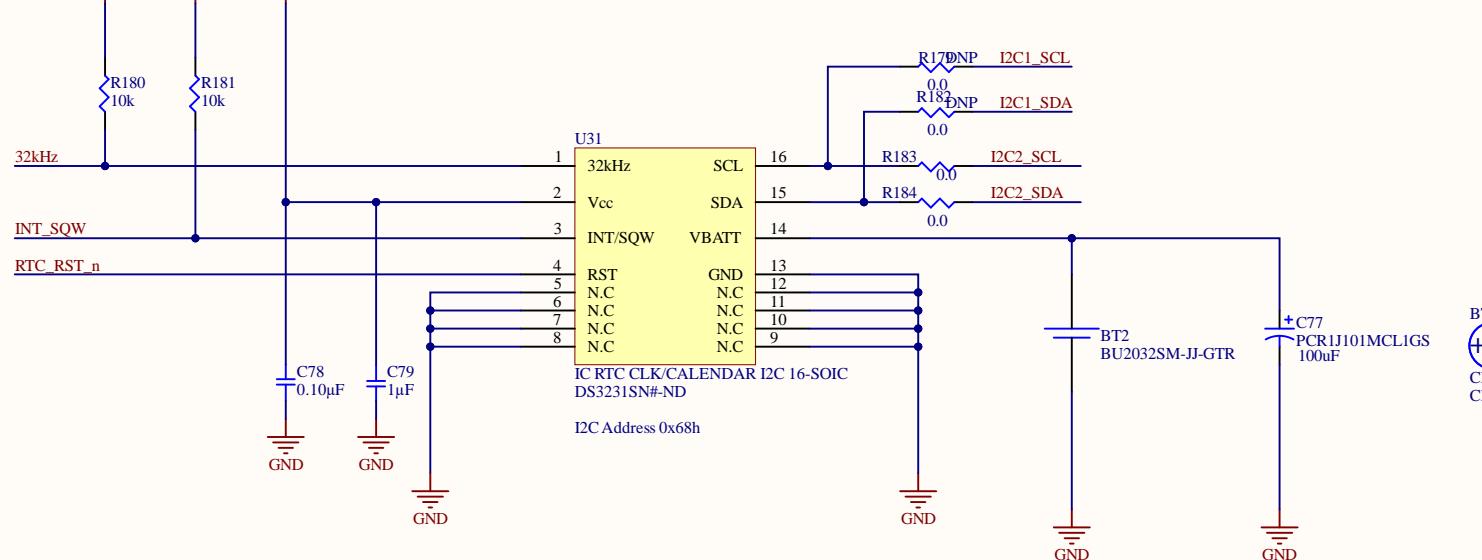
Badgerloop Electrical
133 Engineering Research Building
1500 Engineering Drive
Madison, Wi 53706

BADGER
LOOP

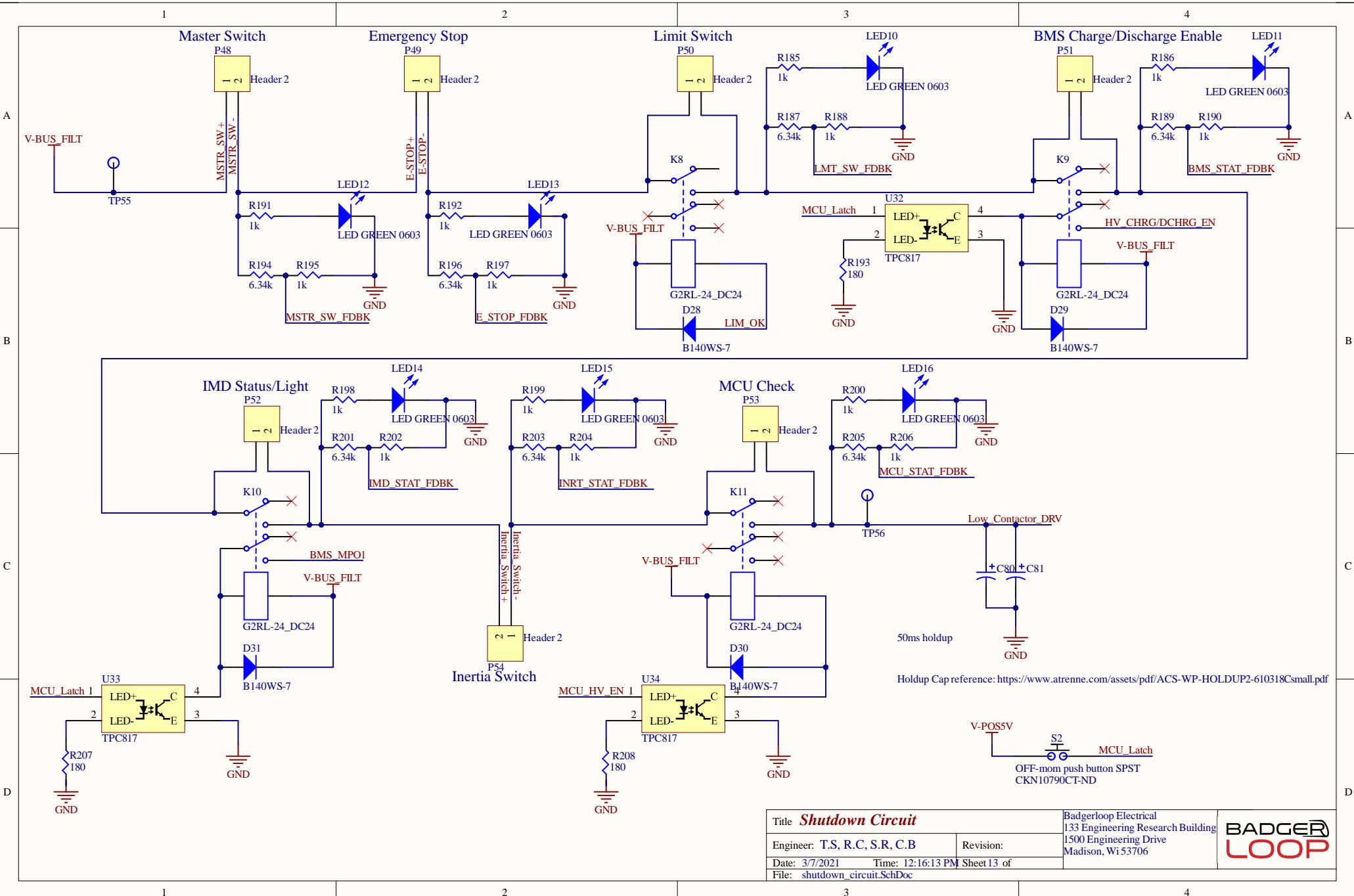
Real Time Clock & Coin Cell

Function determined by
 INTCN bit in OEh - SQW
 if 0, Active low interrupt if
 1 and alarm enabled

 Default = interrupt, but
 alarm is disabled



Title RTC			<i>Badgerloop</i> 133 Engineering Research Building Madison, WI 53715
Size: A4	Number:	Revision:	
Date: 3/7/2021	Time: 12:16:13 PM	Sheet 12 of	
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\RTC.SchDoc			BADGER LOOP



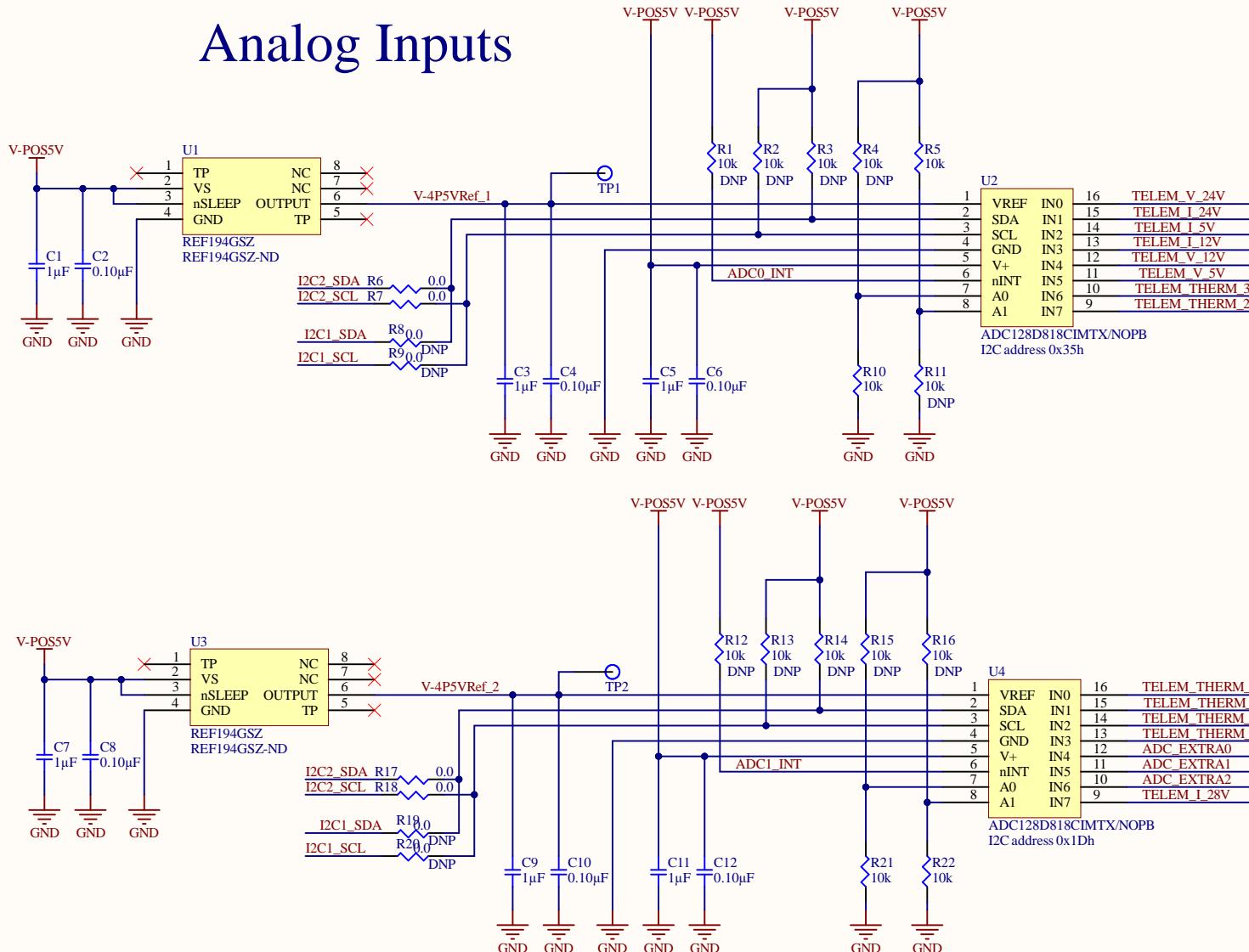
1

2

3

4

Analog Inputs



Title: ADC	Badgerloop 133 Engineering Research Building Madison, WI 53715
Size: A4	Number: _____
Date: 3/7/2021	Revision: _____
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\adc.SchDoc	

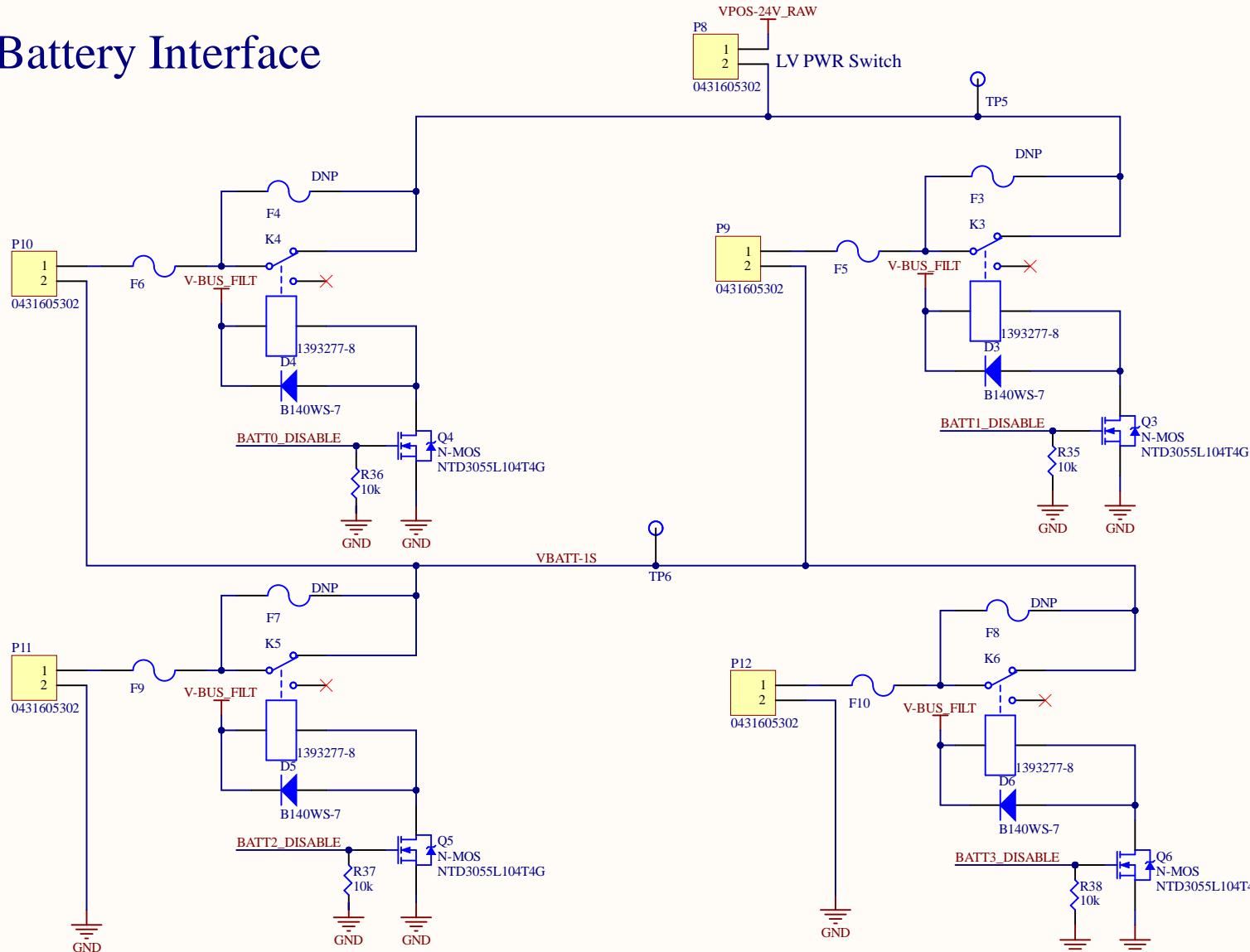
1

2

3

4

LV Battery Interface



Title **LV Battery Interface**

Size: **A4**

Number:

Revision:

Date: **3/7/2021**

Time: **12:16:14 PM**

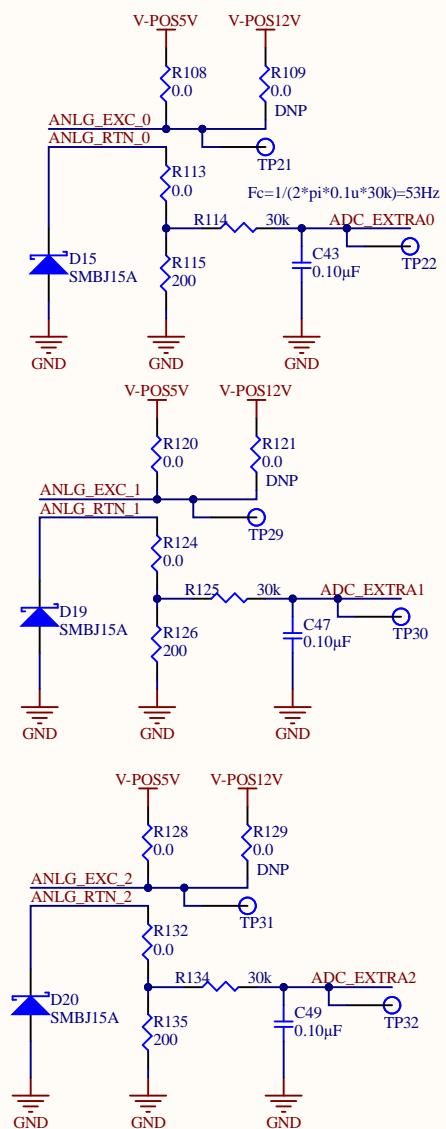
Sheet **15** of

File: **C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\battery_interface.SchDoc**

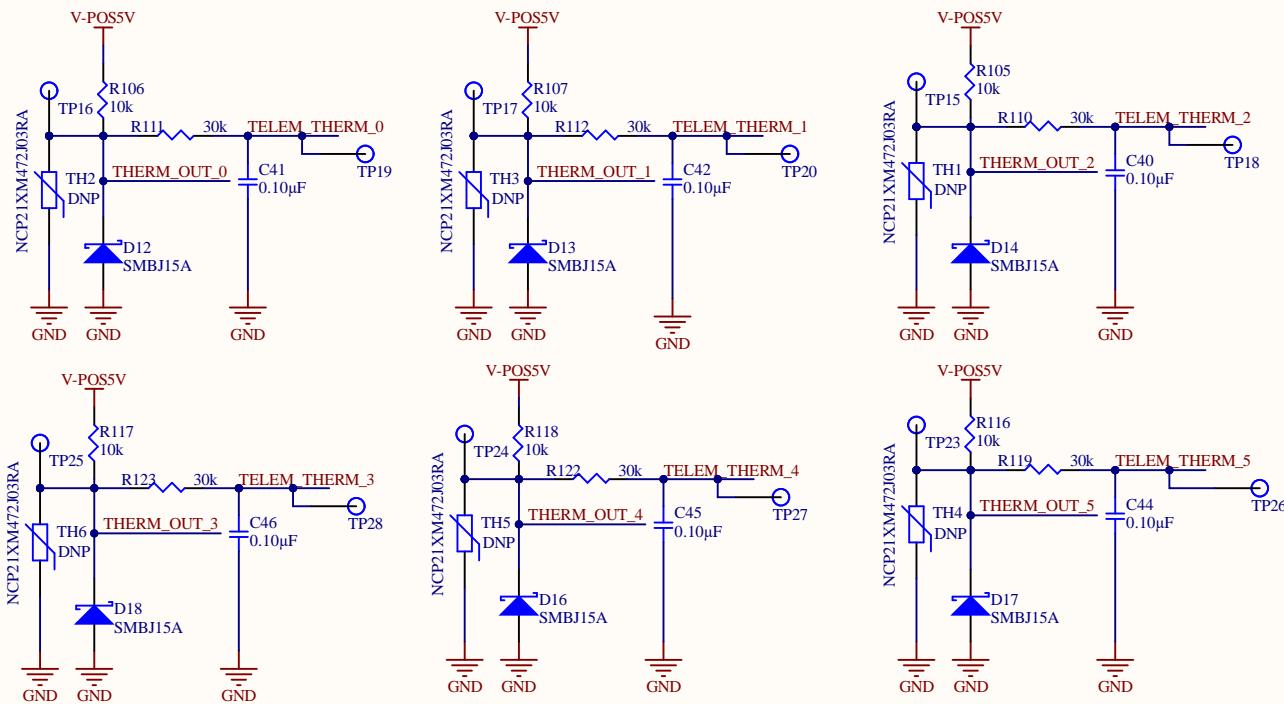
Badgerloop
133 Engineering Research
Building
Madison, WI 53715



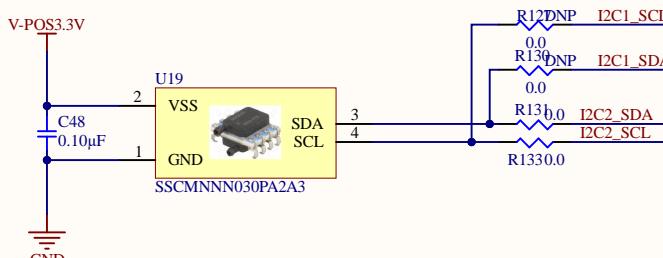
Extra Analog Sensors



Thermistors



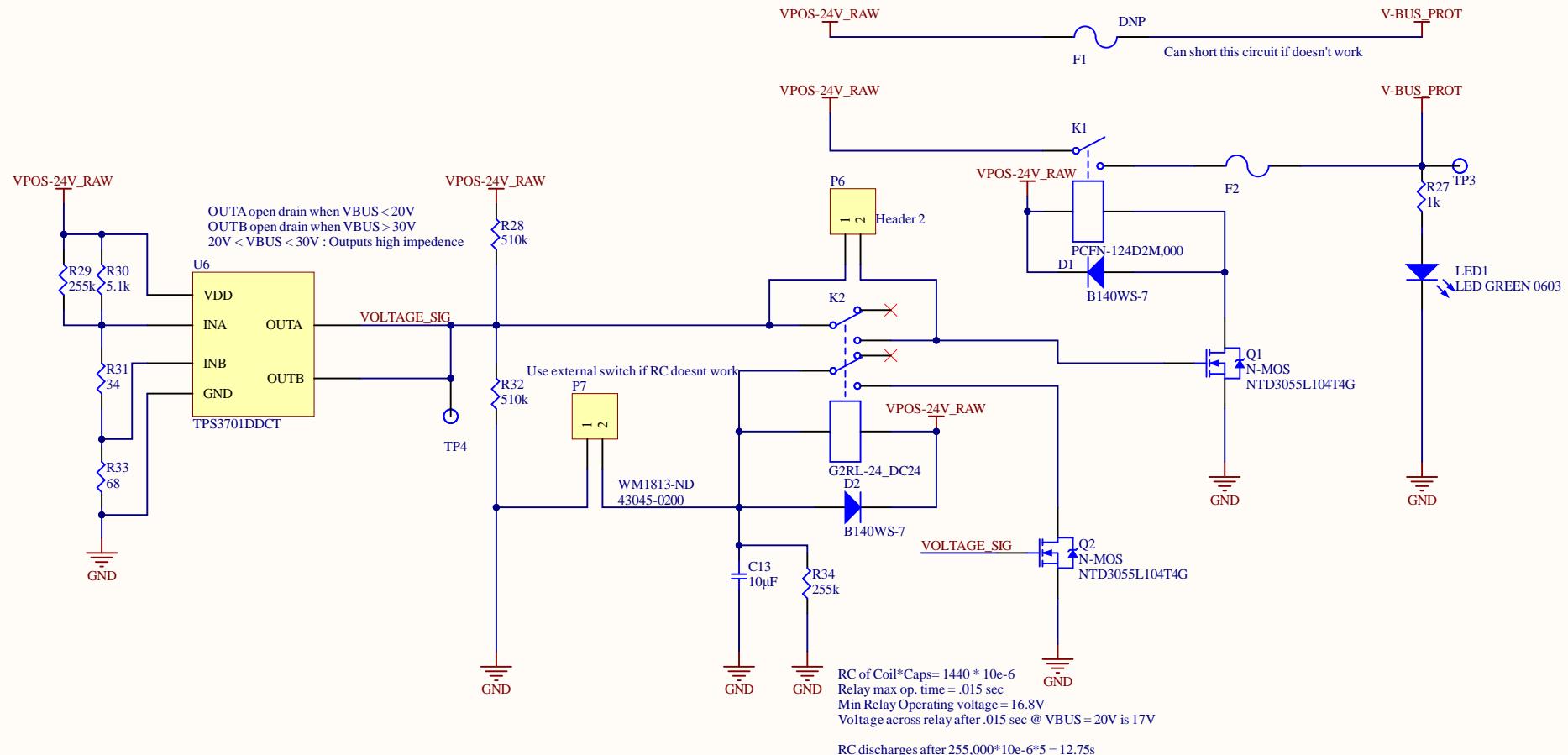
Ambient Pressure Sensor



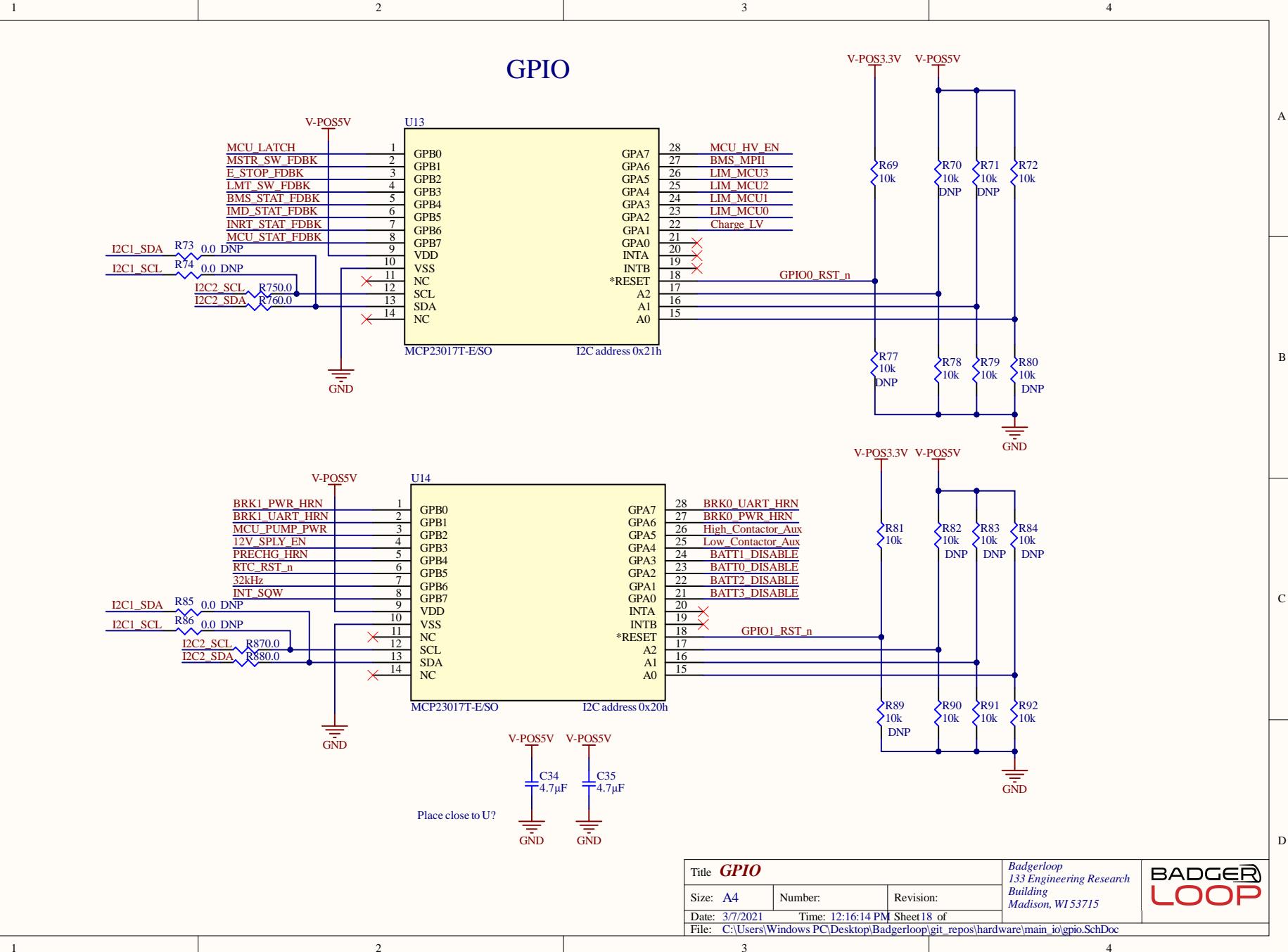
Title: Sensors	Badgerloop 133 Engineering Research Building Madison, WI 53715
Size: A4	Number:
Date: 3/7/2021	Revision:
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\misc_sensors.SchDoc	

**BADGER
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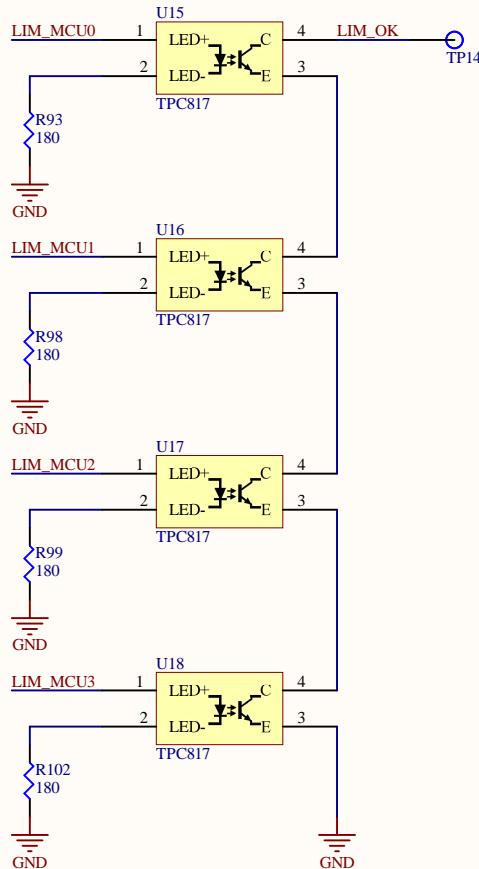
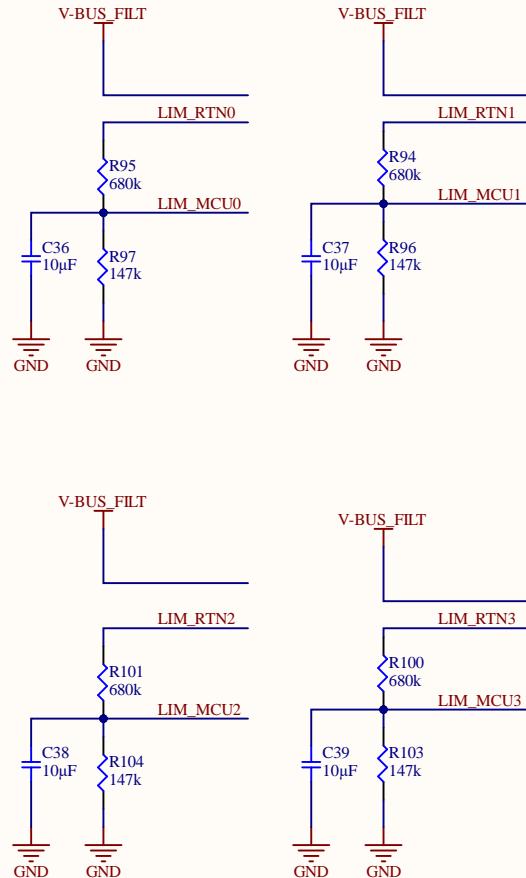
BATTERY PROTECTION



Title: Battery Protection	Badgerloop 133 Engineering Research Building Madison, WI 53715
Size: A4	Number:
Date: 3/7/2021	Revision:
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\batt_protection.SchDoc	Time: 12:16:14 PM Sheet 17 of

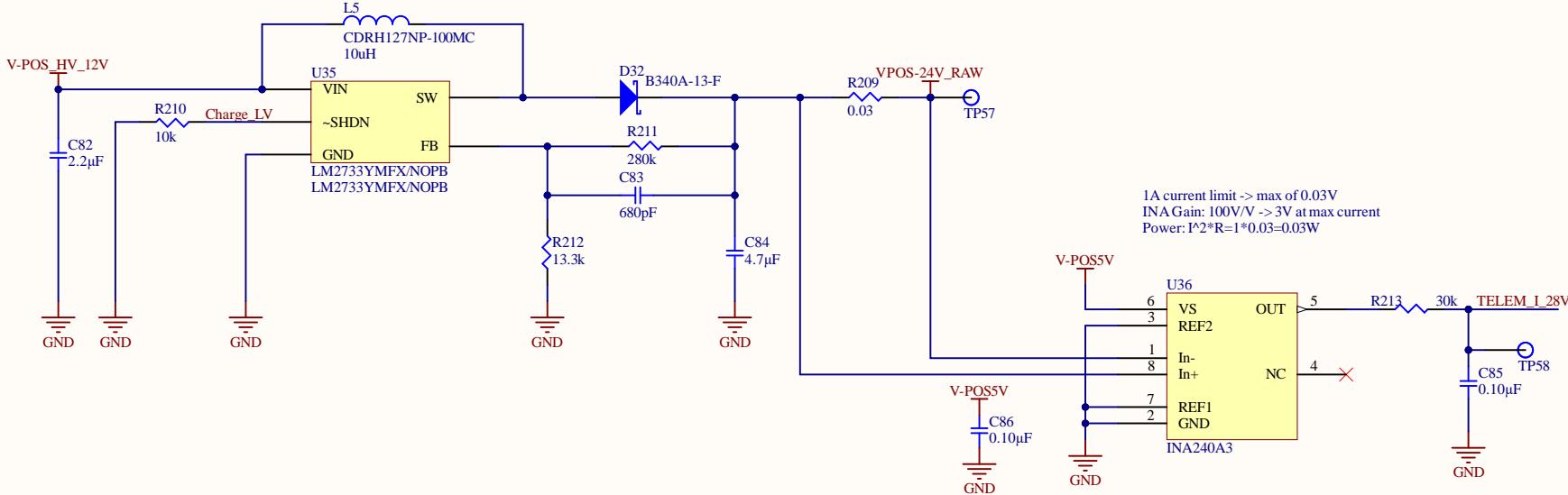


Limit Switch Feedback



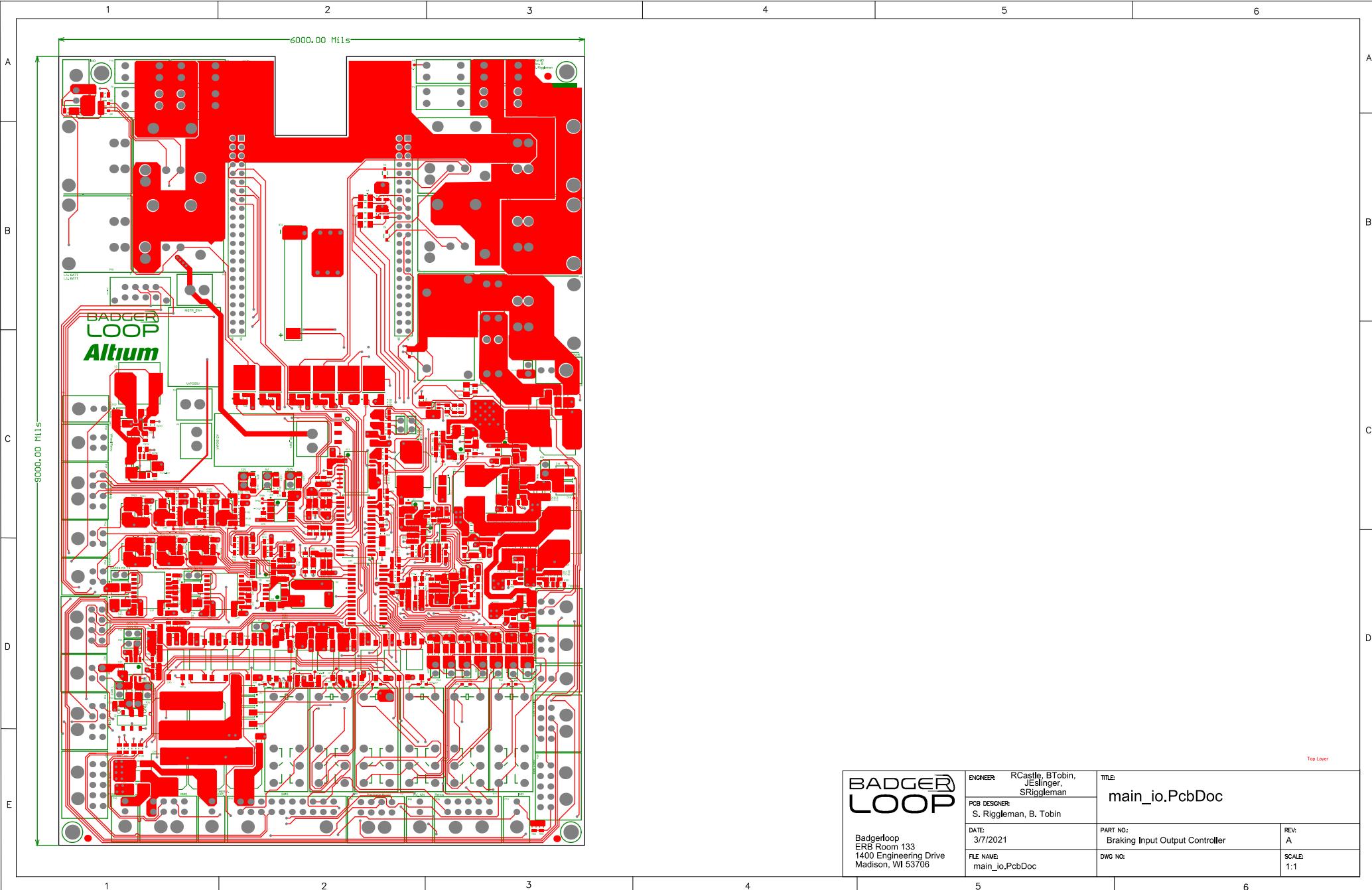
Title: Limit Switches	Badgerloop 133 Engineering Research Building Madison, WI 53715	BADGER LOOP
Size: A4	Number:	Revision:
Date: 3/7/2021	Time: 12:16:14 PM	Sheet 19 of
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\limit_switches.SchDoc		

HV Batt 12V -> 28V



CURRENT TELEM

Title: 28V Boost	Badgerloop
Size: A4	Number:
Date: 3/7/2021	Revision:
Time: 12:16:15 PM	Sheet 20 of
File: C:\Users\Windows PC\Desktop\Badgerloop\git_repos\hardware\main_io\power_28V.SchDoc	



1 2 3 4 5 6

A

A

B

B

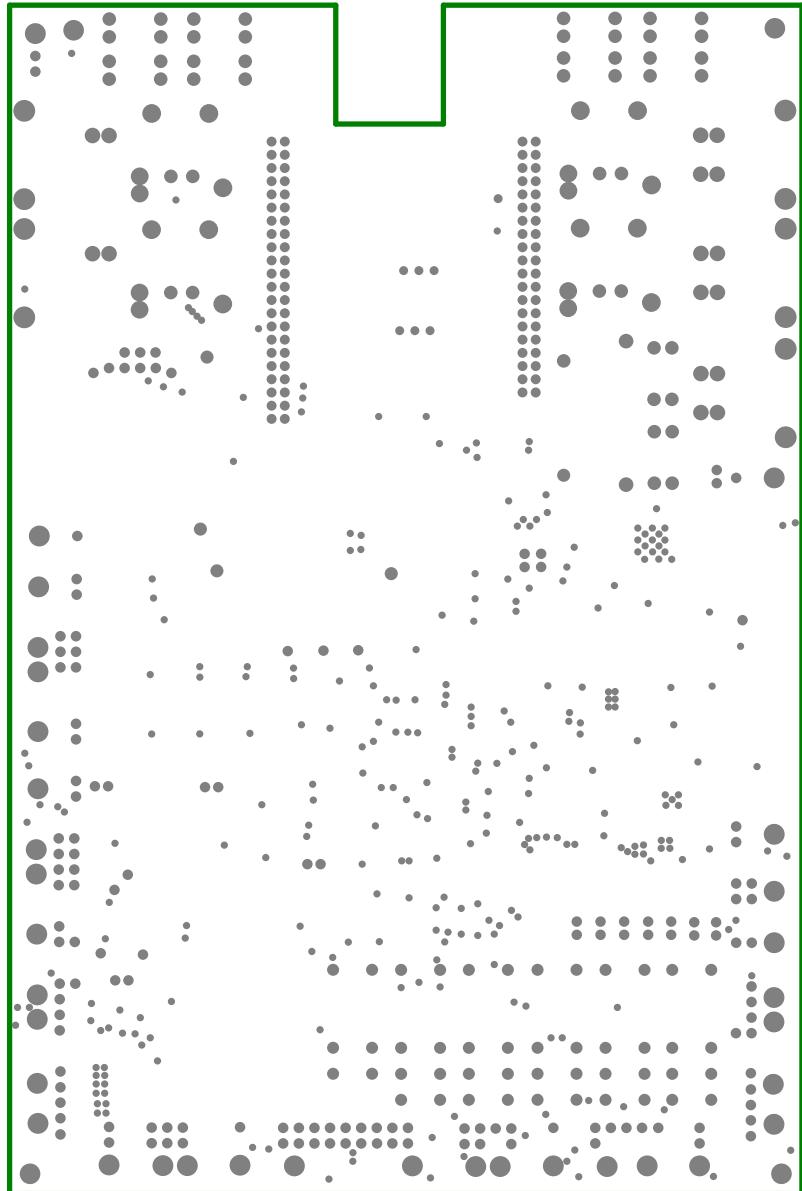
C

C

D

D

E



Badgerloop
ERB Room 133
1400 Engineering Drive
Madison, WI 53706

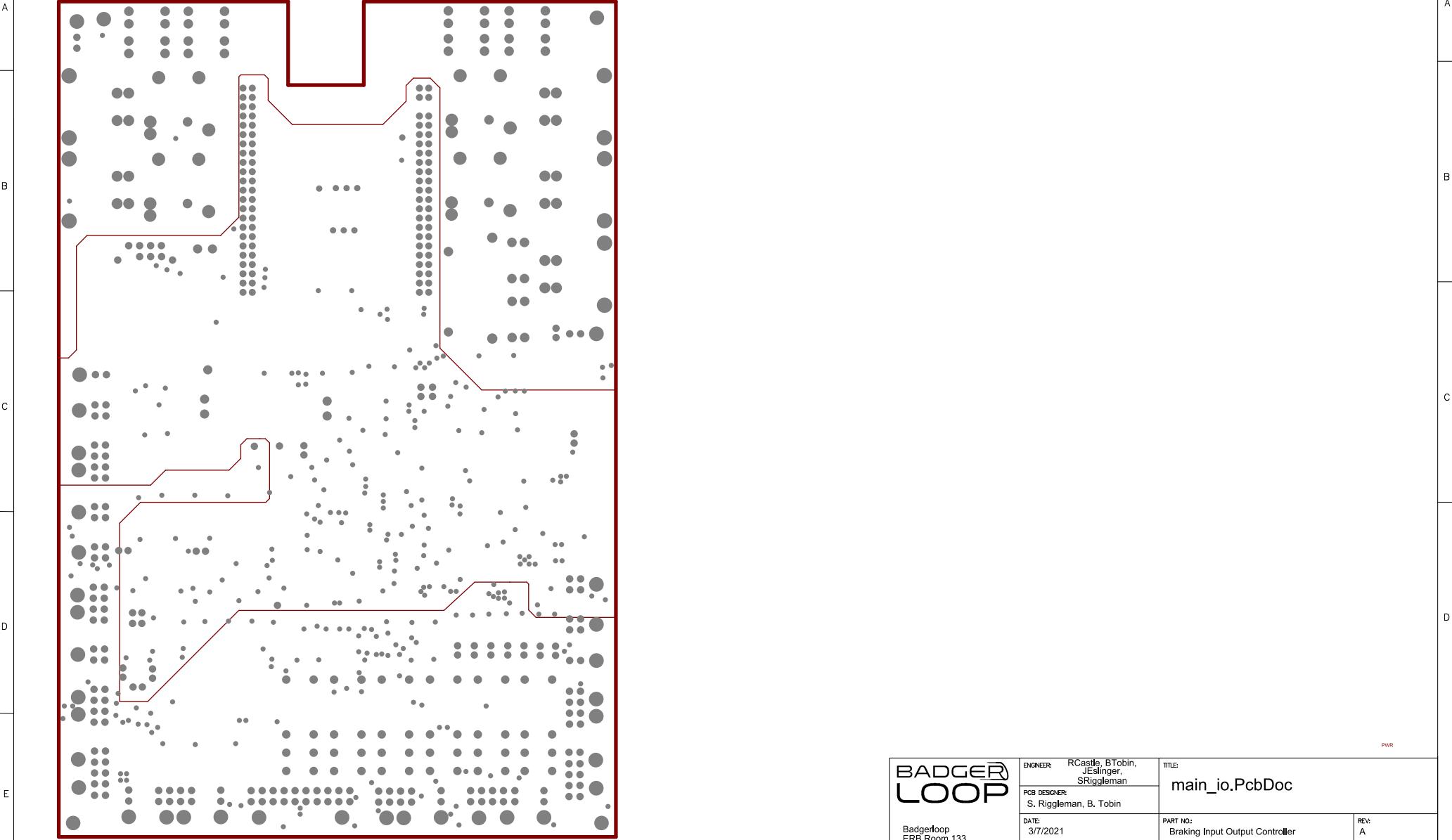
ENGINEER: RCastle, BTobin,
JFessinger,
SRiggleman
PCB DESIGNER:
S. Riggleman, B. Tobin
DATE: 3/7/2021
FILE NAME:
main_io.PcbDoc

NAME: main_io.PcbDoc
PART NO: Braking Input Output Controller
REV: A
DWG NO:
SCALE: 1:1

GND

1 2 3 4 5 6

1 2 3 4 5 6



**BADGER
LOOP**

Badgerloop
ERB Room 133
1400 Engineering Drive
Madison, WI 53706

ENGINEER: RCastle, BTobin,
JFessinger,
SRiggleman

PCB DESIGNER:
S. Riggleman, B. Tobin

DATE: 3/7/2021

FILE NAME:
main_io.PcbDoc

NAME:
main_io.PcbDoc

PART NO:
Braking Input Output Controller

DWG NO:
A

REV:
A

SCALE:
1:1

1 2 3 4 5 6

1 2 3 4 5 6

A

A

B

B

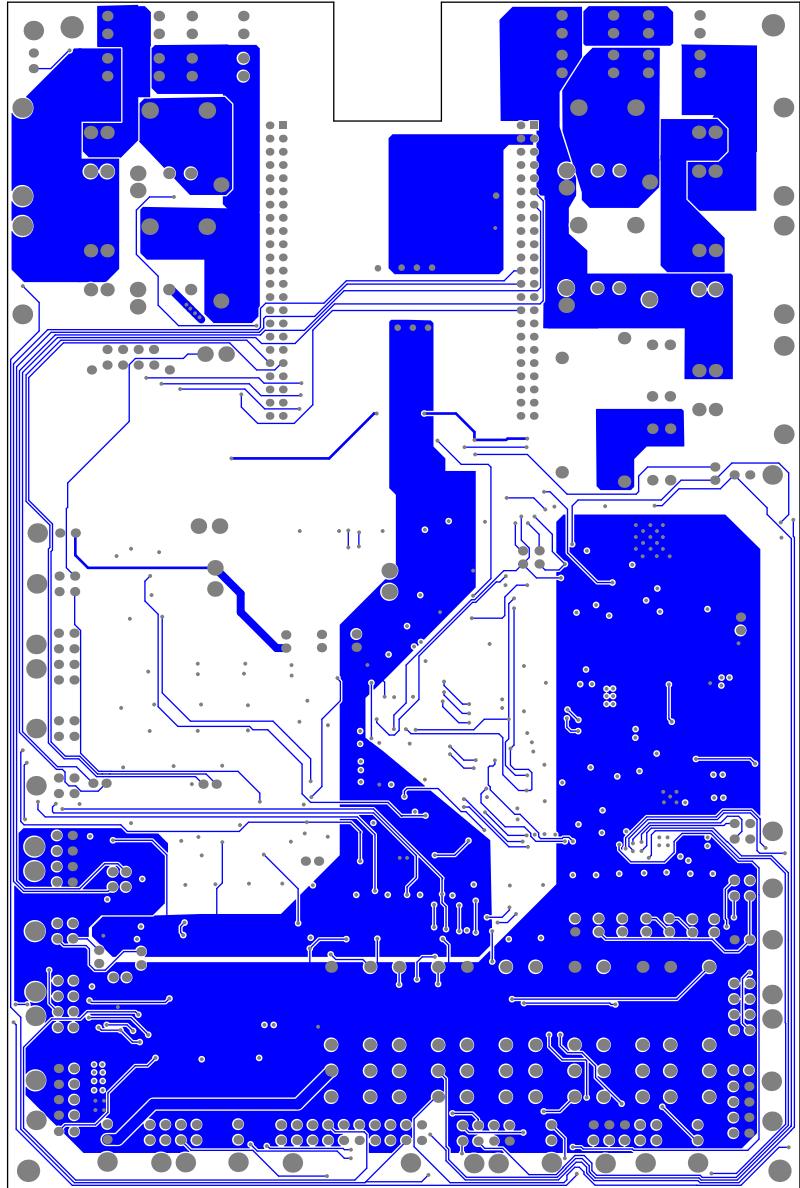
C

C

D

D

E



Bottom Layer



Badgerloop
ERB Room 133
1400 Engineering Drive
Madison, WI 53706

ENGINEER: RCastle, BTobin,
JFleigner,
SRiggleman
PCB DESIGNER:
S. Riggleman, B. Tobin

DATE:
3/7/2021

FILE NAME:
main_io.PcbDoc

NAME:
main_io.PcbDoc

PART NO:
Braking Input Output Controller

DWG NO:
A

REV:
A

SCALE:
1:1

1 2 3 4 5 6

