

A

A

B

B

C

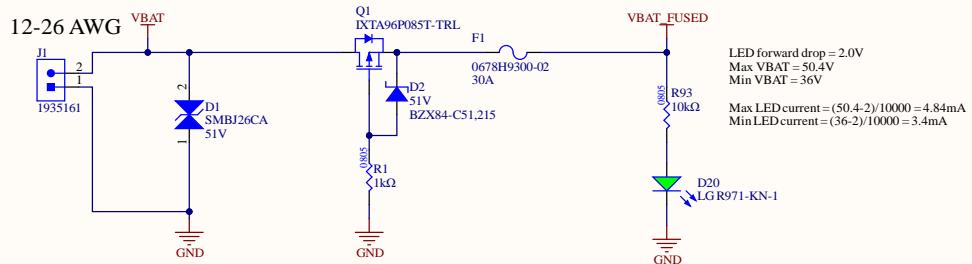
C

D

D

Battery Input (12s1p)

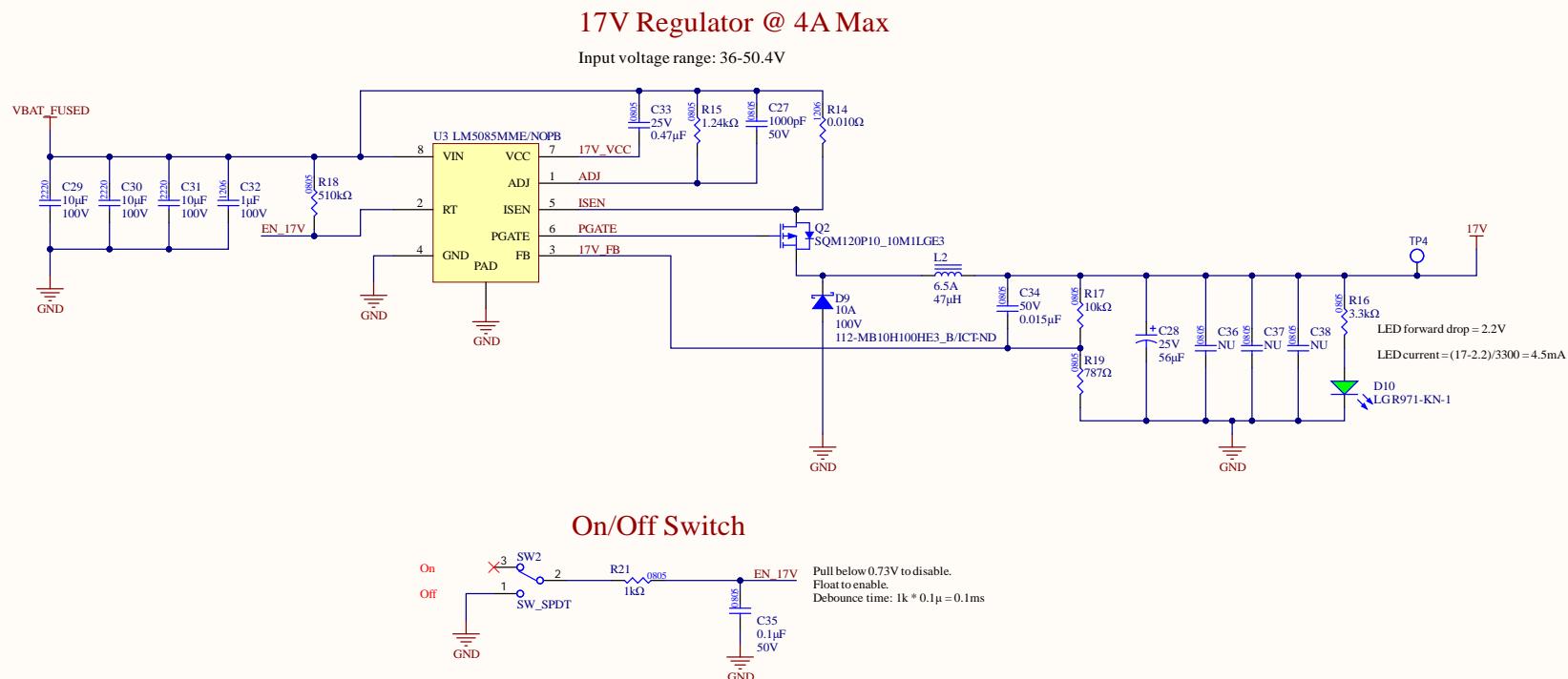
Input voltage range: 36-50.4V

Reverse Polarity Protection

Title: Power	
Project: Power Distribution Board.PnjPcb	
Rev: 3	Reviewer: Cindy Li
	Engineer: Farris Matar

Date: 1/11/2022 | Sheet: 1 of 9

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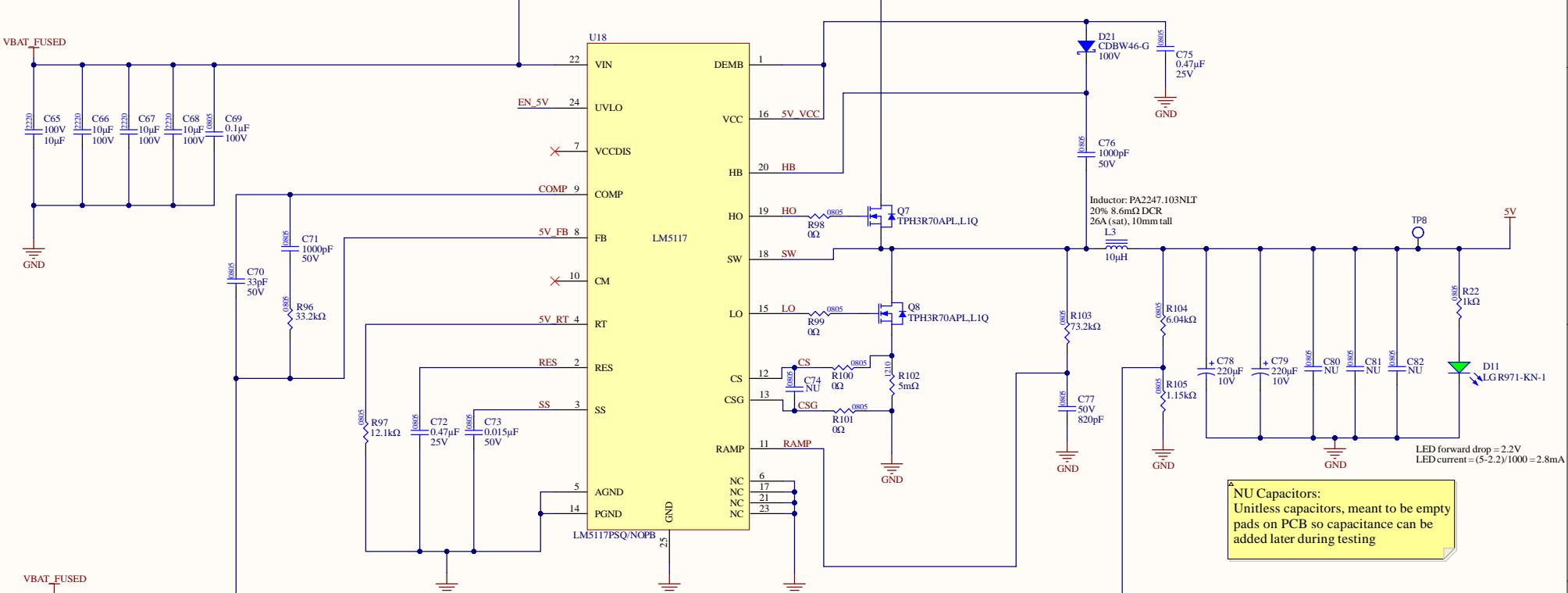


Title: 17V Buck Converter		
Project: Power Distribution Board.PrjPcb		
Rev: 3	Reviewer:	Cindy Li
	Engineer:	Farris Matar
Date: 1/11/2022	Sheet:	2 of 9

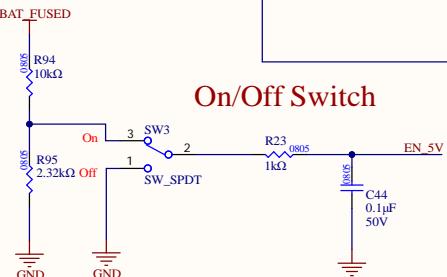
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48-5V Buck Converter @ 10A Max

Input voltage range: 36-50.4V



On/Off Switch



Title: 5V Buck Converter

Project: Power Distribution Board.PjPcb

Rev: 3 Reviewer: Cindy Li

Engineer: Farris Matar

Date: 1/11/2022 Sheet: 3 of 9



A

A

B

B

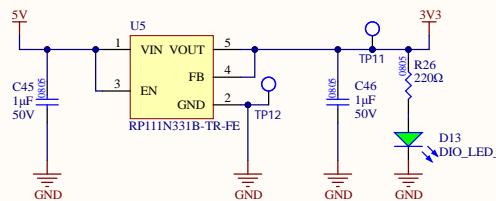
C

C

D

D

3.3V LDO @ 500mA Max



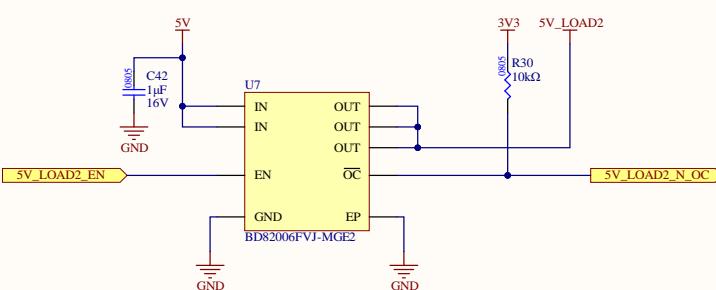
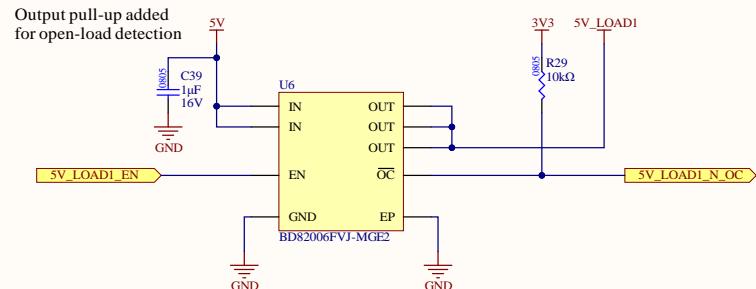
Current Calculations

Green LED voltage drop: 2.2V
 $- I = (3.3 - 2.2V) / 220 = 5mA$

Title: 3.3V Linear Regulator	
Project:	Power Distribution Board.PnjPcb
Rev: 3	Reviewer: Cindy Li
	Engineer: Farris Matar
Date: 1/11/2022	Sheet: 4 of 9



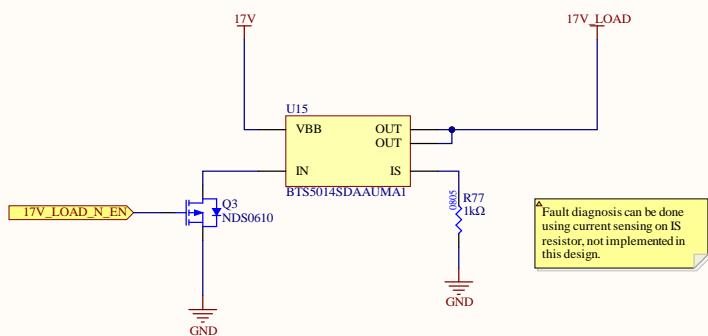
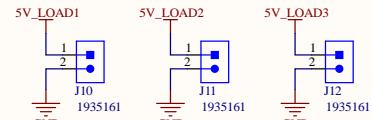
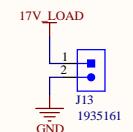
5V Smart High-Side Switches



Title: Load Monitoring I	
Project: Power Distribution Board.PjPcb	
Rev: 3	Reviewer: Cindy Li
Engineer: Farris Matar	Date: 1/11/2022 Sheet: 5 of 9



A

17V Load Smart Switch**5V Outputs****17V Output**

17V power to Nvidia Jetson board

5V power to Science and Gimbal boards (plus two spare)

B

C

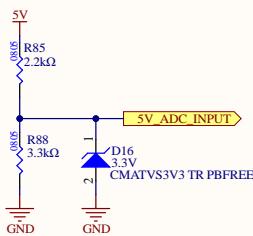
D

A

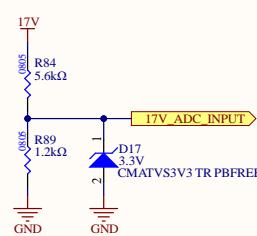
B

C

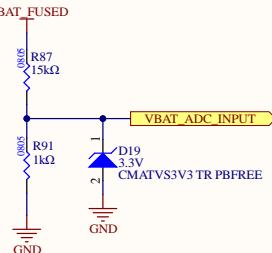
D

Power Rail Voltage Monitoring

Divides 5V to 3V



Divides 17V to 3V



Divides 48V to 3V

Title: Load Monitoring 2

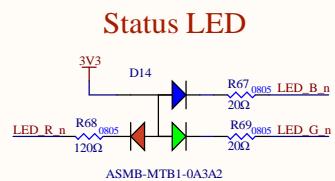
Project: Power Distribution Board.PjPcb

Rev: 3 Reviewer: Cindy Li

Engineer: Farris Matar

Date: 1/11/2022 Sheet: 6 of 9

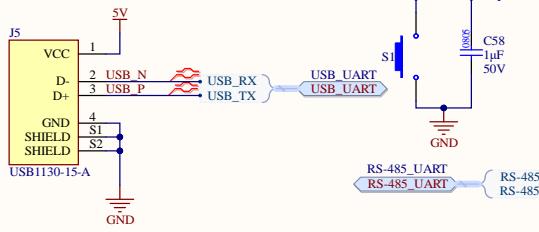
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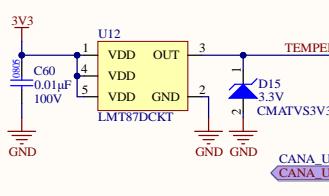
Current Calculations

RGB LED voltage drops:

- Red: 2.1V; $I = (3.3 - 2.1V) / 120 = 10mA$
- Blue: 3.1V; $I = (3.3 - 3.1V) / 20 = 10mA$
- Green: 3.1V; $I = (3.3 - 3.1V) / 20 = 10mA$



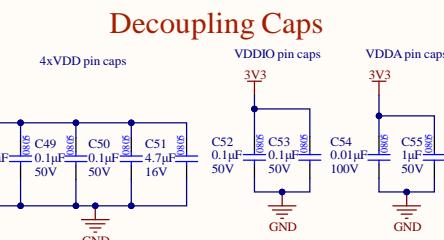
Temperature Sensor



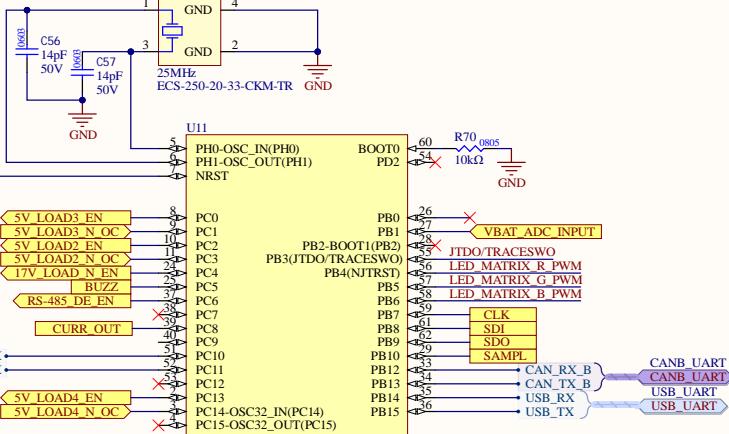
Mounting Holes

MH1 MOUNTING_HOLE_5/32
MH2 MOUNTING_HOLE_5/32
MH3 MOUNTING_HOLE_5/32
MH4 MOUNTING_HOLE_5/32

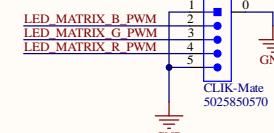
STM32F446RET6



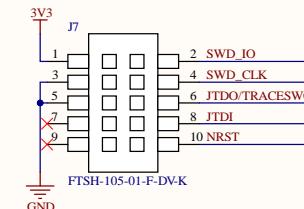
Decoupling Caps



LED Matrix

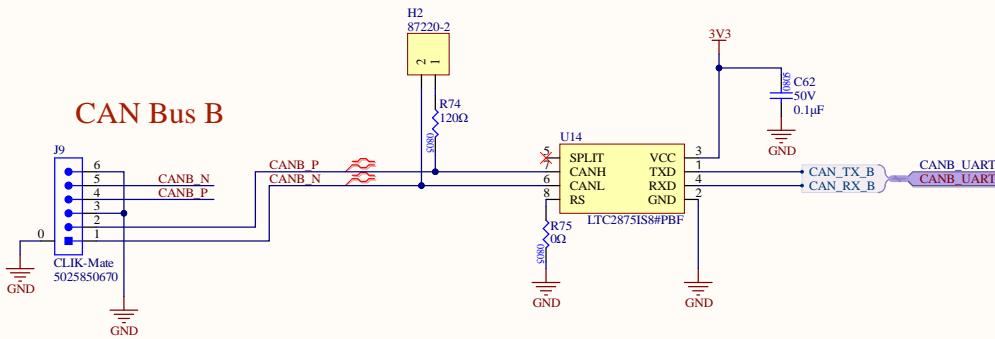
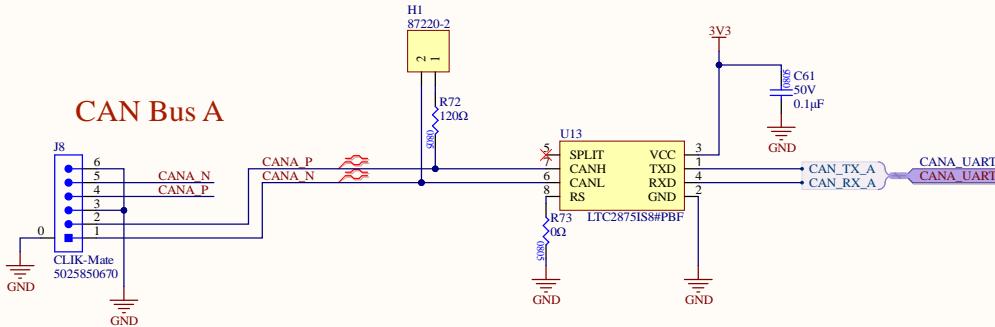


Debug/Programming



Title: Microcontroller	
Project: Power Distribution Board.PrjPcb	
Rev: 3	Reviewer: Cindy Li
	Engineer: Farris Mater
Date: 1/11/2022	Sheet: 7 of 9

CAN Transceivers

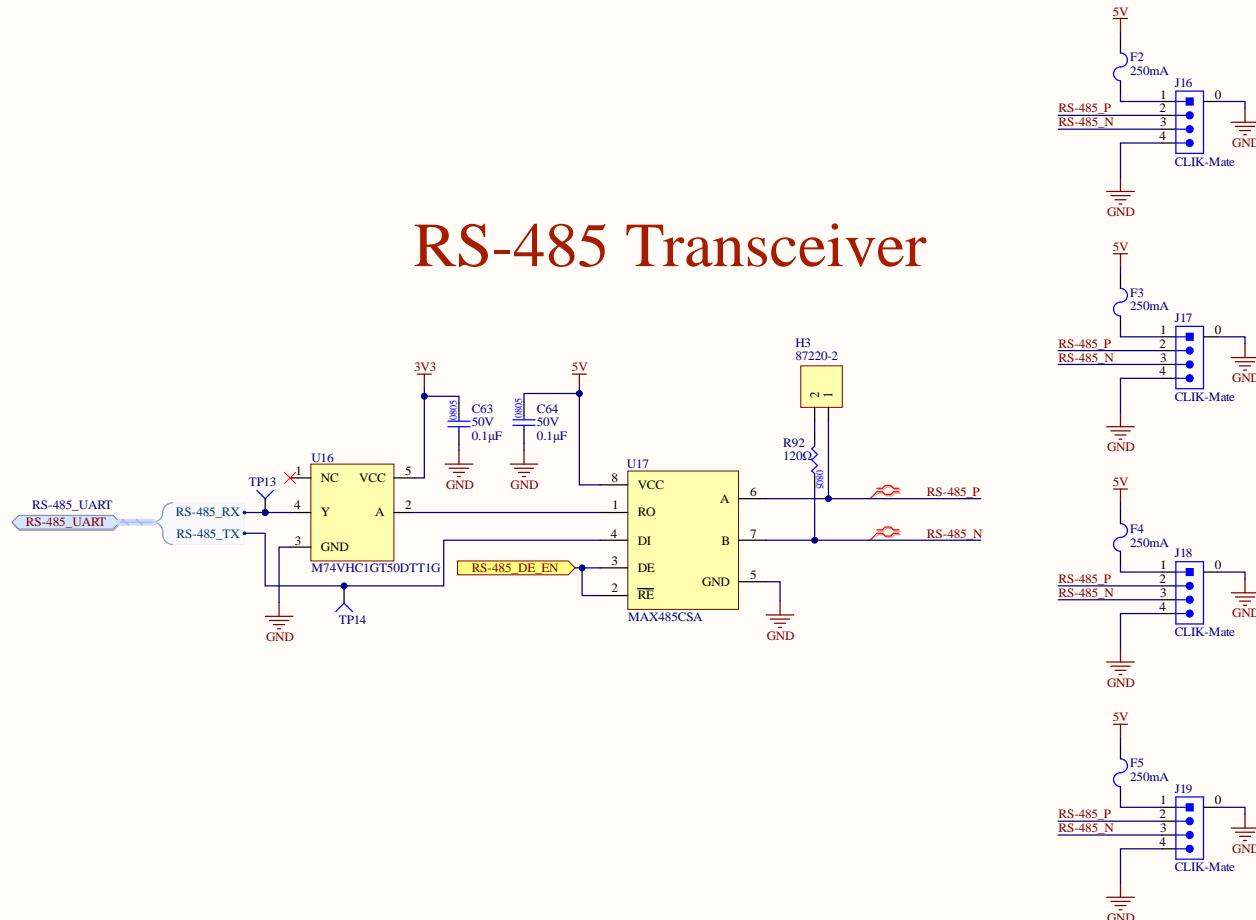


Title: CAN	
Project: Power Distribution Board.PjPcb	
Rev: 3	Reviewer: Cindy Li
Engineer: Farris Matar	Date: 1/11/2022 Sheet: 8 of 9



URM04 Ultrasonic Sensors

RS-485 Transceiver



Title: RS-485

Project: Power Distribution Board.PjPcb

Rev: 3 Reviewer: Cindy Li

Engineer: Farris Matar

Date: 1/1/2022 Sheet: 9 of 9



BMS

A

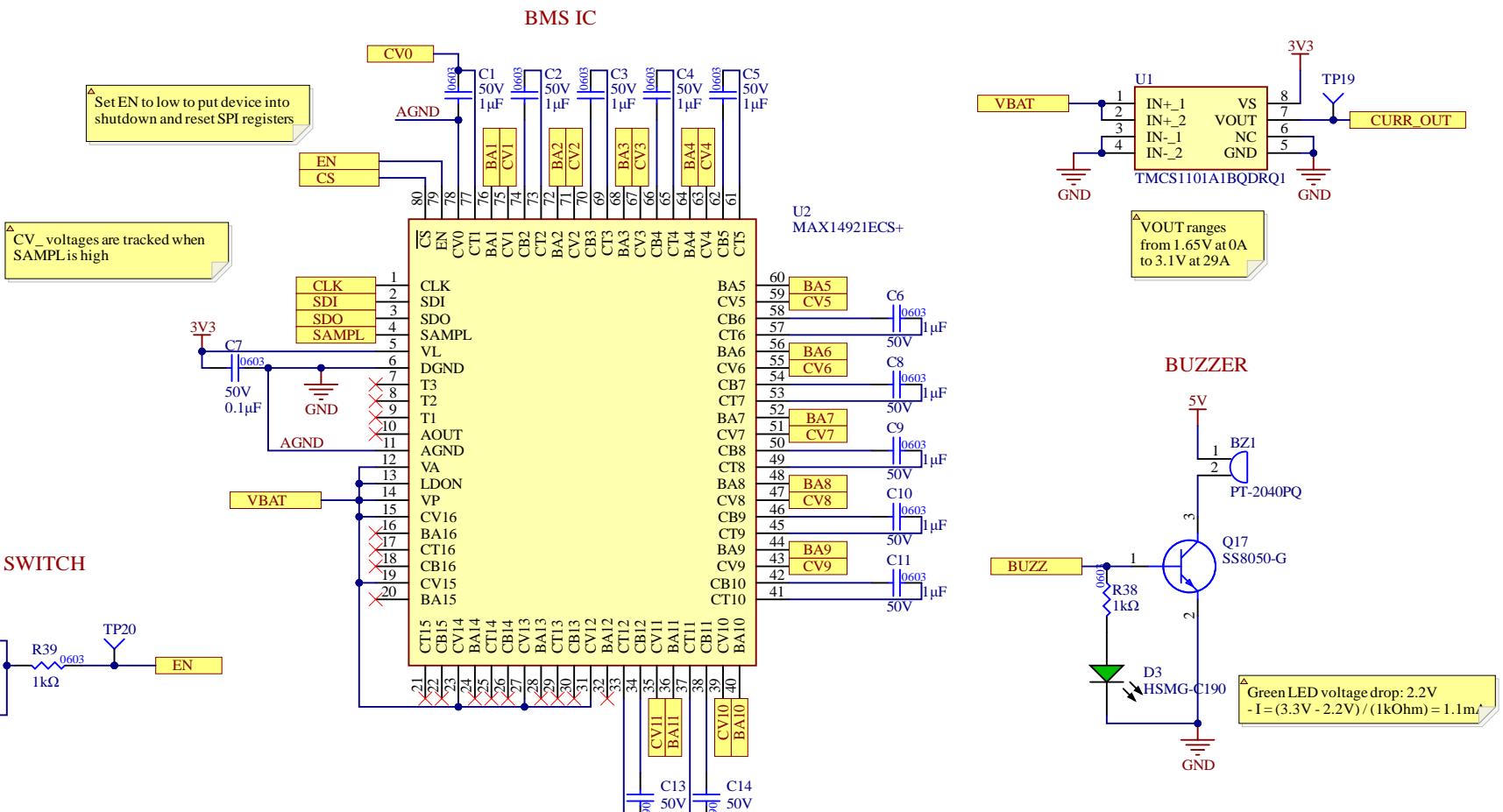
B

C

A

B

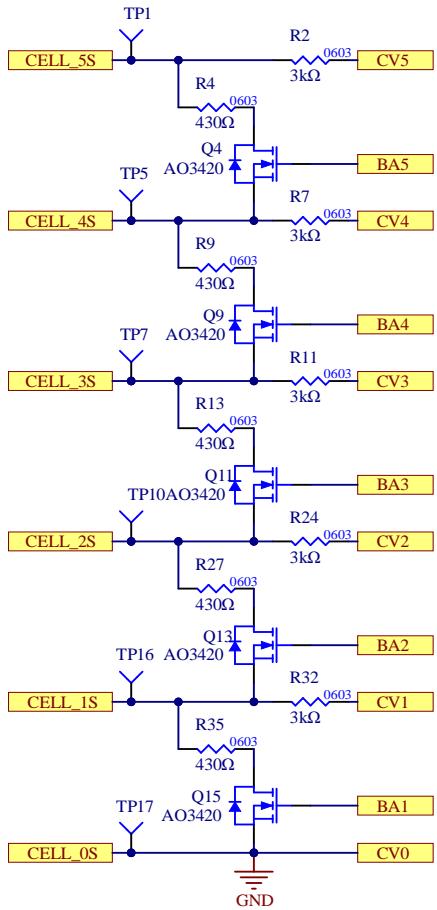
C



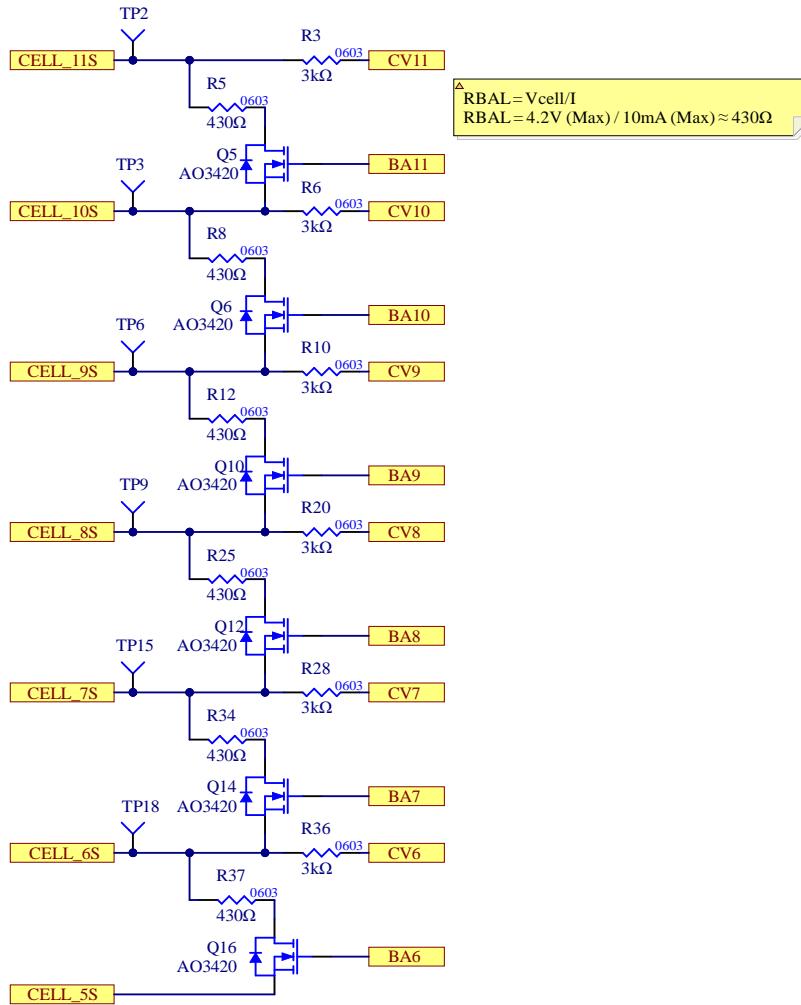
UW ROBOTICS TEAM University of Waterloo Robotics Team 200 University Ave W Waterloo, Ontario, Canada N2L 3G1		REV *
PROJECT Power Distribution Board.Prbcb, [No Variations]		
DOCUMENT SH10 - BMS.SchDoc		MODIFIED 12/23/2021
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		SHEET * OF *

Active Cell Balancing Circuit

A



B



C



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200 University Ave W
Waterloo, Ontario, Canada
N2L 3G1

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*

PROJECT
Power Distribution Board.PjrPcb, [No Variations]

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SH11 - Battery Balancing.SchDoc

ENGINEER

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REVIEWER

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