

A

A

B

B

C

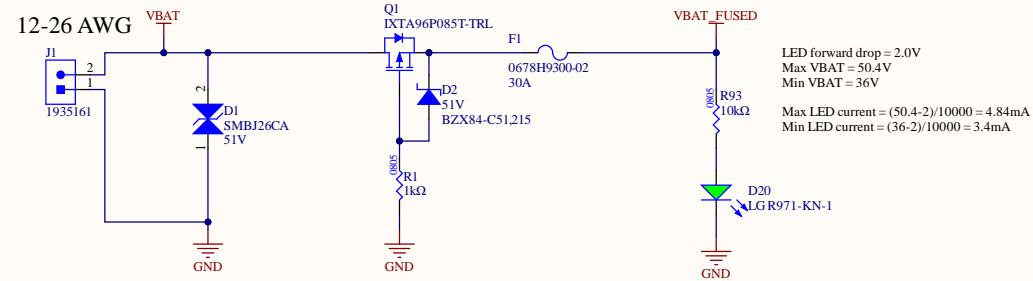
C

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: 2022-01-16

Sheet: 1 of 9

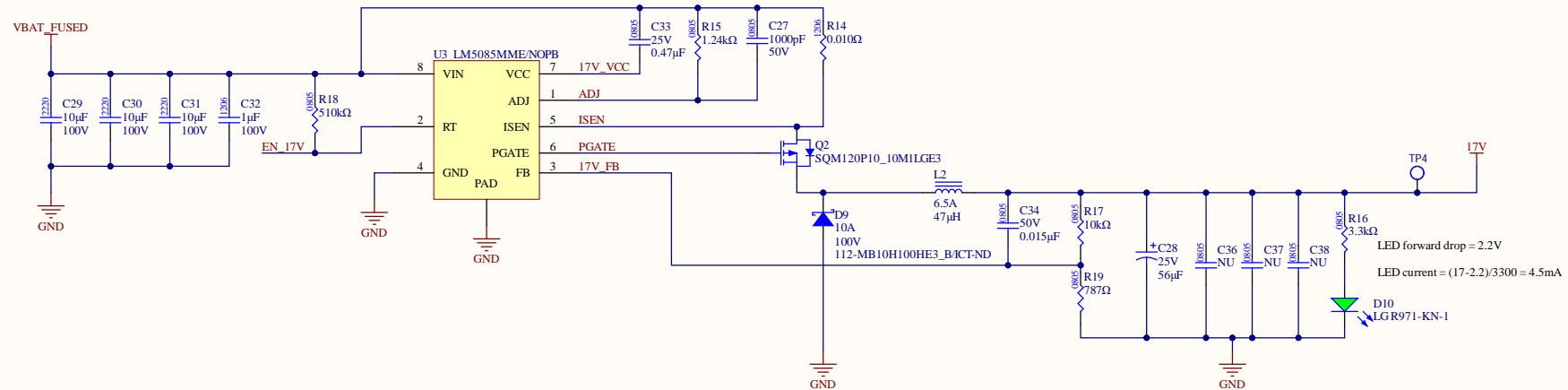


A

A

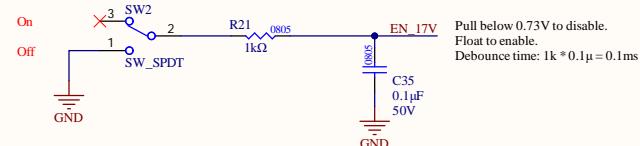
**17V Regulator @ 4A Max**

Input voltage range: 36-50.4V



C

C

**On/Off Switch**

D

D

Title: 17V Buck Converter

Project: Power Distribution Board.PjPrPcb

Rev: 3 Reviewer: Cindy Li

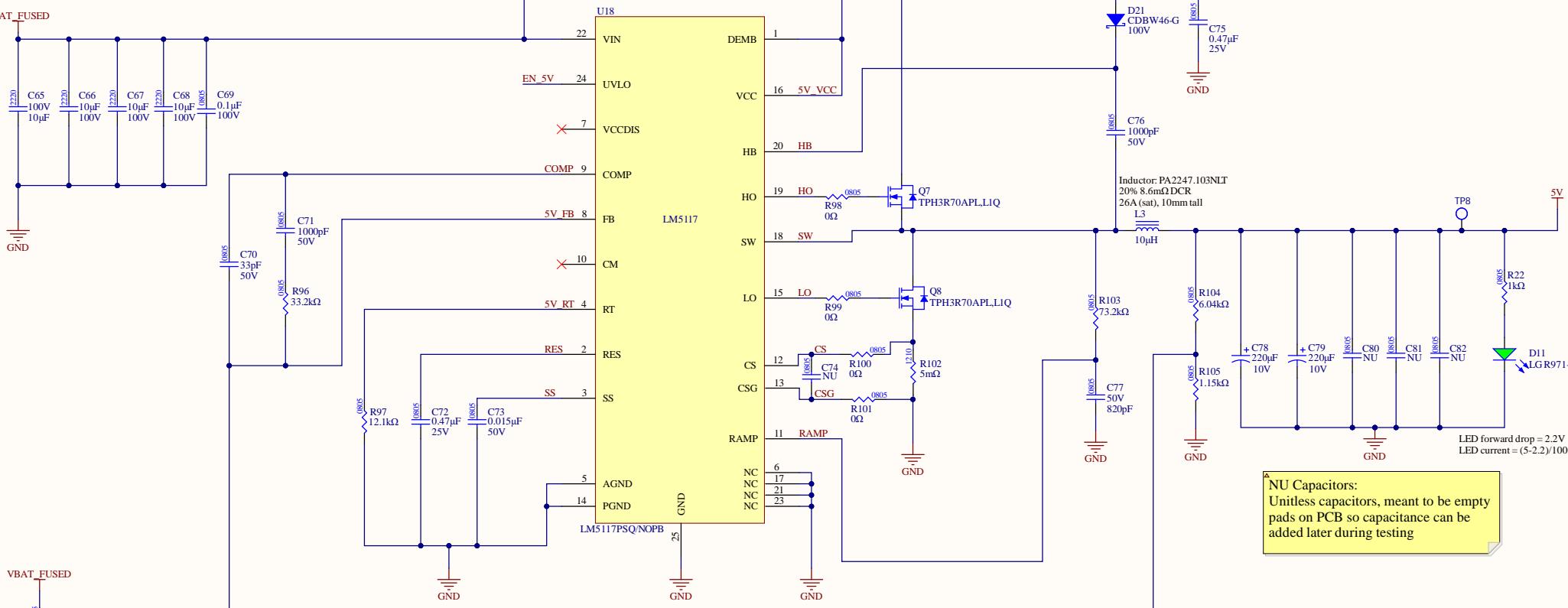
Engineer: Farris Matar

Date: 2022-01-16 Sheet: 2 of 9



## 48-5V Buck Converter @ 10A Max

Input voltage range: 36-50.4V



A

A

B

B

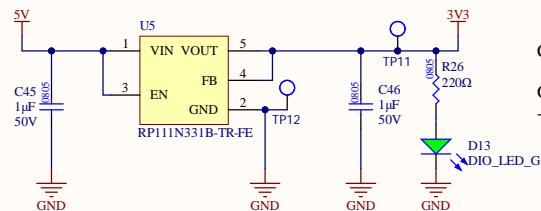
C

C

D

D

### 3.3V LDO @ 500mA Max



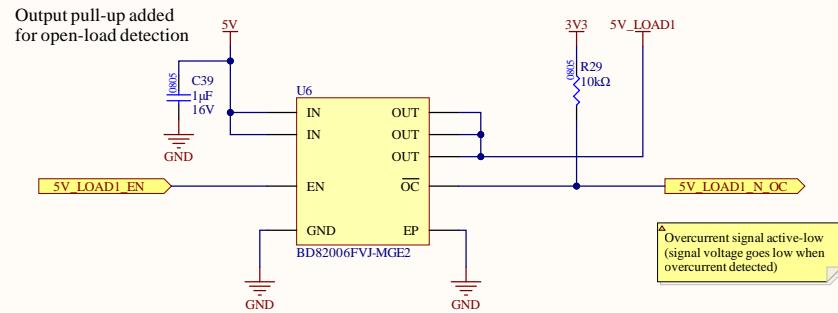
#### Current Calculations

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

Title: 3.3V Linear Regulator	
Project: Power Distribution Board.PrjPcb	
Rev: 3	Reviewer: Cindy Li
Engineer: Farris Matar	
Date: 2022-01-16	Sheet: 4 of 9



# 5V Smart High-Side Switches

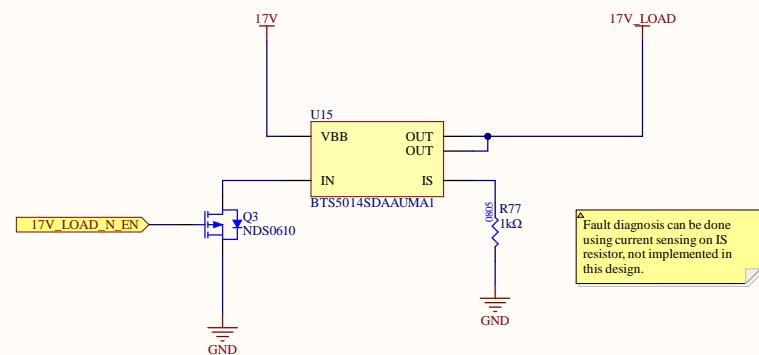


Link to datasheet: [https://fscdn.rohm.com/en/products/databook/datasheet/ic/power/power\\_switch/bd82006fvj-m-e.pdf?src=supplier=Digi-Key](https://fscdn.rohm.com/en/products/databook/datasheet/ic/power/power_switch/bd82006fvj-m-e.pdf?src=supplier=Digi-Key)

Title: Load Monitoring I	
Project: Power Distribution Board.PrjPcb	
Rev: 3	Reviewer: Cindy Li
Engineer: Farris Matar	
Date: 2022-01-16	Sheet: 5 of 9

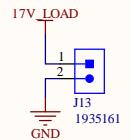
A

## 17V Load Smart Switch



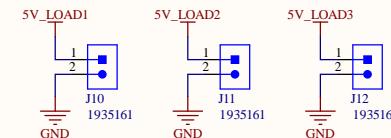
[Link to datasheet: https://datasheet.octopart.com/BTS5014SDAAUMA1-Infineon-datasheet-11768157.pdf](https://datasheet.octopart.com/BTS5014SDAAUMA1-Infineon-datasheet-11768157.pdf)

## 17V Output



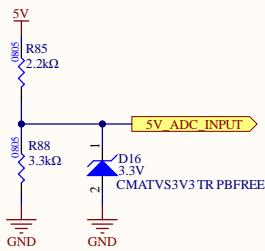
17V power to Nvidia  
Jetson board

## 5V Outputs

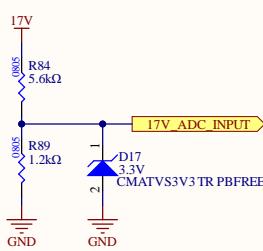


5V power to Science and Gimbal boards  
(plus two spare)

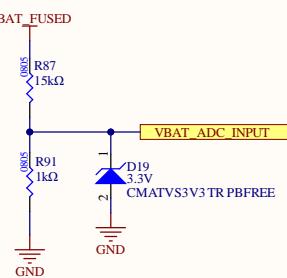
## Power Rail Voltage Monitoring



Divides 5V to 3V



Divides 17V to 3V



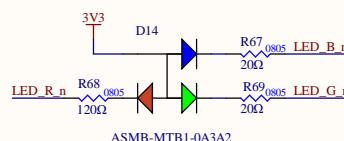
Divides 48V to 3V

5

Title:	Load Monitoring 2
Project:	Power Distribution Board.PjrPcb
Rev:	3
Reviewer:	Cindy Li
Engineer:	Farris Matar
Date:	2022-01-16
Sheet:	6 of 9



## Status LED

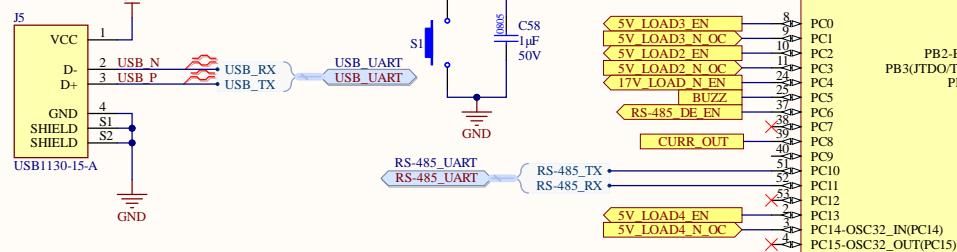


### Current Calculations

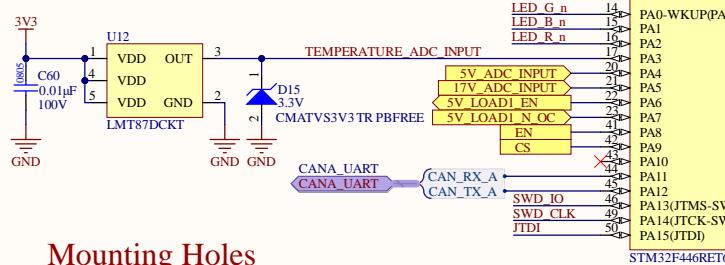
RGB LED voltage drops:  
 - Red:  $2.1V$ :  $I = (3.3-2.1V)/120 = 10mA$   
 - Blue:  $3.1V$ :  $I = (3.3-3.1V)/20 = 10mA$   
 - Green:  $3.1V$ :  $I = (3.3-3.1V)/20 = 10mA$

## STM32F446RET6

## USB Connector



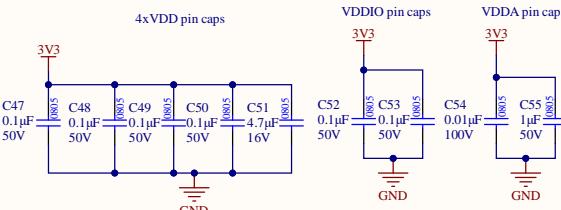
## Temperature Sensor



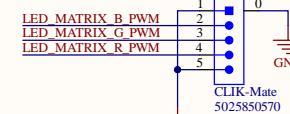
## Mounting Holes

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

## Decoupling Caps

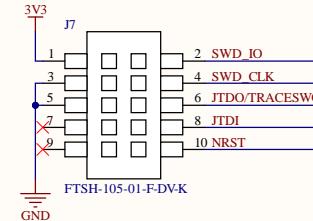


## LED Matrix



LCSC Part #: C69336

## Debug/Programming



Title: Microcontroller

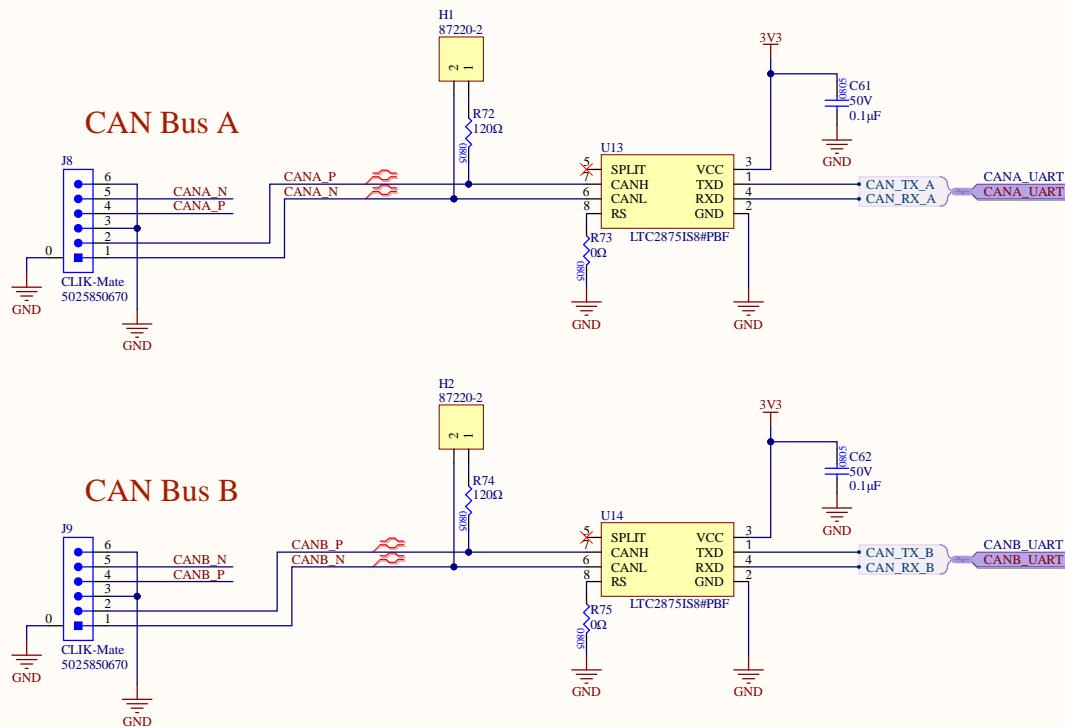
Project: Power Distribution Board.PrbPcb

Rev: 3 Reviewer: Cindy Li

Engineer: Farris Matar

Date: 2022-01-16 Sheet: 7 of 9

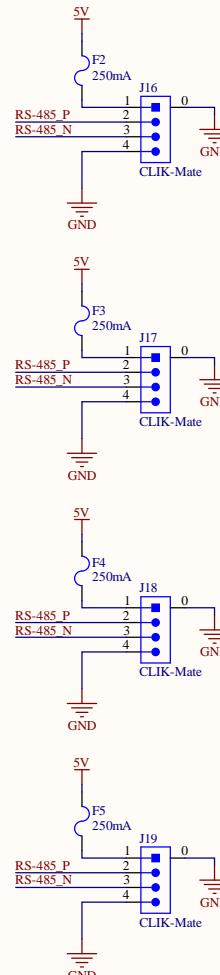
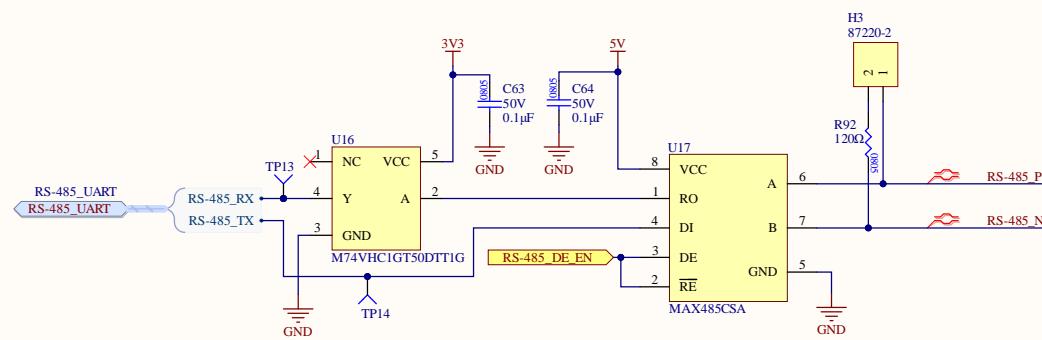
# CAN Transceivers



Title: CAN	
Project: Power Distribution Board.PjPcb	
Rev: 3	Reviewer: Cindy Li
Engineer: Farris Matar	
Date: 2022-01-16	Sheet: 8 of 9

## URM04 Ultrasonic Sensors

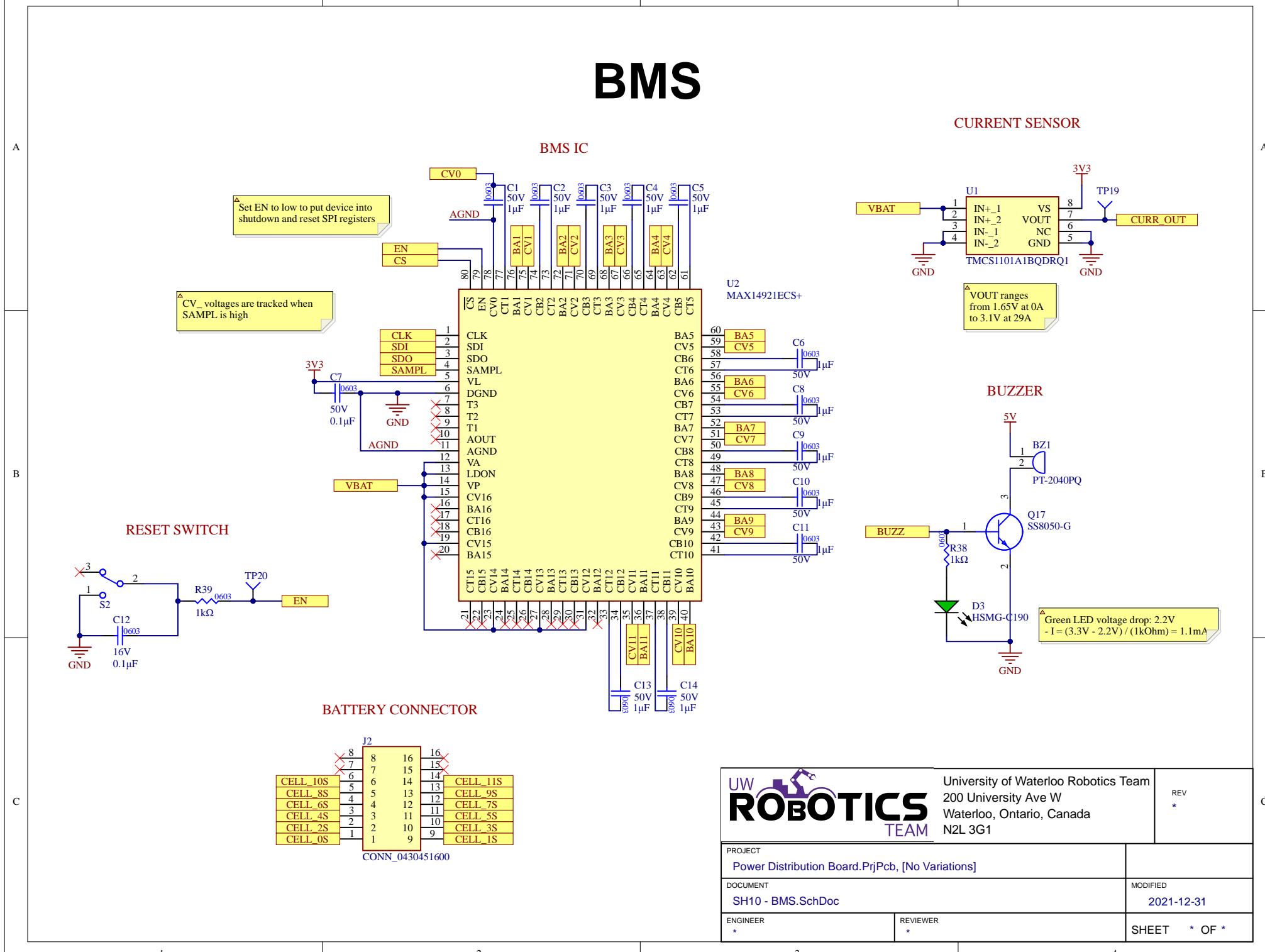
# RS-485 Transceiver



Title:	RS-485
Project: Power Distribution Board.PrjPcb	
Rev: 3	Reviewer: Cindy Li
	Engineer: Farris Matar
Date: 2022-01-16	Sheet: 9 of 9

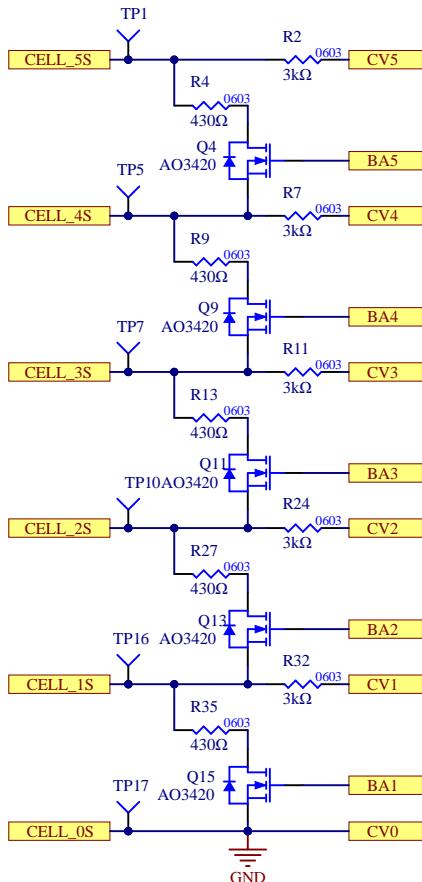


# BMS



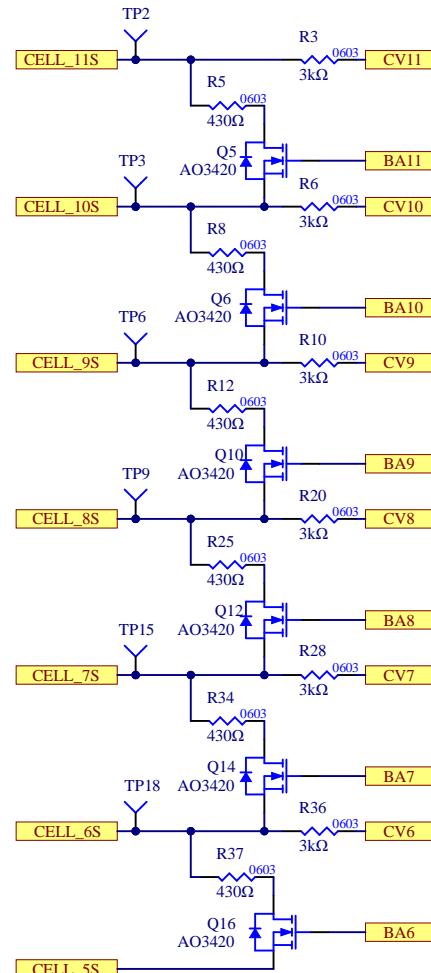
# Active Cell Balancing Circuit

A



A

B



B

C



University of Waterloo Robotics Team  
200 University Ave W  
Waterloo, Ontario, Canada  
N2L 3G1

REV  
\*

PROJECT

Power Distribution Board.PrjPcb, [No Variations]

DOCUMENT

SH11 - Battery Balancing.SchDoc

MODIFIED

2021-12-31

ENGINEER

\*

REVIEWER

\*

SHEET \* OF \*