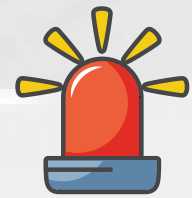
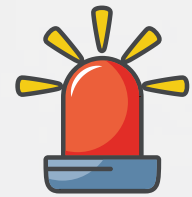


Primary Objectives

Design a LED Controller Board



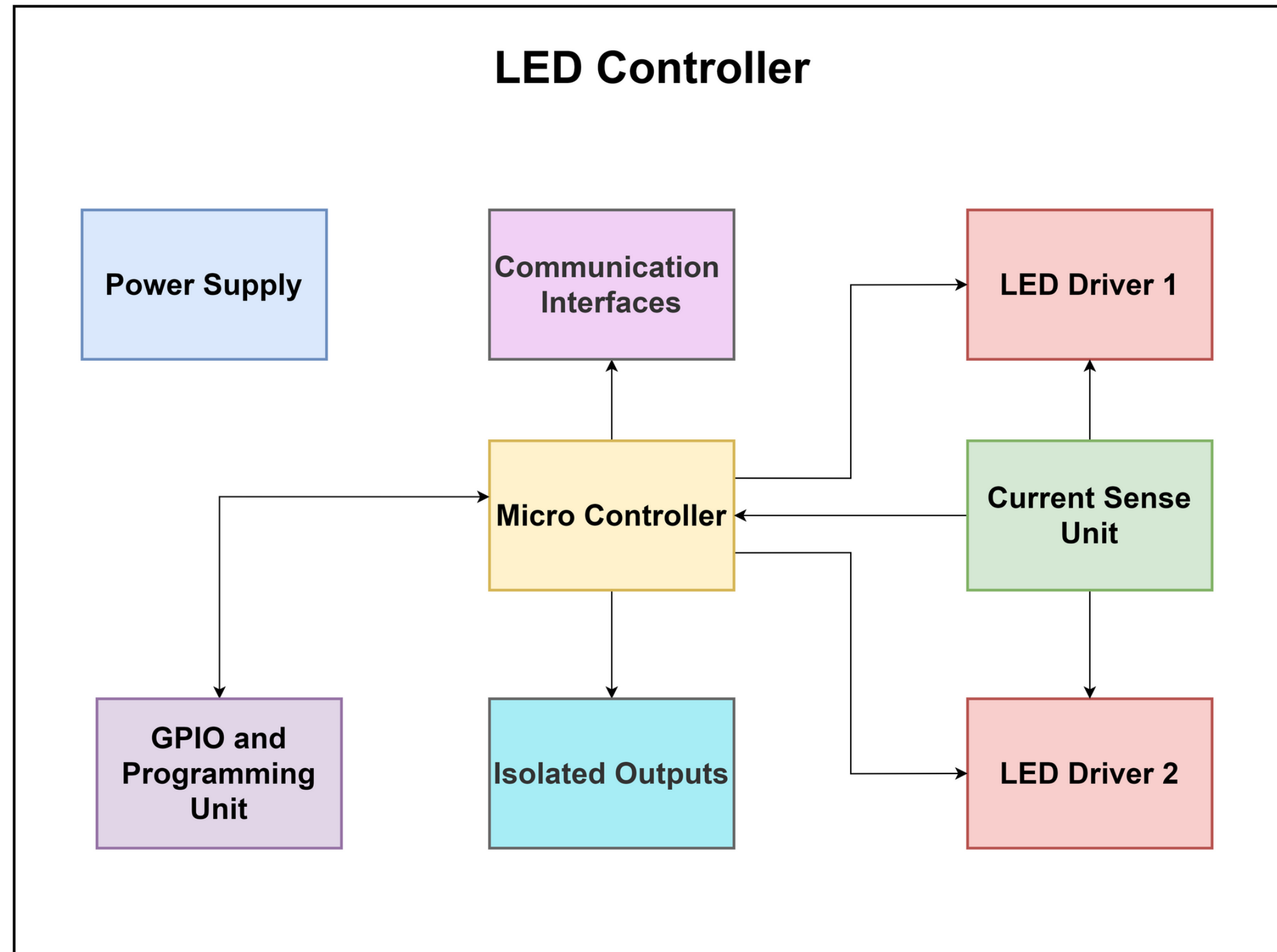
Drive LED strips



Provide brightness control from user input

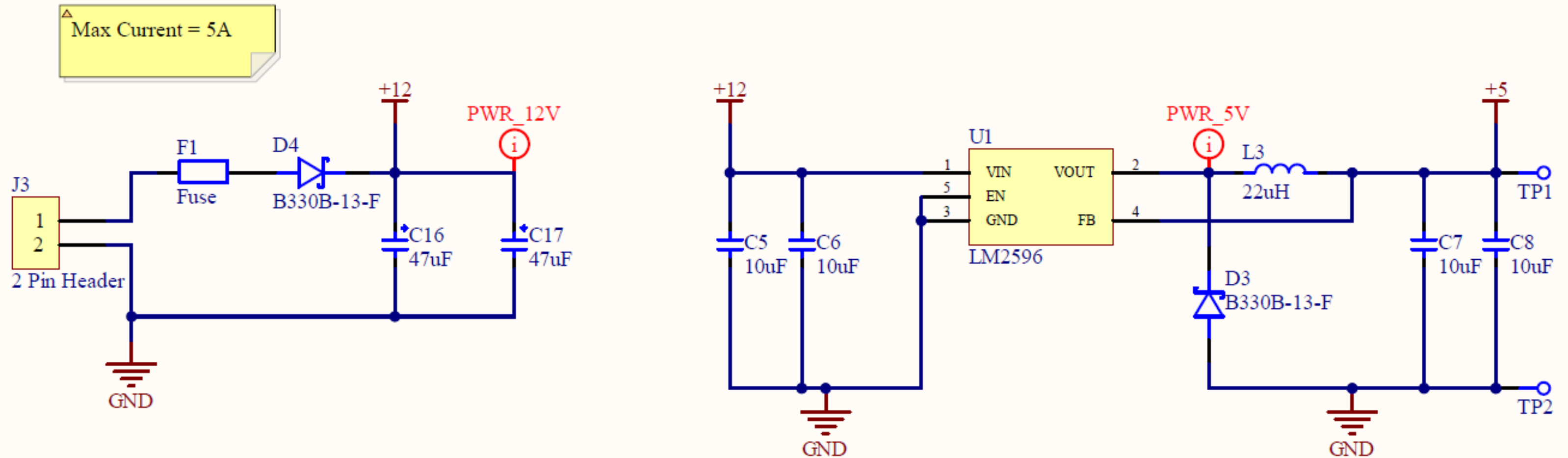
Design LED Strips

Block Diagram of LED Controller



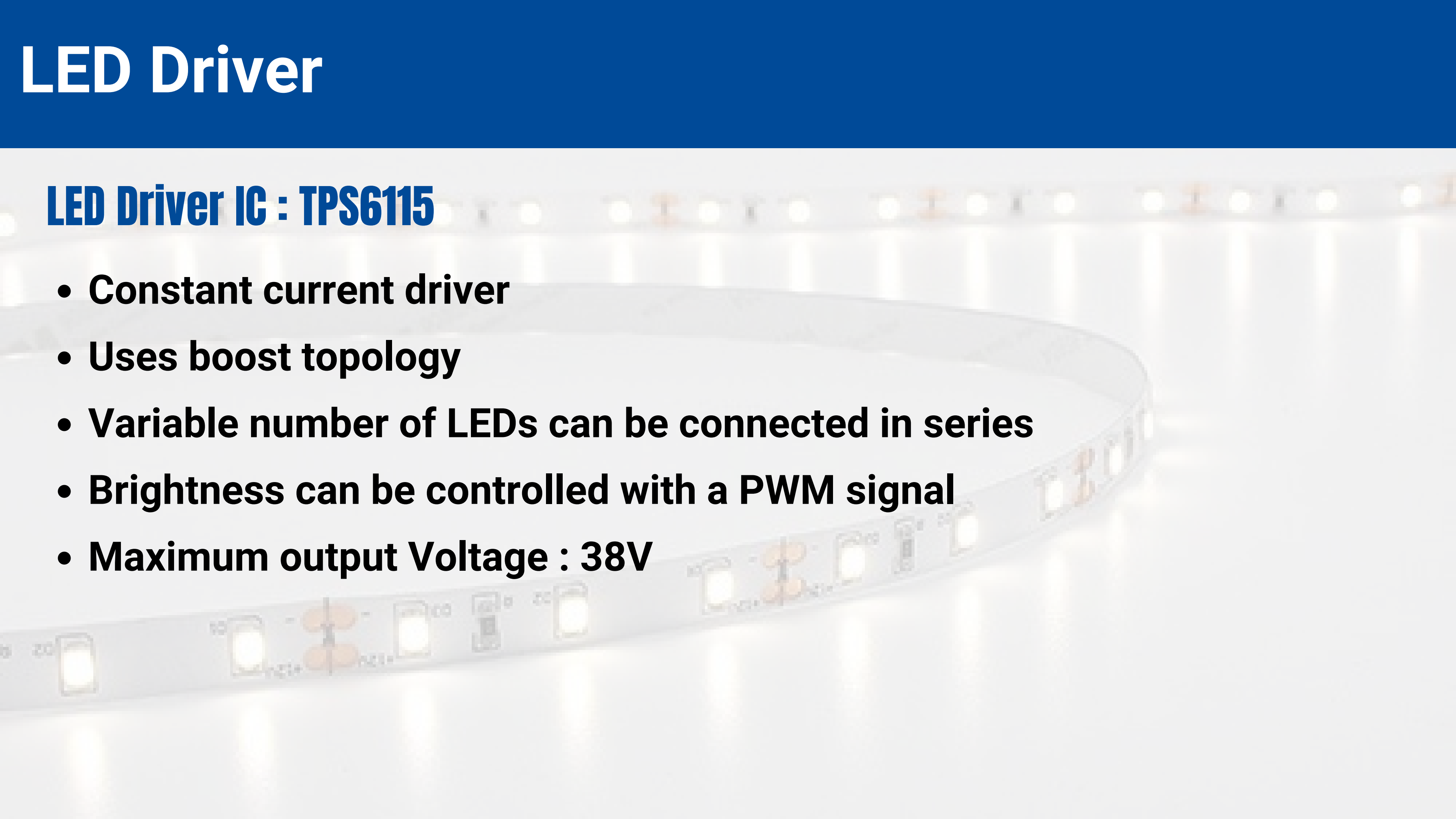
Power Supply Unit - Schematic

Power Supply

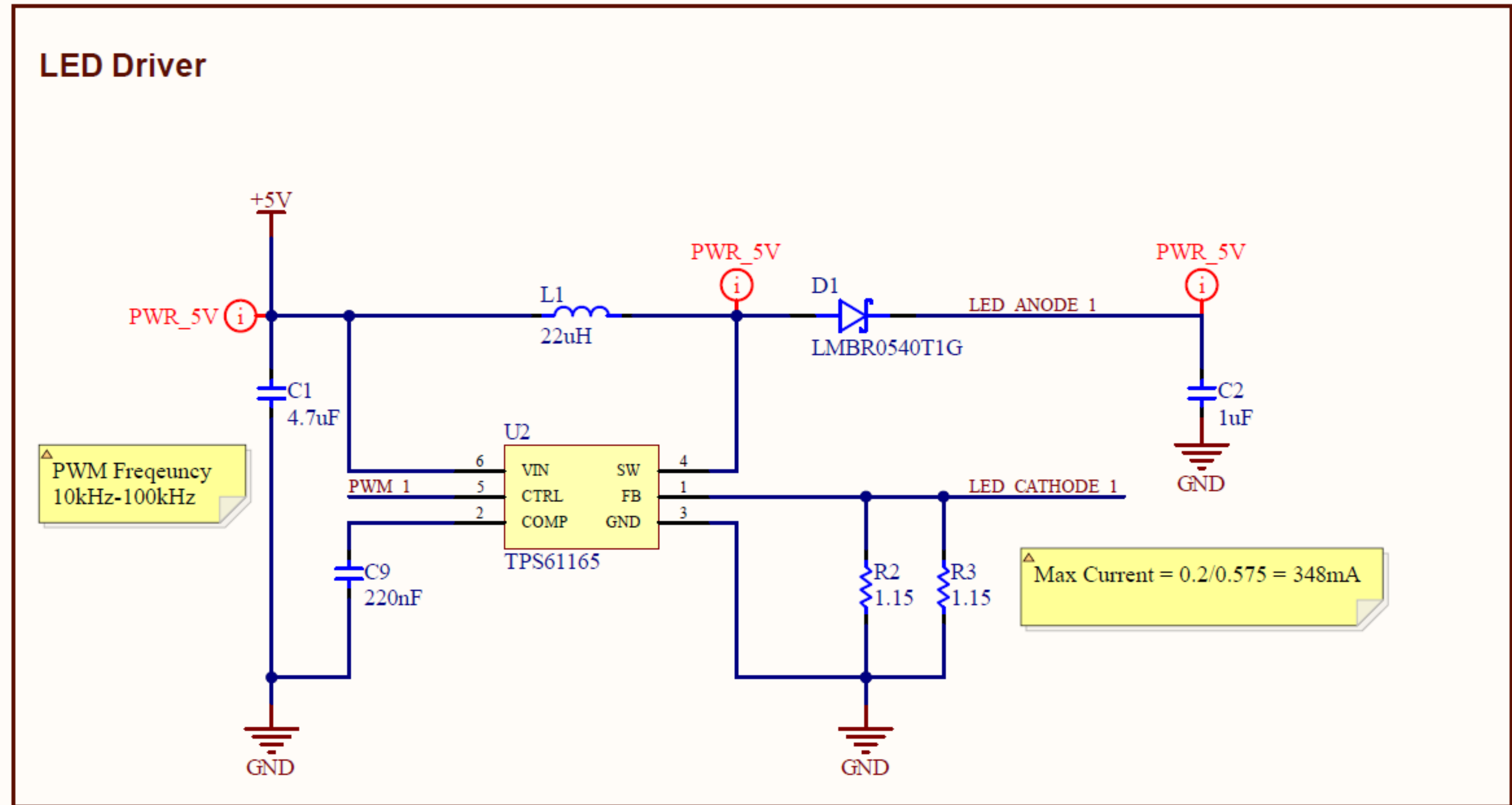


LED Driver

LED Driver IC : TPS6115

- **Constant current driver**
 - **Uses boost topology**
 - **Variable number of LEDs can be connected in series**
 - **Brightness can be controlled with a PWM signal**
 - **Maximum output Voltage : 38V**
- 

LED Driver Unit - Schematic



Current Sense Unit

Current Sense IC : ACS712

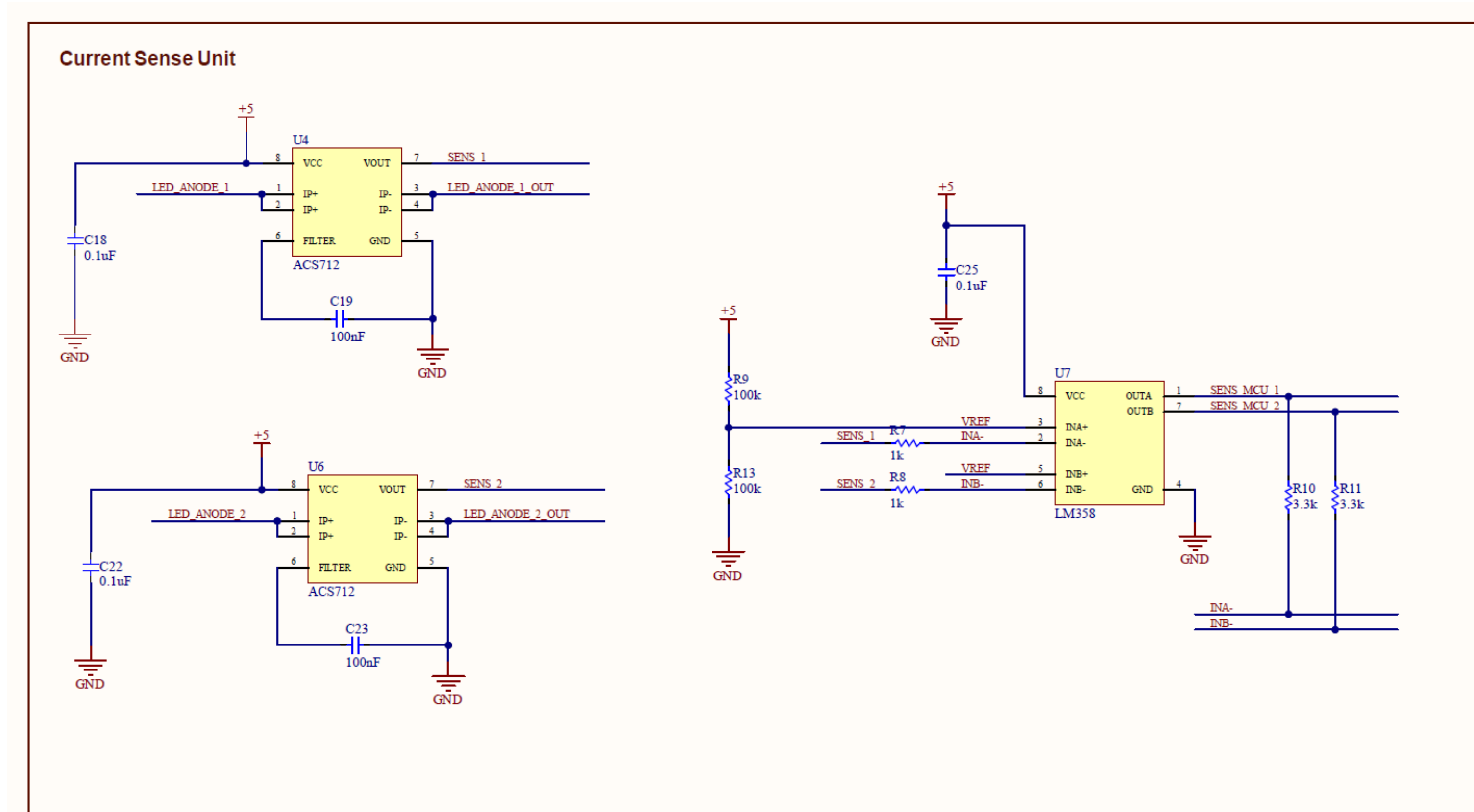
- Uses Hall Effect to produce voltage output sensing the current
- Sensitivity is 185mV/A

Amplifier Circuit : Opamp LM358 based Amplifier

- Improves the sensitivity to 610mV/A

Voltage output from amplifier is provided to microcontroller and it is programmed to detect overcurrent conditions

Current Sense Unit - Schematic

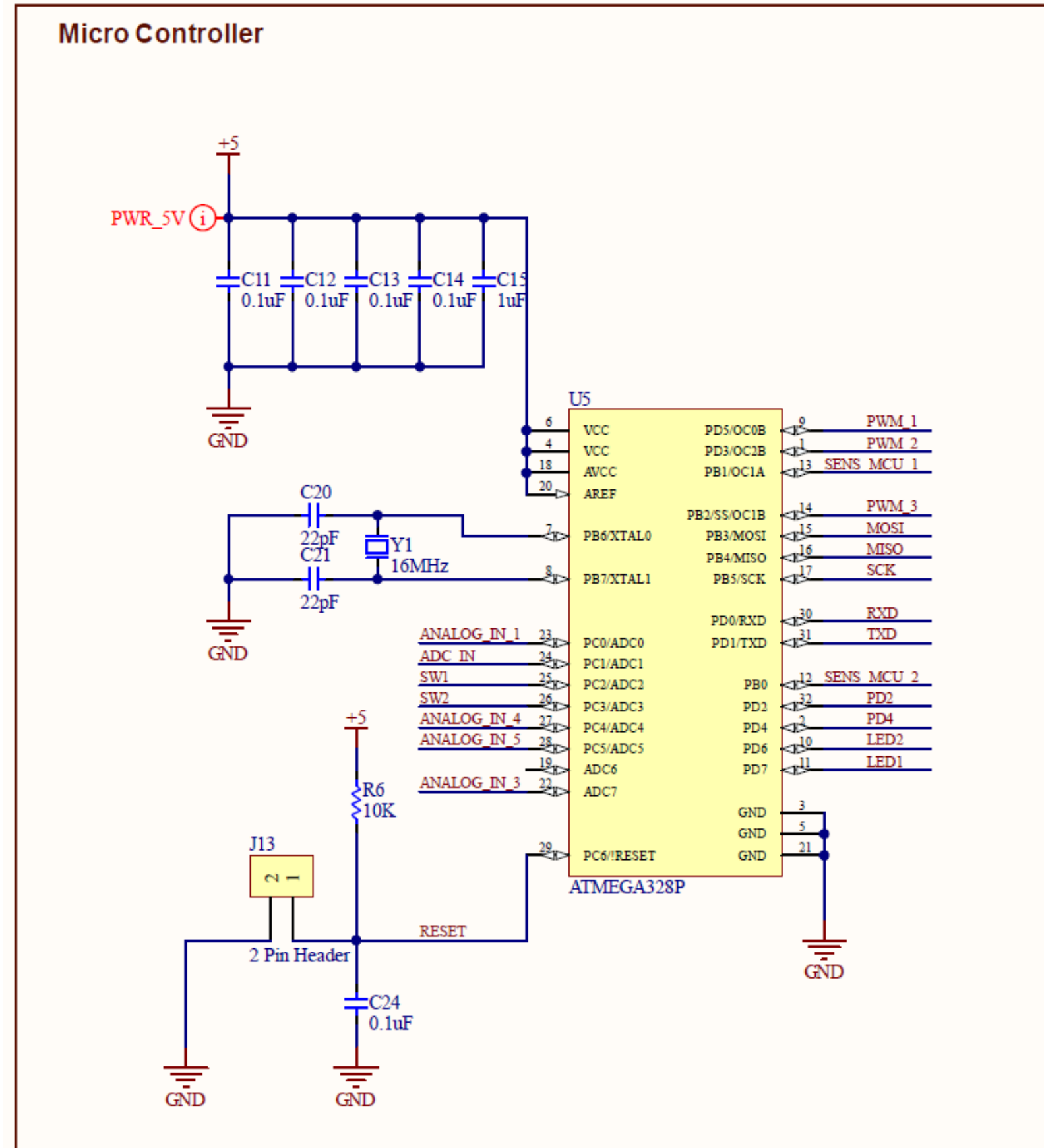


Microcontroller

Microcontroller : ATmega328P

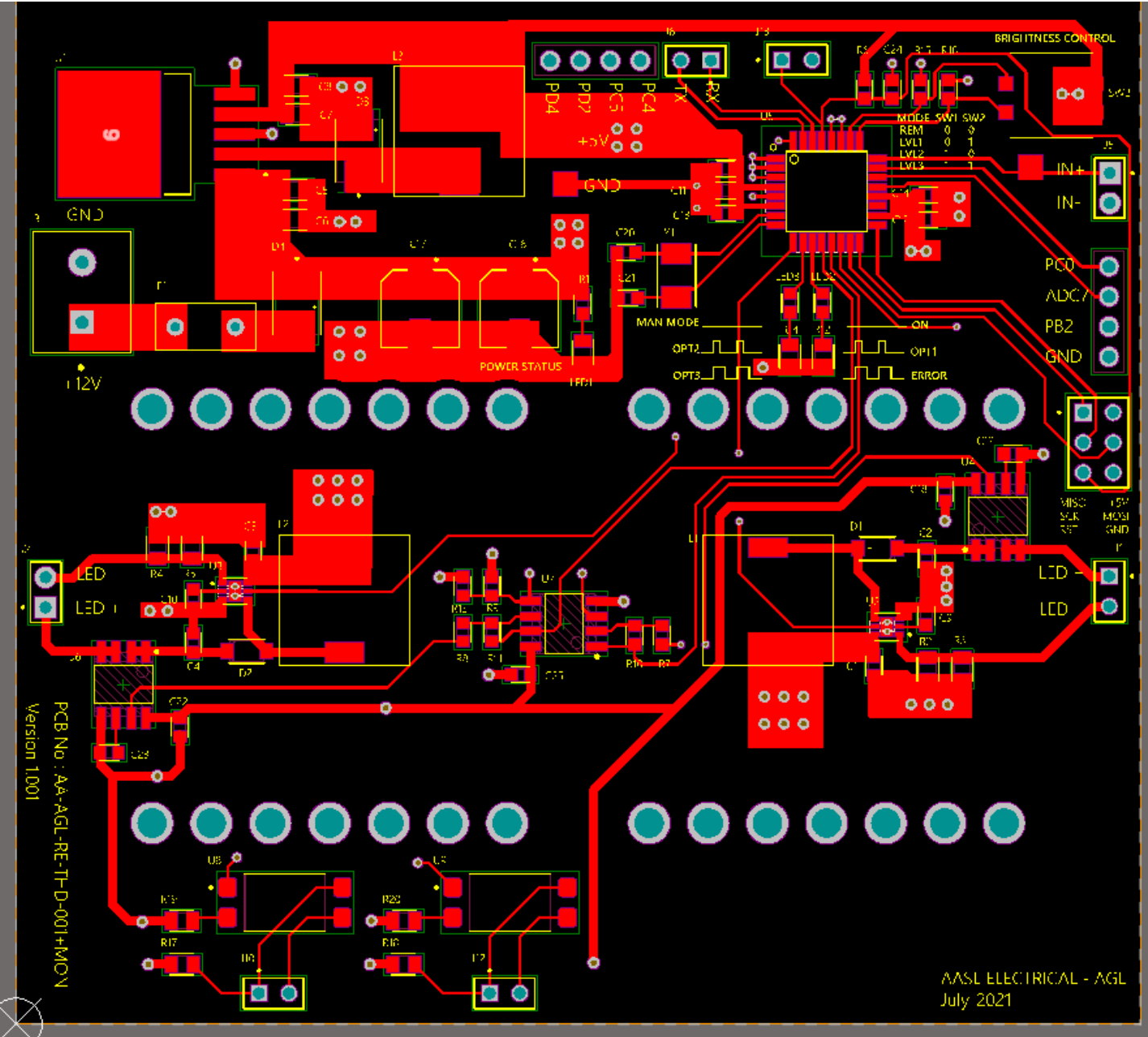
- Operates at 16MHz
- Senses user Input
- Adjusts brightness of LEDs
- Senses output current
- Communicates with external devices
- Provides general purpose input and outputs

Microcontroller - Schematic

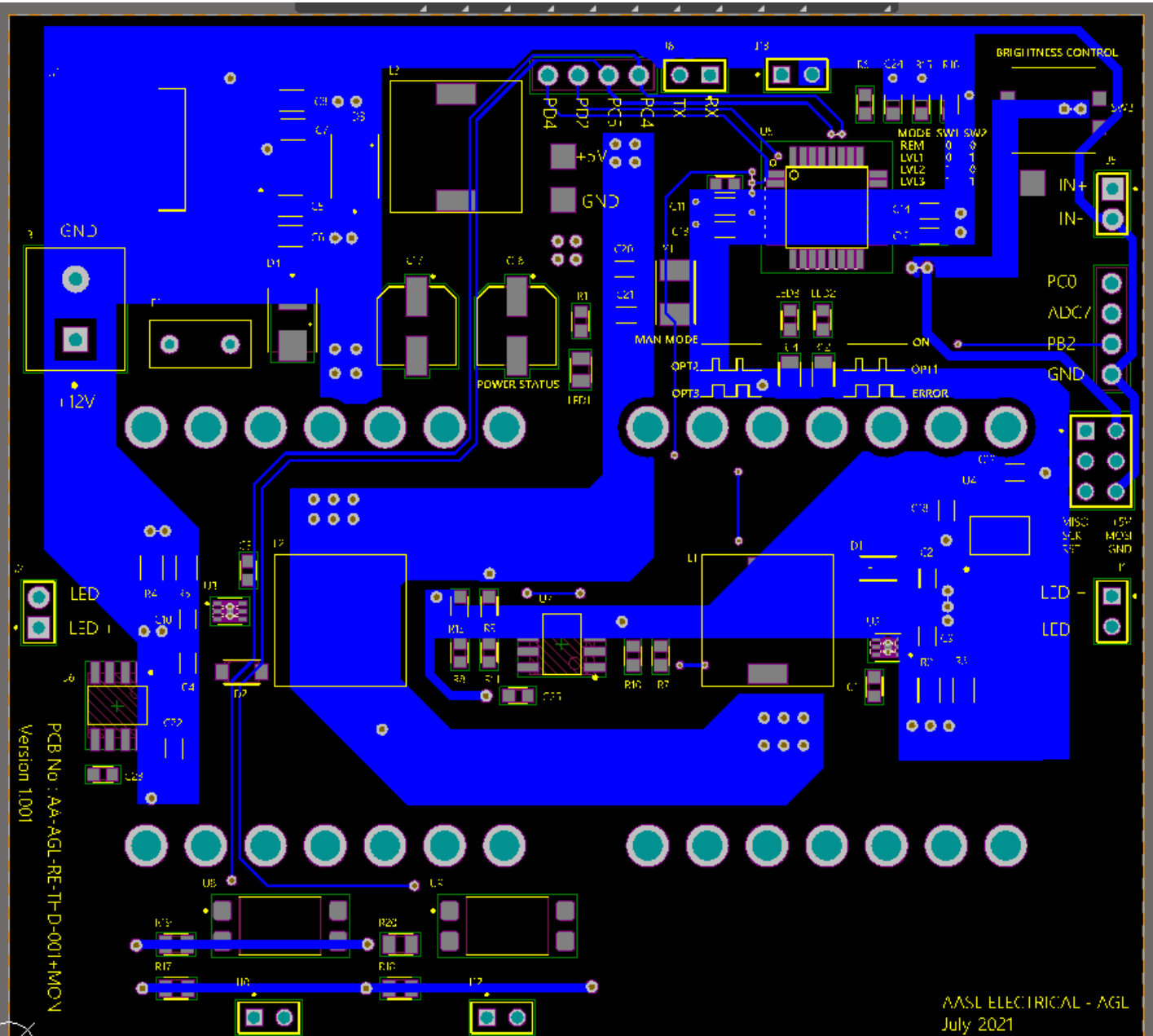


PCB Design

Top Layer Routing

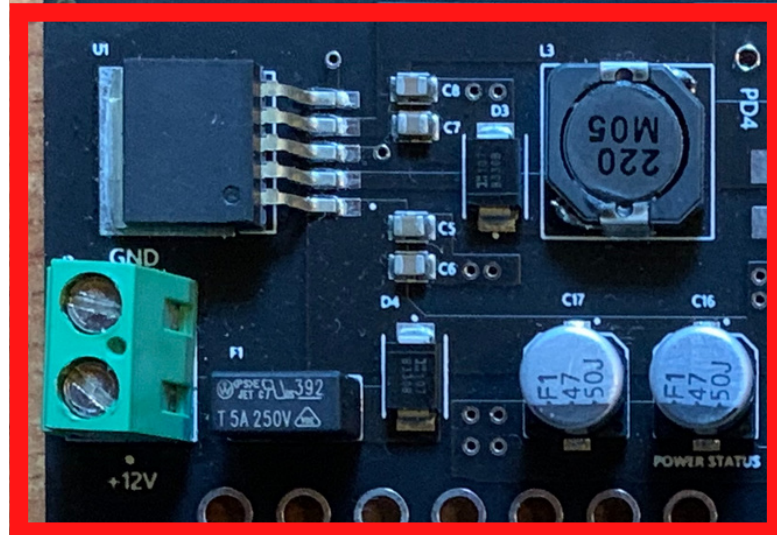


Bottom Layer Routing

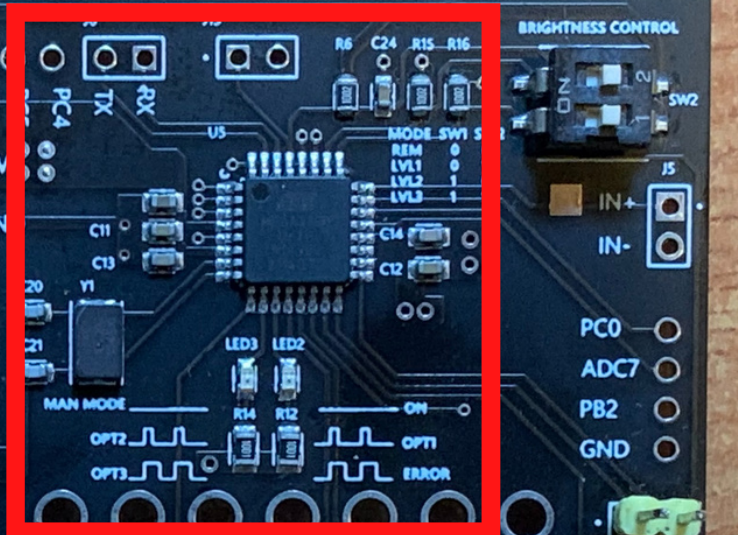


Assembled PCB

1



2



1- Power Supply

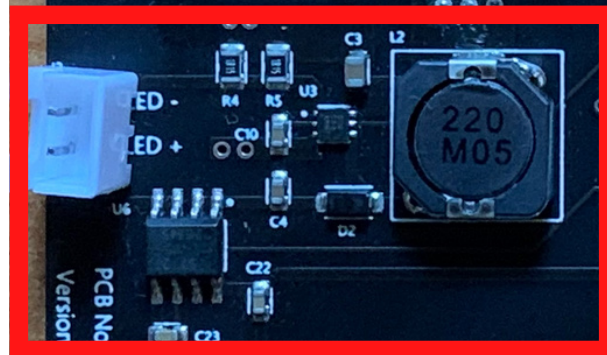
2 - Microcontroller Unit

3 - LED Driver 2 and current sense unit

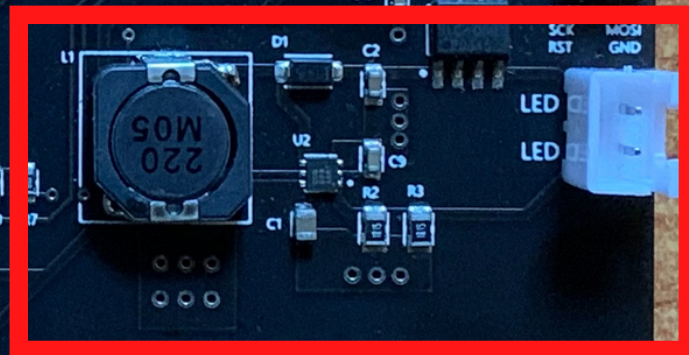
4 - Isolated Outputs

5 - LED Driver 1 and current sense unit

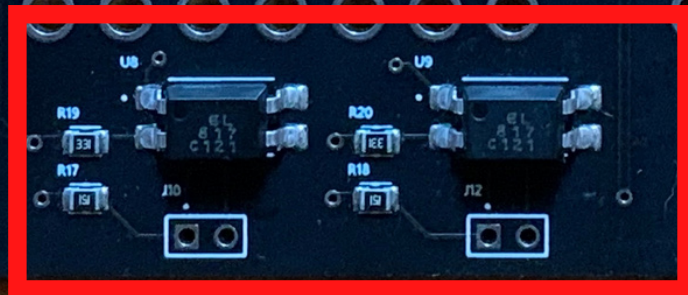
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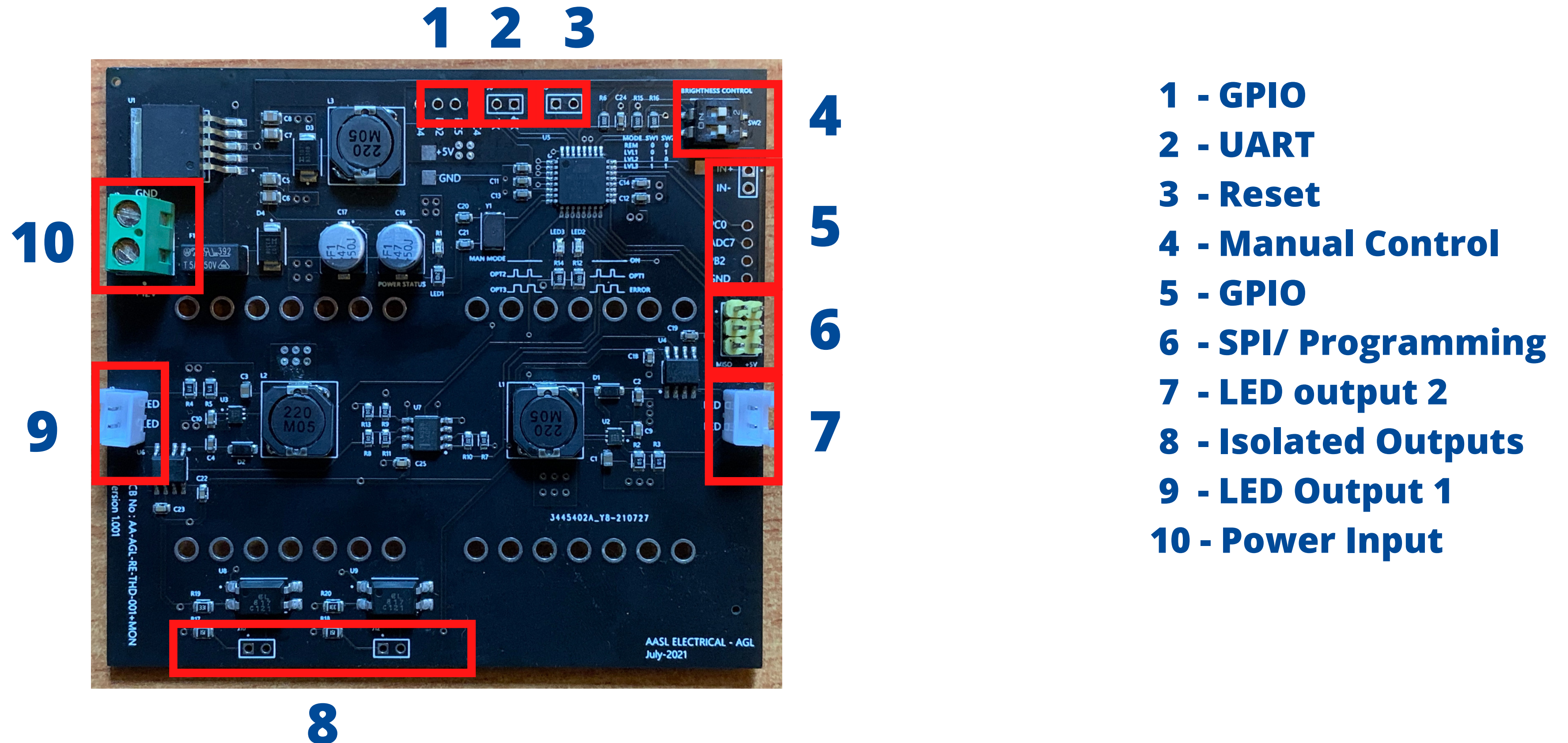
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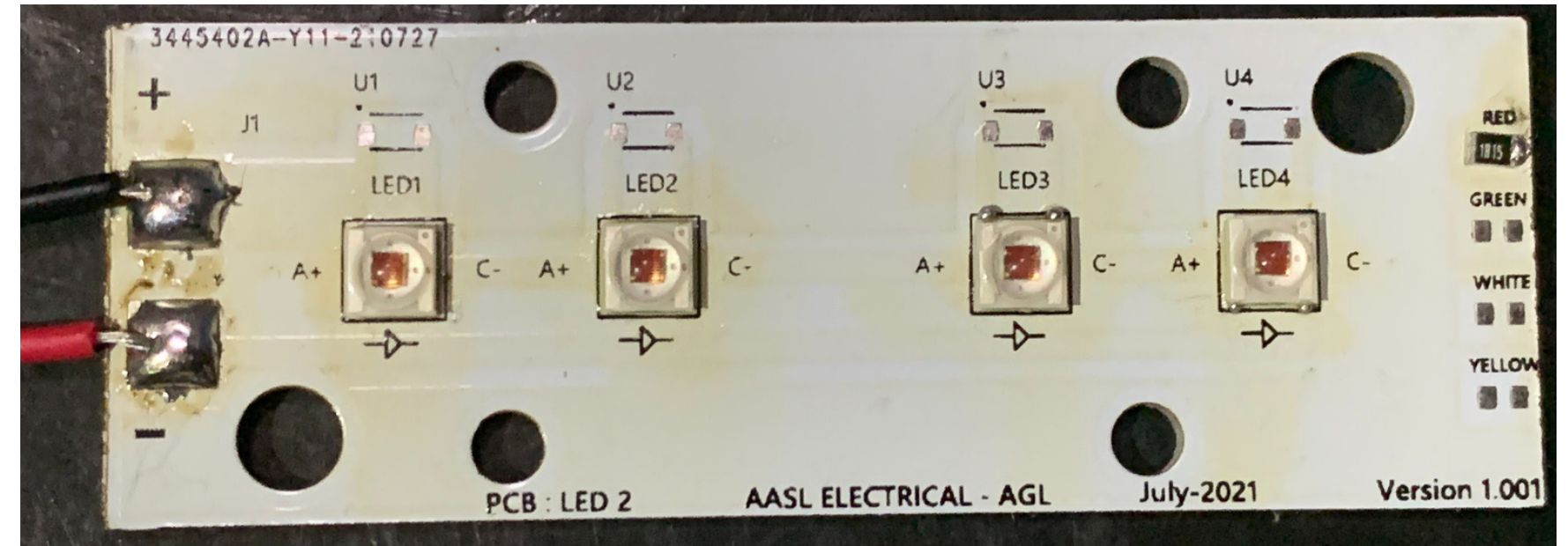
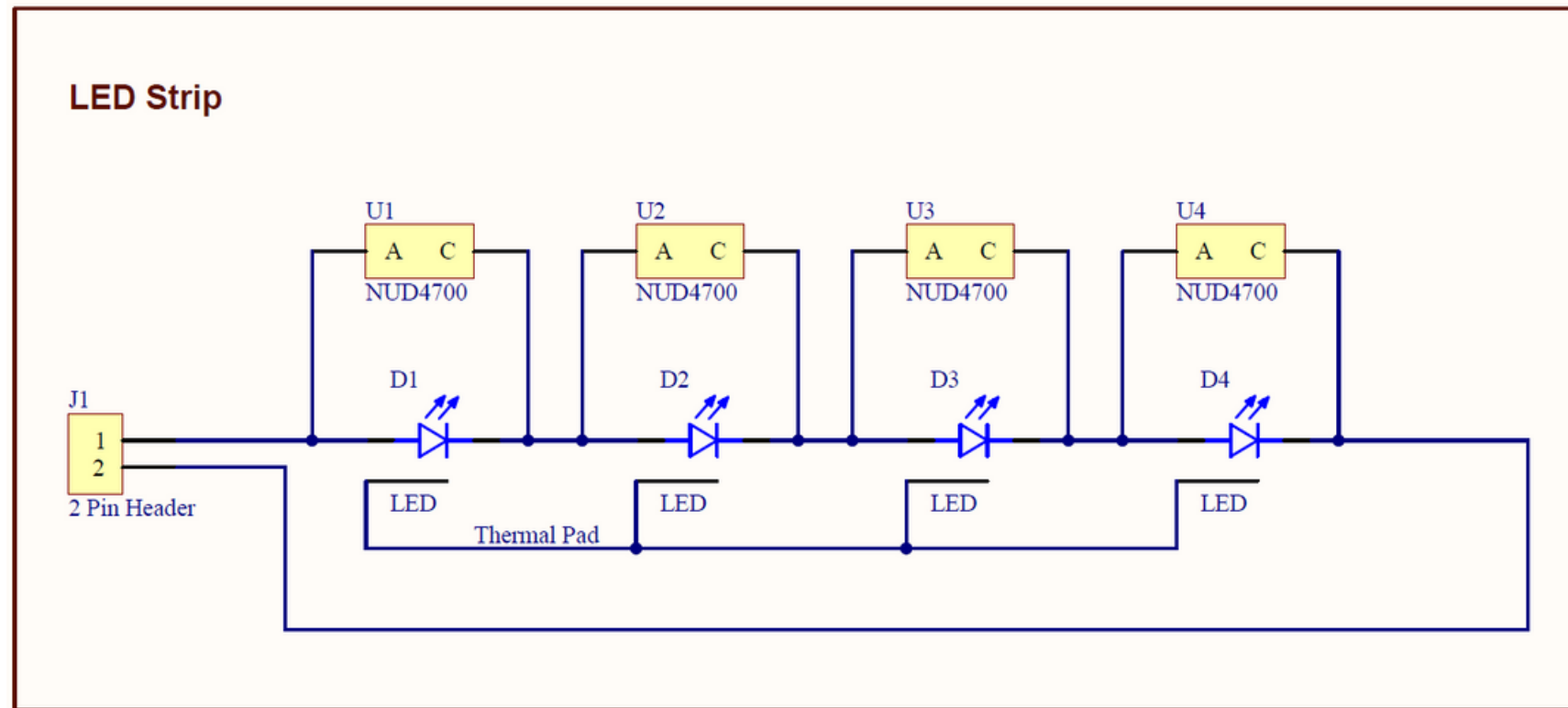
4



Inputs and Outputs



LED Strip - Schematic



- LEDs are connected in series
- Maximum power dissipation of a LED is 1W
- NUD4700 is a LED Shut and it provides a short circuit path between LED anode and cathode, if a LED is mal-functioning