

## CE351 Microcontrollers

S2022 Midterm Exam (55 min, open-book, open-notes, open-internet)  
(Insert the answers, snapshots into a single Word file, convert the Word file into a **SINGLE PDF file** and send it to [yli@fortlewis.edu](mailto:yli@fortlewis.edu))

2. Given that TP4056 is a battery charger IC (link to the datasheet: [SOP8 package](#)) which is used to charge Lipo batteries. An example of the PCB module and a schematic follow. Assuming the 'BAT-' terminal shown on the PCB module is shorted to GND. Note that the schematic (Fig. 2) and the PCB module (Fig. 1) came from different sources so they are slightly different. **Create a TP4056 device from scratch in Eagle PCB, create a schematic and a PCB layout of the module using the circuit shown in Fig. 2.**

Grading rubrics:

1. The TP4056 device in your sch/brd files must be your self-created library device.
2. All the caps and resistors must be in the 0603 package.
3. The parts in the sch view must show the resistance/capacitance/LED color.
4. A snapshot shows DRC error-free should be included in your Word file.
5. Ignore the USB port in the PCB module in Fig. 1. Use pin headers as inputs and outputs in your sch/brd files.

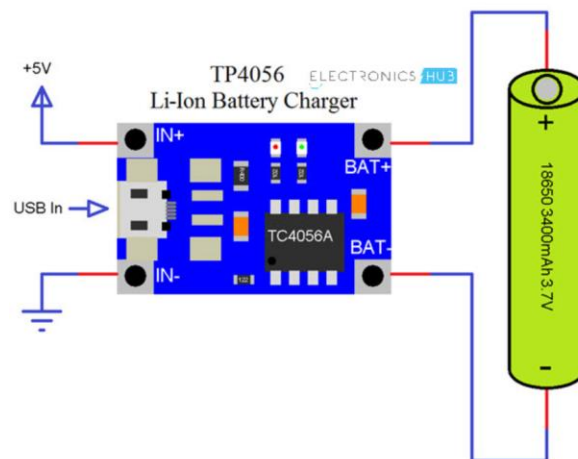


Fig. 1

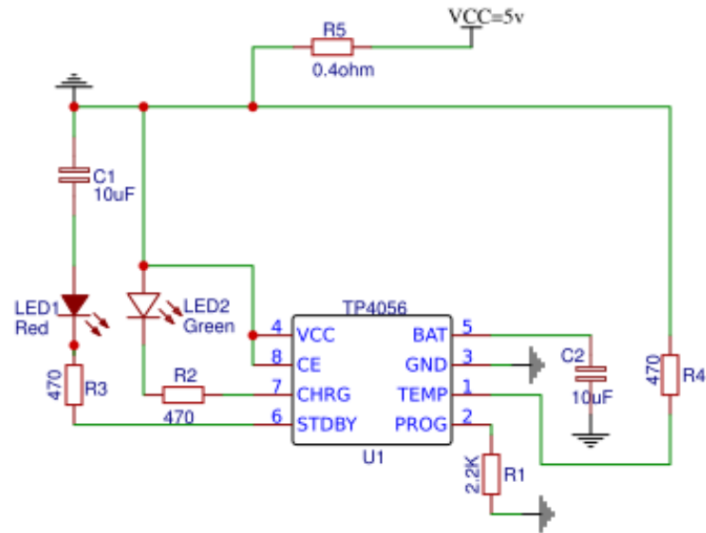


Fig. 2

### PACKAGE/ORDER INFORMATION

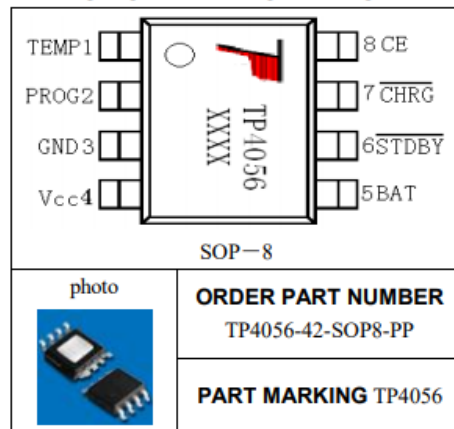


Fig. 3 The TCP4056 chip is in the SOP8 package. **Do not forget the ground pad in the middle.**