

CE351 Microcontrollers

F2020 Midterm Exam (55 min, open-book, open-notes, open-internet)

(Insert the answers, snapshots, code, links to YouTube videos to a single Word file, convert the Word file into a **SINGLE PDF file** and send it to yli@fortlewis.edu)

1. Create an Arduino program that produces the output in the Serial Monitor below. Your code must use two 'for loops'. Your code should only be added to the setup() function. The loop() function must remain empty. (take a **picture** of the result, insert the original code and the snapshot of the result to a Word file). **(25 points)**

```
BEGIN :  
0  
2  
4  
6  
8  
  
8  
4  
0  
  
END
```

Fig. 1

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. The schematic (Fig. 3) and the PCB module (Fig. 2) 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. 3. **(75 points)**

Grading rubrics:

1. The TP4056 device in your sch/brd files must be your original work.
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. 2. Use pin headers as inputs and outputs in your sch/brd files.

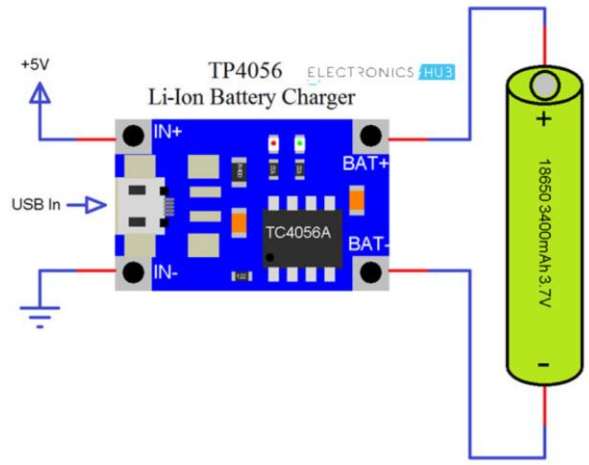


Fig. 2

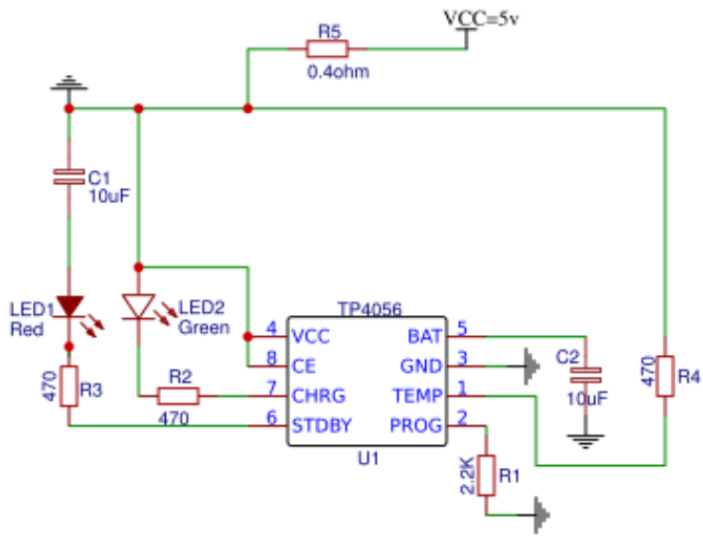


Fig. 3

PACKAGE/ORDER INFORMATION

TEMP1		8 CE
PROG2		7 CHRG
GND3		6 STDBY
Vcc4		5 BAT
SOP-8		
photo	ORDER PART NUMBER TP4056-42-SOP8-PP	PART MARKING TP4056

Fig. 4 The TCP4056 chip is in the [SOP8 package](#). **Do not forget the ground pad in the middle.**