EEE3088F Week 4

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Q1 Github [1]

https://github.com/murrayinglis/EEE3088-group-09

Q2 Power Subsystem Failure Management [5]

(i)

A duplicate of the 3.3V regulator chip will be included on the board, with test points at the pins of this chip and near the other chip. So if the other 3.3V regulator chip fails, the traces can be scratched or the chip can be removed from the board. The test points can be shorted and the duplicate chip can be used instead.

(ii)

Use thick traces to account for temperature changes and spaced as far possible.

Test points at either side of a trace so that if it's damaged it can be shorted with a jumper.

(iii)

There are plenty of 3.3V regulator chips available on JLCPCB. One that is also a cheap, basic part and has a similar pinout to our regulator chip is the C14289. As of checking on 13/03/2023 it has 152575 in stock.

(iv)

Test points so components or certain modules in the circuit can be tested or shorted to remove them from the circuit.

Q3 Sensing Subsystem Failure Management [5]

(i)

For the light sensor chip, add a duplicate of the sensor chip with traces to the microcontroller. However, leave out power traces. If the original sensor fails, jumper cables can be used to power this sensor and the traces to the original sensor's power can be scratched out.

For the battery, the voltage divider resistances may be incorrect or the voltage divider isn't working as intended. If this occurs, an external resistor voltage divider network can be used and connected using jumper cables. Test points are included at the voltage divider to add this circuit.

Guard traces to prevent interference at the sensor output.

(ii)

Use thick traces to account for temperature changes and spaced as far possible.

Test points at either side of a trace so that if it's damaged it can be shorted with a jumper.

(iii)

There are plenty of light sensor chips available on JLCPCB. One that has a similar pinout to our light sensor chip is the BH1750FVI. As of checking on 13/03/2023 it has 1202 in stock.

(iv)

Test points so components or certain modules in the circuit can be tested or shorted to remove them from the circuit.

Q4 Microcontroller interfacing Failure Management [5]

(i)

A duplicate of the EEPROM will be included on the board, with test points at the pins of this chip and near the other chip. So if the other 3.3V regulator chip fails, the traces can be scratched or the chip can be removed from the board. The test points can be shorted and the duplicate chip can be used instead.

(ii)

Use thick traces to account for temperature changes and spaced as far possible.

Test points at either side of a trace so that if it's damaged it can be shorted with a jumper.

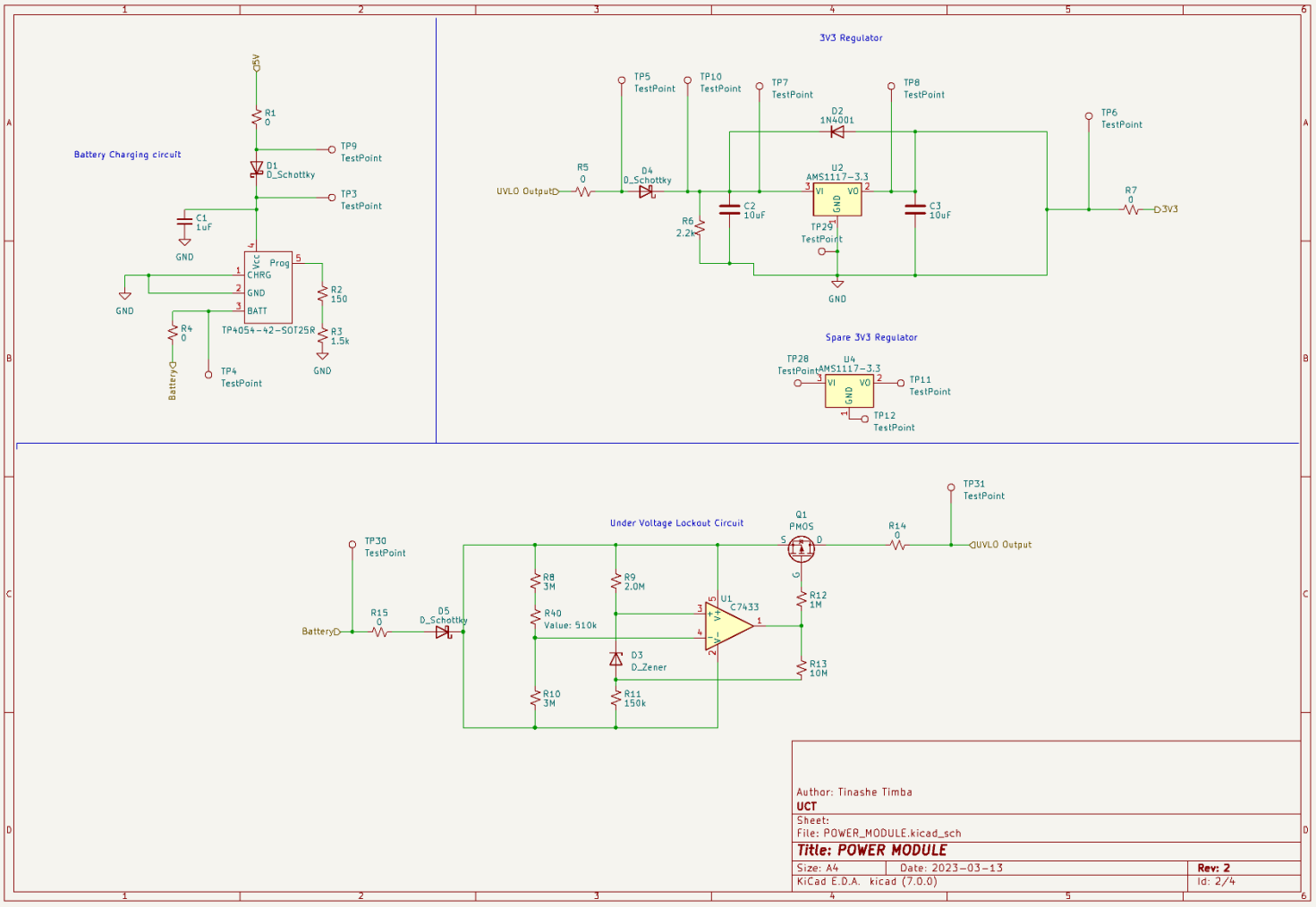
(iii)

We have found another EEPROM (C7562) with very similar specifications and the same pinout as the one we designed our circuit around (C6482). This backup component is a cheap, basic part and as of checking on 09/03/2023 it has 32937 in stock.

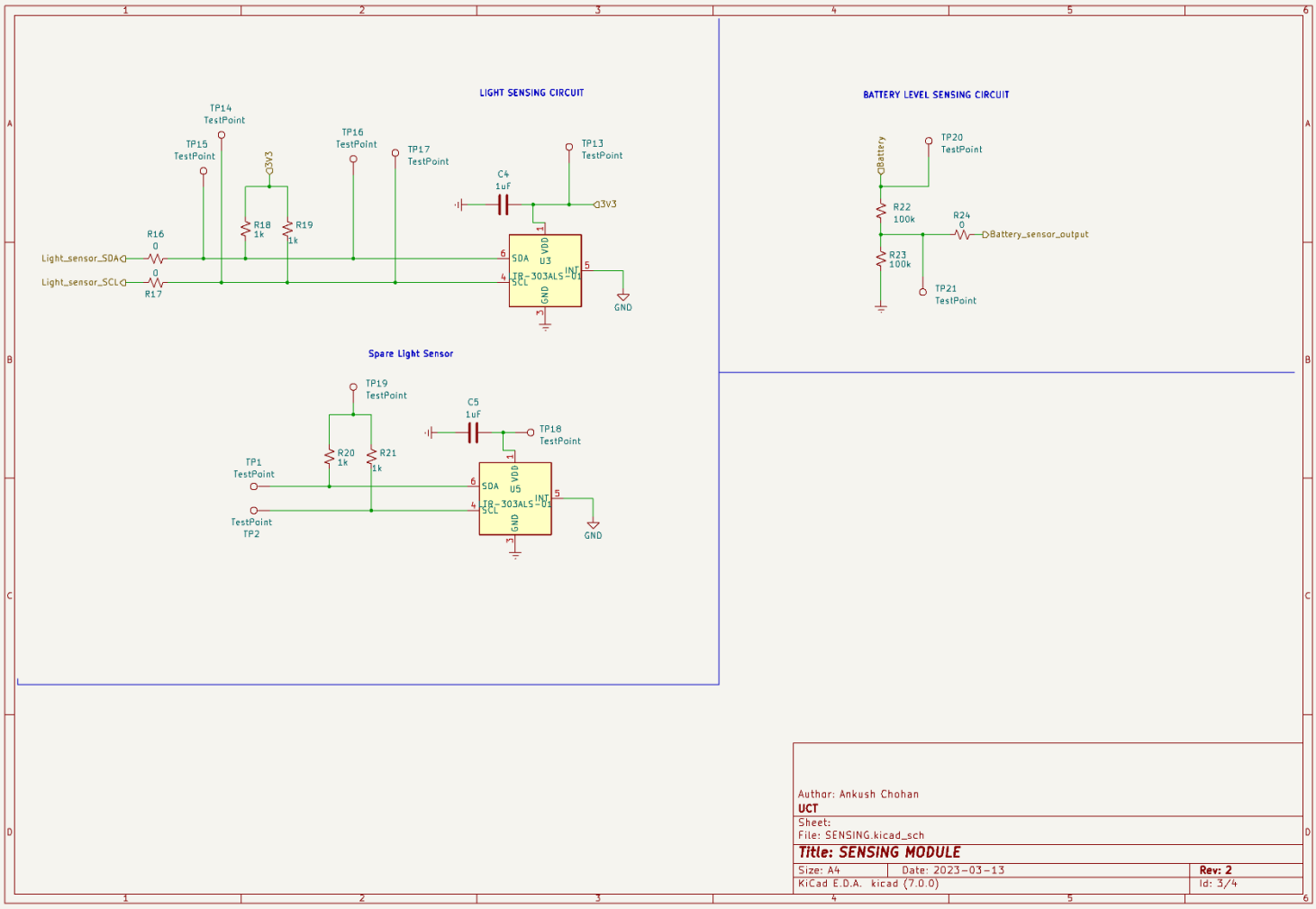
(iv)

Test points so components or certain modules in the circuit can be tested or shorted to remove them from the circuit.

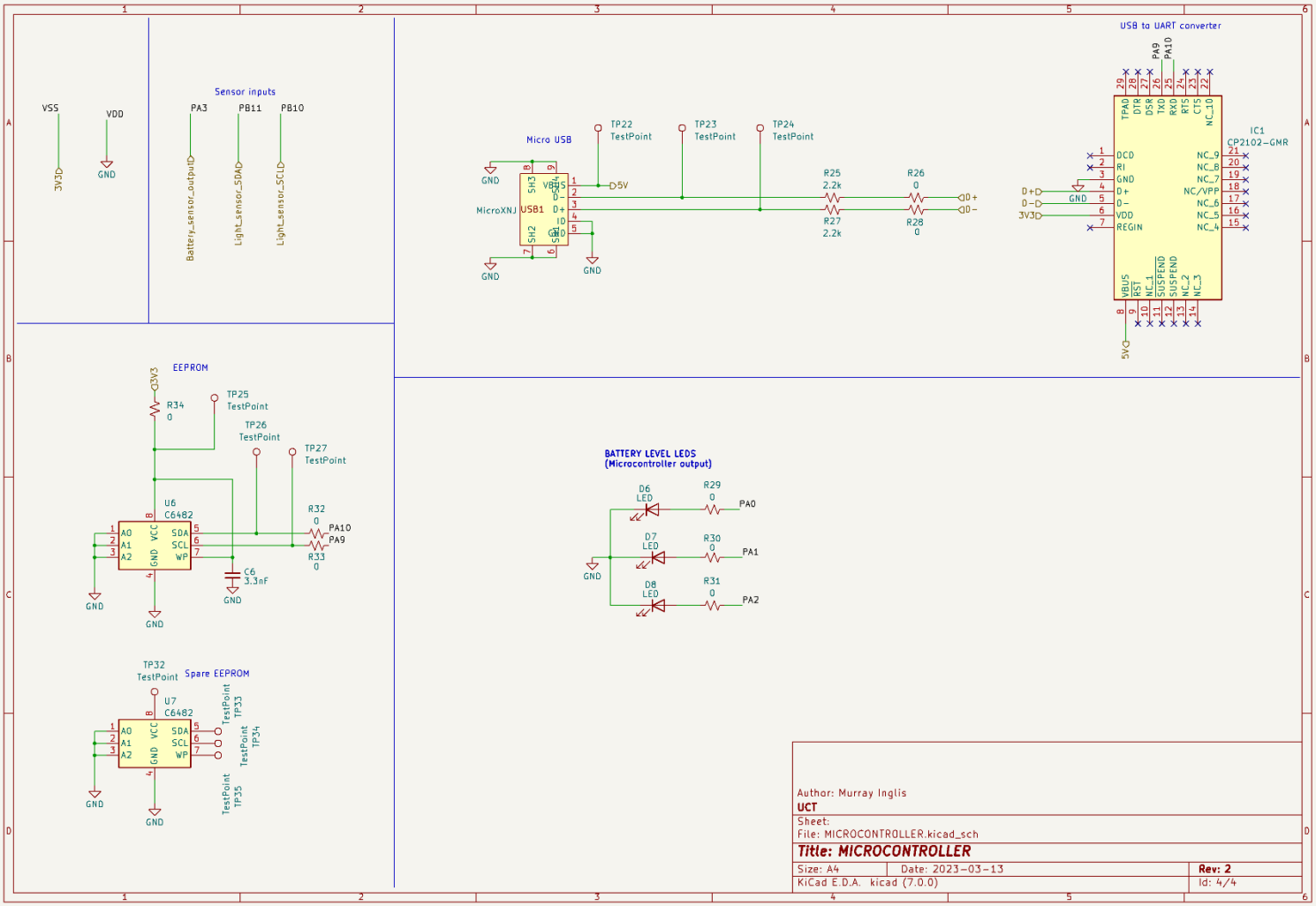
Q5 Power Subsystem Schematic [10]



Q6 Sensing Subsystem Schematic [10]



Q7 Microcontroller interfacing Schematic [10]



Q8 Planned ERCs [5]

- Short circuit detection
- Open circuit detection
- Unconnected pin detection
- Clearance checks
- Net list comparison

Q9 Updated BOM [4]

https://github.com/murrayinglis/EEE3088-group-09/blob/main/PCB/SCHEMATICS/BOM.xlsx

Reference	Value	Extended	Part	Unit price
C1, C4, C5	1uF		C28323	0,0058
C2, C3	10uF		C19702	0,0066
C6	3.3nF		C1613	0,0058
D1, D4, D5	D_Schottky		C191023	0,0167
D2	1N4001		C95872	0,0069
D3	D_Zener		C8056	0,0111
D6-D8	LED		C2286	0,0054
MicroXNJ?		YES	C404969	0,0333
Q1	PMOS		C20917	0,0864
R1, R4, R5, R7, R14-R17, R24, R26, R28-R39	0		C4177	0,0012
R2	150		C22808	0,001
R3	1.5k		C25867	0,0005
R6, R25, R27	2.2k		C17520	0,0017
R8, R10	3M		C23156	0,0013
R9	2.0M		C22976	0,0016
R11	150k		C22807	0,001
R12	1M		C17927	0,0031
R13	10M		C26108	0,0024
R18-R21	1k		C11702	0,0005
R22, R23	100k		C17900	0,003
R40	510k		C11616	0,0005
TP4054-42-SOT25R?			C32574	0,1433
U1	C7433		C7433	0,2804
U2, U4	AMS1117-3.3	YES	C369933	0,0627
U3, U5	LTR-303ALS-01	YES	C364577	0,3887
IC1	CP2102-GMR		C6568	2,3774
U6,U7	C6482	YES	C6482	0,5172
TOTAL				**3,9655**