Lab 2

Yutong Luo

Calculation & Selected Resistors

`Date of birth: 30`

LM317

VOUT1 = 2 + 0.01*30 = 2.3 V

R_1 R_2

- **Datasheet Info** `Equation: V_ref * (1+ R_1/R_2)+ I_adj * R_1V_ref = 1.25 VI_adj = 50 µA`

V_ref * (1+ R_1/R_2)+ I_adj * R_1 = 2.3 V
R_1 = 1.05 / (1.25/R_2 + 0.00005)

let R_2 = 240 Ω,
R_1 = 1.05 /(1.25/240+0.00005) ≈ 199.68 Ω ≈ 200 Ω

- **Datasheet Info** `V_F = 2 VI_F = 2 mA`

R_7

R_7 = (V_OUT1 - V_F) / I_F

let I_F = 5 mA,
R_7 = 0.3 / 0.005 = 60 Ω

TPS79301

VOUT2 = 0.1 + VOUT1 = 2.4 V

R_3 R_4

- **Datasheet Info** `V_OUT = V_REF * (1 + R_3/R_4)V_REF = 1.2246 V`

R_3 = (2.4/1.2246 - 1) * R_4 = 0.9598 * R_4

let R_4 = 30.1 kΩ (recommended),
R_3 ≈ 28.89 kΩ

R_8

- **Datasheet Info** `V_F = 2 VR_8 = (V_OUT1 - V_F) / I_F`

let I_F = 5 mA,
R_8 = 0.4 / 0.005 = 80 Ω

MIC5377

VOUT3 = VOUT2 = 2.4 V

R_5 R_6

- **Datasheet Info** `V_OUT = V_REF * (1 + R_5/R_6)V_REF = 1 V`

R_5 = (2.4 - 1) * R_6 = 1.4 * R_6

let R_6 = 100 kΩ,
R_6 = 140 kΩ

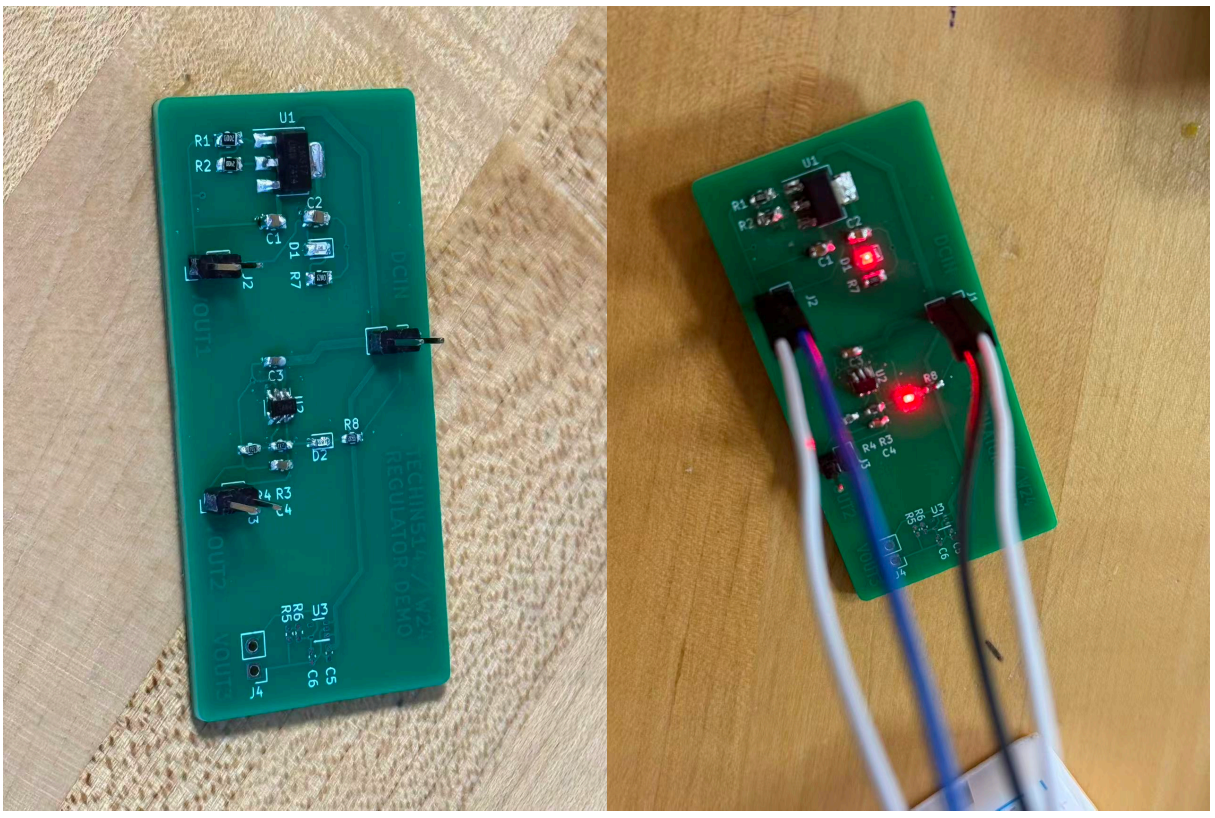
Selected Resistors

Resistors	Calculated	Selected
R1	200Ω	200Ω
R2	240Ω	240Ω
R3	28.89kΩ	27.3kΩ
R4	30.1kΩ	30.3kΩ
R5	100 kΩ	-
R6	140 kΩ	-
R7	60Ω	62.8Ω
R8	80Ω	82Ω

BOM Screenshot

#	Reference	Qty	Value	Footprint	DNP
1	C1, C2	2	1uF	Capacitor_SMD:C_0805_2012Metric_Pad1.18x1.45mm_HandSolder	
2	C3, C4	2	1uF	Capacitor_SMD:C_0603_1608Metric_Pad1.08x0.95mm_HandSolder	
3	C5, C6	2	1uF	Capacitor_SMD:C_0402_1005Metric_Pad0.74x0.62mm_HandSolder	
4	D1	1	LS R976	LED_SMD:LED_0805_2012Metric_Pad1.15x1.40mm_HandSolder	
5	D2	1	LTST-C19	LED_SMD:LED_0603_1608Metric_Pad1.05x0.95mm_HandSolder	
6	J1, J2, J3, J	4	n.m.	Connector_PinHeader_2.54mm:PinHeader_1x02_P2.54mm_Vertical	
7	R1	1	200Ω	Resistor_SMD:R_0805_2012Metric_Pad1.20x1.40mm_HandSolder	
8	R2	1	240Ω	Resistor_SMD:R_0805_2012Metric_Pad1.20x1.40mm_HandSolder	
9	R3	1	28.89kΩ	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder	
10	R4	1	30.1kΩ	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder	
11	R5	1	100 kΩ	Resistor_SMD:R_0402_1005Metric_Pad0.72x0.64mm_HandSolder	
12	R6	1	140 kΩ	Resistor_SMD:R_0402_1005Metric_Pad0.72x0.64mm_HandSolder	
13	R7	1	60Ω	Resistor_SMD:R_0805_2012Metric_Pad1.20x1.40mm_HandSolder	
14	R8	1	80Ω	Resistor_SMD:R_0603_1608Metric_Pad0.98x0.95mm_HandSolder	
15	U1	1	LM317_SC	Package_TO_SOT_SMD:SOT-223-3_TabPin2	
16	U2	1	TPS79301	Package_TO_SOT_SMD:SOT-23-6	
17	U3	1	MIC5377	Package_TO_SOT_SMD:SOT-353_SC-70-5	

Board

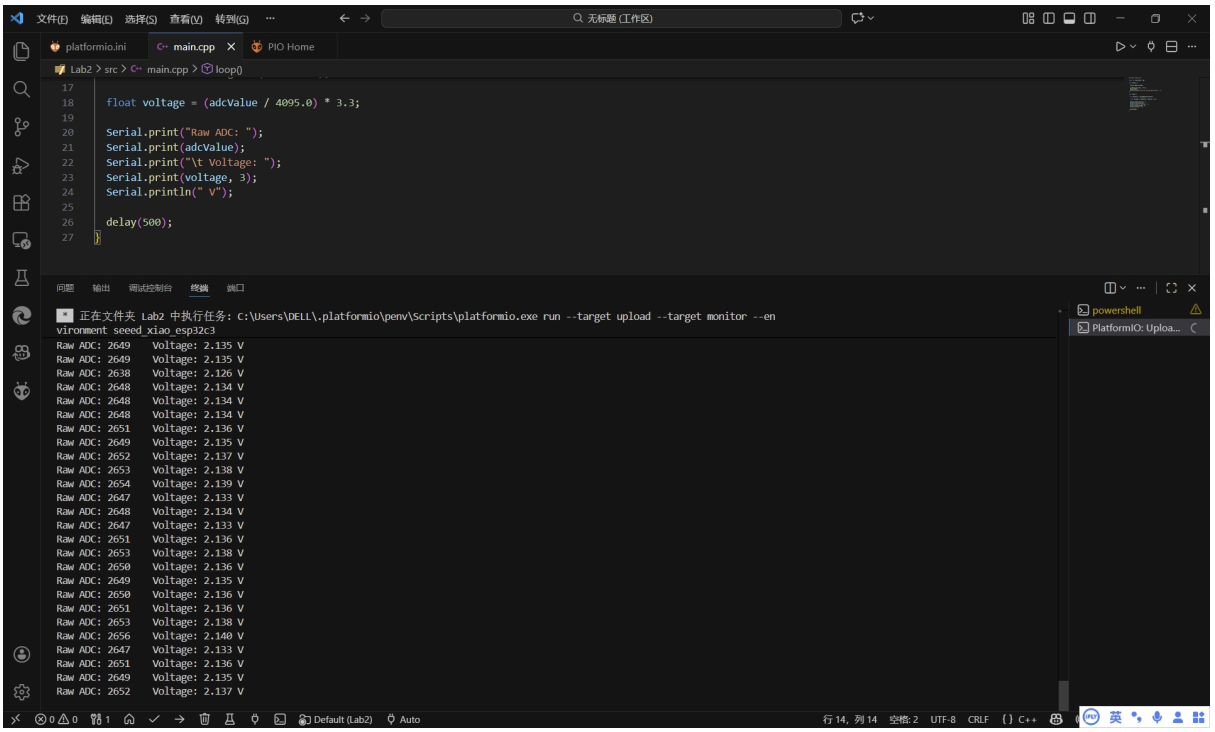


Github

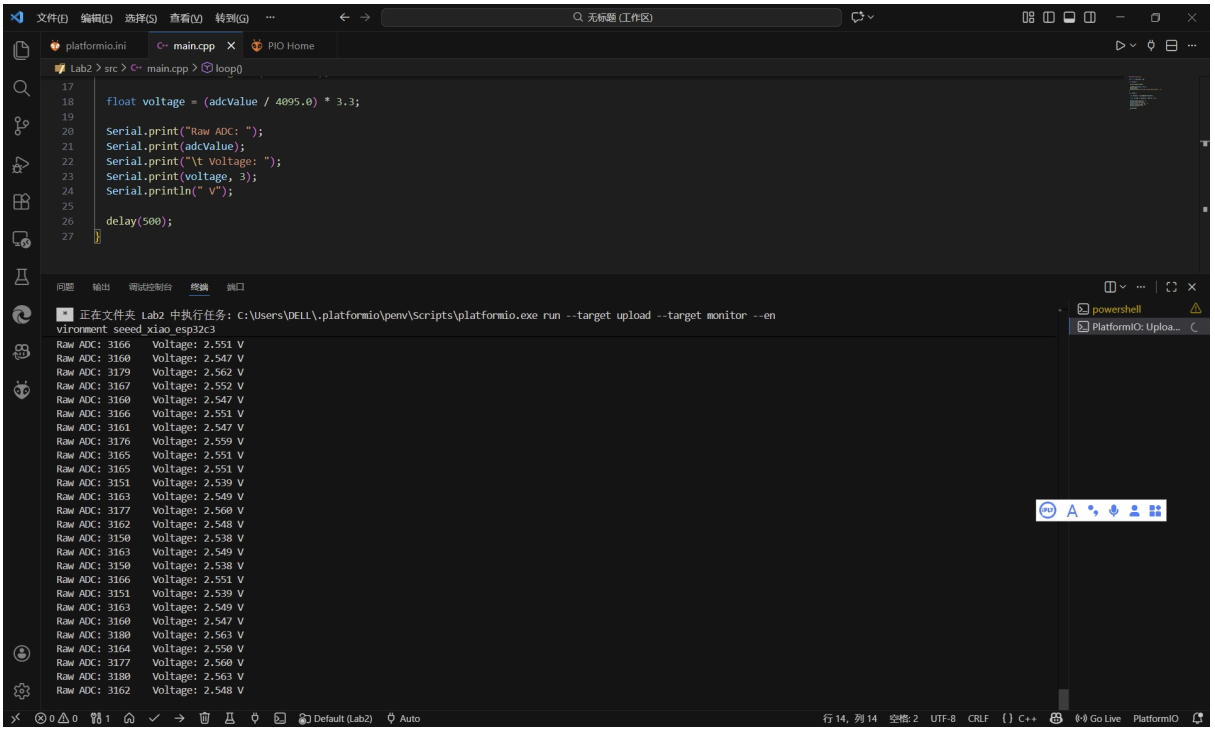
https://github.com/TongSUE/TECHIN-514/tree/main/Lab2

ESP32 Output

VOUT1 ≈ 2.13 V



VOUT2 ≈ 2.55 V



Bonus

1. Helping another student

Name of the student I helped: **Cindy Yang**

What I helped her with: I helped Cindy identify issues in her board soldering and worked with her to locate soldering errors. We re-soldered several components together, including some parts that were more difficult to solder. In addition, as a Lab Crew member, I helped supervise the lab space and provided necessary components during the process.

2. Receiving help from another student

Name of the student who helped me: **Lucia Shen**

What she helped me with: Lucia helped me when reading datasheets and doing related calculations. She pointed out where to find specific information in the datasheets and helped clarify several definitions that I was initially confused about.