

Lab 2

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Calculation & Selected Resistors

Date of birth: 30

LM317

$$V_{OUT1} = 2 + 0.01 \times 30 = 2.3 \text{ V}$$

R₁ R₂

- Datasheet Info** Equation: $V_{ref} * (1 + R_1/R_2) + I_{adj} * R_1 V_{ref} = 1.25$ $V_{I_{adj}} = 50 \mu A$

$$V_{ref} * (1 + R_1/R_2) + I_{adj} * R_1 = 2.3 \text{ V}$$

$$R_1 = 1.05 / (1.25/R_2 + 0.00005)$$

$$\text{let } R_2 = 240 \Omega,$$

$$R_1 = 1.05 / (1.25/240 + 0.00005) \approx 199.68 \Omega \approx 200 \Omega$$

- Datasheet Info** $V_F = 2$ $V_{I_F} = 2 \text{ mA}$

R₇

$$R_7 = (V_{OUT1} - V_F) / I_F$$

$$\text{let } I_F = 5 \text{ mA},$$

$$R_7 = 0.3 / 0.005 = 60 \Omega$$

TPS79301

$$V_{OUT2} = 0.1 + V_{OUT1} = 2.4 \text{ V}$$

R₃ R₄

- Datasheet Info** $V_{OUT} = V_{REF} * (1 + R_3/R_4)$ $V_{REF} = 1.2246 \text{ V}$

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

$$\text{let } R_4 = 30.1 \text{ k}\Omega \text{ (recommended),}$$

$$R_3 \approx 28.89 \text{ k}\Omega$$

R_8

- **Datasheet Info** $V_F = 2 V_{R_8} = (V_{OUT1} - V_F) / I_F$

let $I_F = 5 \text{ mA}$,

$$R_8 = 0.4 / 0.005 = 80 \Omega$$

MIC5377

$$V_{OUT3} = V_{OUT2} = 2.4 \text{ V}$$

R_5 R_6

- **Datasheet Info** $V_{OUT} = V_{REF} * (1 + R_5/R_6) V_{REF} = 1 \text{ V}$

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

let $R_6 = 100 \text{ k}\Omega$,

$$R_6 = 140 \text{ k}\Omega$$

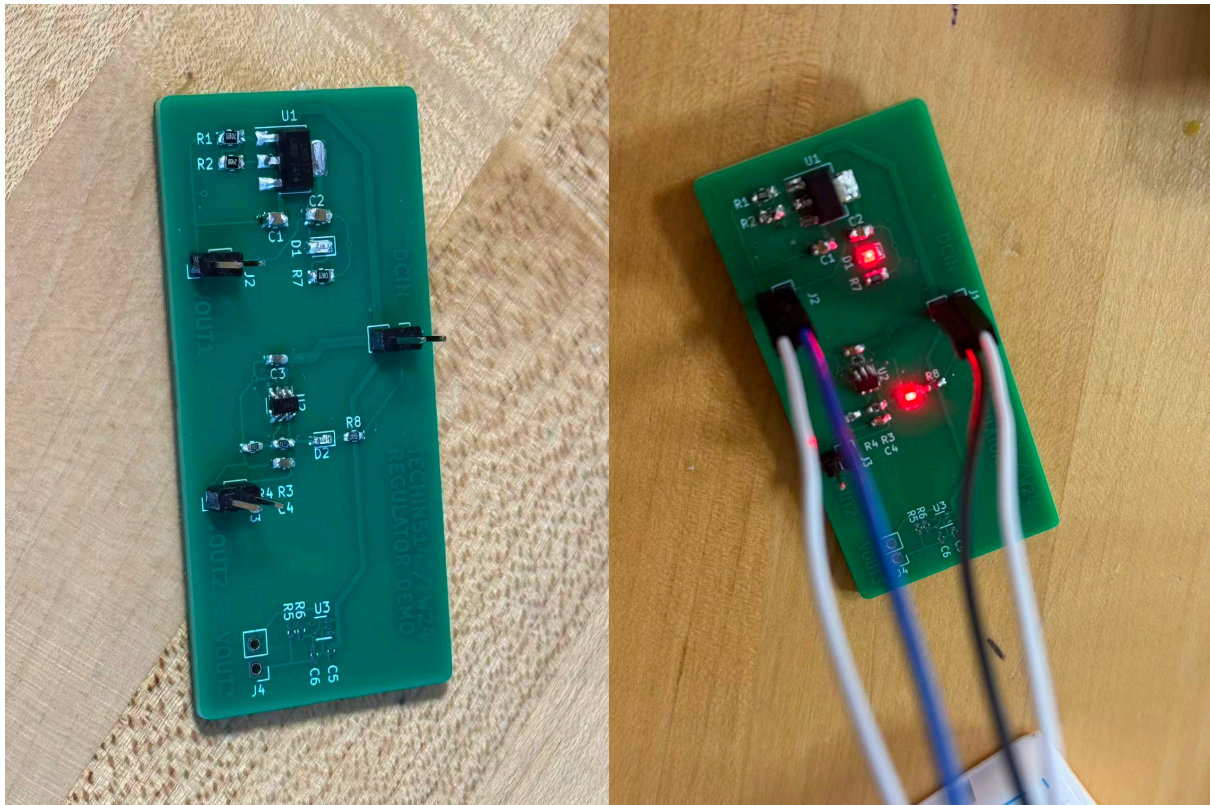
Selected Resistors

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

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, J4	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

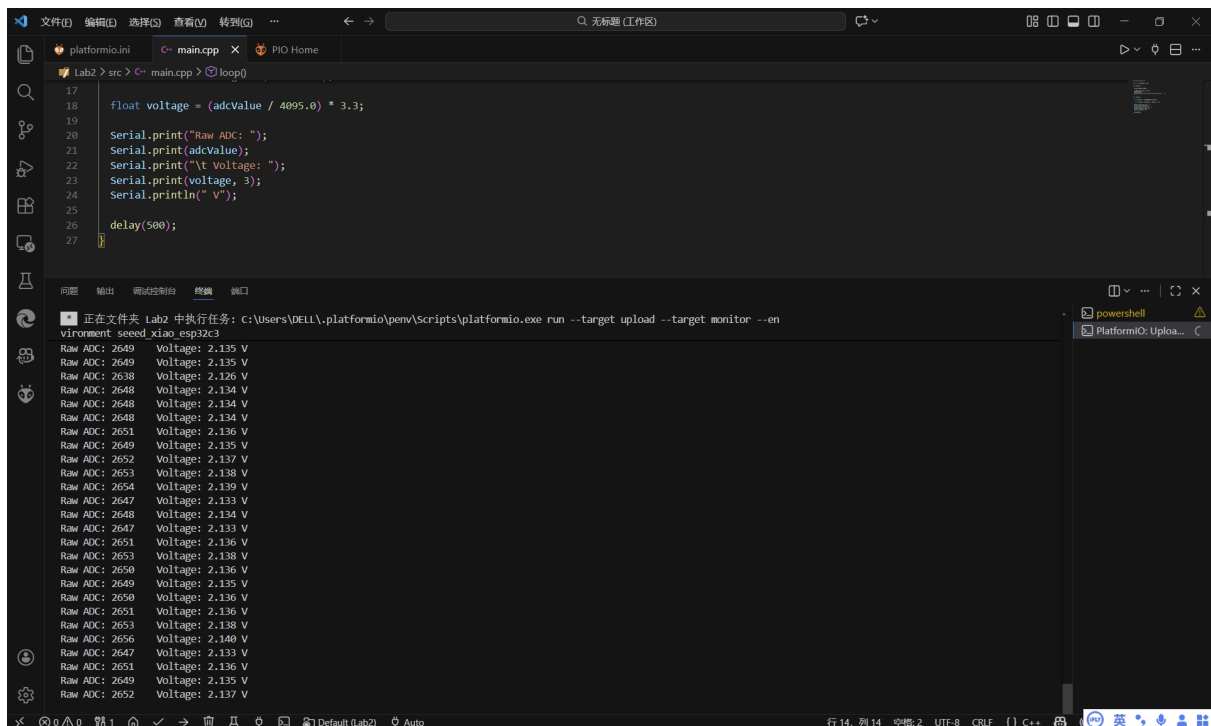


Github

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

ESP32 Output

VOUT1 \approx 2.13 V



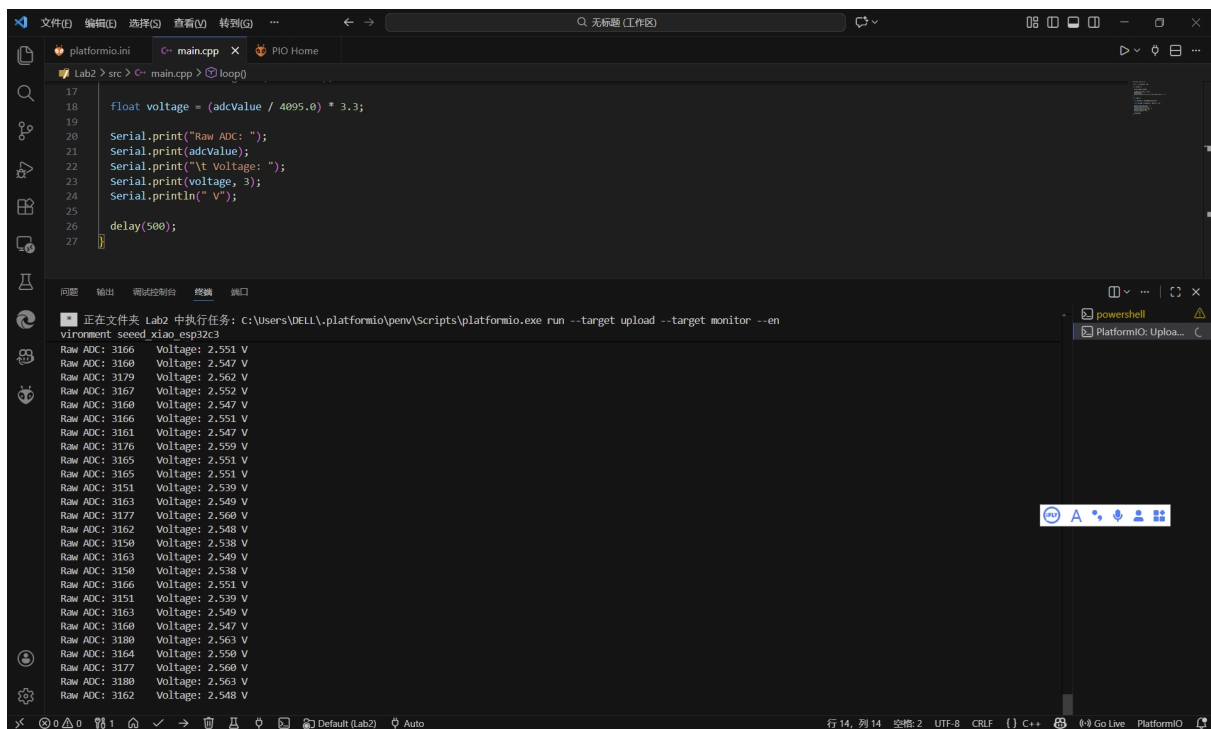
The screenshot shows the PlatformIO IDE interface. The main.cpp file is open, displaying the following code:

```
17  
18 float voltage = (adcValue / 4095.0) * 3.3;  
19  
20 Serial.print("Raw ADC: ");  
21 Serial.print(adcValue);  
22 Serial.print("\t\t Voltage: ");  
23 Serial.print(voltage, 3);  
24 Serial.println(" V");  
25  
26 delay(500);  
27 }
```

The serial monitor at the bottom shows the output of the program, which is a list of raw ADC values and their corresponding voltage readings:

```
Environment: seeed_xiao_esp32c3  
Raw ADC: 2649 Voltage: 2.135 V  
Raw ADC: 2649 Voltage: 2.135 V  
Raw ADC: 2638 Voltage: 2.126 V  
Raw ADC: 2648 Voltage: 2.134 V  
Raw ADC: 2648 Voltage: 2.134 V  
Raw ADC: 2648 Voltage: 2.134 V  
Raw ADC: 2648 Voltage: 2.134 V  
Raw ADC: 2651 Voltage: 2.136 V  
Raw ADC: 2649 Voltage: 2.135 V  
Raw ADC: 2652 Voltage: 2.137 V  
Raw ADC: 2653 Voltage: 2.138 V  
Raw ADC: 2654 Voltage: 2.139 V  
Raw ADC: 2647 Voltage: 2.133 V  
Raw ADC: 2648 Voltage: 2.134 V  
Raw ADC: 2647 Voltage: 2.133 V  
Raw ADC: 2651 Voltage: 2.136 V  
Raw ADC: 2653 Voltage: 2.138 V  
Raw ADC: 2650 Voltage: 2.136 V  
Raw ADC: 2649 Voltage: 2.135 V  
Raw ADC: 2650 Voltage: 2.136 V  
Raw ADC: 2651 Voltage: 2.136 V  
Raw ADC: 2653 Voltage: 2.138 V  
Raw ADC: 2656 Voltage: 2.140 V  
Raw ADC: 2647 Voltage: 2.133 V  
Raw ADC: 2651 Voltage: 2.136 V  
Raw ADC: 2649 Voltage: 2.135 V  
Raw ADC: 2652 Voltage: 2.137 V
```

VOUT2 \approx 2.55 V



```
17 float voltage = (adcValue / 4095.0) * 3.3;
18
19
20 Serial.print("Raw ADC: ");
21 Serial.print(adcValue);
22 Serial.print("\t Voltage: ");
23 Serial.print(voltage, 3);
24 Serial.println(" V");
25
26 delay(500);
27
```

正在文件夹 Lab2 中执行任务: C:\Users\DELL\.platformio\penv\Scripts\platformio.exe run --target upload --target monitor --en

environment: seeed_xiao_esp32c3

Raw ADC	Voltage
3166	2.551 V
3160	2.547 V
3179	2.562 V
3167	2.552 V
3160	2.547 V
3166	2.551 V
3161	2.547 V
3176	2.559 V
3165	2.551 V
3165	2.551 V
3151	2.539 V
3163	2.549 V
3177	2.560 V
3162	2.548 V
3150	2.538 V
3163	2.549 V
3150	2.538 V
3166	2.551 V
3151	2.539 V
3163	2.549 V
3160	2.547 V
3180	2.563 V
3164	2.550 V
3177	2.560 V
3180	2.563 V
3162	2.548 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.