

Lab 2

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Calculation & Selected Resistors

Date of birth: 30

LM317

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

R₁ R₂

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

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

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

let R₂ = 240 Ω,

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

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

R₇

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

let I_F = 5 mA,

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

TPS79301

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

R₃ R₄

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

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

let R₄ = 30.1 kΩ (recommended),

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

R_8

- **Datasheet Info** $V_F = 2$ $VR_8 = (V_{OUT1} - V_F) / I_F$

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 $R_6 = 100 \text{ k}\Omega$,
 $R_6 = 140 \text{ k}\Omega$

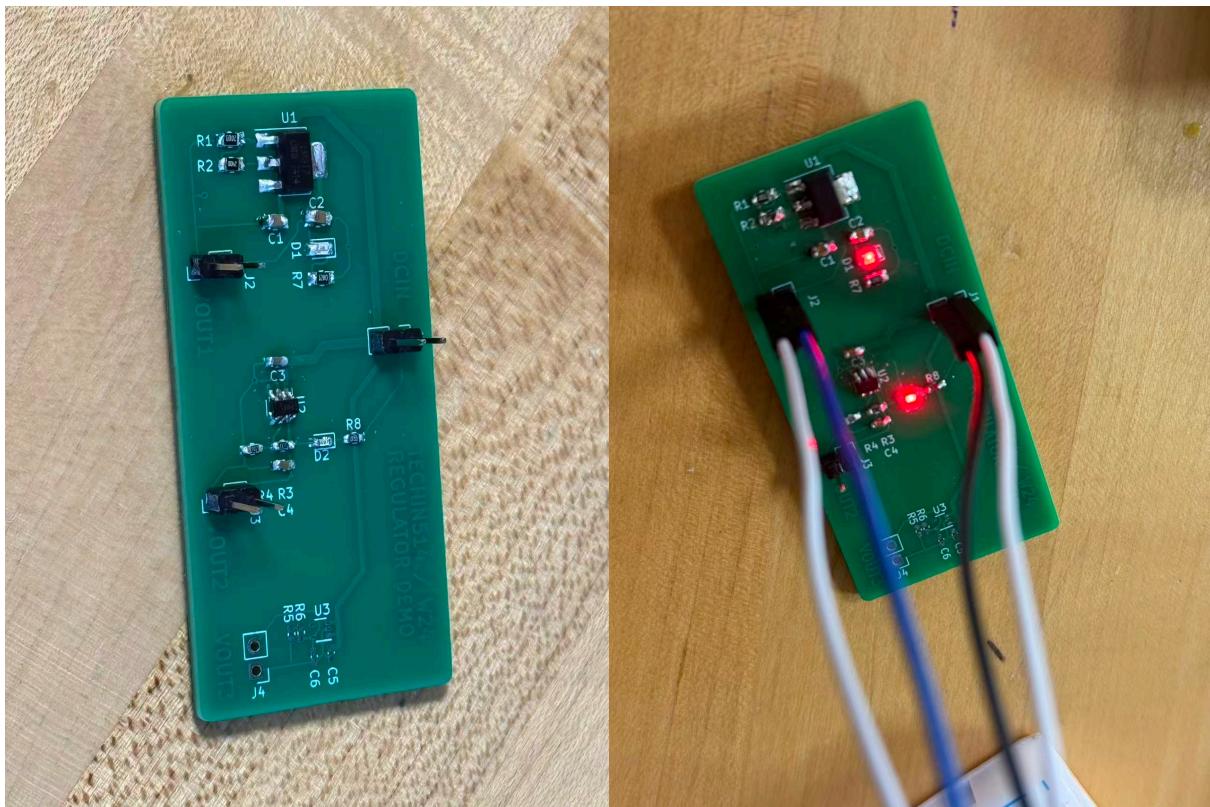
Selected Resistors

Resistors	Calculated	Selected
R1	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, 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

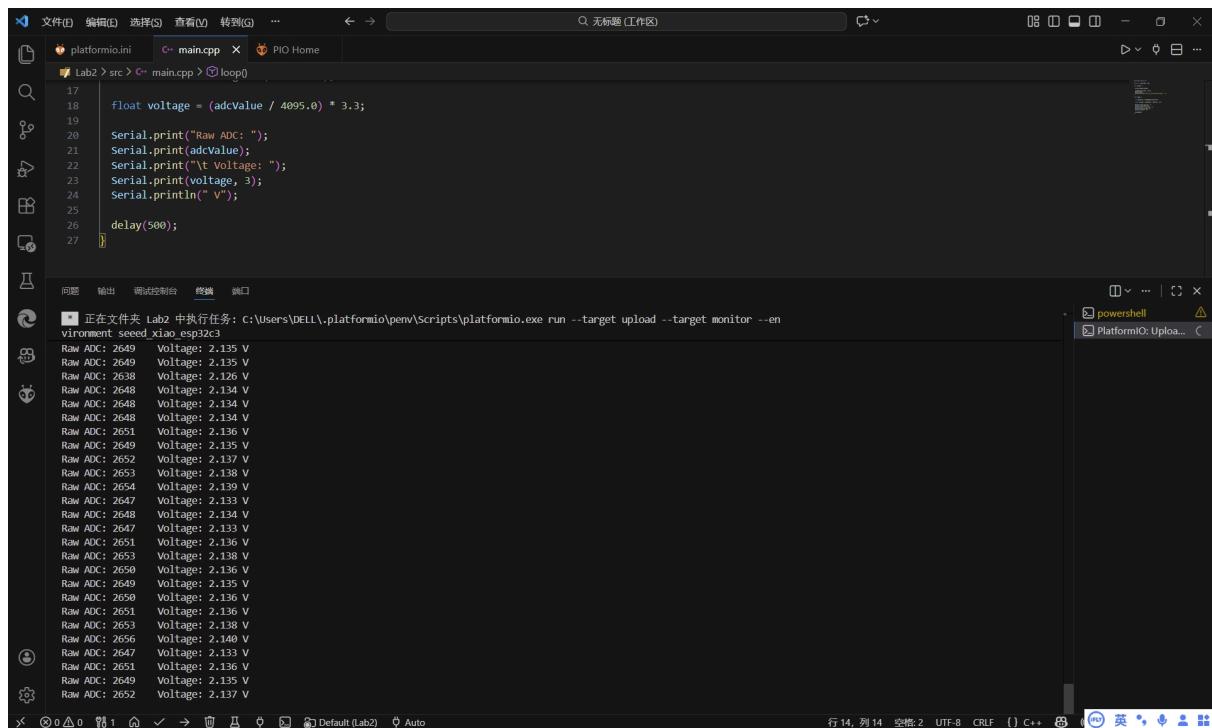


Github

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

ESP32 Output

VOUT1 ≈ 2.13 V



The screenshot shows the PlatformIO IDE interface with the main.cpp file open. The code prints raw ADC values and their corresponding voltages. The terminal window shows the output of the serial monitor.

```
platformio.ini          main.cpp      PIO Home
Lab2 > src > main.cpp > loop()

17   float voltage = (adcValue / 4095.0) * 3.3;
18
19   Serial.print("Raw ADC: ");
20   Serial.print(adcValue);
21   Serial.print("\t Voltage: ");
22   Serial.print(voltage, 3);
23   Serial.println(" V");
24
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
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: 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 ≈ 2.55 V

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

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
Raw ADC: 3166 Voltage: 2.551 V
Raw ADC: 3160 Voltage: 2.547 V
Raw ADC: 3179 Voltage: 2.562 V
Raw ADC: 3167 Voltage: 2.552 V
Raw ADC: 3160 Voltage: 2.547 V
Raw ADC: 3166 Voltage: 2.551 V
Raw ADC: 3161 Voltage: 2.547 V
Raw ADC: 3176 Voltage: 2.559 V
Raw ADC: 3165 Voltage: 2.551 V
Raw ADC: 3165 Voltage: 2.551 V
Raw ADC: 3151 Voltage: 2.539 V
Raw ADC: 3163 Voltage: 2.549 V
Raw ADC: 3177 Voltage: 2.569 V
Raw ADC: 3162 Voltage: 2.548 V
Raw ADC: 3150 Voltage: 2.538 V
Raw ADC: 3163 Voltage: 2.549 V
Raw ADC: 3150 Voltage: 2.538 V
Raw ADC: 3166 Voltage: 2.551 V
Raw ADC: 3151 Voltage: 2.539 V
Raw ADC: 3163 Voltage: 2.549 V
Raw ADC: 3160 Voltage: 2.547 V
Raw ADC: 3180 Voltage: 2.563 V
Raw ADC: 3164 Voltage: 2.550 V
Raw ADC: 3177 Voltage: 2.560 V
Raw ADC: 3180 Voltage: 2.563 V
Raw ADC: 3162 Voltage: 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.