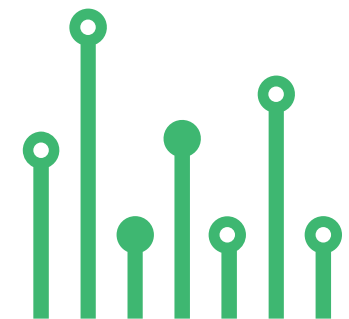


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# I2C DAC Controlled Electronic Load, Battery Performance Tester



SKU: EI143803

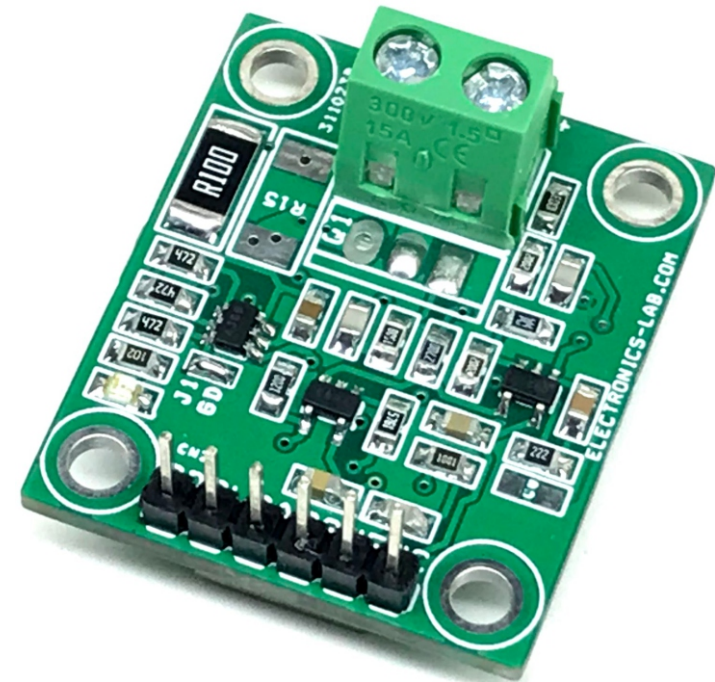
# I2C DAC Controlled Electronic Load, Battery Performance Tester



The project presented here is an I2C electronic load, intended for testing power supplies, solar panels, batteries, and supercapacitors. The board consists of an I2C interface DAC MCP4725, OPAMP U2 acts as V to I (Voltage to Current), OPAMP U3 measures the load current across the shunt resistor and provides 0 to 4.9V Voltage with a current range of 0 to 1A. Users may control the battery discharge current using the MCP4725 DAC in the range 0 to 1A. The circuit also provides load current feedback and voltage feedback. This way it can help users to measure the battery's performance. Suppose the user desires to measure the battery's performance as it is being discharged at constant power. In that case, a current measuring circuit can be used in the feedback loop to enforce the constant power constraint. This enables you to discharge a battery at a controlled way. The project can handle 1A @ 24V, thus a total of 24W with the use of a large-size heatsink and fan. The circuit works with 5V DC voltage input. The project can be used with Arduino, ESP32, or other microcontroller.

## FEATURES

- Supply 5V DC
- Maximum Load 24W with Large Heatsink and Fan
- Maximum Load Voltage 24V
- On Board Amplifier for Current Feedback I to V Converter
- On Board Divider Resistor for Voltage Feedback
- V to I Controlled Using I2C DAC
- Easy Micro-Controller Interface
- On Board Power LED
- Header Connector for easy connections to Arduino
- 4 X 3MM Mounting Holes
- PCB Dimensions 33.81X28.73MM



## ARDUINO CONNECTION TO ELECTRONIC LOAD

- Arduino Vs Electronic Load
- 5V = CN2 Pin 1 VCC (5V Power to Electronic Load)
- VF Connect It Any Arduino Analog Pin A0 to A3, Voltage Feedback (CN2 Pin 2)
- CS Connect It Any Arduino Analog Pin A0 to A3, Current Feedback (CN2 Pin 3)
- SDA Arduino A4 (CN2 Pin 4)
- SCL Arduino A5 (CN2 Pin 5)
- GND = Arduino GND (CN2 Pin 6)

### Voltage Feedback

It is important to use the right voltage divider resistor for voltage feedback of the load. For example, for 24V load  $R1=100K$  and  $R2=20K$  will output 4V. For a 3.7V battery,  $R1=10K$  Ohms and  $R2=47K$  Ohms will provide approx. 3V Output.

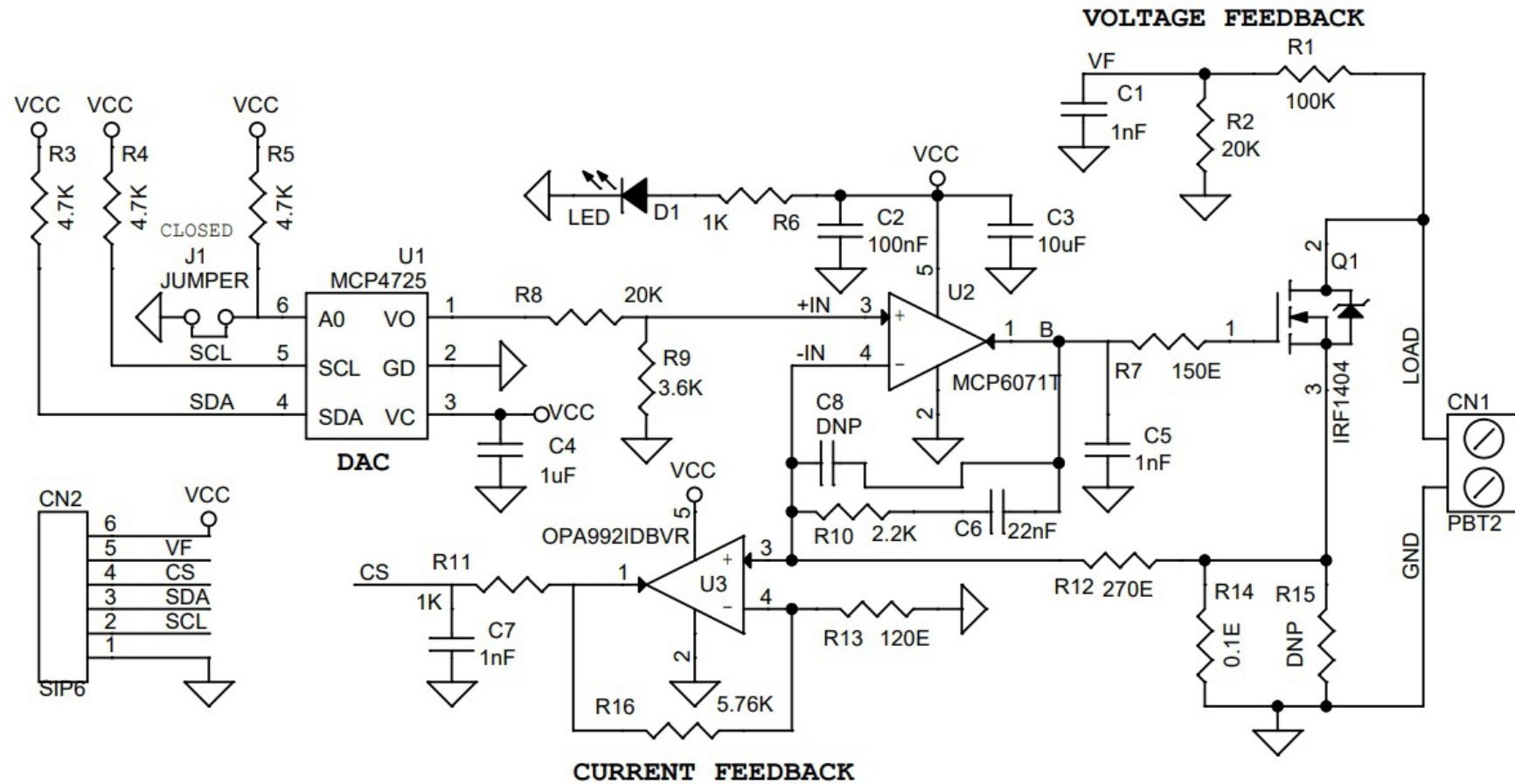
### Current Feedback

U3 OPAMP OPA992IDBVR is used as I to V converter. The amplifier measures the current across the shunt resistor  $R14$  and provides 0 to 4.9V for current 0 to 1A.

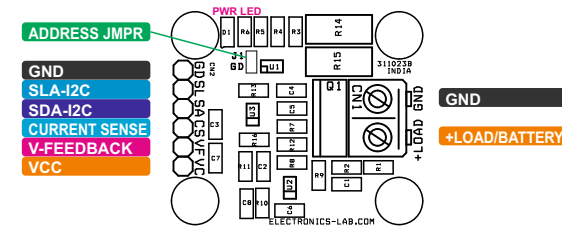
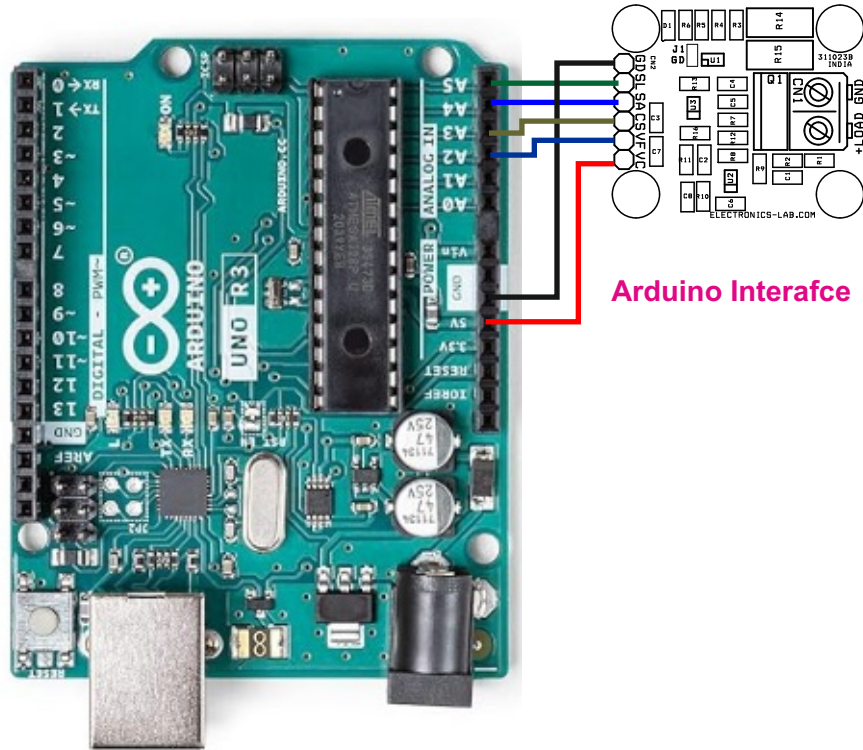
### Arduino Example Code

Download the Arduino code to test the board. We have conducted an easy test with the code. The DAC increases output every 2 seconds in 6 steps, it starts with 0.18A and goes to 1.08A.

# Schematic



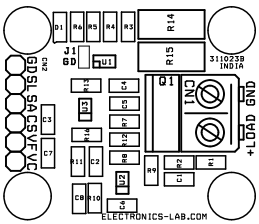
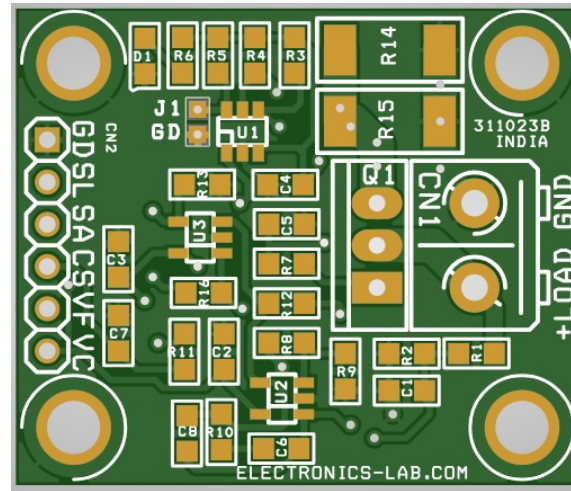
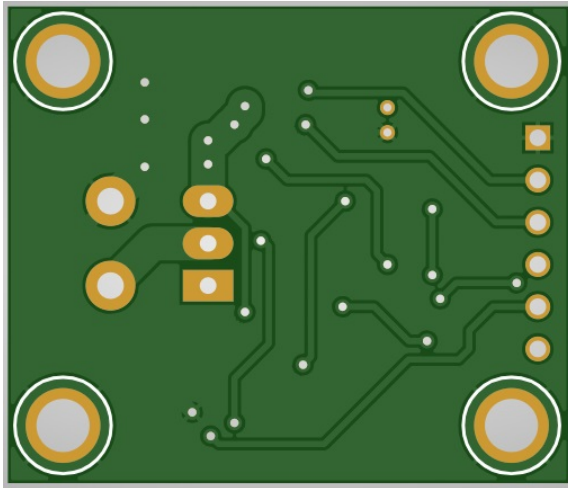
# Connections



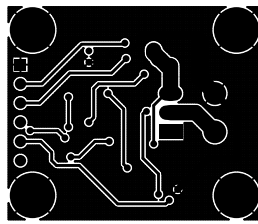
## FEATURES

- Cn1: Pin 1 = Load +, Pin 2 = GND
- CN2: Pin 1 = GND, Pin 2 = SCL (I2C), Pin 3 = SDA (I2C), Pin 4 = Current Sensor Output, Pin 5 = Voltage Feedback, Pin 6 = VCC
- J1: Jumper I2C Address Set
- D1: Power LED

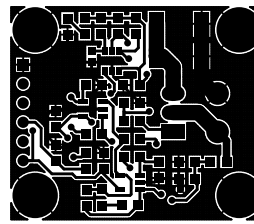
# PCB



SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

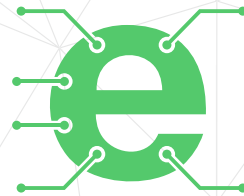
PCB DIMENSIONS 33.81X28.73MM

# Parts List

BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
2	1	CN2	6 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5319-ND
3	3	C1,C5,C7	1nF/50V CERAMIC SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
4	1	C2	100nF/50V CERAMIC SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
5	1	C3	10uF/35V CERAMIC SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
6	1	C4	1uF/35V CERAMIC SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
7	1	C6	22nF/50V CERAMIC SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
8	2	C8,R15	DNP			
9	1	D1	LED RED SMD SIZE 0805	OSRAM	DIGIKEY	475-1278-1-ND
10	1	J1	SOLDER JUMPER-PCB			
11	1	Q1	IRF1404 TO220 MOSFET	INFINION	DIGIKEY	IRF1404PBF-ND
12	1	R1	100K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
13	2	R2,R8	20K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
14	3	R3,R4,R5	4.7K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
15	2	R6,R11	1K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
16	1	R7	150E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
17	1	R9	3.6K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
18	1	R10	2.2K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
19	1	R12	270E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
20	1	R13	120E 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
21	1	R14	0.1E 2W 1% SMD SIZE 2512	MURATA/YAGEO	DIGIKEY	
22	1	R16	5.76K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
23	1	U1	MCP4725 SOT23-5	MICROCHIP	DIGIKEY	MCP4725A2T-E/CHCT-ND
24	1	U2	MCP6071T SOT23-5	MICROCHIP	DIGIKEY	MCP6071T-E/OTCT-ND
25	1	U3	OPA992IDBVR SOT23-5	TI	DIGIKEY	296-OPA992IDBVRCT-ND







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