



Diode I-V Characteristics

Materials:

- Digital Multimeter (DMM): [DMM6500](#)
- Direct current (DC) power supply: [2230 High Power Programmable Power Supply](#)
- Resistor (1)
- General purpose diode (1)
- Breadboard
- Jumper wires

Procedure:

$R = 10\Omega$ Diode (D) PN: 1N4936

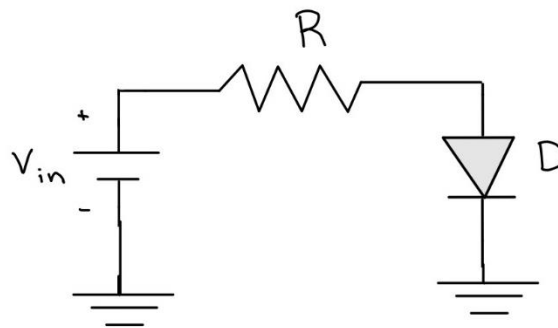


Figure 1. Diode I-V characteristic circuit setup.

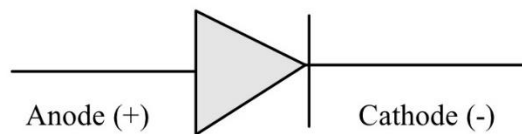


Figure 2. Anode and cathode diagram for standard diode.

1. Build the circuit in Figure 1. making sure to have the diode in the correct orientation. Diodes only allow current to flow from the anode to the cathode. Use the diagram in Figure 2. to understand the polarity of the diode and build the circuit correctly.
2. To understand the forward bias region of the diode, a voltage sweep is useful to understand the current and voltage relationship. Fill out Table 1. by sweeping the input voltage from 0 V to 3 V. Configure the power supply to limit the current to around 0.3 Amps to protect the diode. Use the DMM to measure the voltage and current across the diode. Make sure to switch the lead connections into the DMM when switching between measuring voltage and current.





Input Voltage (V)	Diode Current	Diode Voltage
0.1		
0.2		
0.3		
0.4		
0.5		
0.6		
0.7		
0.8		
0.9		
1		
1.5		
2		
3		

Table 1. Diode current and voltage measurements.

- Notice the trend of the current and voltage. The threshold voltage of a diode is the minimum voltage needed to create a conducting path along the diode. At what voltage does the diode's current increase significantly? Does this voltage make sense as the diode's threshold voltage?
- With the collected data in Table 1., create a plot of the diode voltage vs. the diode current. Plot the estimated threshold voltage based on the measurement data collected. Examine the exponential increase in current with change in voltage.

Instructor's Notes:

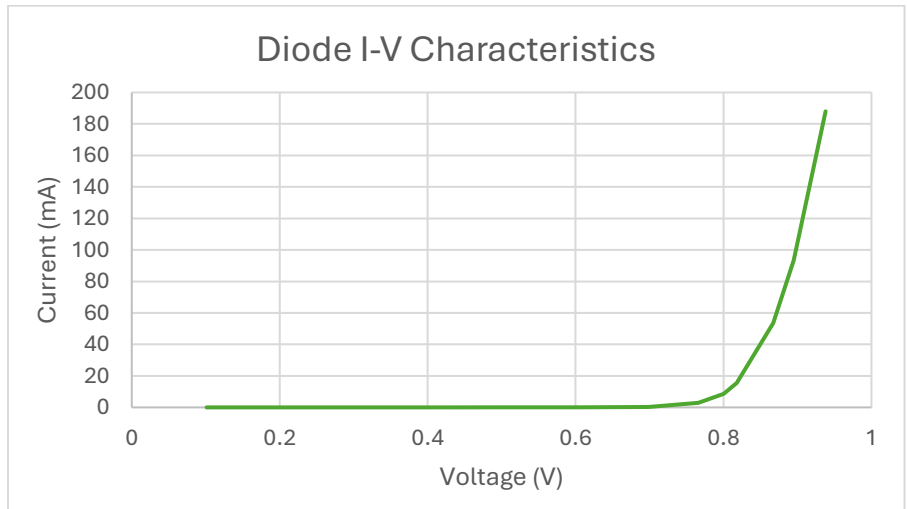


Figure 1. Plotted diode voltage vs diode current.





Input Voltage (V)	Diode Current	Diode Voltage
0.1	0.0002 μ A	101.2 mV
0.2	0.002 μ A	0.2012 V
0.3	0.32 μ A	0.3012 V
0.4	0.04 μ A	0.401 V
0.5	0.335 μ A	0.501 V
0.6	6.67 μ A	0.601 V
0.7	0.237 mA	0.6981 V
0.8	2.93 mA	0.766 V
0.9	8.69 mA	0.8 V
1	15.5 mA	0.818 V
1.5	53.4 mA	0.867 V
2	93.4 mA	0.895 V
3	0.188 A	0.938 V

Table 1. Experimental values from step 2 with a 1N4936 diode.

Find more valuable resources at [TEK.COM](https://www.tek.com)

