

NEUB CSE 214 LAB 1

North East University Bangladesh

Department of CSE

Course no: CSE 214

Experiment no: 01

Experiment Name: Introduction to diode

CAUTIONS:

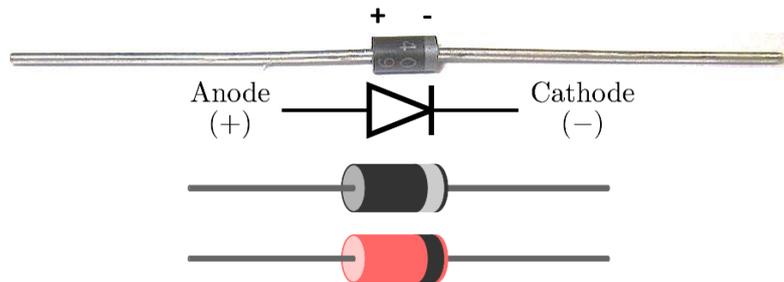
1. Don't switch on the supply of the circuit until you have verified the circuit carefully
2. Take readings of apparatus carefully
3. Take care of any bare circuit elements in energized condition
4. Never try to touch bare live wires

Objective

The objective of this experiment is to understand the basics of PN junction diode and to find characteristics of a diode.

Theory

A diode is a 2 terminal device commonly found in a cylindrical shape with the number written around it. There is a silver line (In case of black diodes and black marking in case of diodes with lighter body colour) wrapping the cylinder in 1 side of the cylinder indicating the negative side of the diode.



To check if a diode is ok or not we can employ three techniques

- (1) a digital display meter (DDM) with a diode checking function
- (2) the ohmmeter section of a multimeter
- (3) Tracing curve

Diode Checking Function

Many Digital Display Multimeters have functionalities for measuring diode forward bias voltage. A digital display meter with a diode checking capability appears in Fig. 2. Note the small diode symbol at the top right of the rotating dial. When set in this position and hooked up as shown in Fig. 1a, the diode should be in the "on" state and the display will provide an indication of the forward-bias voltage such as 0.67 V (for Si).

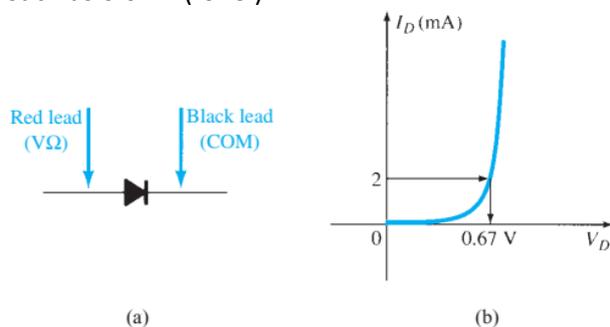


Figure 1 Checking a diode in the forward bias state



Figure 2 Digital display meter.

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Ohmmeter testing

we found that the forward-bias resistance of a semiconductor diode is quite low compared to the reverse-bias level. Therefore, if we measure the resistance of a diode using the connections indicated in Fig. 3, we can expect a relatively low level. The resulting ohmmeter indication will be a function of the current established through the diode by the internal battery (often 1.5 V) of the ohmmeter circuit. The higher the current, the lower is the resistance level. For the reverse-bias situation the reading should be quite high, requiring a high resistance scale on the meter, as indicated in Fig. 13b. A high resistance reading in both directions indicates an open (defective-device) condition, whereas a very low resistance reading in both directions will probably indicate a shorted device.

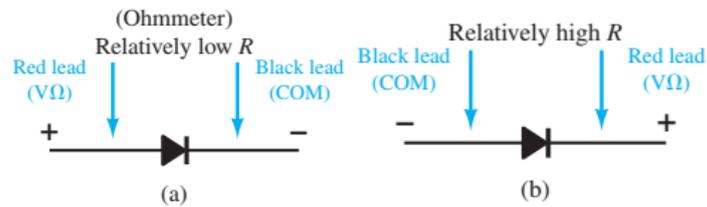


Figure 3 Checking a diode with an ohmmeter.

Tracing the curve

For tracing the curve we can use the following circuit and plot the current versus voltage relationship on a graph paper.

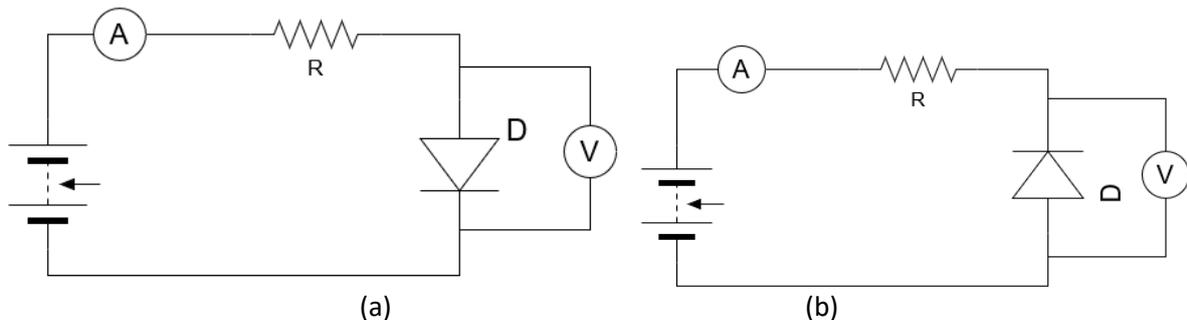


Figure 4 Circuit for finding IV characteristics of a diode

Apparatus Needed

- Trainer Board (Bread board)
- Diode
- Resistor
- DC Voltmeter
- DC Ammeter
- DC power supply
- Connecting wires

Procedure

1. Identify the diode number from the diode and find the datasheet from internet.
2. Identify which side is positive and which side is negative
3. Use the datasheet to find the
 - a. V_K
 - b. PRV rating
 - c. Maximum reverse current
4. Find the forward bias voltage of the diode using a multimeter. [Ref: Fig 1]
5. Measure forward bias resistance and reverse bias resistance using ohmmeter. [Ref: Fig 3]
6. Identify in which of the circuit in figure 4 is the diode forward biased and reverse biased.
7. For tracing IV characteristics
 - a. Measure 8 Readings of voltage and current for Forward Biased diode. [0 V to 1.4 V with 0.2V interval]
 - b. Measure 8 Readings of voltage and current for Reverse Biased diode. [0 V to 14 V with 2V interval]
8. Plot the graph from the data in step 7

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Table 1 Data for steps 1 through 6

Step	Measurement Name	Measurement / Identification
1	Diode number	
3	V_K	
	PRV rating	
	Maximum reverse current	
4	Forward Bias Voltage	
5	Forward Bias Resistance	
	Reverse Bias Resistance	
6	Diode Forward Biased	
	Diode Reverse Biased	

Table 2 Data for Step 7 through 8

V (in Volts)	I
-14	
-12	
-10	
-8	
-6	
-4	
-2	
0	
0.2	
0.4	
0.6	
0.8	
1.0	
1.2	
1.4	

Report

1. Carefully Fill all the data for table 1 and 2
2. Plot IV characteristics graph for the diode
3. Comment on the learnings from this LAB