

Lab8–PHOTO DIODE

9.1 Introduction

A photodiode is a semiconductor p-n junction device that converts light into an electric current. The current is generated when photons are absorbed in the photodiode. Photodiodes may contain optical filters, built-in lenses, and may have large or small surface areas. Photodiodes usually have a slower response time as their surface area increases. The common, traditional solar cell used to generate electric solar power is a large area photodiode. Photodiodes are similar to regular semiconductor diodes except that they may be either exposed or packaged with a window or optical fiber connection to allow light to reach the sensitive part of the device. Many diodes designed for use specially as a photodiode use a PIN junction rather than a p-n junction, to increase the speed of response. A photodiode is designed to operate in reverse bias.

9.2 Objective

Educational:

V-I characteristics stand for voltage-current characteristics of an electrical component or device. The V-I graph yields valuable information about the resistance and breaks down an electronic component. It also provides the operating region of a component. By studying these characteristics, we can understand where and how to use a component in an electric circuit.

Experimental:

To draw V - I characteristics of Photo Diode for different Light Intensities.

9.3 Prelab Preparation:

Reading:

Construction and working of a Photo Diode, Different types of PhotoDiodes, V-I characteristic curves.

Written:

Keep the worksheet ready with required write up, Formulae, Tabular columns and theoretical values.

9.4 Equipment needed

1. Voltmeter
2. Ammeter
3. Photo Diode
4. Electric Bulb
5. Connecting Wires

9.5 Background

Back Ground: A Photo Diode is a two terminal PN Junction Device, which operates in a reverse mode. It has a small transparent window, which allows light to strike on the PN junction. Fig 2 (a) and (b) shows the structure and schematic symbol of Photo Diode. It may be recalled that a rectifier diode has a very small reverse current when it is reverse biased. The reverse biased current is produced by thermally generated electron hole pairs in the depletion layer, which are swept across the junction by the electric field created by the reverse voltage. In a rectifier diode, the reverse current increases with the temperature due to an increase in the number of electron hole pairs. A Photo Diode differs from a rectifier diode in a sense that its reverse current increases with the light intensity at the PN junction. When there is no incident light, the reverse current is almost negligible and it is called the dark current. An increase in the amount of light energy produces an increase in the reverse current.

9.6 Applications of Photo diodes

- 1) Photo Detection.
- 2) Demodulation.
- 3) Logic Circuits.
- 4) Switching.
- 5) Optional Communication system.
- 6) Character Recognition.

9.7 Circuit Diagram

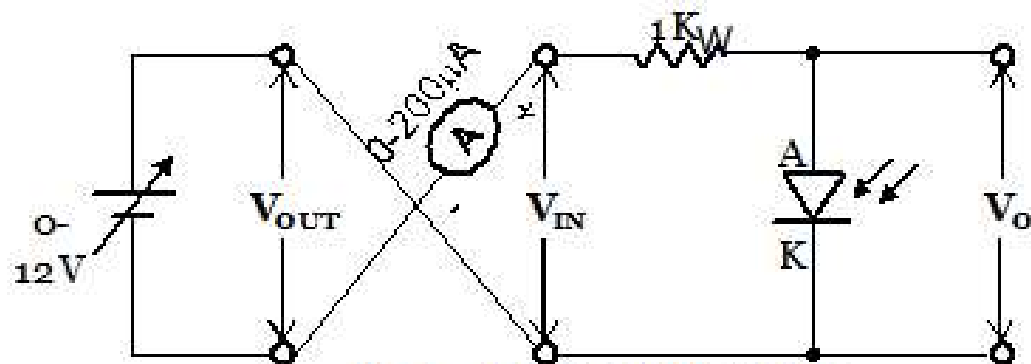


Fig.1. Reverse characteristics