

Other diode types

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Zener diode

- In the breakdown region, the i - v curve has a step curve and a near constant voltage drop (Fig. 1)
- This behavior is used to make voltage regulator¹
- **Zener diodes**—also called **breakdown diodes** are specifically manufactured to operate in the breakdown region².

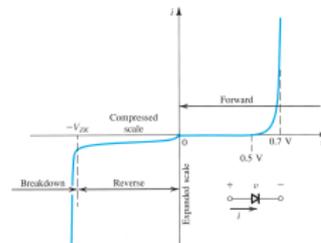


FIG 1. The diode i - v relationship

¹ A voltage regulators are circuits that provide a constant dc output voltage irrespective of changes in their load current and power-supply voltage. See https://en.wikipedia.org/wiki/Voltage_regulator

² Zener diodes have been virtually replaced in voltage-regulator design by

Zener diode

- Zener diodes provide a specified breakdown voltage V_{Z0} .
- Note that although the breakdown voltage is on the negative voltage axis (reverse-bias), its value is given as a positive quantity.
- Fig. 2 shows a circuit symbol of a Zener diode

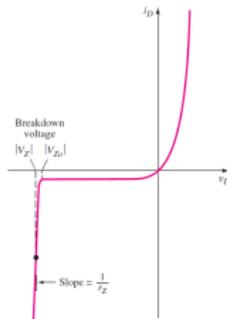
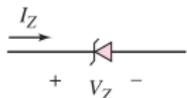


FIG 3. Zener diode i - v characteristics

Solar Cell

- solar cell is a pn junction device with no voltage directly applied across the junction.
- The pn junction, which converts solar energy into electrical energy, is connected to a load
- When light hits the space-charge region, electrons and holes are generated. They are quickly separated and swept out of the spacecharge region by the electric field, thus creating a photocurrent.
- The generated photocurrent will produce a voltage across the load,

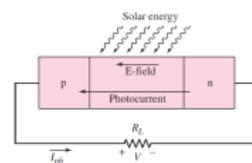


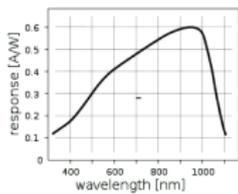
FIG 4. A pn junction solar cell connected to load

Photodiode

- Photodetectors convert optical signals into electrical signals.
- They are similar to a solar cell except that the pn junction is operated with a reverse-bias voltage.



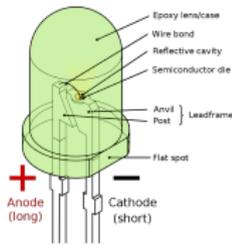
(a) A photodiode



(b) Response of a photo diode vs wavelength of the incident light

Light-Emitting Diode

- The light-emitting diode (LED) converts current to light



¹<https://en.wikipedia.org/wiki/Photodiode>

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¹https://en.wikipedia.org/wiki/Light-emitting_diode

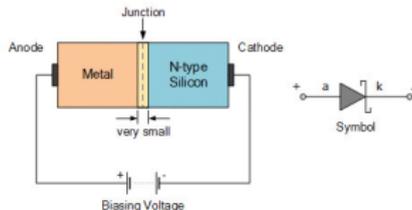
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Schottky diode

- The Schottky Diode is a type of metal-semiconductor diode having a low forward voltage drop and a very fast switching speed



- Schottky diodes are used in rectification, signal conditioning and switching, through to TTL and CMOS logic gates due to their low power and fast switching speeds.

¹<https://www.electronics-tutorials.ws/diode/schottky-diode.html>

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The end