What does a diode do?

Types of diodes:

- **Generic diode**: limit voltage range
- **Zener diode**: voltage reference (reverse bias mode)
- **Light emitting diode**: emit light when forward biased
- **Schottky diode**: high speed generic diode
- **Photodiode**: convert photons into electrons
- **Laser diode**: convert electric current into coherent light
- **Varistor**: voltage limiter for power applications
**Electrical characteristic:**

**Ideal diode**

\[ V > 0 : \text{short circuit} \approx \quad \]
\[ V < 0 : \text{open circuit} \approx \quad \]

**Real diode**

**Effective circuit in the forward direction:**

\[ 0.6V \text{ few } \Omega \]

*Other than Zener diodes designed to operate in the reverse-biased regime for regulation, other types of diodes can break down with strong reverse bias.*

**Working model:**

\[ V > 0.6V : \text{short circuit with a diode drop} \]
\[ V < 0V : \text{open circuit} \]
\[ V \ll -1V : \text{no good. Can lead to damage} \]
Applications:

1. Protection: diode prevents reverse current

   Example A: power supply V $\xrightarrow{i}$ V-0.6 sensitive device, say, laser diode, which cannot be reverse-biased.

   Example B: power supply V $\xrightarrow{i}$

   What's the difference? ExA: limits reverse current $I \geq \text{Inverse}$
   ExB: limits reverse voltage $V \geq -0.6V$

2. Rectifier: convert AC signal into DC signal