

IDEAL DIODES

Introduction to Diodes

Once you graduate from the simple, passive components that are resistors, capacitors, and inductors, it's time to step on up to the wonderful world of semiconductors. One of the most widely used semiconductor components is the diode.

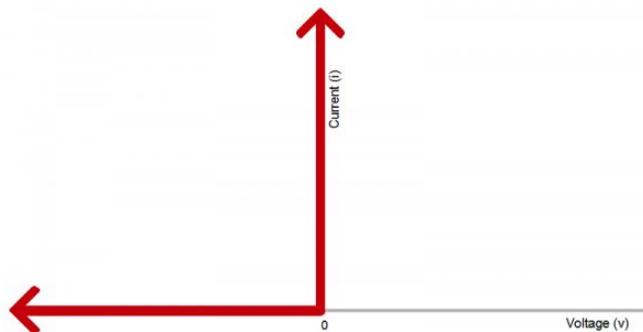


Ideal Diodes

The key function of an **ideal** diode is to control the *direction* of current-flow. Current passing through a diode can only go in one direction, called the forward direction. Current trying to flow the reverse direction is blocked. They're like the one-way valve of electronics.

If the voltage across a diode is negative, no current can flow*, and the ideal diode looks like an open circuit. In such a situation, the diode is said to be *off* or **reverse biased**.

As long as the voltage across the diode isn't negative, it'll "turn on" and conduct current. Ideally* a diode would act like a short circuit (0V across it) if it was conducting current. When a diode is conducting current it's **forward biased**(electronics jargon for "on").



The current-voltage relationship of an ideal diode. Any negative voltage produces zero current – an open circuit. As long as the voltage is non-negative the diode looks like a short circuit.

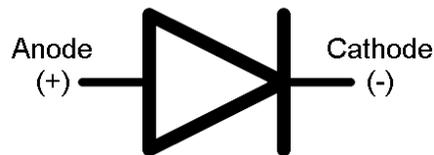
Ideal Diode Characteristics		
Operation Mode	On (Forward biased)	Off (Reverse biased)

Current Through	$I > 0$	$I = 0$
Voltage Across	$V = 0$	$V < 0$
Diode looks like	Short circuit	Open circuit

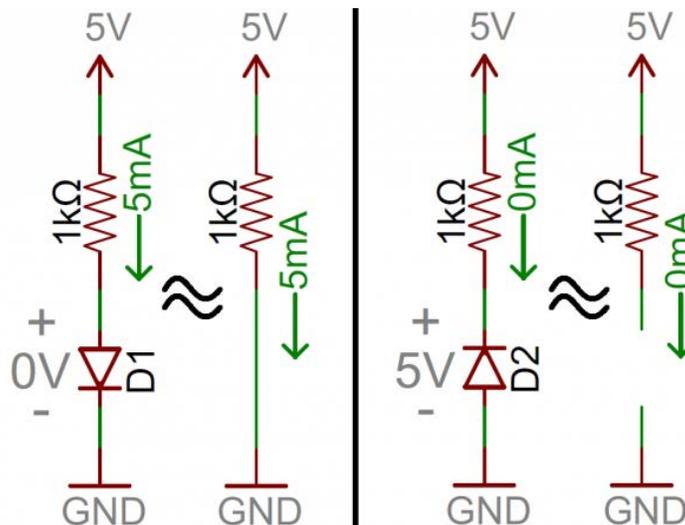
Circuit Symbol

Every diode has **two terminals** – connections on each end of the component – and those terminals are **polarized**, meaning the two terminals are distinctly different. It's important not to mix the connections on a diode up. The positive end of a diode is called the **anode**, and the negative end is called the **cathode**. Current can flow from the anode end to the cathode, but not the other direction. If you forget which way current flows through a diode, try to remember the mnemonic *ACID*: “anode current in diode” (also *anode cathode is diode*).

The **circuit symbol** of a standard diode is a triangle butting up against a line. As we'll cover in the later in this tutorial, there are a variety of diode types, but usually their circuit symbol will look something like this:



The terminal entering the flat edge of the triangle represents the anode. Current flows in the direction that the triangle/arrow is pointing, but it can't go the other way.



Above are a couple simple diode circuit examples. On the left, diode D1 is forward biased and allowing current to flow through the circuit. In essence it looks like a short circuit. On the right, diode D2 is reverse biased. Current cannot flow through the circuit, and it essentially looks like an open circuit.

Source : <https://learn.sparkfun.com/tutorials/diodes#ideal-diodes>