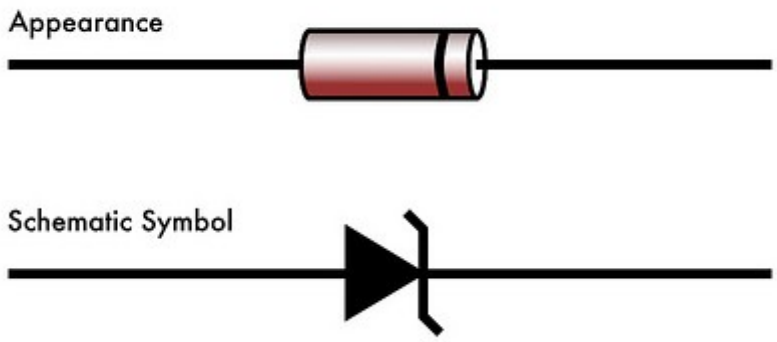
Zener diodes



Zener diodes are a special kind of diode which permits current to flow in the forward direction. What makes them different from other diodes is that Zener diodes will also allow current to flow in the reverse direction when the voltage is above a certain value. This breakdown voltage is known as the Zener voltage. In a standard diode, the Zener voltage is high, and the diode is permanently damaged if a reverse current above that value is allowed to pass through it. Zener diodes are designed in a way where the Zener voltage is a much lower value. There is a controlled breakdown which does not damage the diode when a reverse current above the Zener voltage passes through a Zener diode.

Types of Zener Diodes

There are many different kinds of Zener diodes. At Future Electronics we stock many of the most common types categorized by power dissipation, nominal working voltage, forward (drive) current, forward voltage, packaging type and maximum reverse current. The parametric filters on our website can help refine your search results depending on the required specifications.

The most common values for nominal working voltage are 5.1 V, 5.6 V, 6.2 V, 12 V and 15 V. We also carry Zener diodes with nominal working voltage up to 1 kV. Forward (drive) current can have a range from 200 uA to 200 A, with the most common forward (drive) current being 10 mA or 200 mA.

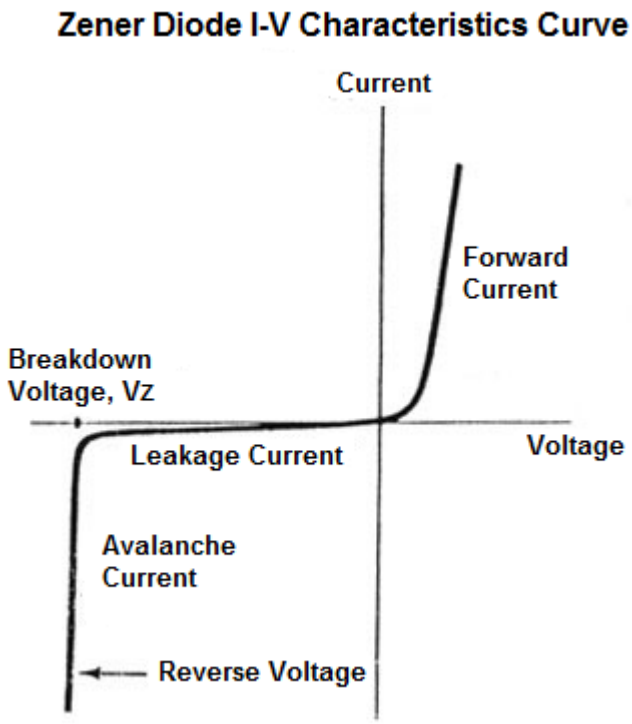
Zener Diodes from Future Electronics

Future Electronics has a full Zener diode chip selection from several manufacturers when designing a circuit and looking for a Zener diode regulator, low voltage Zener diode, high voltage Zener diode, power Zener diode, Zener diode rectifier, 3v Zener diode, 5v Zener diode, 12v Zener diode, 18v Zener diode, 24v Zener diode or for any Zener diode circuits. Simply choose from the Zener diode technical attributes below and your search results will quickly be narrowed in order to match your specific Zener diode application needs.

If you have a preferred brand, we deal with several semiconductor manufacturers such as Fairchild, NXP, Diodes Inc., ON Semiconductor or Vishay, among other chip manufacturers. You can easily refine your Zener diode product search results by clicking your preferred Zener diode brand below from our list of manufacturers.

Applications for Zener Diodes:

Zener diodes can be found in several applications. Some of these are: voltage stabilizers or regulators (in shunt mode), surge suppressors for device protection, peak clippers, switching operations, reference elements and in meter protection applications. The constant reverse voltage of a Zener diode renders it a very useful component in regulating the output voltage against variations in the load resistance or variations in the input voltage from an unregulated power supply. The current through the Zener diode will change in order to keep the voltage within the threshold limits of Zener action and the maximum power that it can dissipate.



The right half side of the characteristics curve is the part in which the zener diode receives forward voltage, which is the positive voltage across its anode to cathode terminals. The diode in this region is in forward biased. During this period, the current is small for a while until it spikes exponentially up once the voltage reaches a certain point, called the threshold voltage.

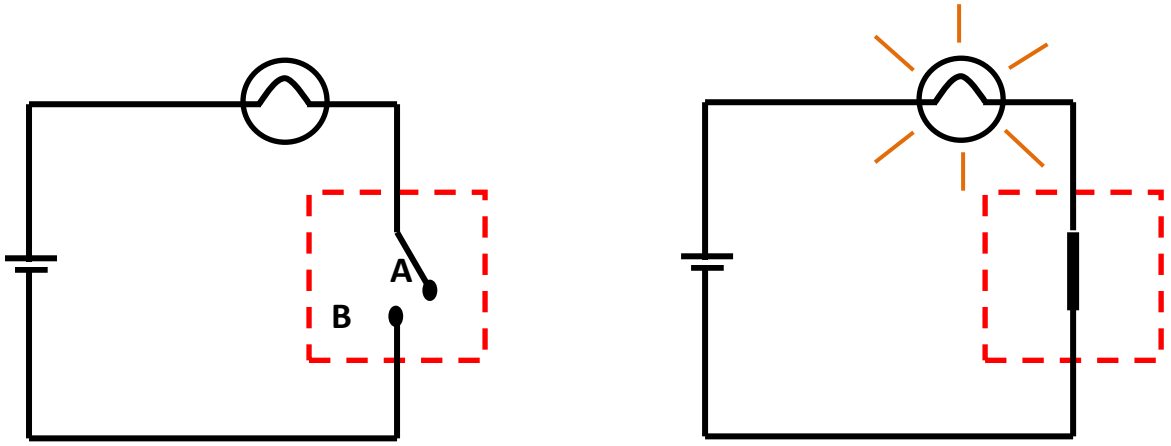
The left half side of the characteristics curve is the more important part, when considering zener diodes. This is the part in which the zener diode receives positive voltage across its cathode to anode terminals. The diode in this region is in reverse biased. At first, when receiving reverse voltage, the current is very small. There is only a small current, called the leakage current, flowing through the diode. Once it hits the breakdown voltage, the current drastically increases. This current is the called the avalanche current, because it spikes so drastically up. The breakdown voltage point is also important, not just because of the avalanche current, but more importantly because once the voltage of the zener diode has reached this point, it remains constant at this voltage, even though the current across it may increase largely. This makes the zener diode useful in applications such as voltage regulation.

The zener diode has the important characteristic in that once the voltage across a zener has reached this breakdown voltage, also called a zener diode's zener voltage, VZ, the voltage that a zener drops across itself will not continue to increase. For example, if a

zener diode has a zener voltage of 5.1V, and the voltage feeding the diode is approximately around 5.1V, the zener will drop the 5.1V across its terminals. Now if the voltage supplying it continues to increase, to say 12V, the zener diode will maintain its zener voltage, 5.1V, even though the voltage (and current) supplying it continues to increase.

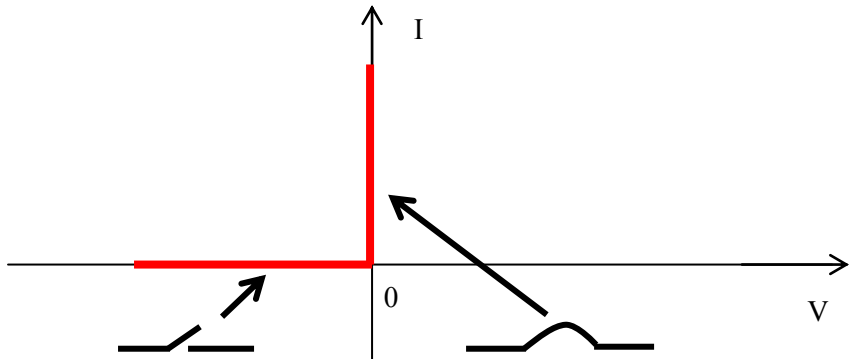
This is the single most important characteristic of a zener diode, which as stated before, allows it it to act as a voltage regulator in a circuit. The voltage that is dropped across a zener will not exceed its breakdown or zener voltage, even if the voltage or current in the circuit increases, which is what the I-V characteristics curve above depicts.

Comparison of V-I characteristics of Ideal Diode and Electric Switch



Potential deference between point A and Point B (V) ≠ 0

Electric current (I) = 0 Resistance between point A and B (R) ⟶ Infinity



This is likely reverse bias of an ideal Diode

This is likely forward bias of an ideal Diode