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## Diode Properties

* Diodes allow current to flow in only one direction.
* Forward biased silicon diodes have 0.7 Volts (700mV) across them.
* Diodes protect circuits from incorrect polarity power connection.
* Electrons flow against the direction of the arrow.
* Diodes convert A.C. into D.C. by blocking one direction of current flow.
* Diodes protect semiconductors from damage caused by high back-emf voltages by allowing the inductor current to die away gradually.
* Zener diodes provide an accurate reference voltage.
* Light emitting diodes emit light. D'Oh!
* LASER diodes emit coherent monochromatic light.
* Photo-diodes are used as light sensors.
* PIN diodes are used as really sensitive and high speed light sensors.
* Lit LEDs have approximately 2 Volts across them.
* Diodes demodulate Amplitude Modulated radio signals.

## Symbols



## Diode Characteristics



## LEDs

|  |  |
| --- | --- |
|  | LED Resistor Calculation – GCSE and AS**Work out the potential difference across the resistor = ( 5 – 2 ) Volts.****R = V / I****R = ( 5 – 2 ) / 0.01****R = 300 Ω****Use 330 Ω to allow a small safety margin.****The colour code of a 5% 330 Ω resistor is****Orange Orange Brown Gold** |

## Zener Diodes

**Zener diodes break down at a specified voltage in reverse bias.
They are most commonly used to provide an accurate reference voltage.**

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| --- | --- |
| Diode zener.gif | Zener Diode Calculation – AS Only* In this circuit assume the load takes a maximum current of 95 mA.
* For reliable operation, the Zener diode must take at least 5 mA.
* Under maximum load, the total current will be 100 mA.
* If the load current decreases, the Zener current increases by the exact same amount.
* With the load disconnected the Zener current rises to 100mA.
* This behaviour ensures that the voltage across the Zener diode remains constant.

If the Zener voltage is 4V and the supply voltage is 9V, the potential difference across R will be 5V.Using Ohm's Law ... R = V / I R = ( 9 - 4 ) / (100 x 10-3) R = 50Ω The nearest suitable preferred value is 47Ω 51Ω would not be suitable because the Zener current might drop below 5mA. |

## Zener Diode Characteristics

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| --- | --- |
| Zener characteristic.gif | In the shaded region, the Zener diode does not provide a correct reference voltage. At least 5 to 10 mA needs to flow before the correct reference voltage is reached. |

## Power Supplies – GCSE

Convert a 230 Volt alternating current into low voltage smooth direct current.



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