

# Components



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**COMPONENTS Resistor** Resistors are used to regulate the amount of current flowing in a circuit- the higher the resistor's value or resistance, the less current that flows and vice-versa. Resistors values are measured in ohms ( $\Omega$ ) and are identified by the colour bands on their bodies. They may be connected into a circuit either way around (i. e., they are not polarised).

Resistors are made in different sizes, capable of dissipating or getting rid of different amounts of energy (as heat). They are also made using different materials as the actual resistive element. Small low power resistors usually have an element made from either carbon or a thin film of metal. Larger resistors made to dissipate more power generally have an element wound from a wire such as nichrome (nickel-chromium alloy).

**Symbol of a resistor:** **Diagram of a resistor:** **Polyester capacitor** Polyester capacitors use polyester plastic film as their insulating dielectric. Some polyester capacitors are called green caps since they are coated on the outside with green (or brown!) plastic to keep out dust and moisture. Their values are specified in microfarads ( $\mu\text{F}$ ) , nanofarads (nF) or picofarads (pF), and range from 1nF up to about 10  $\mu\text{F}$ . They are not polarised.

**Symbol of polyester capacitor:** **Picture of a polyester capacitor:** **Electrolytic capacitor** Electrolytic capacitors (or electrolytic capacitors) use a very thin film of metal oxide as their dielectric, which allows them to provide a large amount of capacitance in a very small volume. They range in value from about 100nF up to hundreds of thousands of microfarads ( $\mu\text{F}$ ). They are commonly used to filter power supply rails, for coupling audio signals and in timing circuits. All electrolytic capacitors allow a very small DC leakage current

through them, but special ??? low leakage??™ types are made so that this leakage current is much smaller than normal. Note that electrolytic capacitors are polarised and the positive and negative leads are clearly marked on their bodies. Be sure to connect them the right way around.

Symbol of electrolytic capacitor: Picture of a electrolytic capacitor: Protection

DiodeIt is a semiconductor device which can pass current in one direction only. In order for current to flow the anode (A) must be positive with respect to the cathode (K). In this condition, the diode is said to be forward biased and a voltage drop of about 0.6V appear across its A and K terminals. If the anode is less than 0.6V positive with respect to the cathode, negligible current flows and the diode effectively behaves as an open circuit. Symbol of a protection diode: Picture of silicon diode: Transistor (NPN)There are two types of standard transistors, NPN and PNP, with different circuit symbols.

The letters refer to the layers of semiconductor material used to make the transistor. Most transistors used today are NPN because this is the easiest type to make from silicon. Symbol of NPN transistor: Picture of NPN transistor: Loud speakerA loudspeaker (or “ speaker”) is an electroacoustic transducer that produces sound in response to an electrical audio signal input.

Symbol of loudspeaker: Picture of loudspeaker: Audio TransformerA transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors??” the transformers coils. A varying current in the first or primary winding creates a varying magnetic flux in the transformers core and thus a varying magnetic field through the

secondary winding. This varying magnetic field induces a varying electromotive force (EMF), or “ voltage”, in the secondary winding. This effect is called mutual induction. Symbol of an audio transformer: Picture of an audio transformer: PotentiometerA potentiometer and colloquially known as a “ pot”) is a three-terminal resistor with a sliding contact that forms an adjustable divider. If only two terminals are used (one side and the wiper), it acts as a variable resistor or rheostat. Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment.

Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Symbol of potentiometer: Picture of potentiometer: Battery clipThe standard battery clip fits a 9V PP3 battery and many battery holders such as the 6 ? AA cell holder shown. Battery holders are also available with wires attached, with pins for PCB mounting, or as a complete box with lid, switch and wires. Many small electronic projects use a 9V PP3 battery but if you wish to use the project for long periods a better choice is a battery holder with 6 AA cells. This has the same voltage but a much longer battery life and it will work out cheaper in the long run. Larger battery clips fit 9V PP9 batteries but these are rarely used now. Symbol of battery clip: Picture of battery clip: