Electronics component guide

[Resistor](https://learn.sparkfun.com/tutorials/resistors) - https://learn.sparkfun.com/tutorials/resistors

- *Made of* = spirals of carbon (charcoal-like material)
- *Function* = limits and reduces flow (current) of electricity
- *Used for* = protecting sensitive components (like LEDs) from spikes in power, directing the flow of electricity by creating more or less “attractive” paths
- *Name of property* = resistance
- *Measured in* = ohms (Ω) - commonly in kilo- and Mega-

Non-polarized

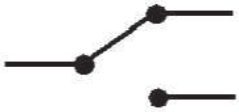
Electrolytic / polarized

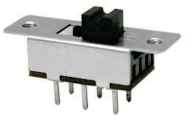
Ceramic - non-polarized

Aluminum - electrolytic / polarized

[Capacitor](https://learn.sparkfun.com/tutorials/capacitors) - https://learn.sparkfun.com/tutorials/capacitors

- *Made of* = two pieces of conductive material with space between them, usually filled with a material that can hold electricity, called a dielectric.
    a. Ceramic and aluminum
- *Function* = stores electricity for later use by discharging
- *Used for* = filtering and smoothing signals and power fluctuations, building up large amounts of electricity for instantaneous use
- *Name of property* = capacitance
- *Measured in* = farads (F) - commonly pico-, nano-, micro-
- *Special notes* = can be polarized (electrolytic) or not.



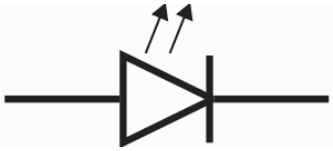


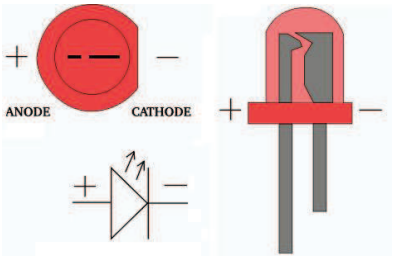
[Switches and buttons](https://learn.sparkfun.com/tutorials/switch-basics)
https://learn.sparkfun.com/tutorials/switch-basics

- *Used for* = allows a human to control the flow of electricity in a circuit by opening or closing pathways
- *Terminals …*
    a. Poles = number of circuits that can be controlled
    b. Throws = number of possible choices that poles can connect to
    c. Shorthand = xPxT - ex. SPDT means single-pole double-throw
- Types …
    a. Momentary = must be held by user or will return to default state
    b. Maintained = keeps state as user left it
    c. Latching = changes state each time it is pressed
    d. Toggle = thin stick
    e. Slide = small nub that moves along one axis
    f. Rocker = angled like a see-saw
    g. Tactile = very small “clicky” switch, used in most consumer devices
    h. Rotary = change state by rotating
    i. DIP = array of tiny rocker or slide switches
    j. Magnetic/reed = glass vessel with metal contacts that connect under external magnetism

Diodes - https://learn.sparkfun.com/tutorials/diodes

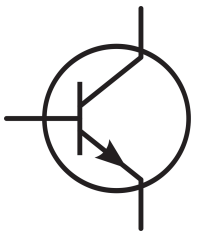
- *Function* = allow electricity to only flow in one direction
- *Used for* = protecting electricity from flowing to parts of circuit it shouldn’t, converting from AC to DC

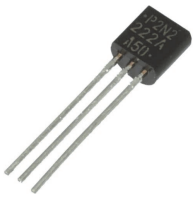




[LEDs](https://learn.sparkfun.com/tutorials/light-emitting-diodes-leds) - https://learn.sparkfun.com/tutorials/light-emitting-diodes-leds

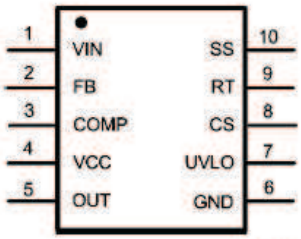
- *Stands for* = **light emitting diode**
- *Function* = **emits light**
- *Properties include …*
    a. **Forward voltage (V) = minimum amount of voltage required to "turn on"**
    b. **Current draw (mA) = amount of current used when "on"**
    c. **Brightness = measured in millicandela (mcd)**
    d. **Wavelength = color, measured in nanometers (nm)**
    e. **Viewing angle = angle of cone from center of LED that light is visible**
    f. **Dimensions = most common types are 3mm and 5mm**



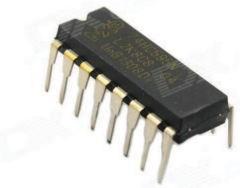


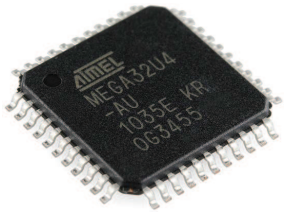
[Transistor](https://learn.sparkfun.com/tutorials/transistors) - https://learn.sparkfun.com/tutorials/transistors

- *Made of* = combinations of silicon tweaked to conduct or insulate
- *Function* = electrically-controlled switch, or can amplify current
- *Used for* = enabling and disabling circuits, amplifying signals and varying the amount of power going into a circuit (PWM)
- *Properties include …*
    a. Types = NPN or PNP
    b. Pins = base, collector and emitter



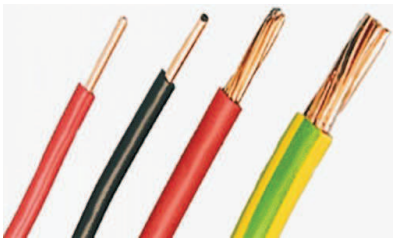
Number of pins and functions vary significantly!





[Integrated circuits (ICs)](https://learn.sparkfun.com/tutorials/integrated-circuits) - https://learn.sparkfun.com/tutorials/integrated-circuits

- *What are they* = self-contained circuits to do useful tasks efficiently using combinations of all other components inside a single box
- *Function* = extremely varied, generally meant to solve specific problems
- *Used for* = achieving desired functionality in very small format



[Wire](https://learn.sparkfun.com/tutorials/working-with-wire) - https://learn.sparkfun.com/tutorials/working-with-wire

- Core type
  a. Stranded = more flexible
  b. Solid = less flexible, but fits into breadboards
- Thickness = measured using American Wire Gauge (AWG)
  a. The larger the AWG, the smaller the diameter
  b. Smaller wires carry less current
- Insulation = most common is PVC.
- Conductors = some wires are actually bundles of multiple wires, referred to as conductors