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Introduction to Hardware

Basics of Electronics Part-I

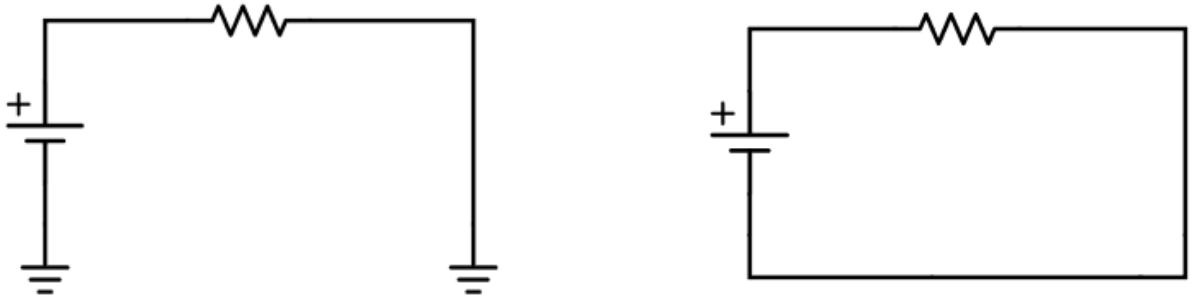
Agenda

- Basic concepts
- Components
- Packages
- Bread Board
- PCB
- Memory
- Hardware Tools

Basic concepts – GND/VCC

GND, VCC and bipolar supply

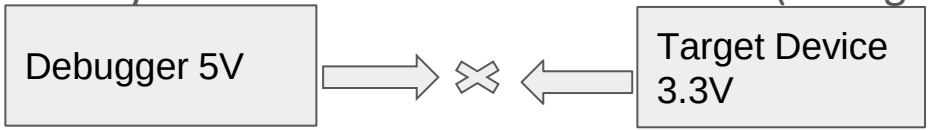
GND:
Ground is just a name we give to a certain point in the circuit, usually 0 volts



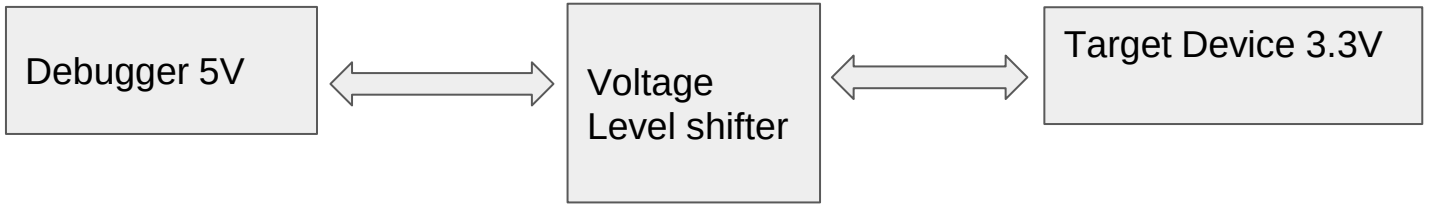
Vcc:
VCC is more commonly labelled V+, VS+ or VDD (voltage drain drain)
V_{CC} and V_{EE} then refer to the plus and minus supply lines respectively in common NPN circuits
It's the highest Voltage in that particular circuit.

Basic concepts - Voltage Level Shifter

- It allows Compatibility between two different Devices (voltage levels)



- Device A and Device B can not communicate with each other



- Level shift can be one direction or are bidirectional, Allowing signals to travel back and forth as needed

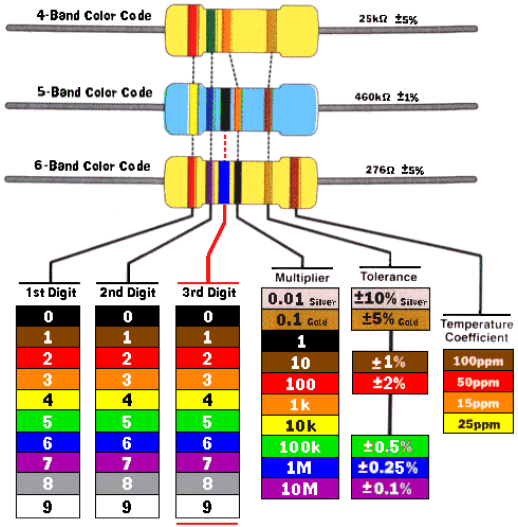
Basic concepts – AC/DC Supply

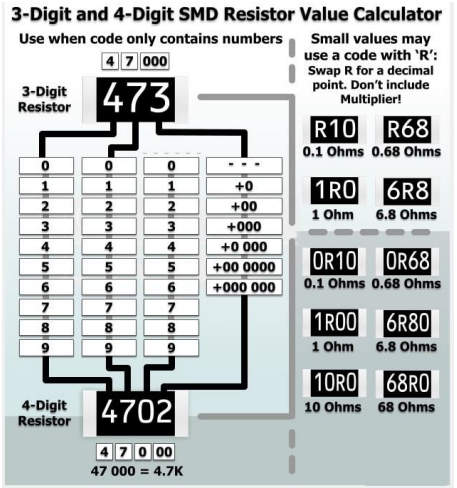
- Difference Between AC and DC supply

	Alternating Current	Direct Current
Amount of energy that can be carried	Safe to transfer over longer city distances and can provide more power.	Voltage of DC cannot travel very far until it begins to lose energy.
Cause of the direction of flow of electrons	Rotating magnet along the wire.	Steady magnetism along the wire.
Frequency	The frequency of alternating current is 50Hz or 60Hz depending upon the country.	The frequency of direct current is zero.
Direction	It reverses its direction while flowing in a circuit.	It flows in one direction in the circuit.
Current	It is the current of magnitude varying with time	It is the current of constant magnitude.
Flow of Electrons	Electrons keep switching directions - forward and backward.	Electrons move steadily in one direction or 'forward'.
Obtained from	A.C Generator and mains.	Cell or Battery.
Passive Parameters	Impedance.	Resistance only
Power Factor	Lies between 0 & 1.	it is always 1.
Types	Sinusoidal, Trapezoidal, Triangular, Square.	Pure and pulsating.

Components

- Resistor
  - An electrical component that limits or regulates the flow of electrical current.
  - Works on the principle of Ohm's Law; **V = IR**



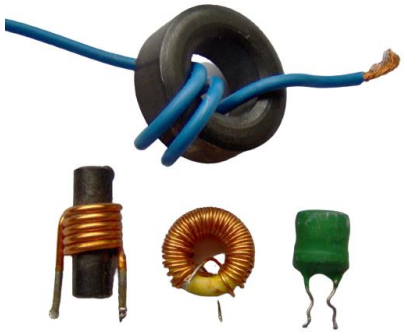


Components

- Capacitor
  - A passive component used to store charge. The charge (q) stored in a capacitor is the product of its capacitance (C) value and the voltage (V) applied to it ; C=Q/V
  - They are used for blocking DC components or bypassing the AC signals. Stabilize the power supply

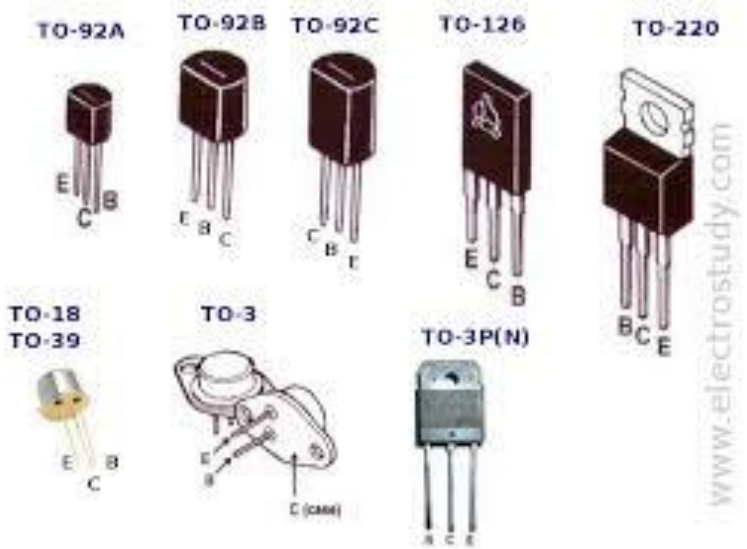
Components

- Inductor
  - A passive electronic component that stores energy in the form of a magnetic field when electric current is flowing through it.
  - Unit of inductance is the Henry (H)



Components

- Transistors
  - Transistor is a semiconductor device which is used to amplify the signals as well as in switching circuits.
  - It’s a active component

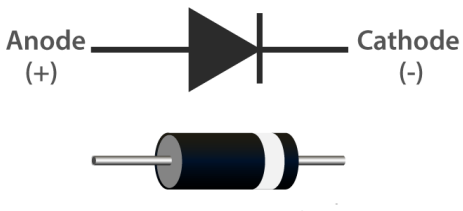


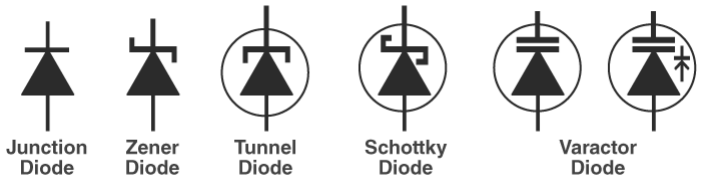
Components

- Crystal Oscillator
  - It is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a precise frequency.

Components

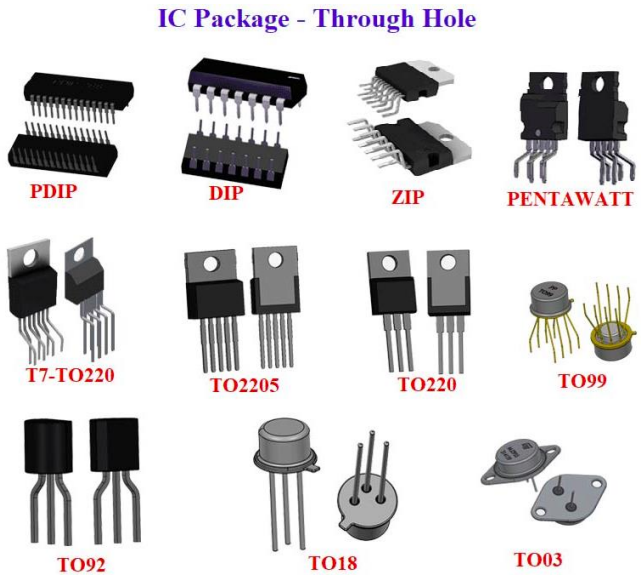
- Diode
  - A diode is a device which only allows unidirectional flow of current if operated within a rated specified voltage level.
  - It acts as a valve in the electronic and electrical circuit.

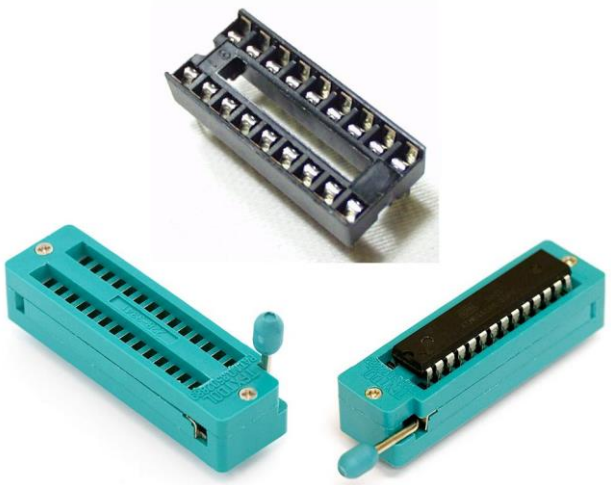




Packages

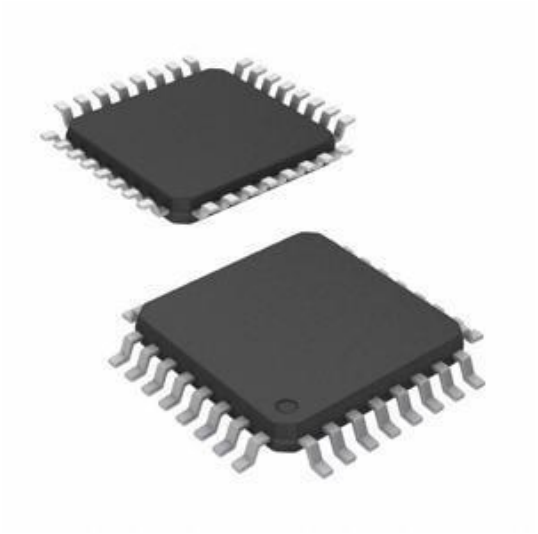
- DIP (Dual In-line Package)





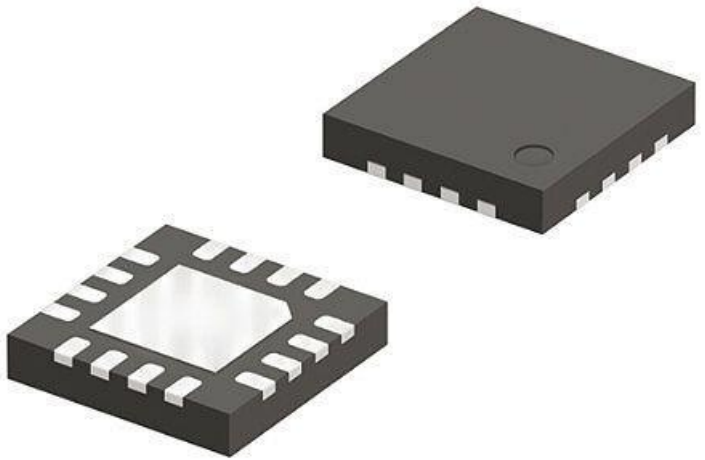
Packages

- Surface-Mount (SMD/SMT) Packages
- Quad Flat Packages (QFP)



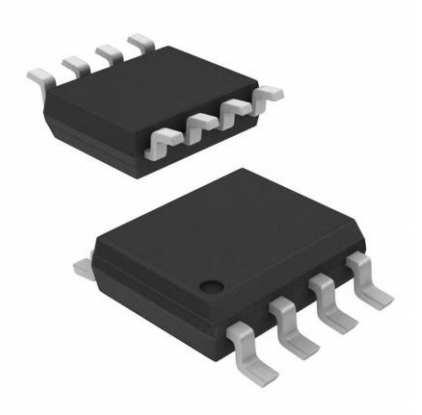
Packages

- Surface-Mount (SMD/SMT) Packages
- Quad Flat No-Lead (QFN)



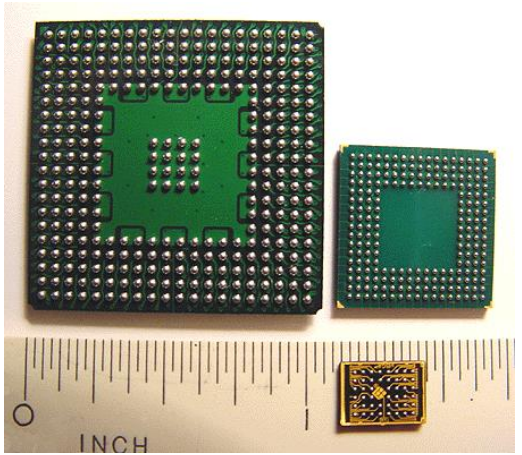
Packages

- Surface-Mount (SMD/SMT) Packages
- SIOC (Small Outline Integrated Circuit)



Packages

- Surface-Mount (SMD/SMT) Packages
- BGA (Ball Grid Arrays)



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