Electronic Components

Resistor

Capacitor

Inductor

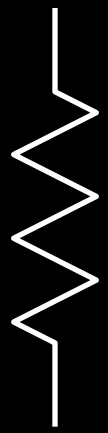
Transformer

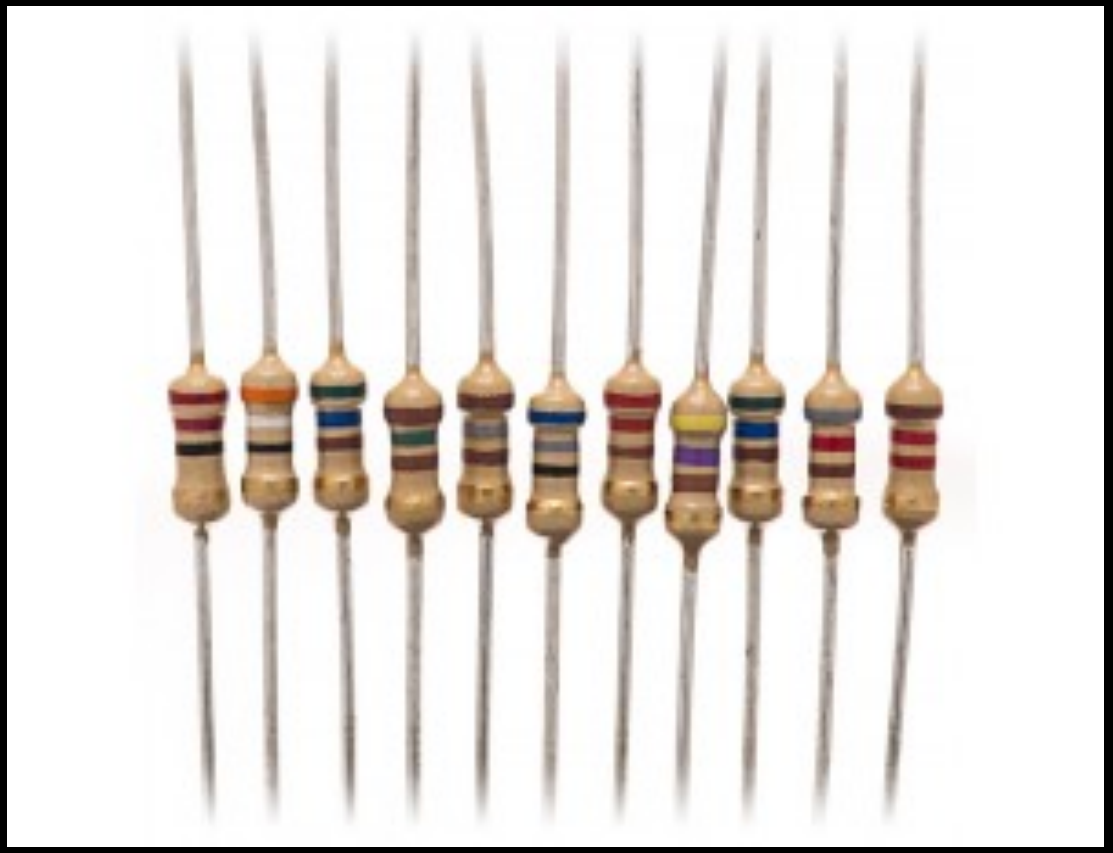
Diode

Transistor

Integrated Circuit

Resistors



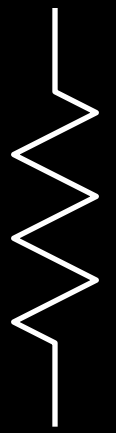


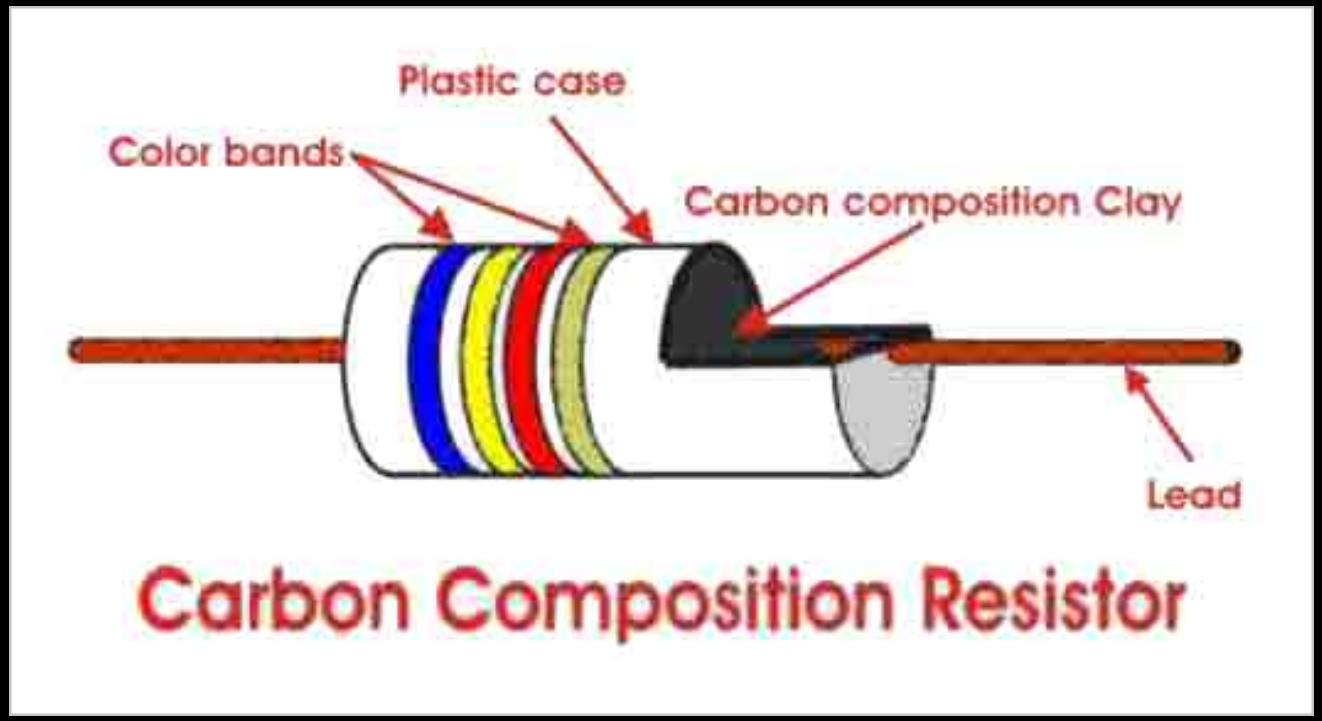
Resistors RESIST the flow of electrons

Measured in Ohms (Ω)

Symbol = R

Resistor composition

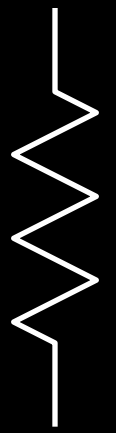


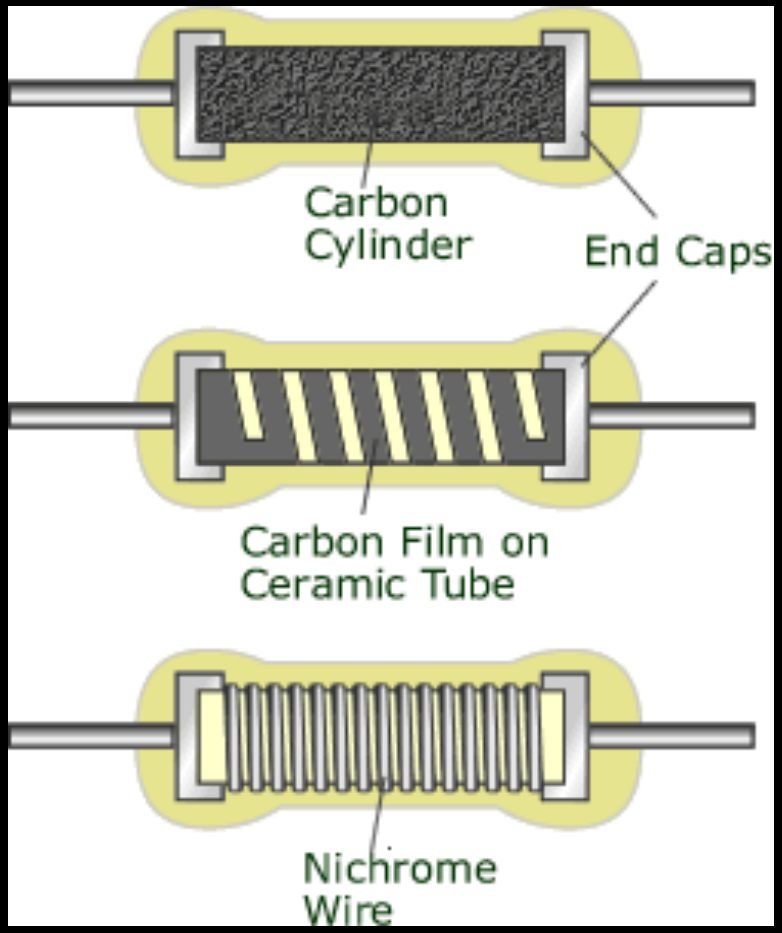


Carbon Composition – most common type of resistor

A slurry of insulating and conducting material is used to control conductivity/resistance

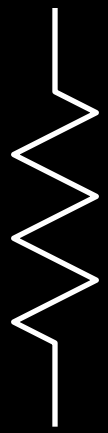
Resistor composition



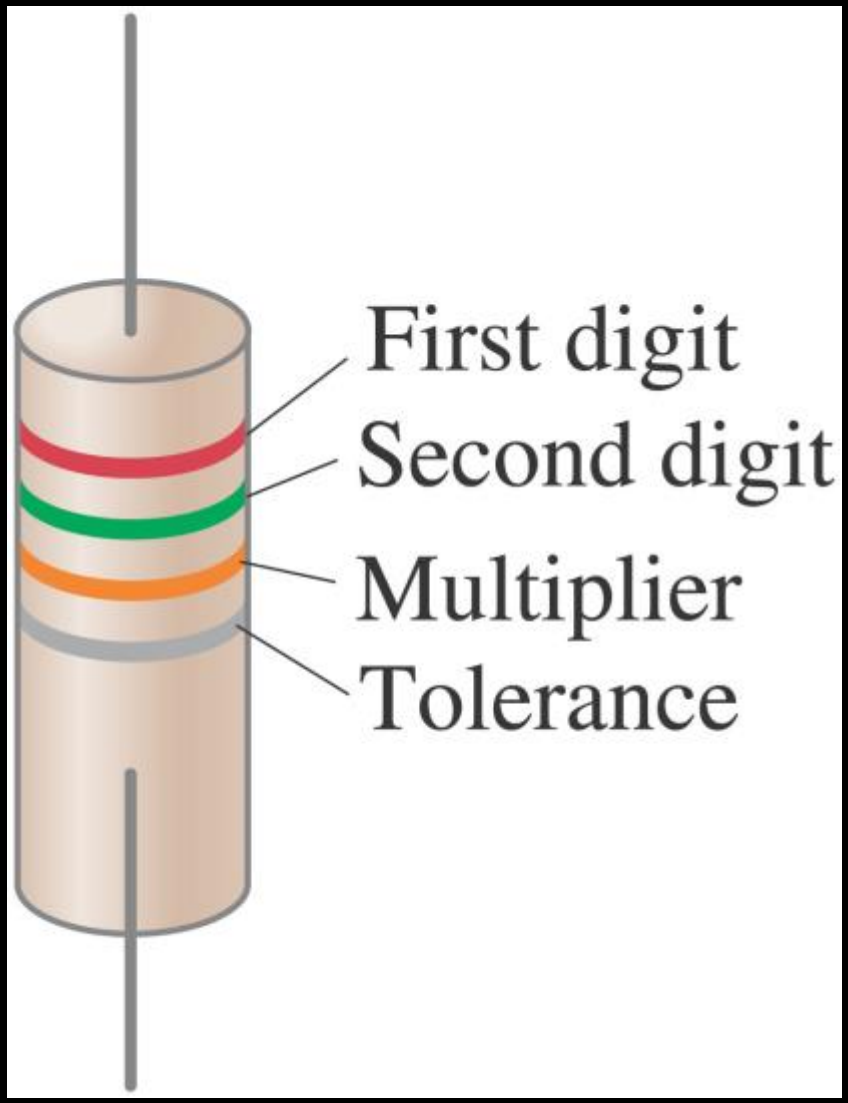


Carbon composition, Carbon film, Wire wound

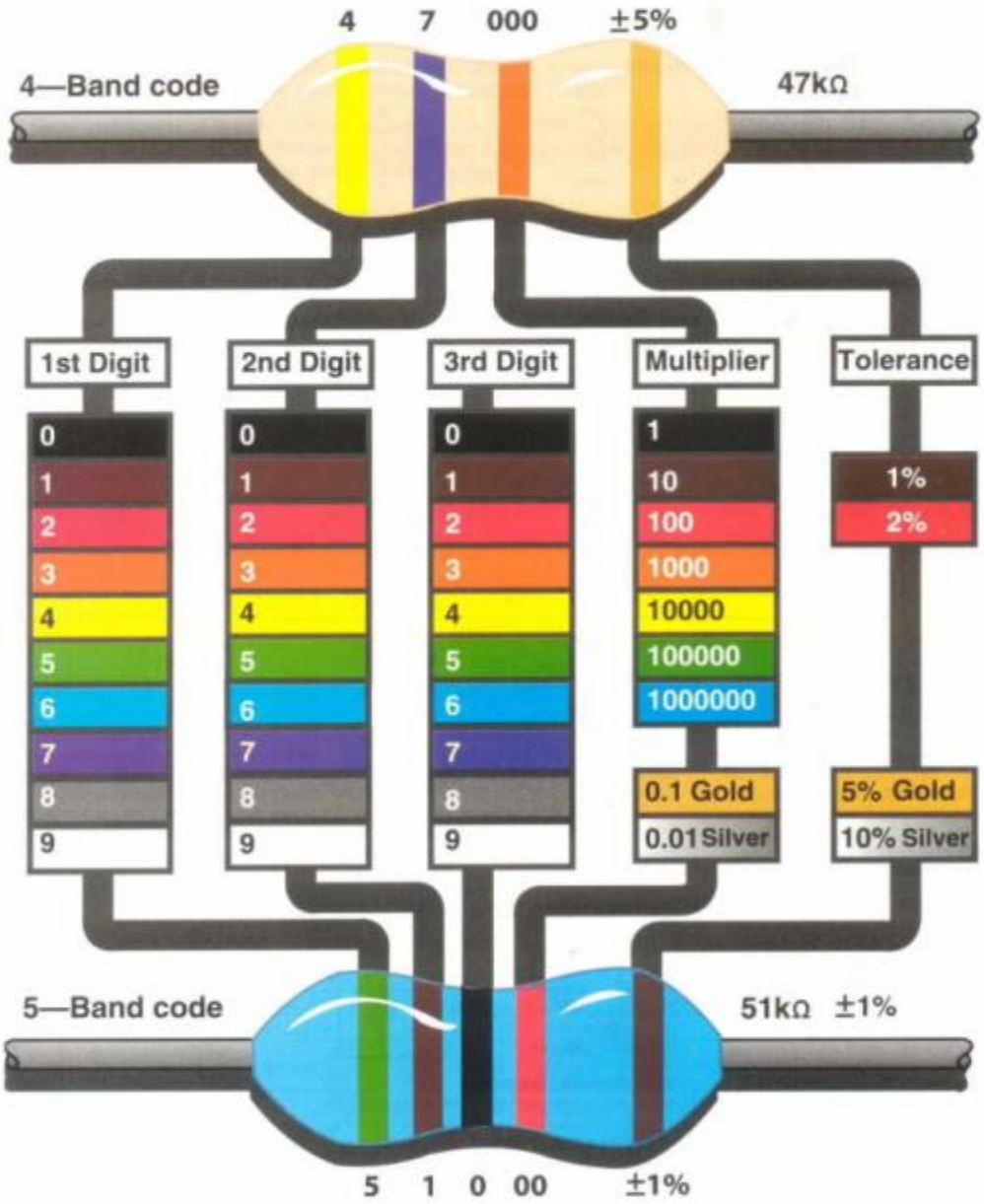
Resistor Color Code



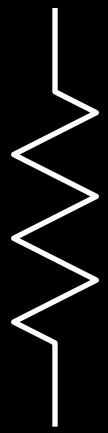
BBROYGBVGW



RESISTOR COLOUR CODE

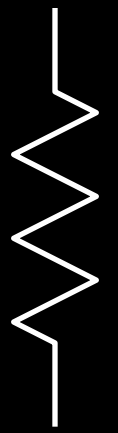


Resistor Color Code



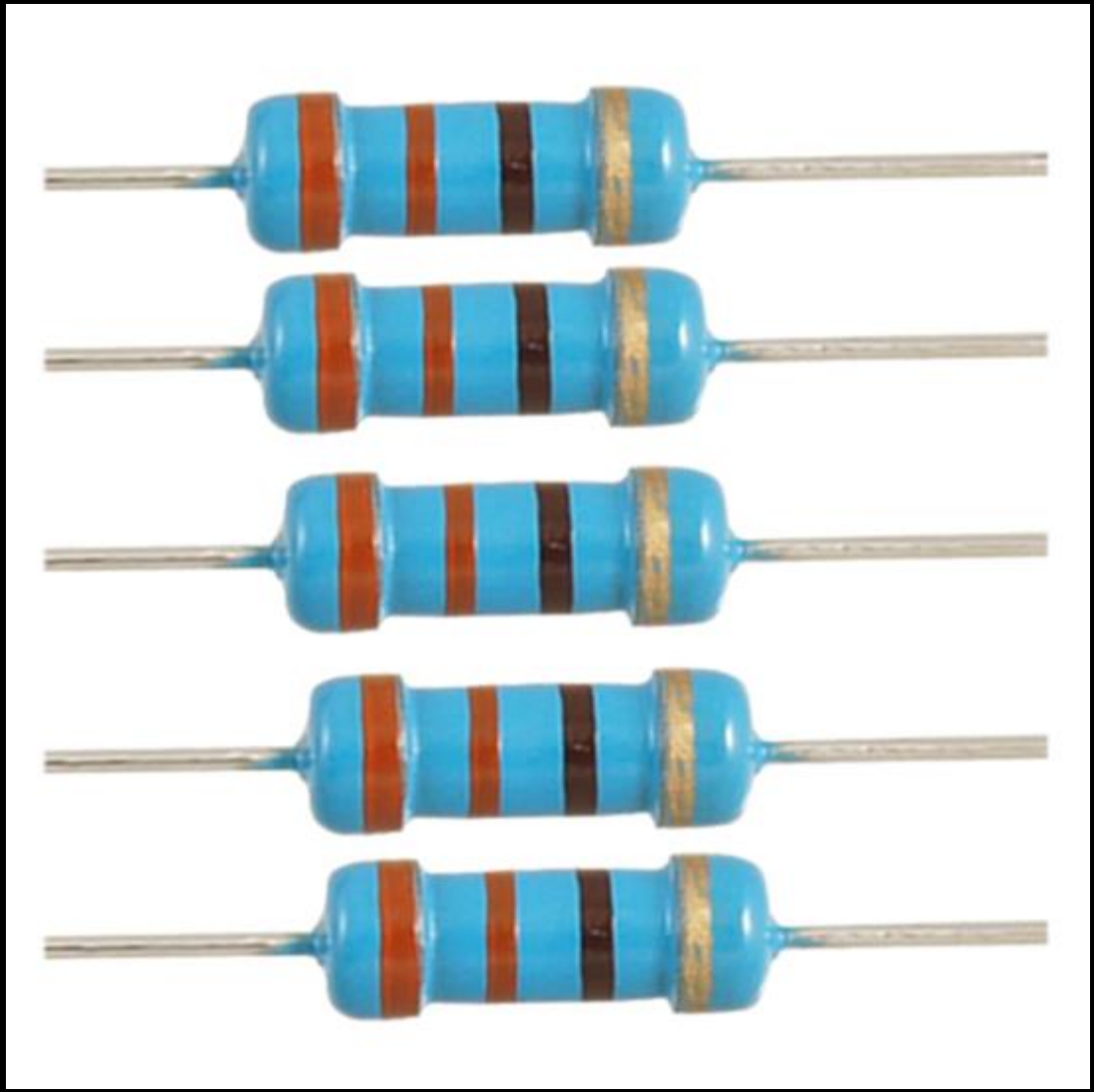
What is the value of this resistor?

Resistor Color Code

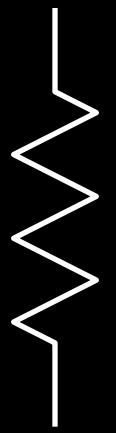


What is the value of these resistors?

orange –orange –brown - gold

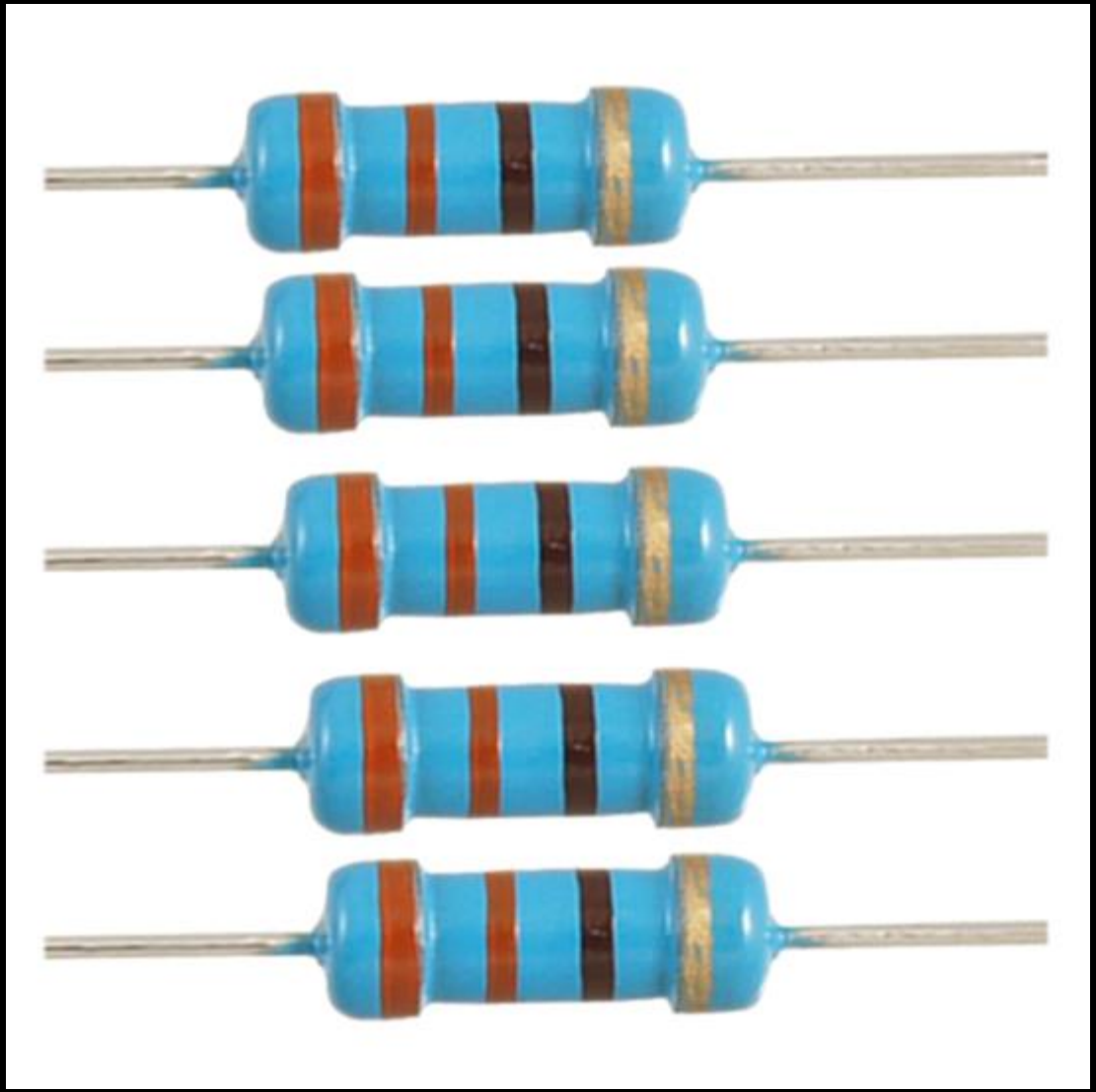


Resistor Color Code

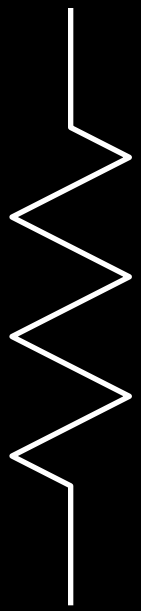


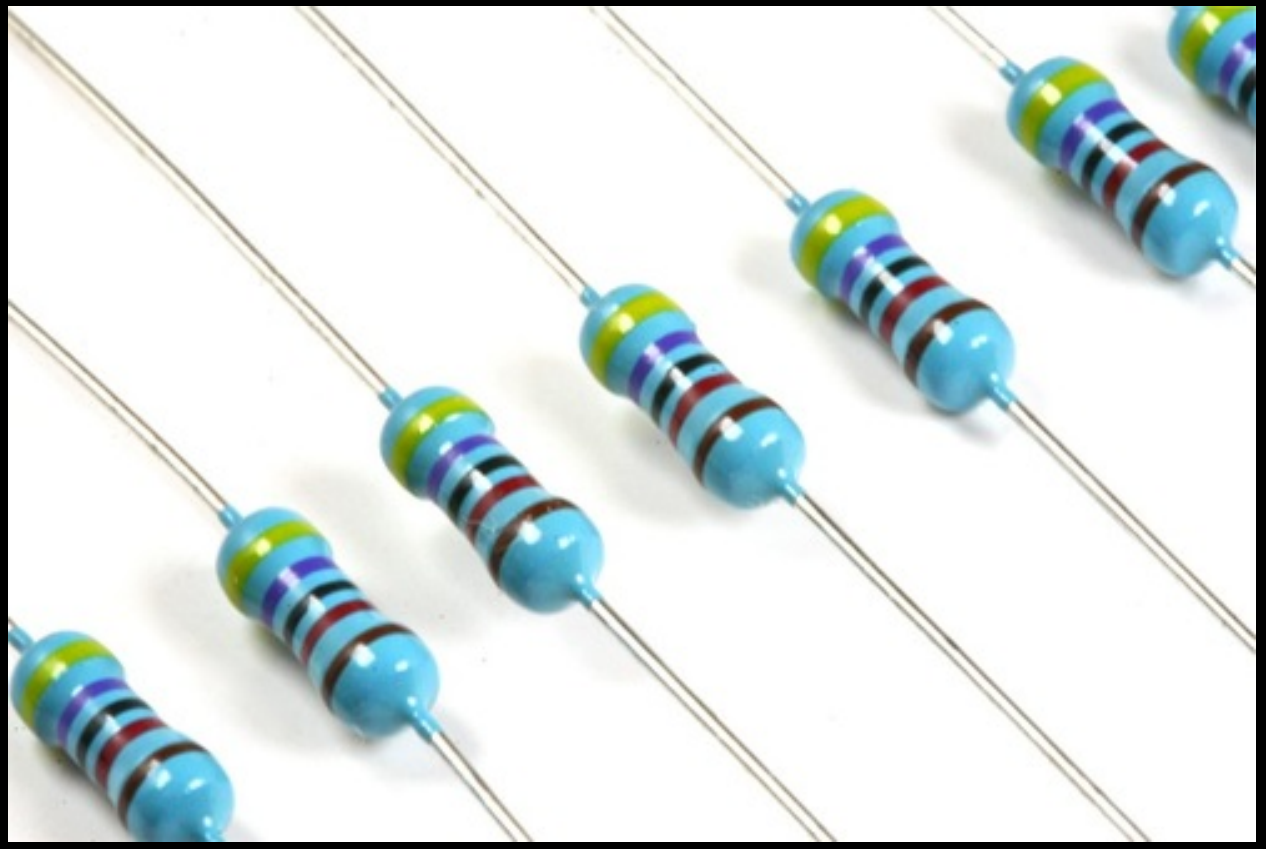
orange – orange – brown – gold

3 - 3 - 1 - +/- 5%



Resistor Color Code





What is the value of these resistors?

Resistors – Power Ratings

Typical:

1/8W

¼ W

½ W

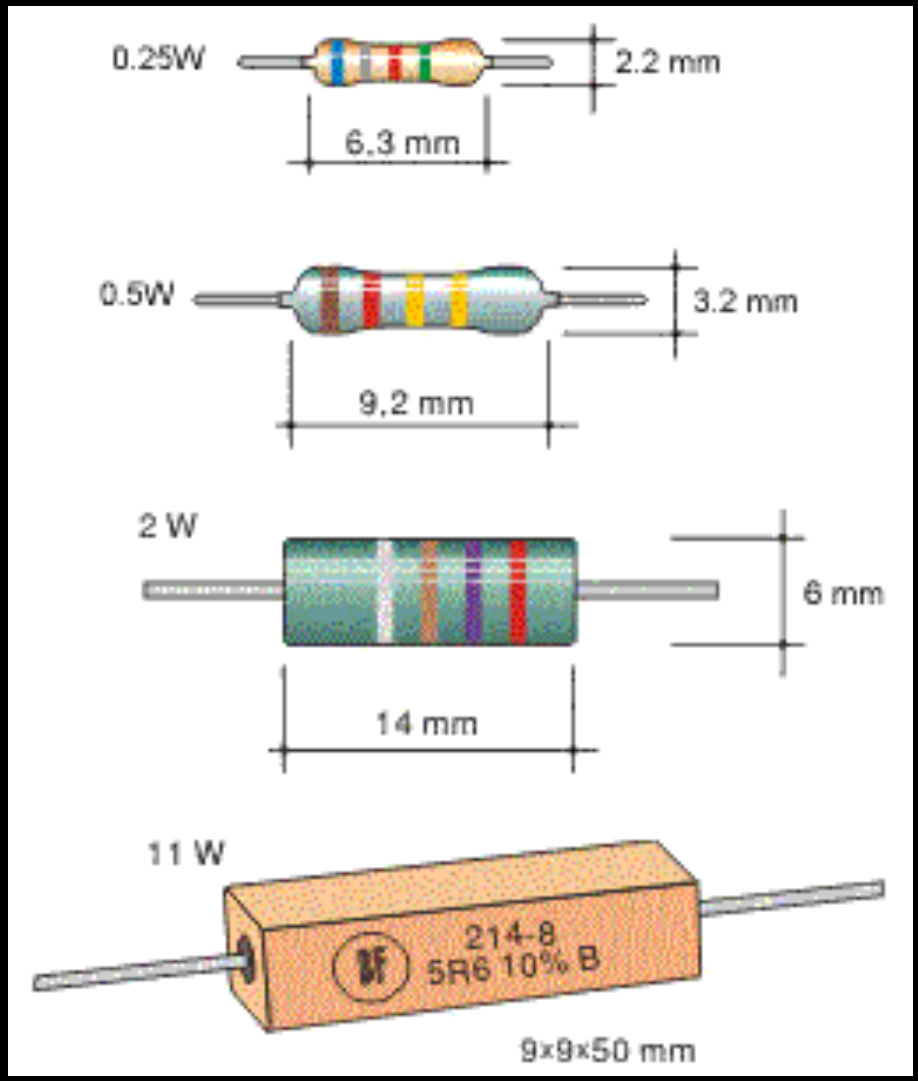
1 W

2W

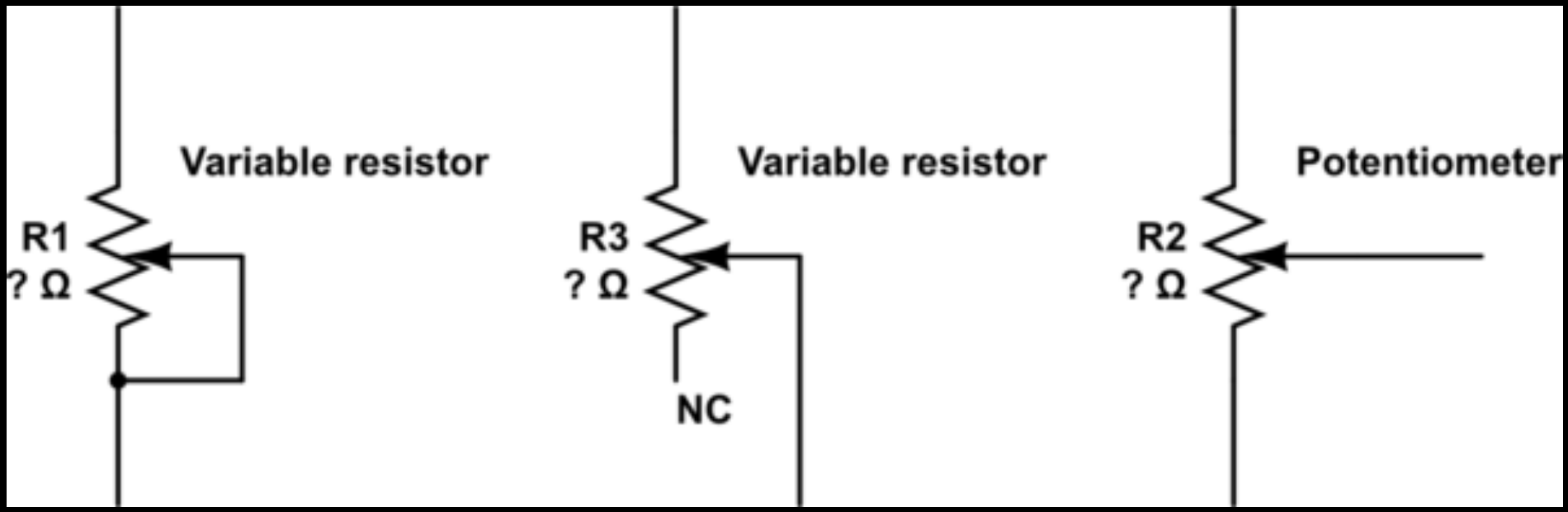
5W

10W

HUGE

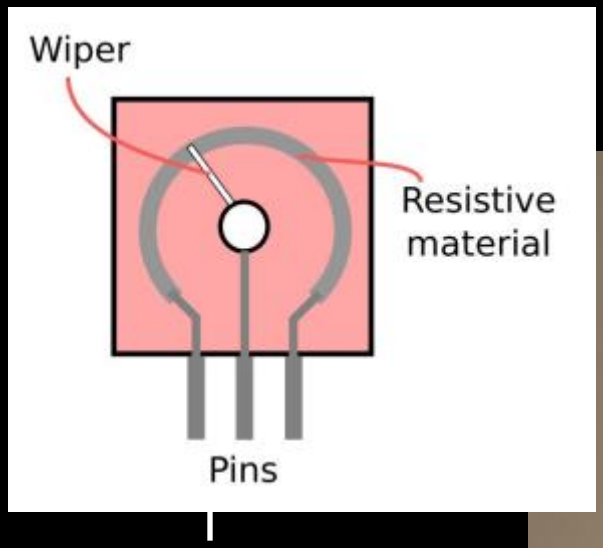


Resistors – Variable

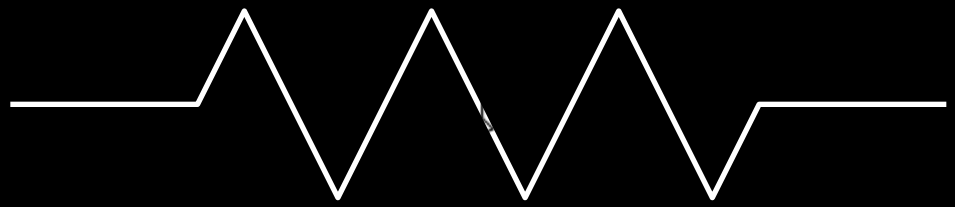


Variable Resistors - Potentiometers

Potentiometer



Resistors – Questions?



Electronic Components

Resistor

Capacitor

Inductor

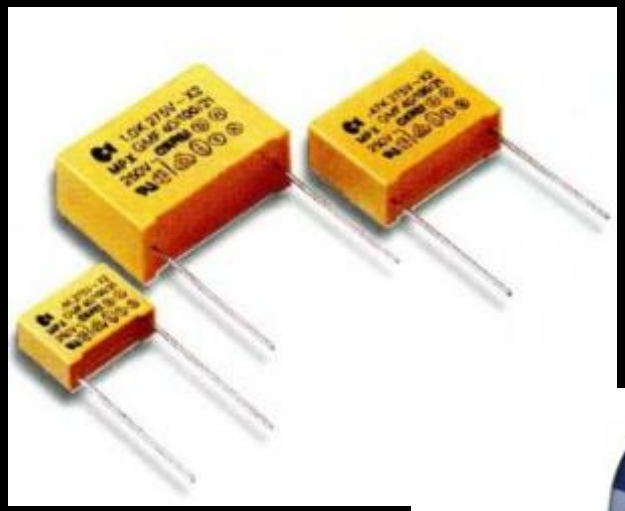
Transformer

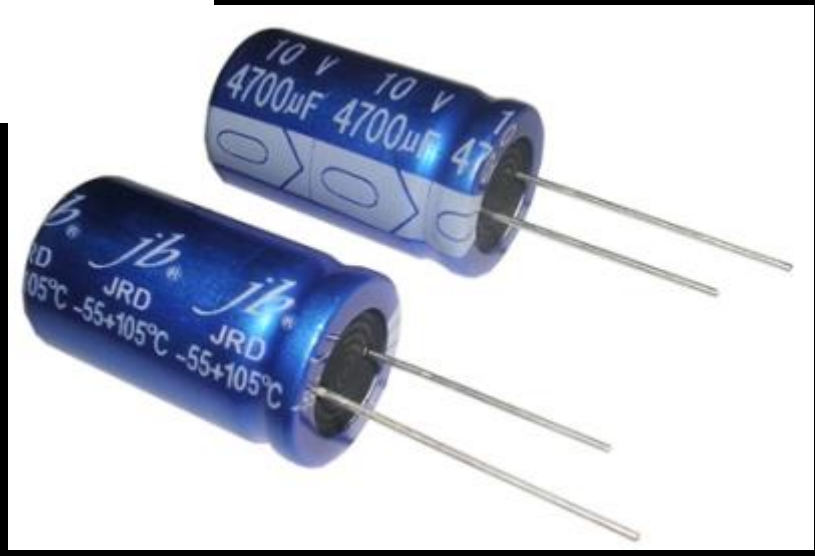
Diode

Transistor

Integrated Circuit

Capacitors





Capacitors:

store energy (just a tiny bit)

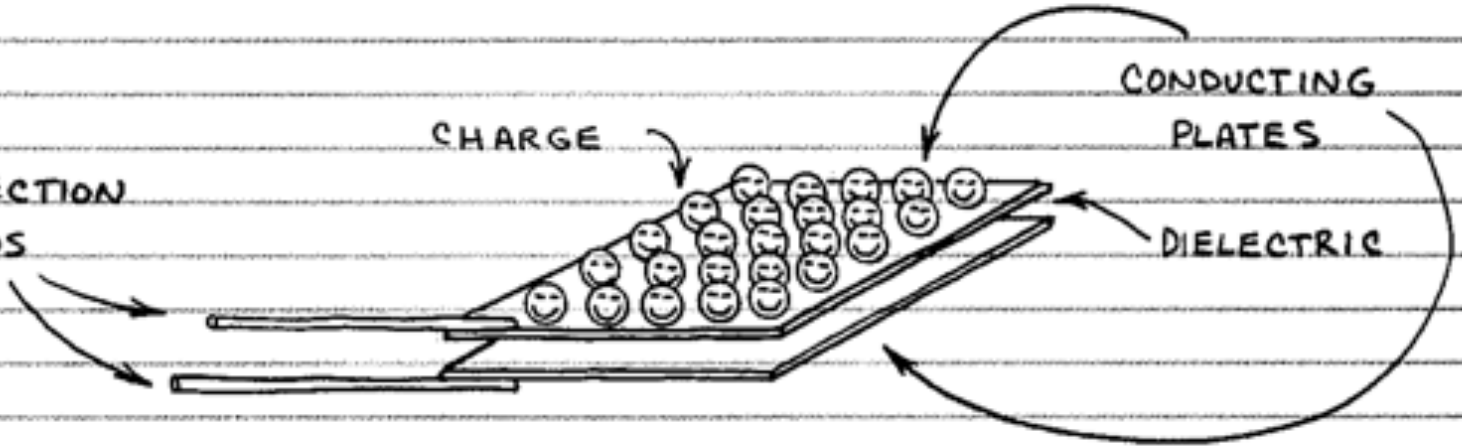
Block DC - low frequency audio signal

Pass AC – high frequency audio signal

Smooth ripple in power supplies

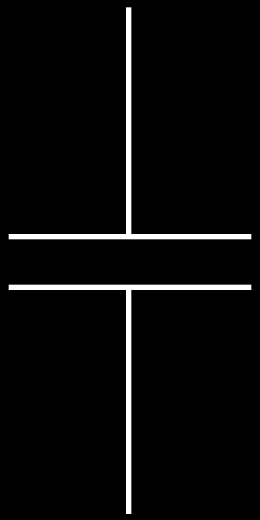
CAPACITORS

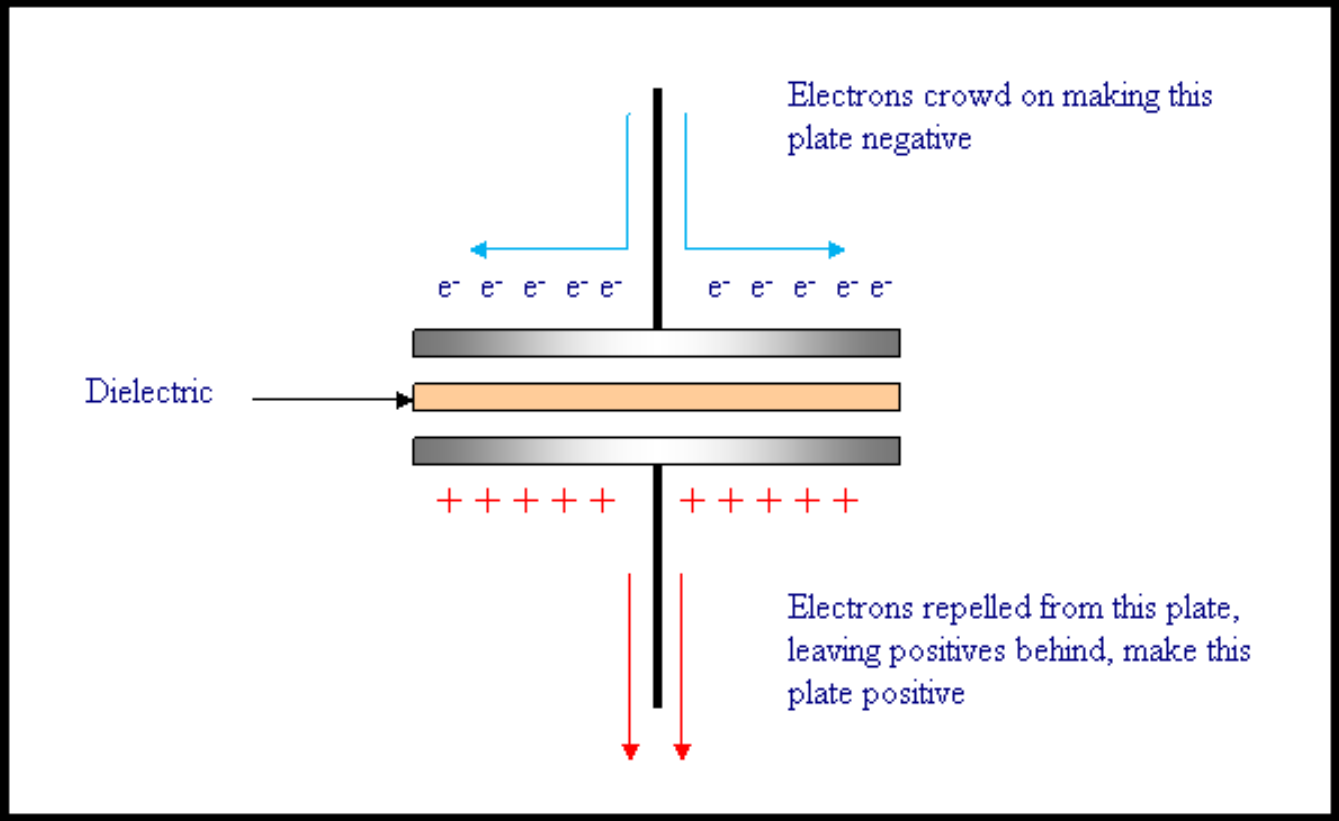
THERE ARE MANY KINDS OF CAPACITORS, BUT THEY ALL DO THE SAME THING: STORE ELECTRONS. THE SIMPLEST CAPACITOR IS TWO CONDUCTORS SEPARATED BY AN INSULATING MATERIAL CALLED THE DIELECTRIC. LIKE THIS:



THE DIELECTRIC CAN BE PAPER, PLASTIC FILM, MICA, GLASS, CERAMIC, AIR OR A VACUUM. THE PLATES CAN BE ALUMINUM DISCS, ALUMINUM FOIL OR A THIN FILM OF METAL APPLIED TO OPPOSITE SIDES OF A SOLID DIELECTRIC. THE CONDUCTOR – DIELECTRIC – CONDUCTOR SANDWICH CAN BE ROLLED INTO A CYLINDER OR LEFT FLAT. MORE ABOUT TYPES OF CAPACITORS LATER.

Capacitors

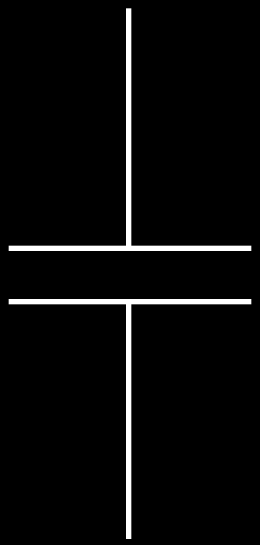


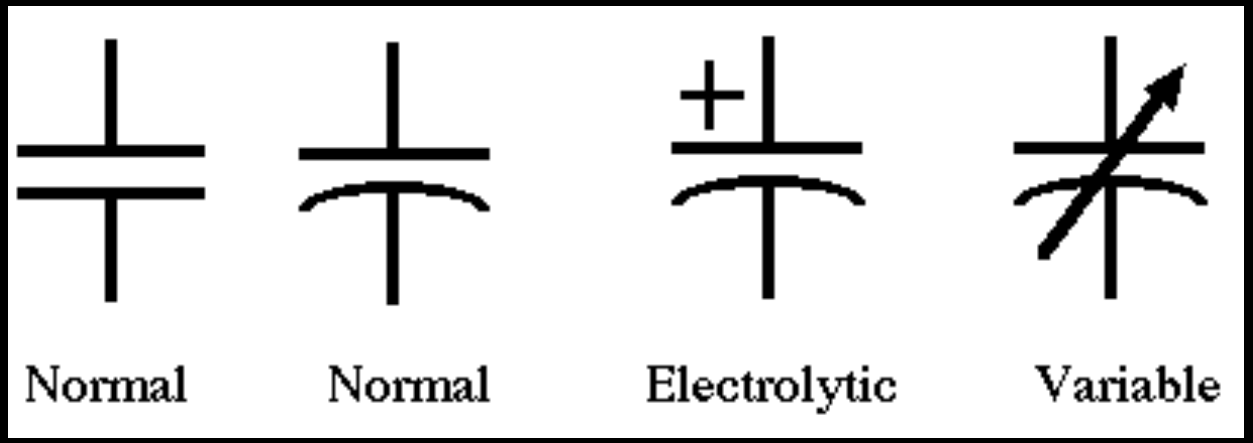


Conductive plates separated by an insulator (dielectric)

Dielectric : air, mica, plastic film, oxide, mica, or any insulator

Capacitors



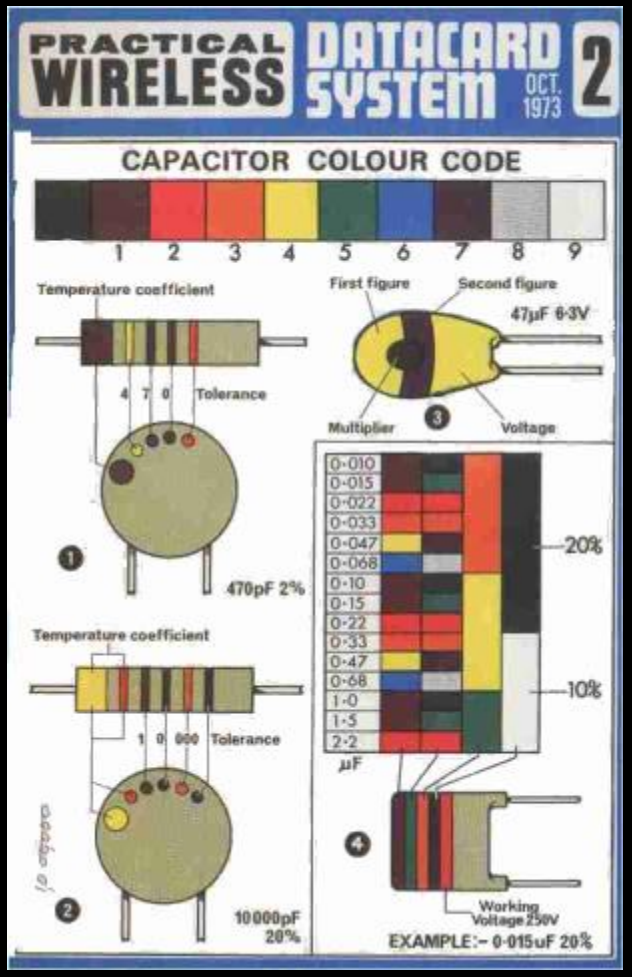


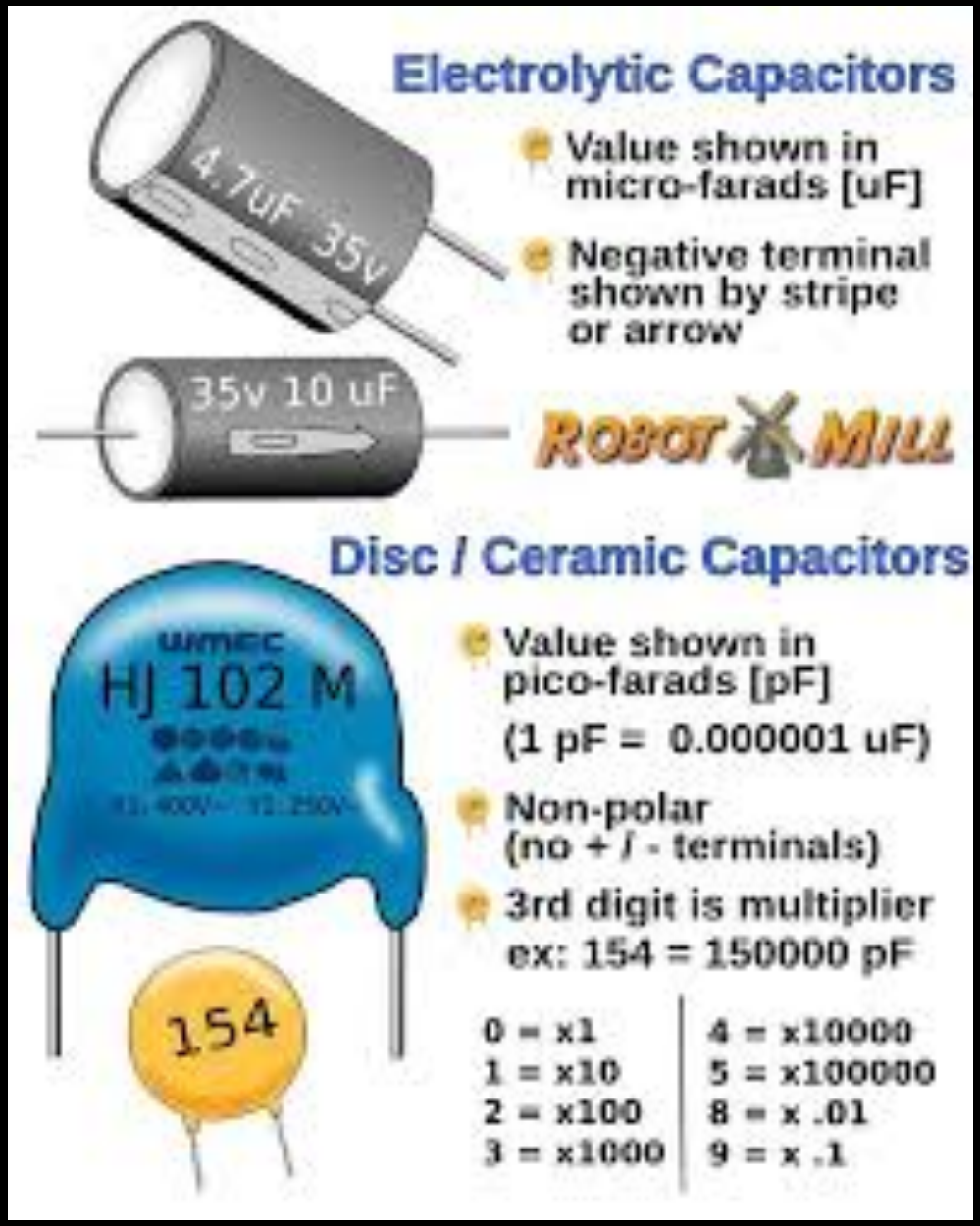
Capacitance is measured in Farads

Symbol = C

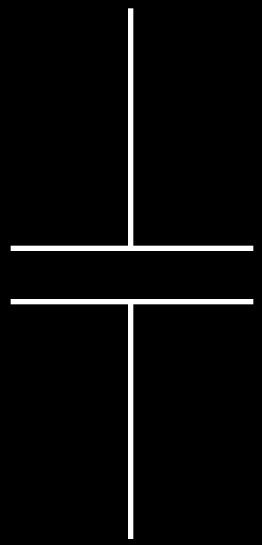
Some capacitors are polarized and some are not

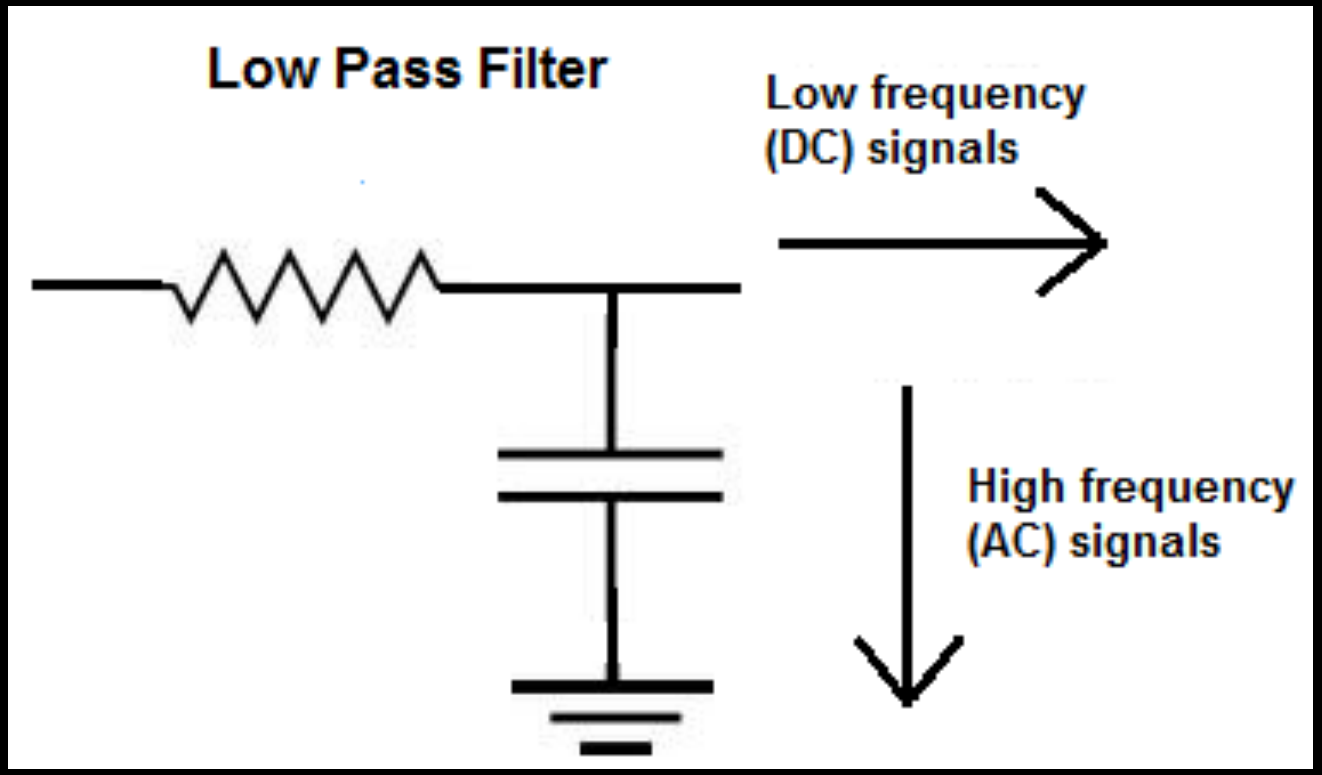
Capacitor Codes



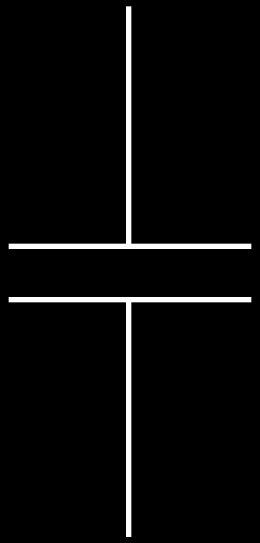


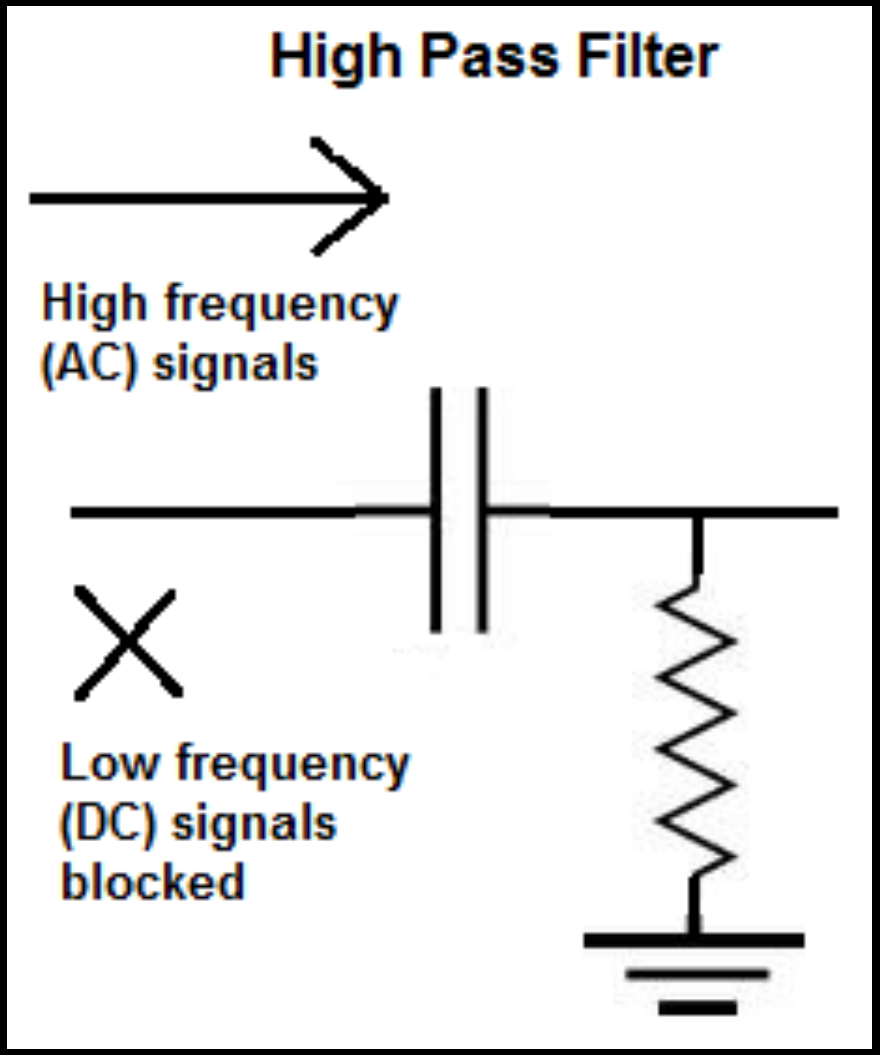
Capacitor - RC Low Pass filter



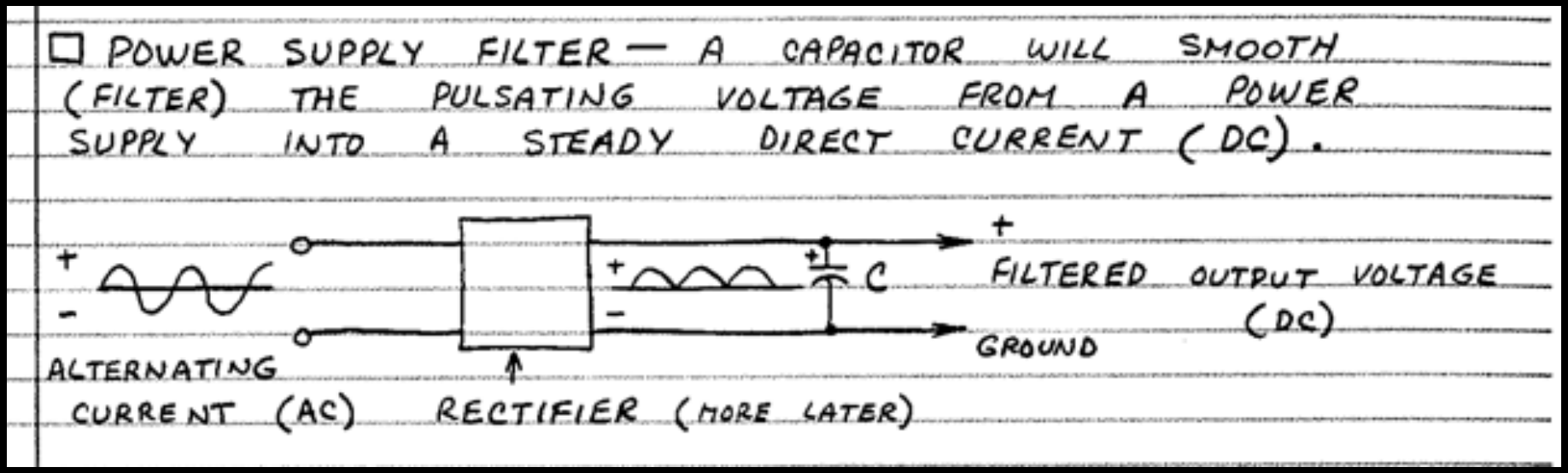


Capacitor - RC High Pass filter





Capacitor – Power Supply Filtering



Capacitors – Questions?

Capacitor – Reactive Component #1

REACTANCE: X

Opposition that capacitance or inductance offers to alternating current. This opposition changes with frequency.

IMPEDANCE: Z

A frequency dependent resistance that is the combined opposition to AC by DC resistance and capacitive and inductive reactance.

Inductor – Reactive Component #2

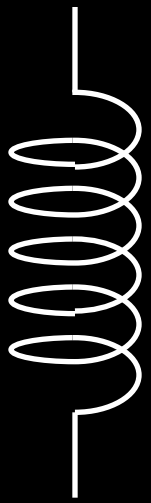
REACTANCE: X

Opposition that capacitance or inductance offers to alternating current. This opposition changes with frequency.

IMPEDANCE: Z

A frequency dependent resistance that is the combined opposition to AC by DC resistance and capacitive and inductive reactance.

Inductor – AKA Coil, Choke

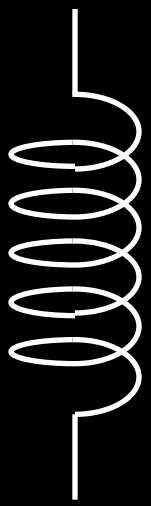


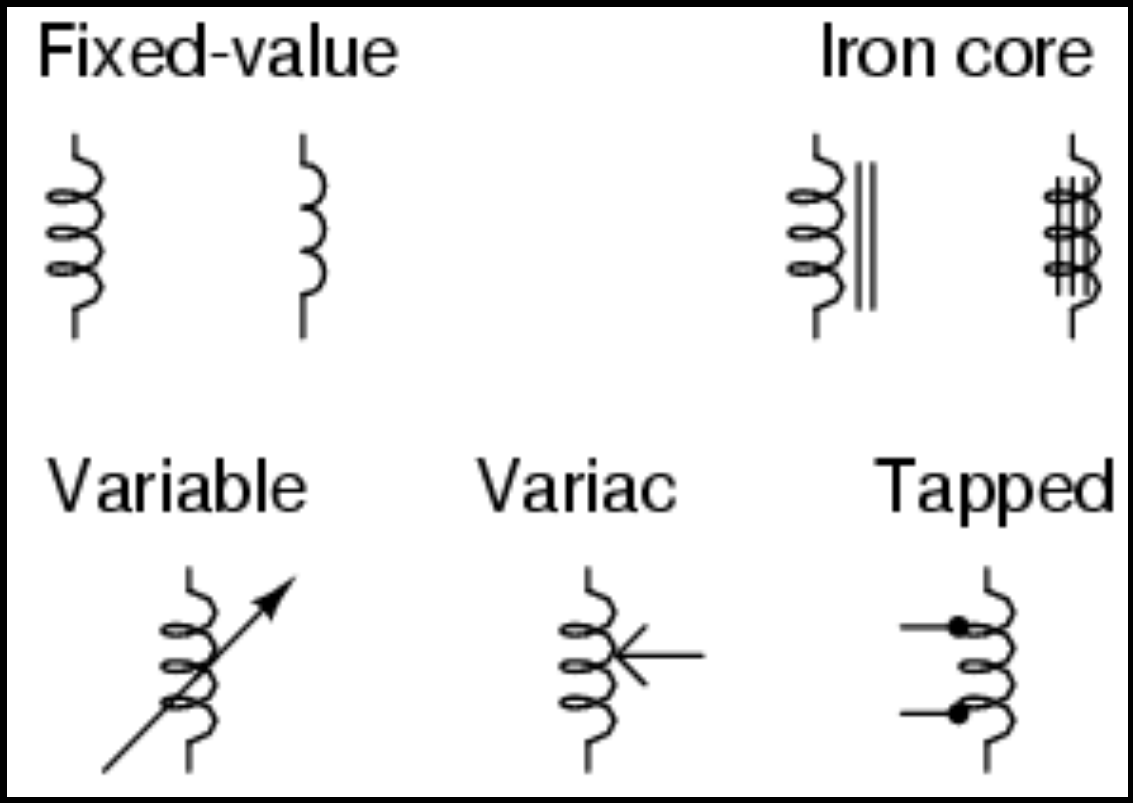
Inductors resist change/ are slow to react to current changes

Measured in Henries

Symbol = L

Inductor



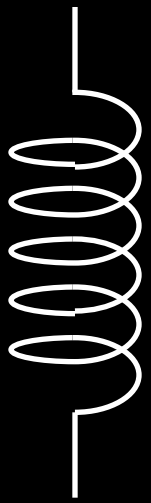


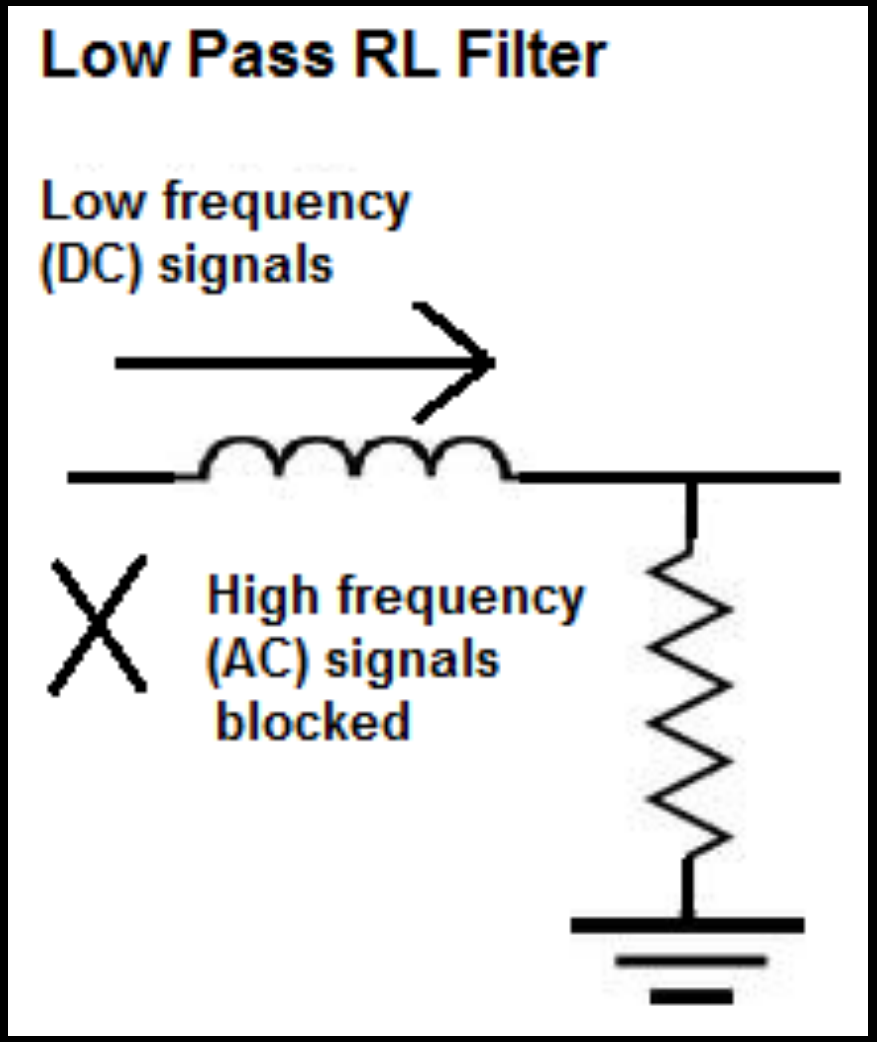
Inductors

Pass DC - low frequency audio signal

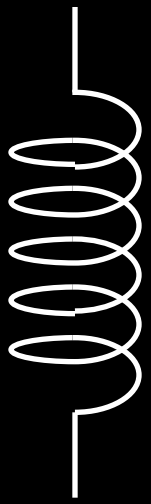
Block AC – high frequency audio signal

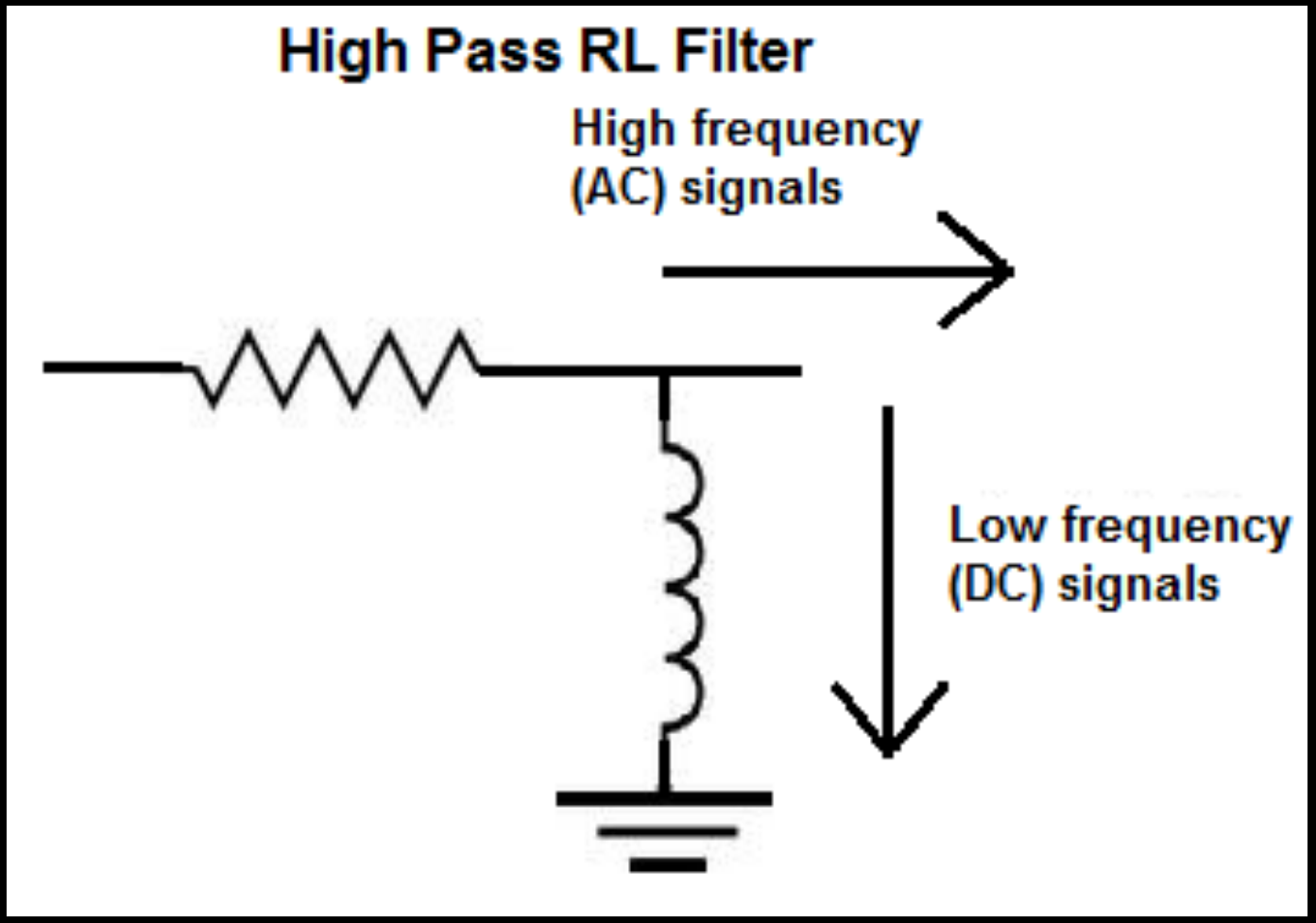
Inductor – Low Pass filter



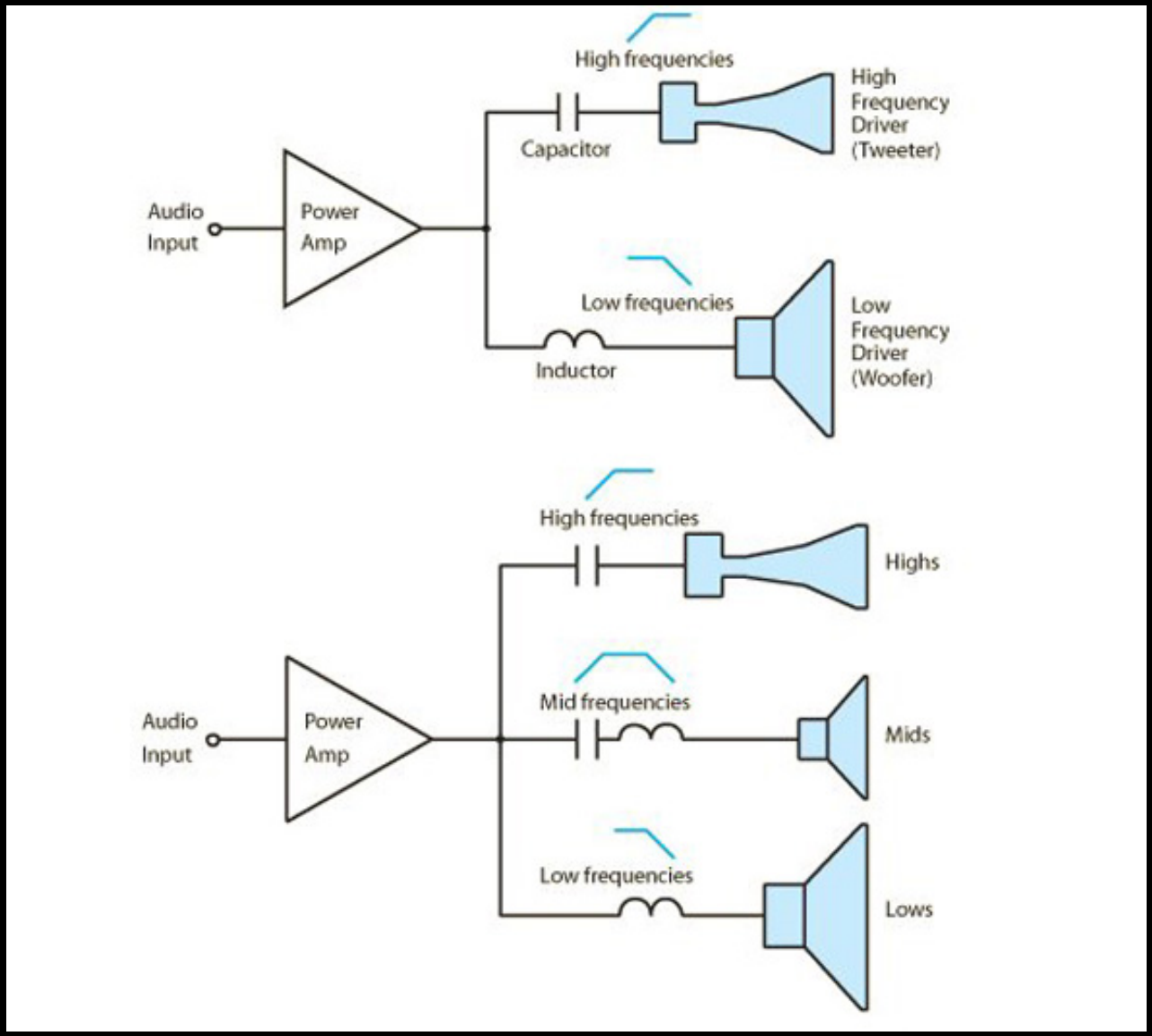


Inductor – High Pass filter

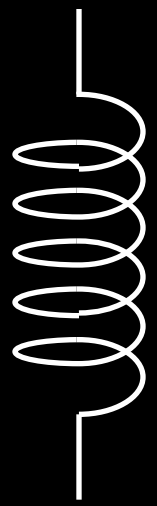


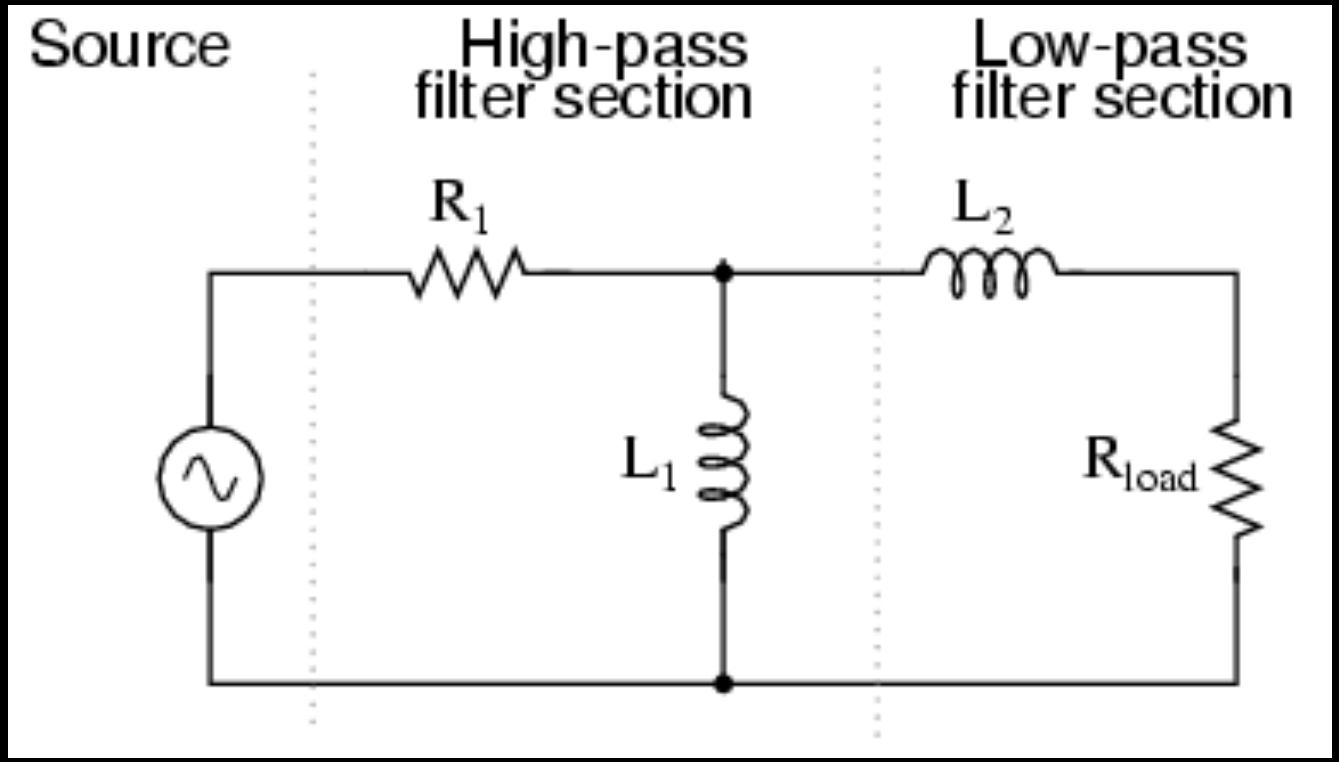


Inductors & Capacitors - Passive Crossover



Inductors – Questions?



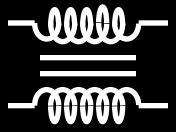


Electronic Components

Resistor

Capacitor

Inductor



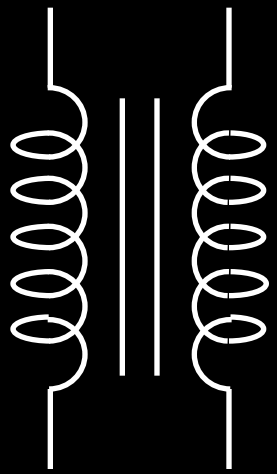
Transformer

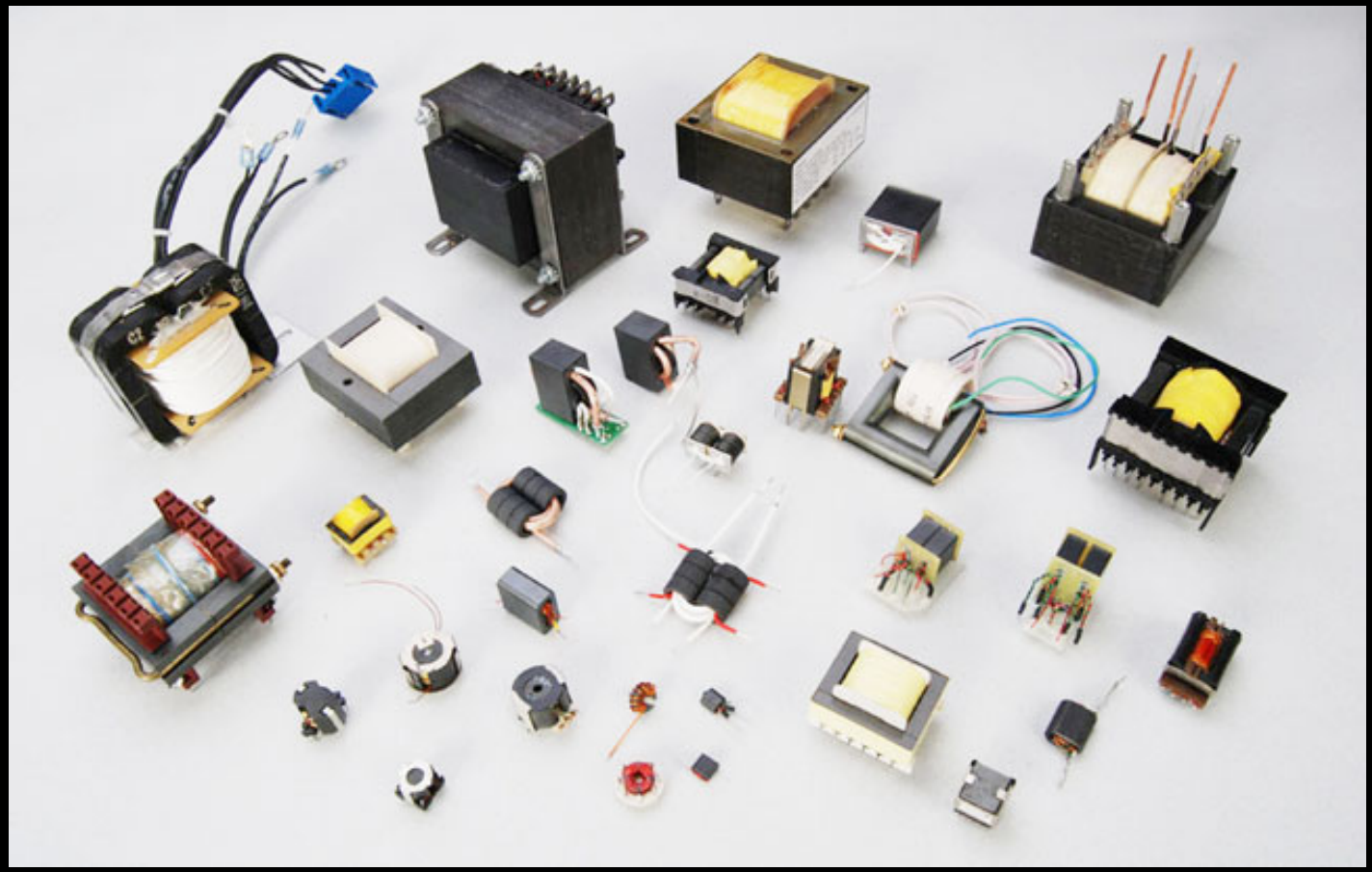
Diode

Transistor

Integrated Circuit

Transformers

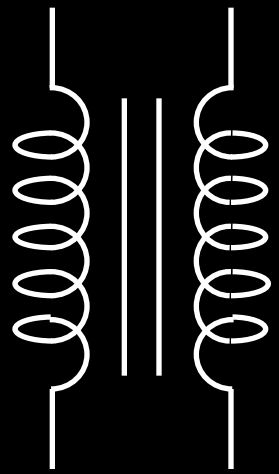


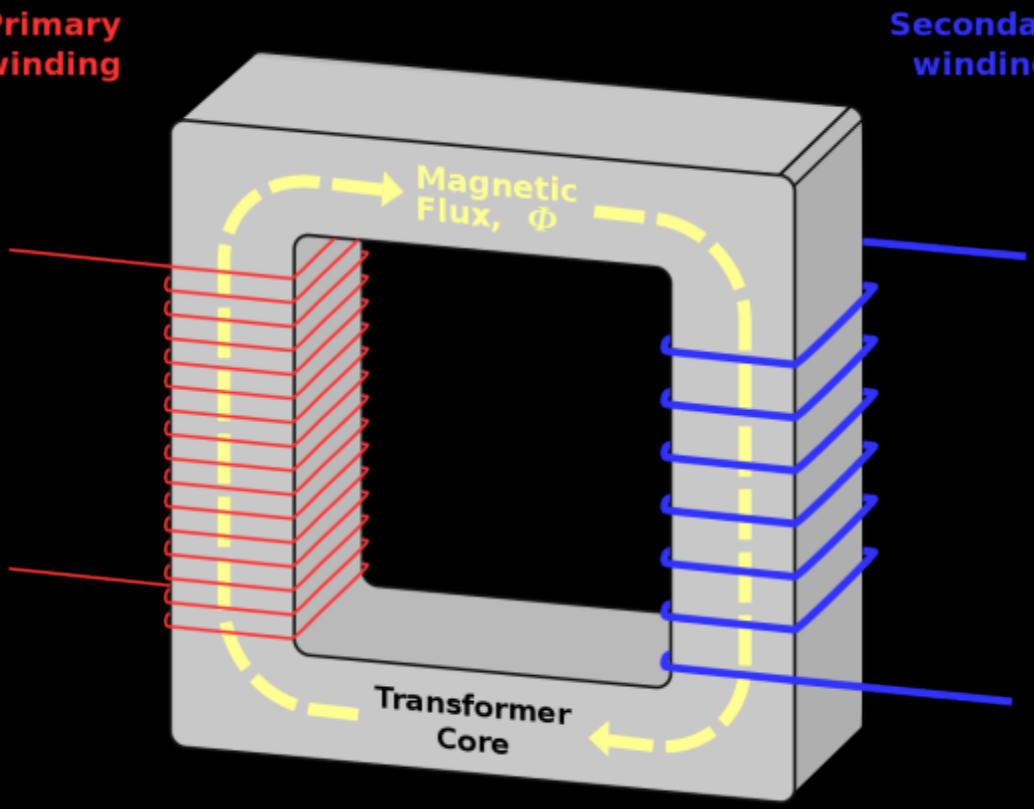


Transformers TRANSFORM Alternating Current (AC)

A transformer will not pass DC!

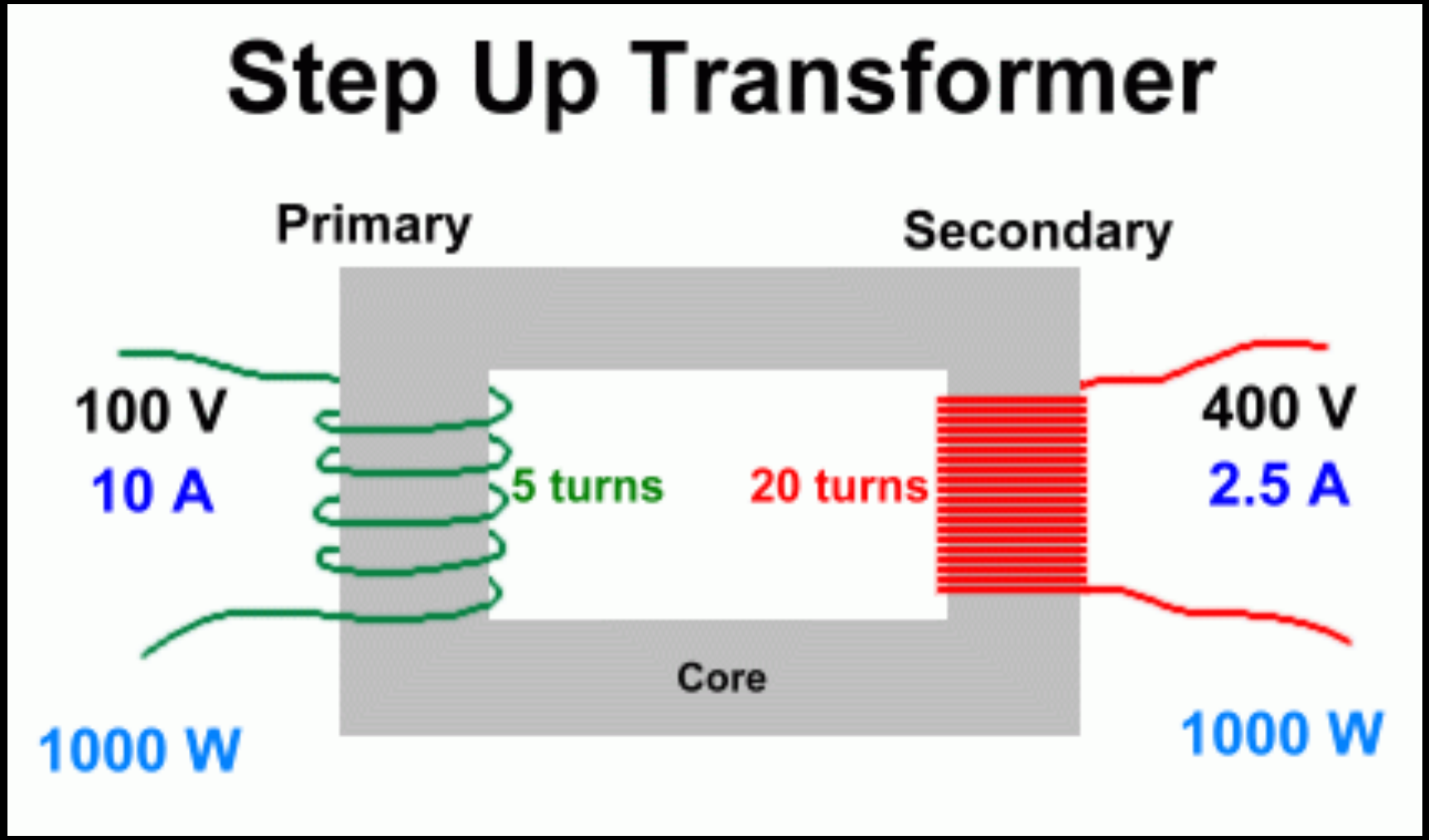
Transformers



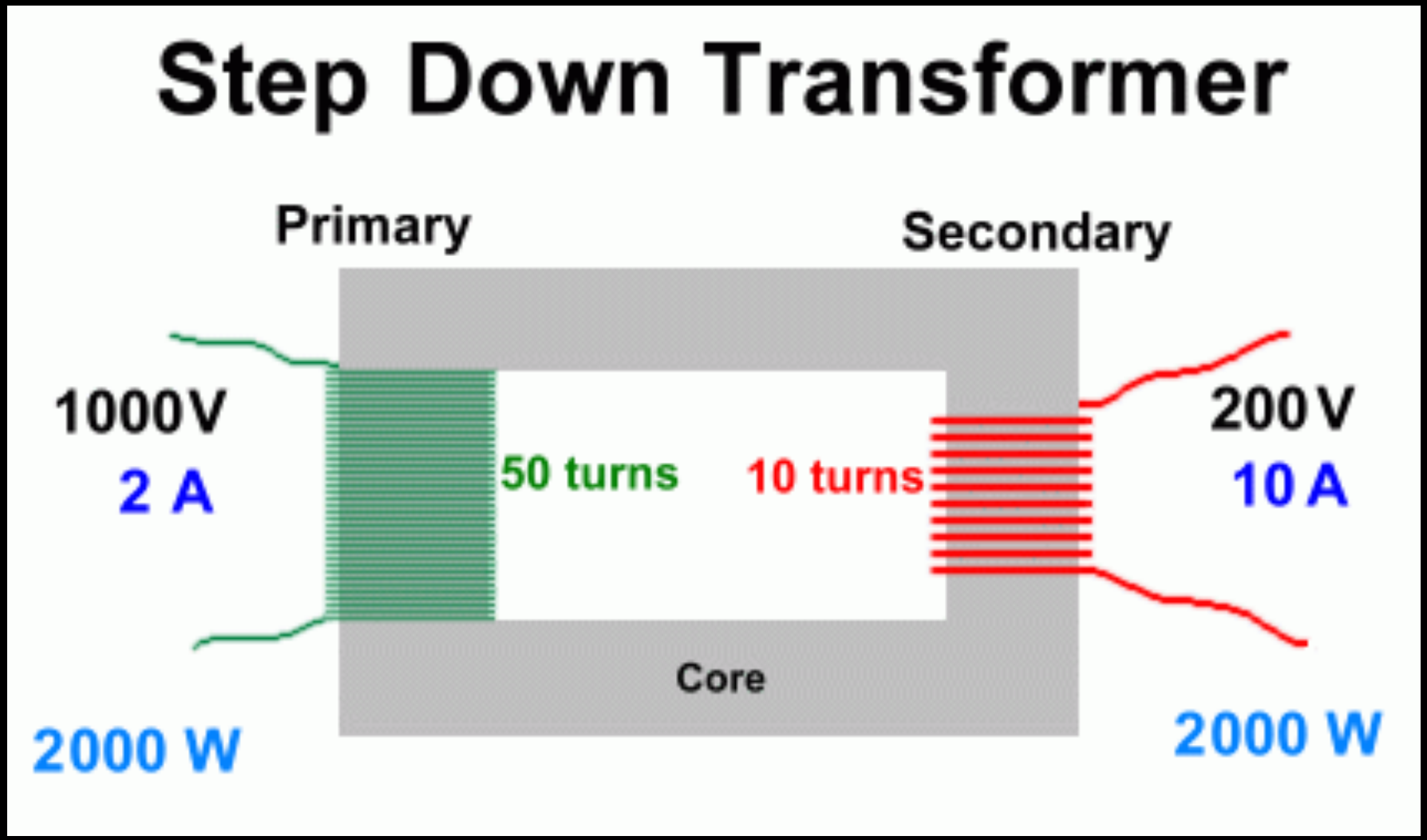


The ratio of primary to secondary windings determines the transformation: Step-Up, Step-Down, or Unity (Isolation)

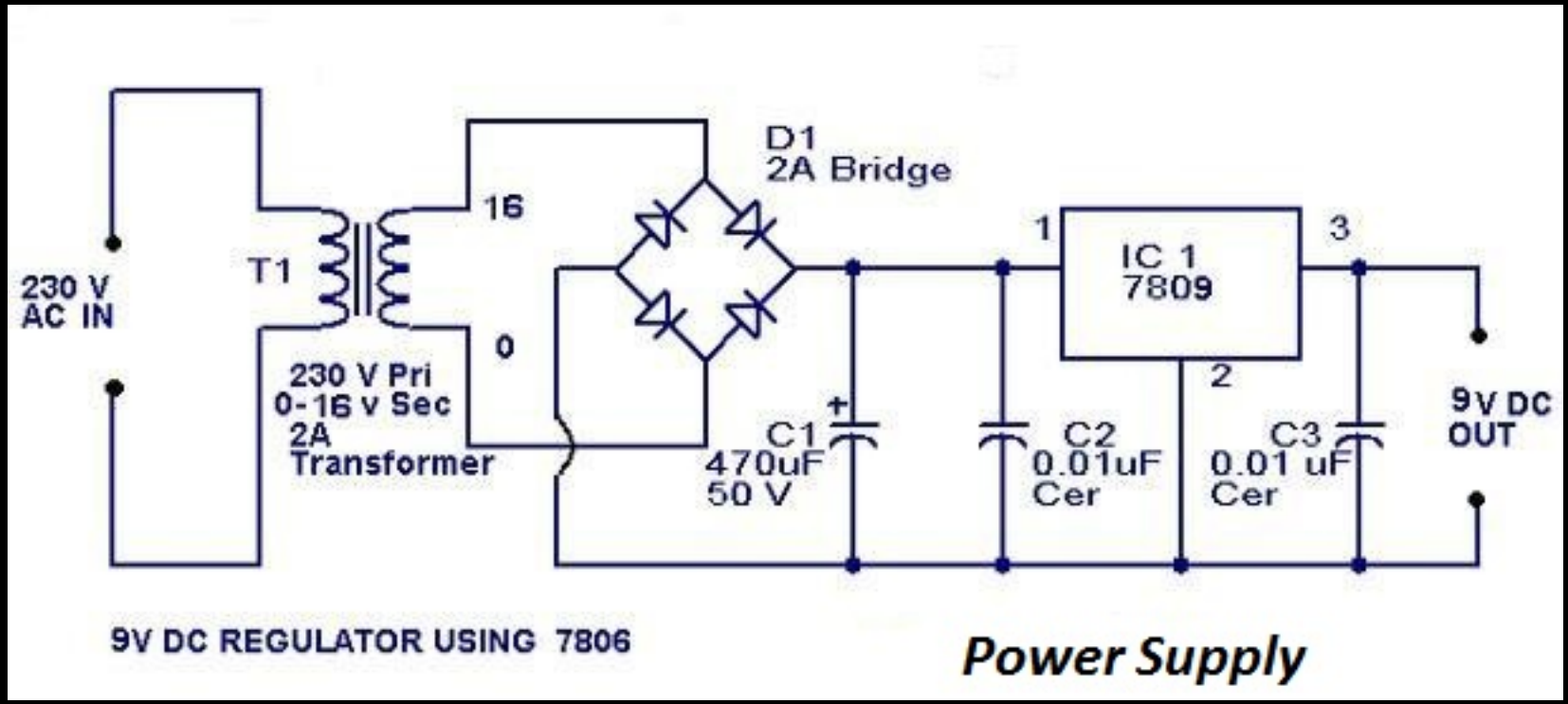
Transformers



Transformers

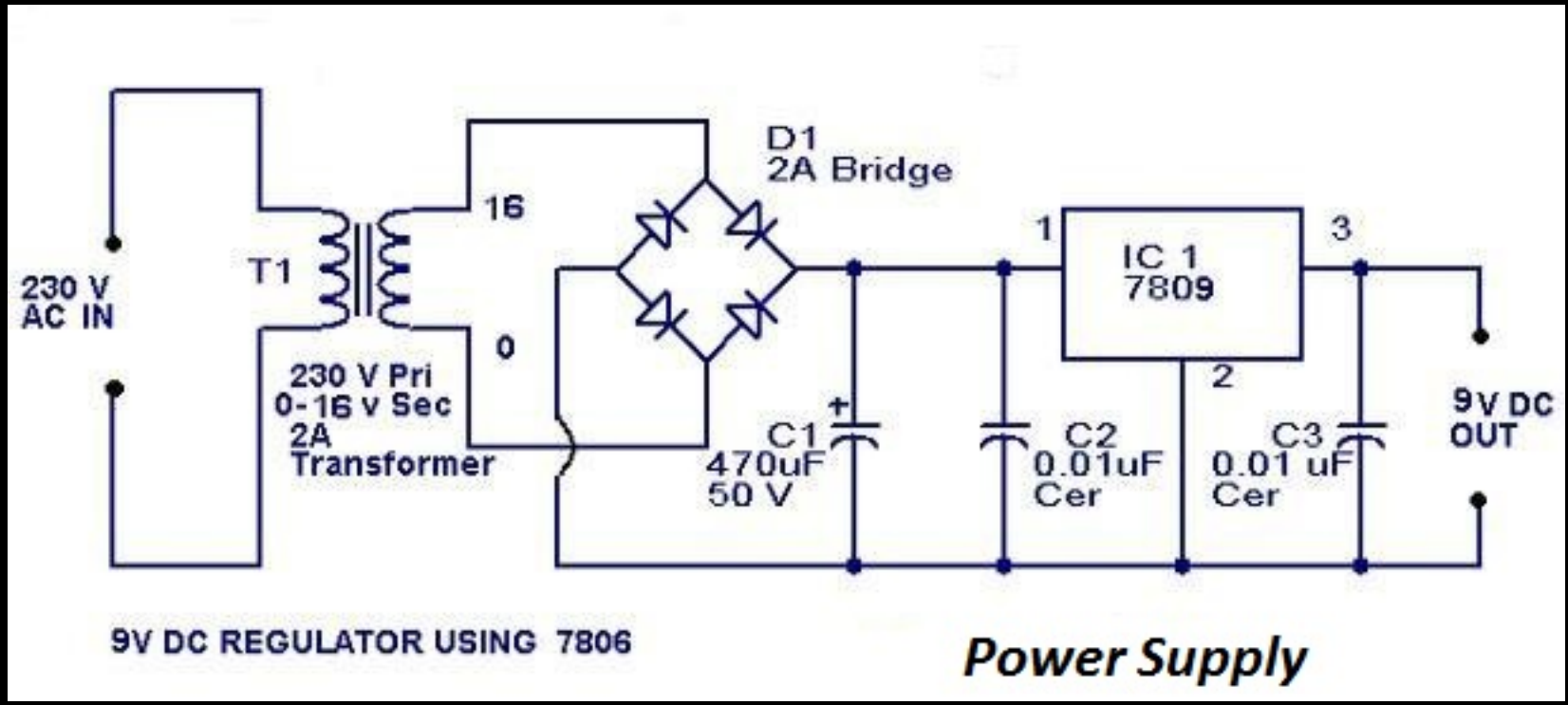


Transformers



Transformers are essential for modern-day power use: long distance transmission and conversion of AC to DC

Transformers – Questions?

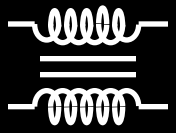


Electronic Components


Resistor


Capacitor


Inductor

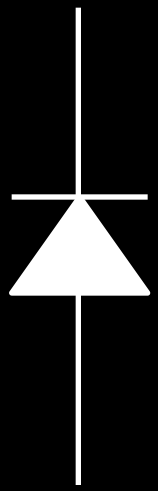

Transformer

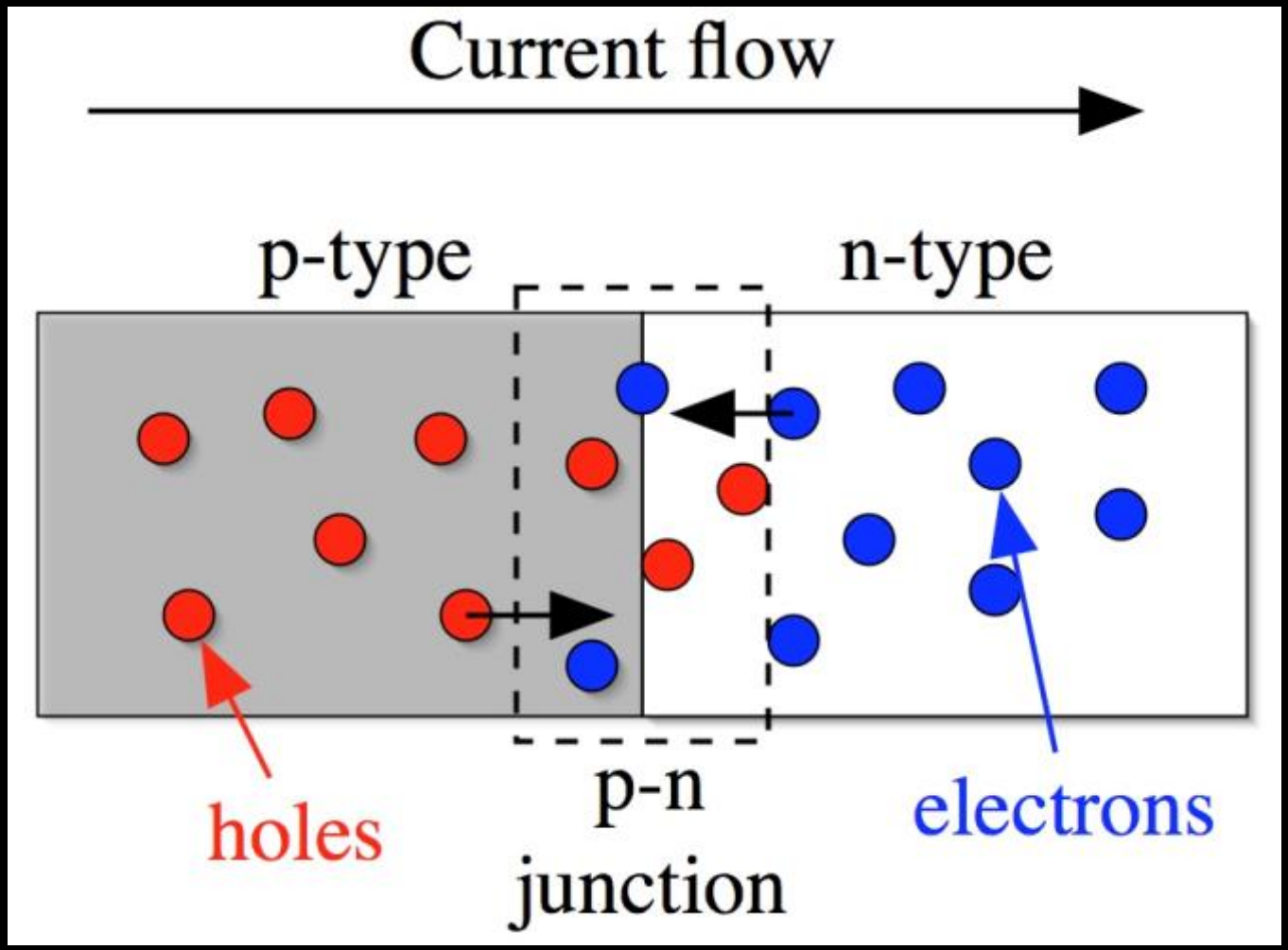
Diode 

Transistor

Integrated Circuit

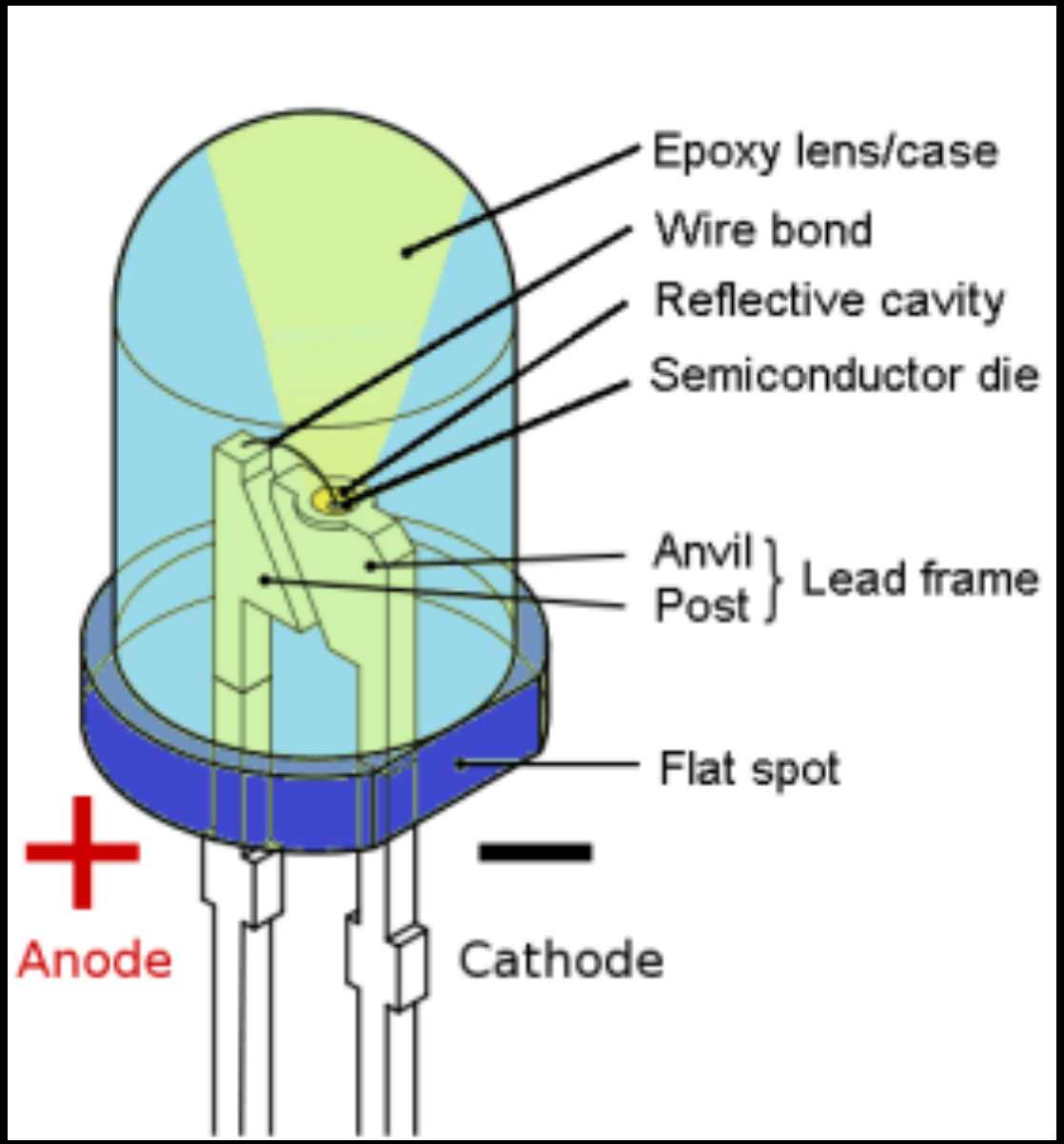
Diode





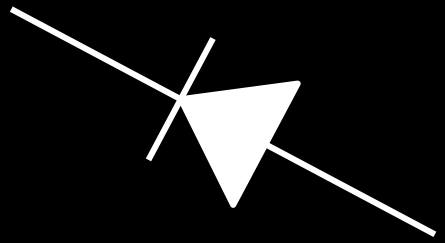
Diodes act as a “one-way valve” for electron flow

Diode



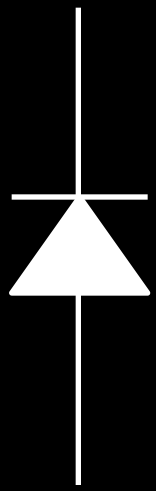
LED = Light-Emitting Diode

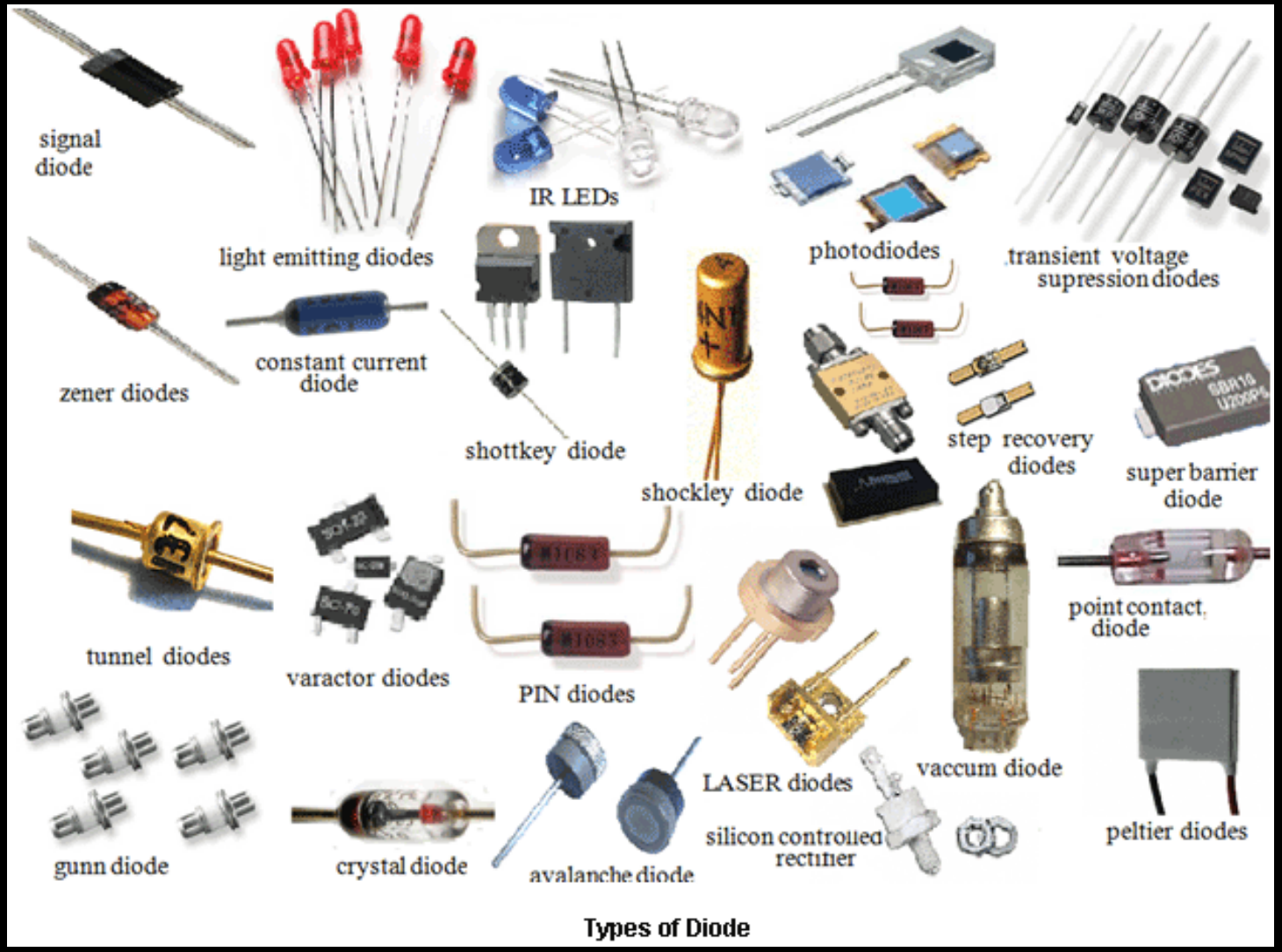
Diode



Common types – signal and power diodes

Diode



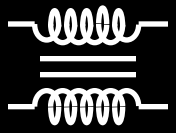

signal diode
light emitting diodes
IR LEDs
photodiodes
transient voltage supression diodes
zener diodes
constant current diode
shottkey diode
shockley diode
step recovery diodes
super barrier diode
tunnel diodes
varactor diodes
PIN diodes
point contact diode
vaccum diode
LASER diodes
gunn diode
crystal diode
avalanche diode
silicon controlled rectifier
peltier diodes
Types of Diode

Electronic Components

Resistor

Capacitor

Inductor



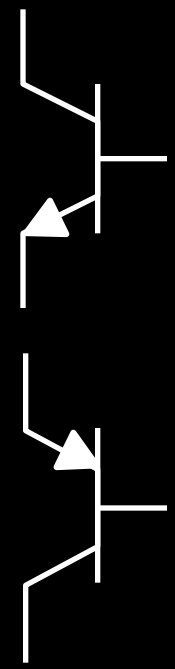
Transformer

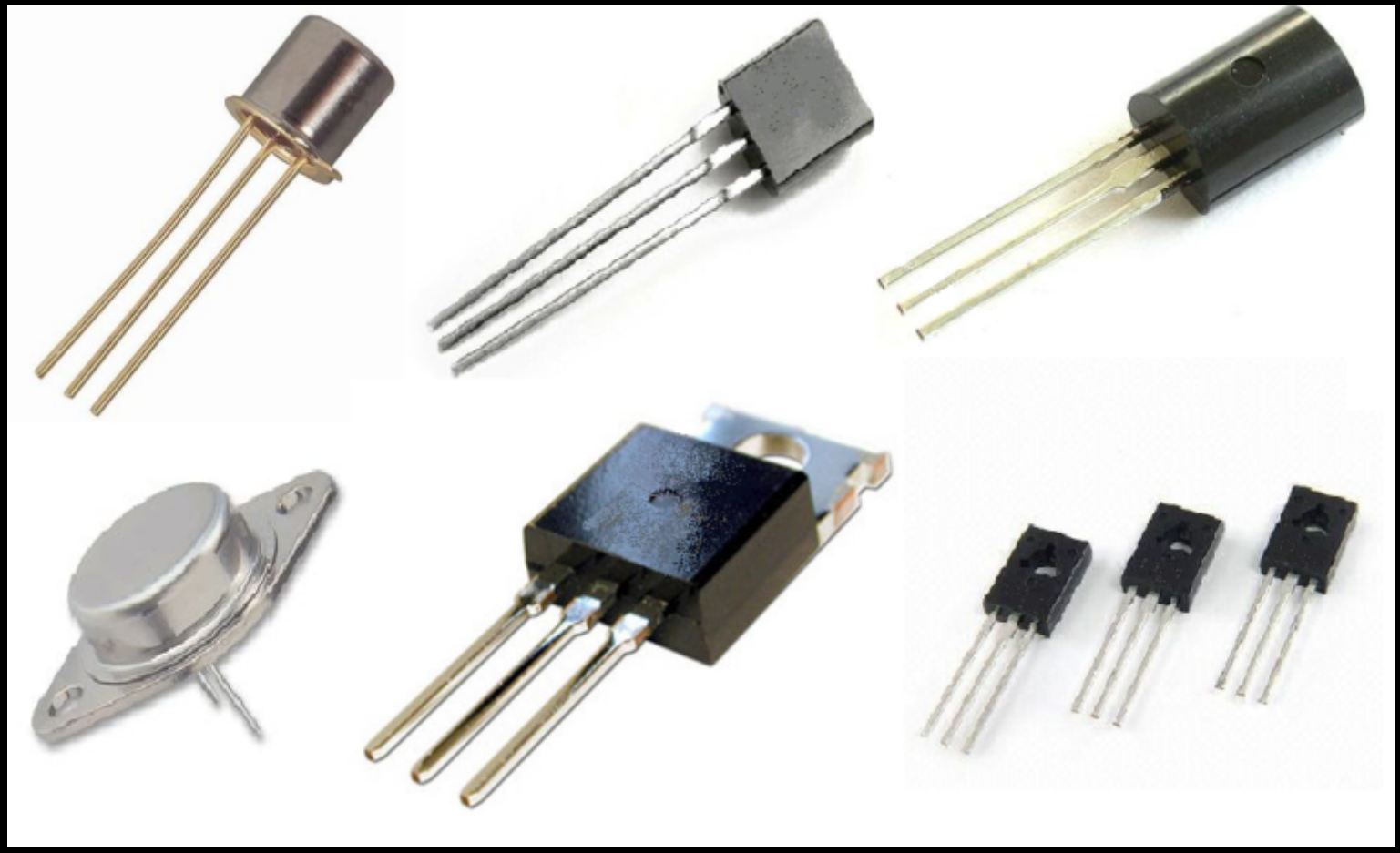
Diode 

Transistor

Integrated Circuit

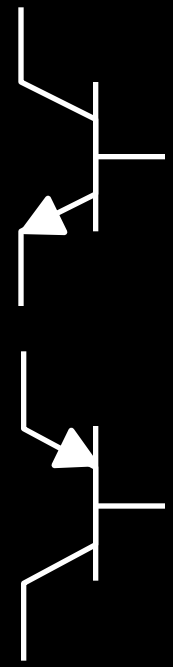
Transistors

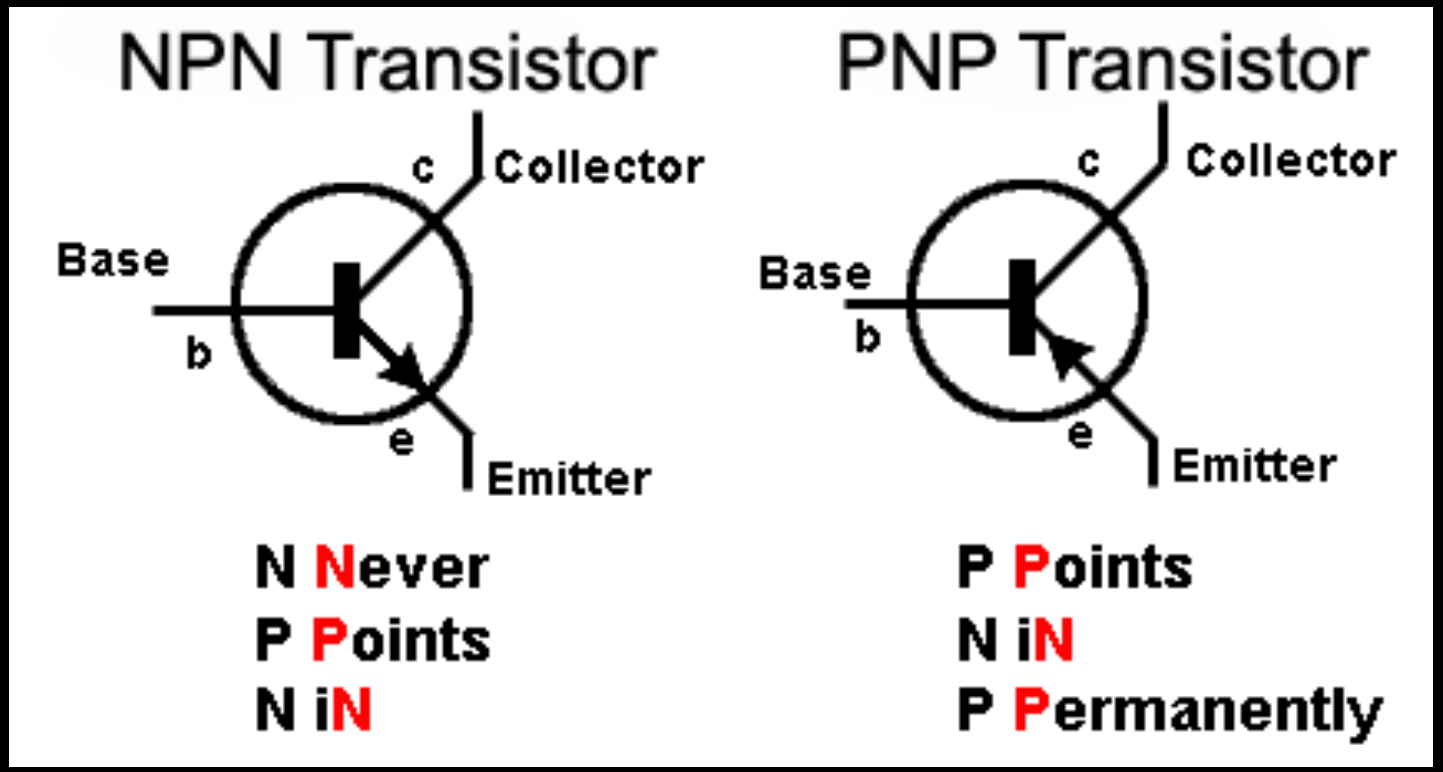




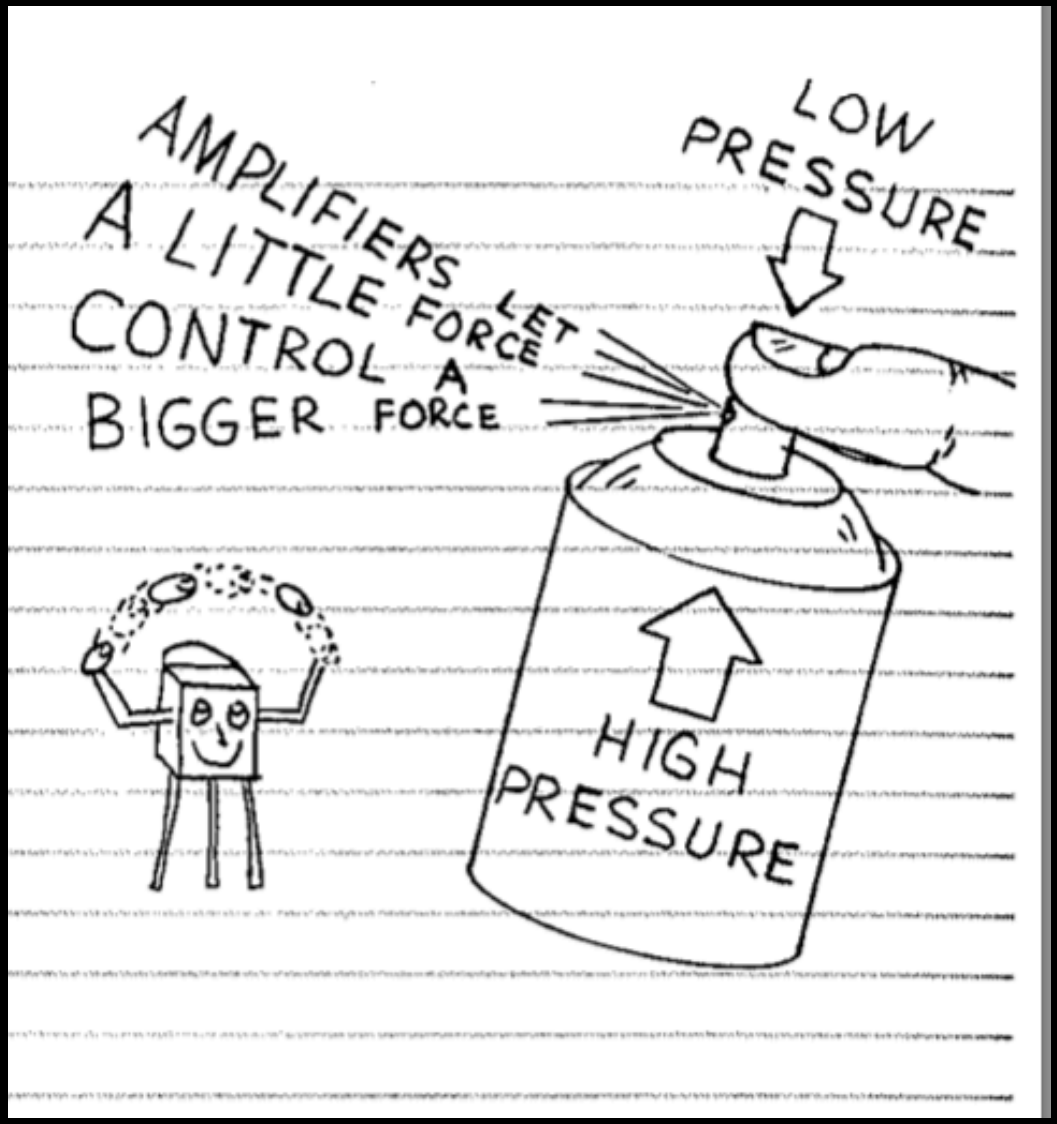
Transistors amplify voltage or current

Transistors – Bipolar Junction Transistors



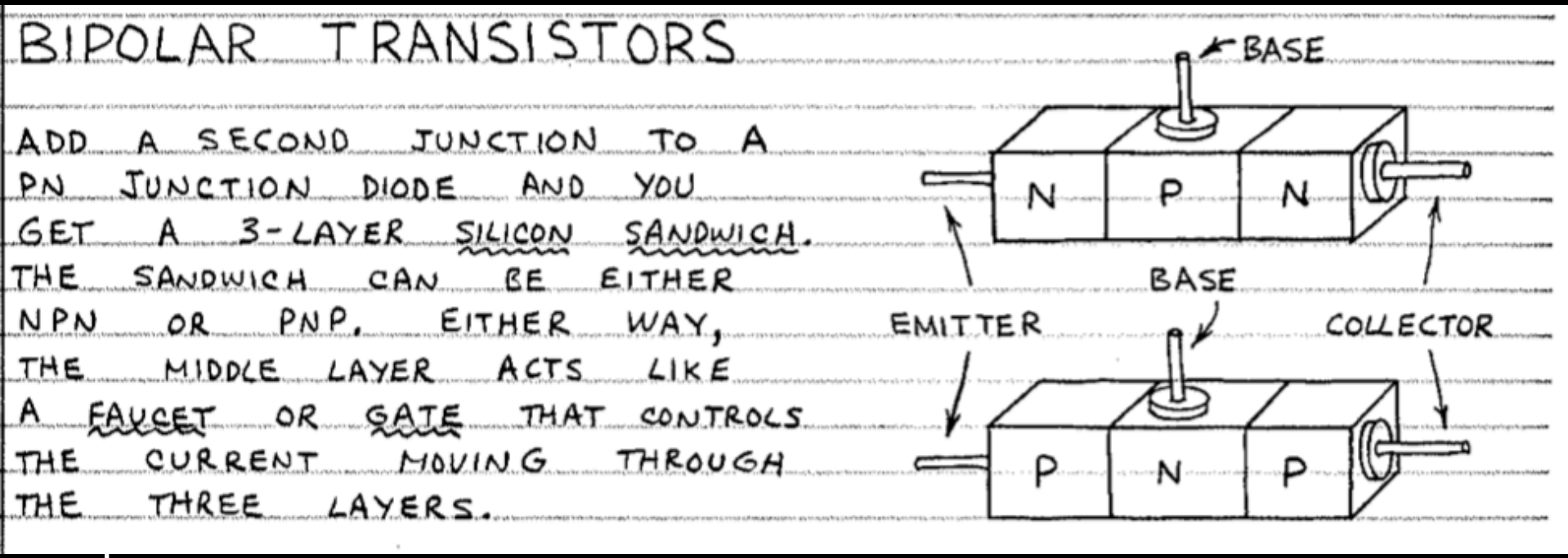


Transistors

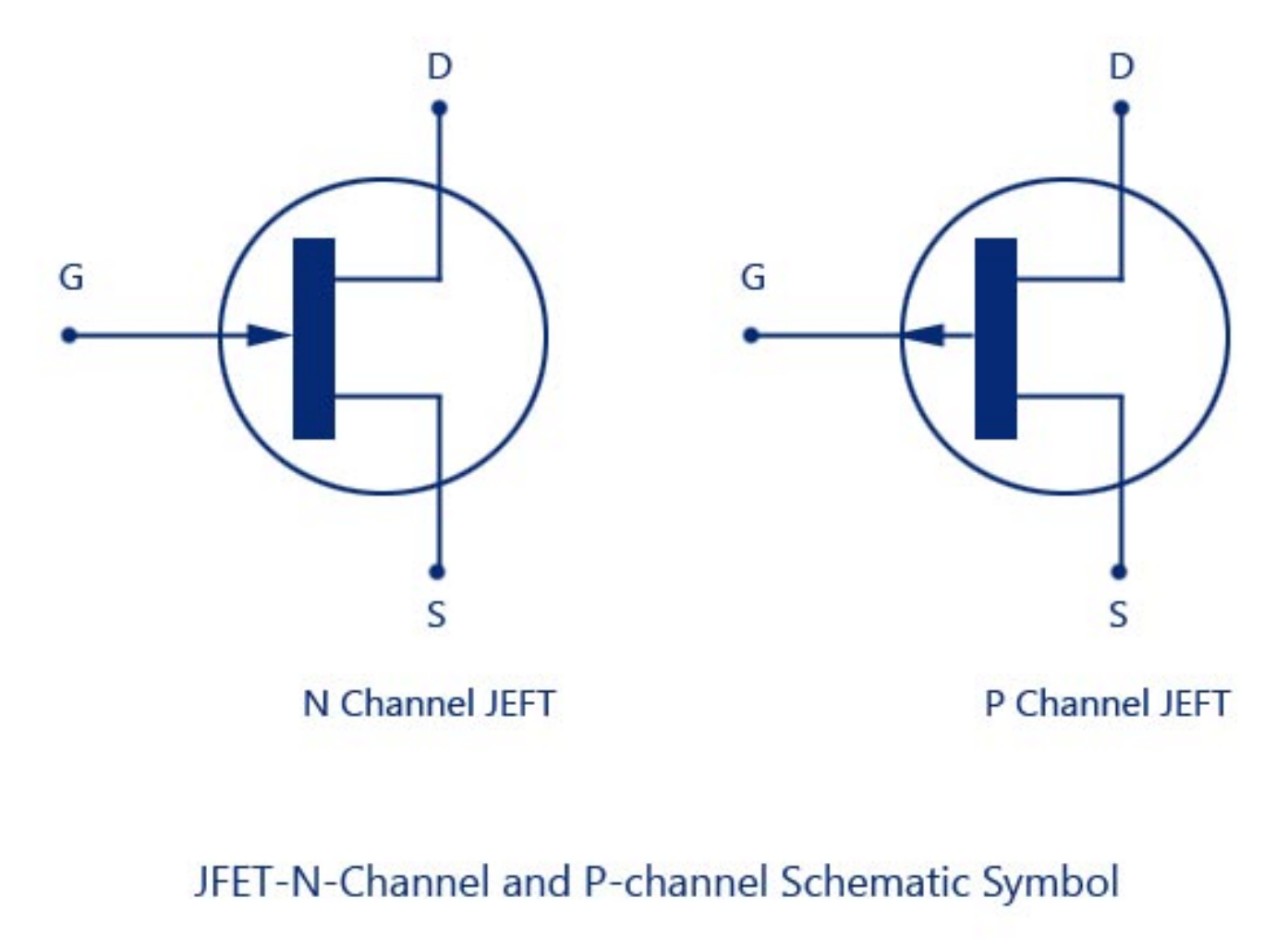


Transistor amplification analogy ala Mimms

Transistors



Transistors – Field Effect Transistors



JFET-N-Channel and P-channel Schematic Symbol

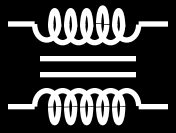
Transistors – Questions??

Electronic Components

Resistor

Capacitor

Inductor



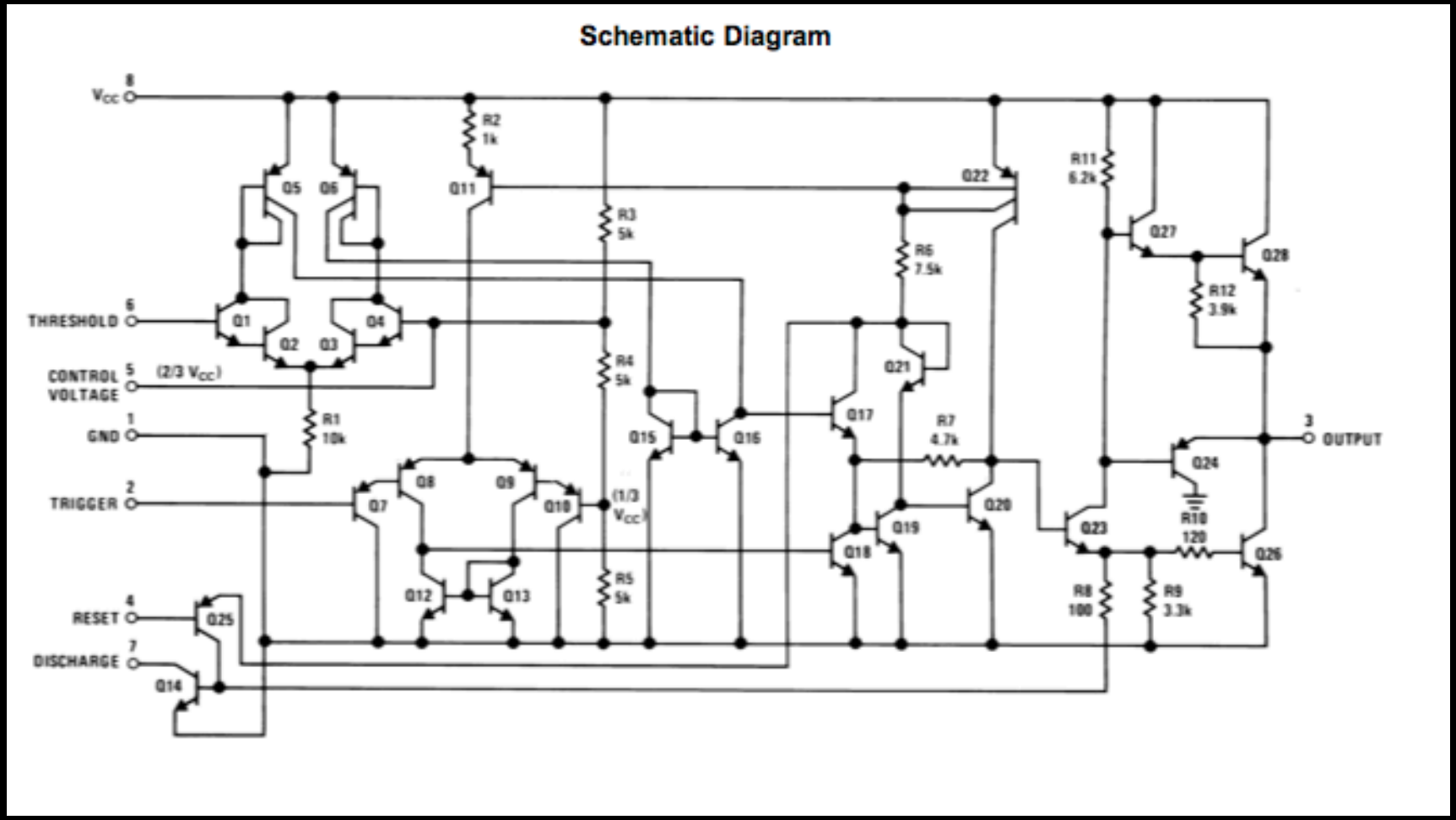
Transformer

Diode 

Transistor

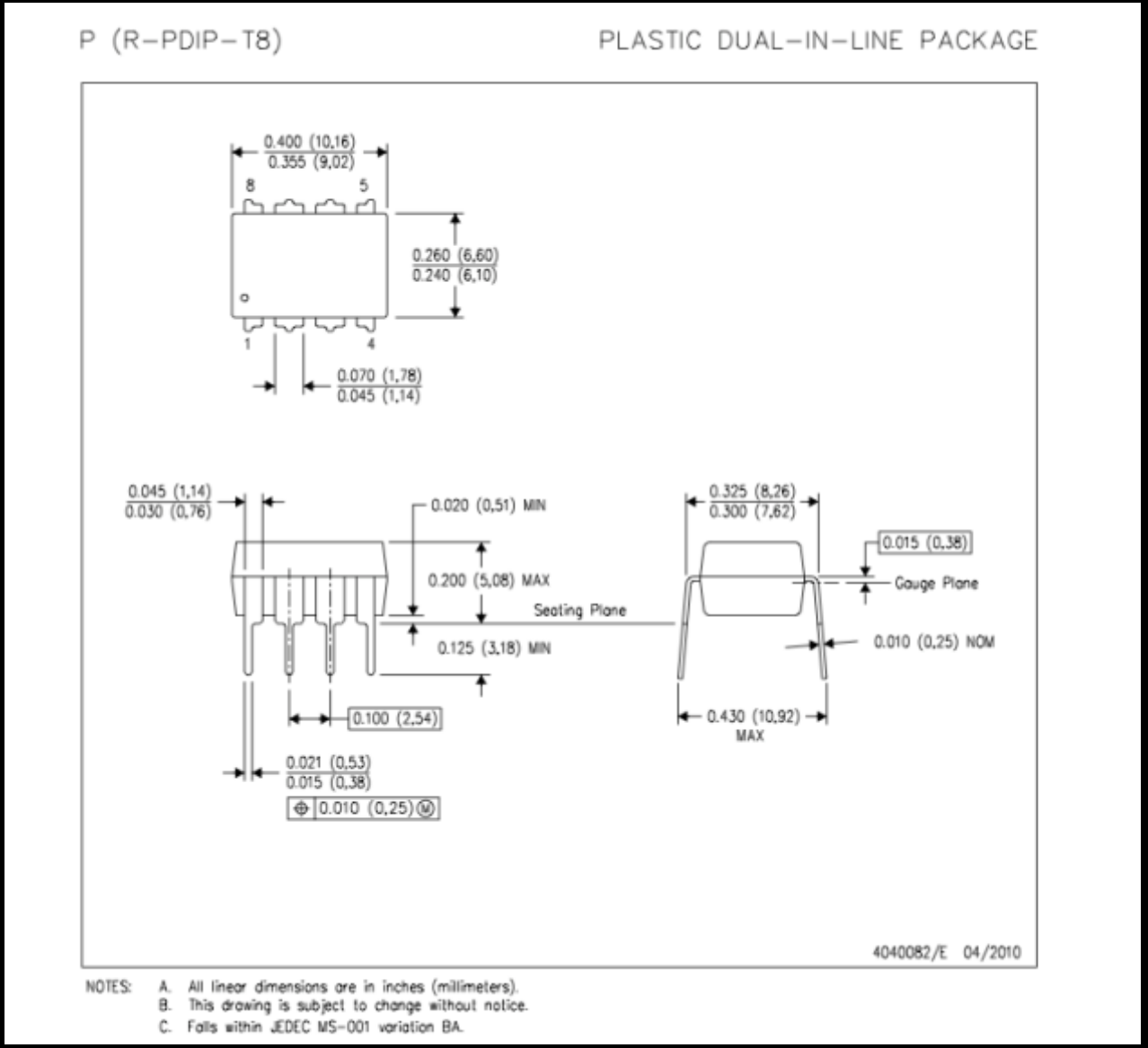
Integrated Circuit

Integrated Circuits

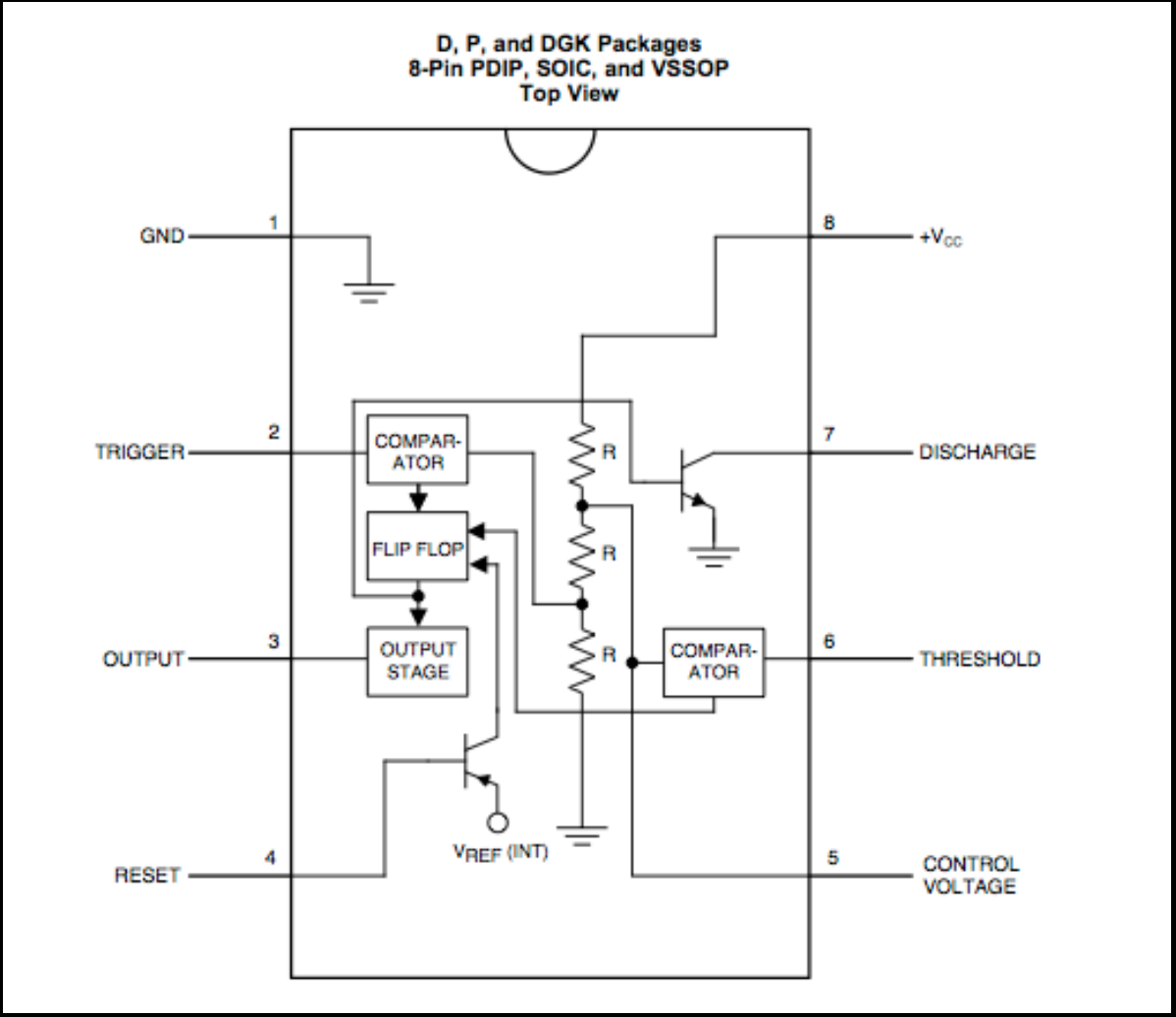


Many resistors, diodes, and transistors all in one tiny package!

Integrated Circuits



Integrated Circuits



Questions?