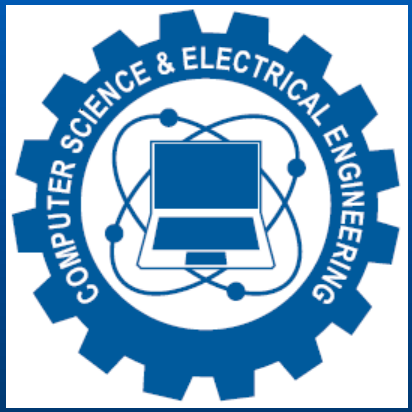
Resistors



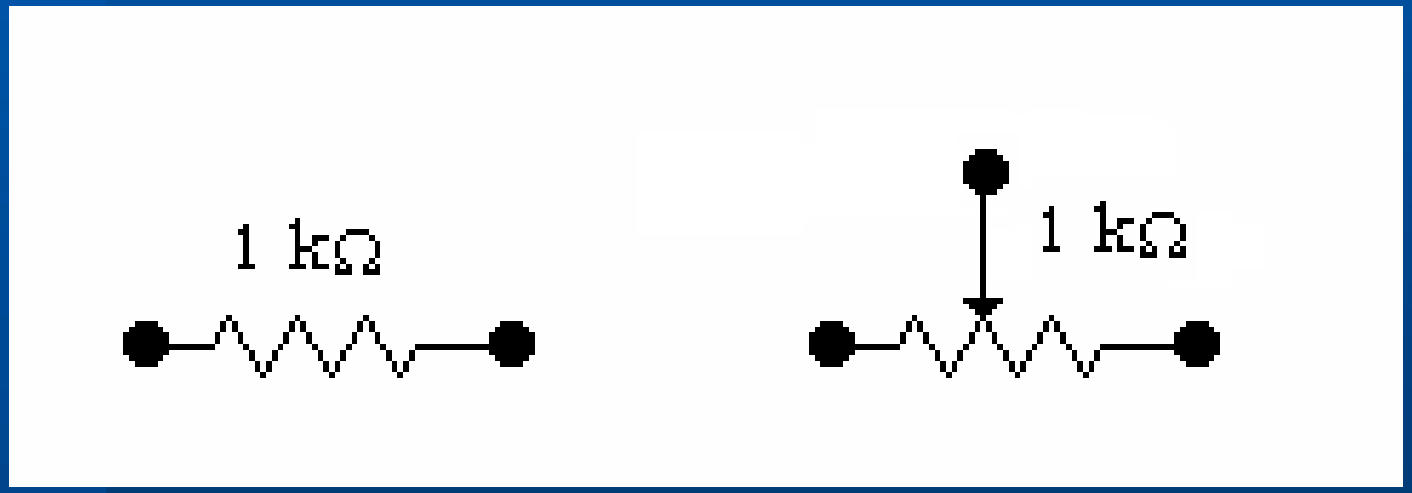
Characteristics

- an electronic device that limits the flow of electrical current and controls voltage
- Ohm = basic unit of value
- Ω = unit symbol for resistance
- values range from Ohms (Ω) to M Ω (MegaΩ)
- schematic symbol = R

Characteristics

- color coded for identification
- has a power rating (Watts)
- various physical sizes
- 2 types: fixed and variable
- used in all levels of electronics

Device Symbol



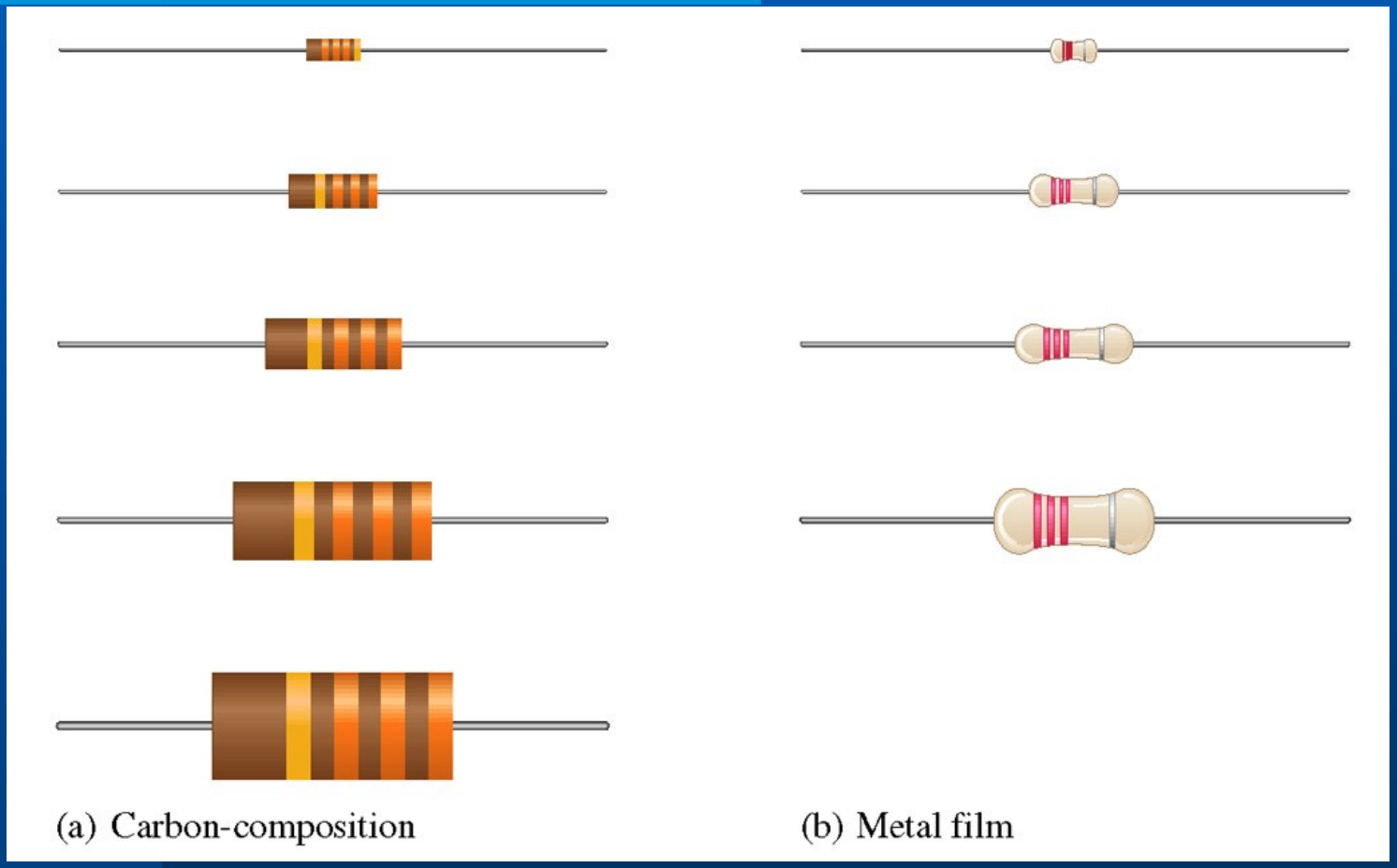
Resistors (fixed)

Wire-Wound: constructed of special metallic material (tungsten/manganin) with resistive characteristics and who's length determines the value of the resistor. Values range from less than 1Ω to several kΩ in power ratings from 5W to 100W.

Resistors (fixed)

Carbon-Composite: constructed of fine carbon or graphite with a powered insulating material as a binder to help attain the resistive value. Resistor values range from 1Ω to 20 MΩ in power ratings from 1/10W to 2W

Resistors (fixed)



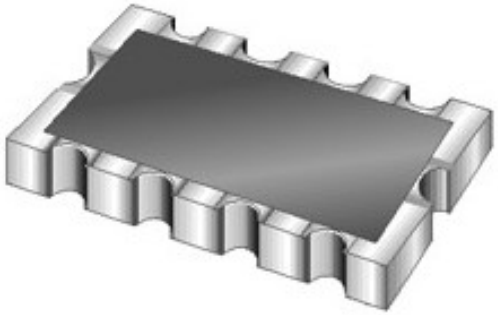
(a) Carbon-composition (b) Metal film

Resistors (fixed)

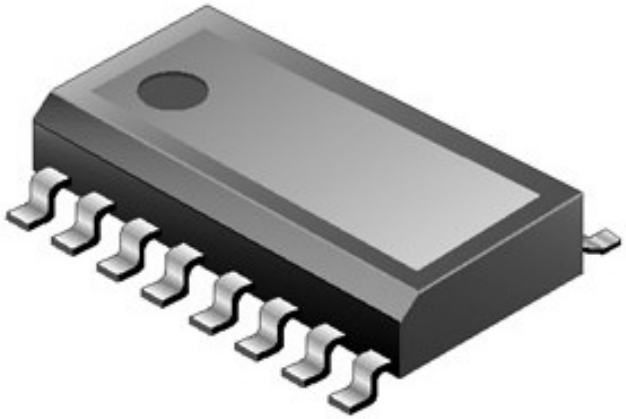
Surface-Mount: chip resistors (made by depositing a thick carbon film on a ceramic base where the resistance value is controlled by the composition of the carbon as well as the trimming done to the carbon deposit). Leads are soldered to the copper traces on the PCB where the resistor is mounted thus making the connection between the resistor and the outside world. Power ratings range from 1/8W to 1/4W and are very temperature stable

Resistor Packaging

Metal film
chip resistor



Chip resistor array



Resistor network (surface mount)

Resistors (fixed)

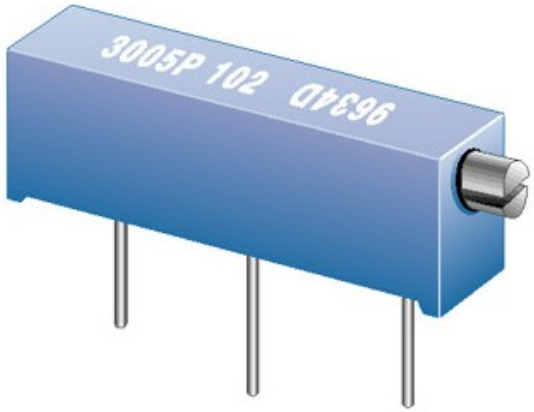
Thermistor: a thermally sensitive resistor that changes resistance with changes in temperature depending on temperature coefficient.

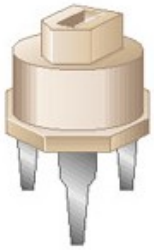
Resistors (variable)

- **Potentiometer (common): 3 terminal device whose purpose is to vary/tap off a portion of the applied voltage or current**

- **Rheostat (rare): 2 terminal device whose purpose is to vary the amount of current by connecting it in series within the circuit**

Resistors (variable)

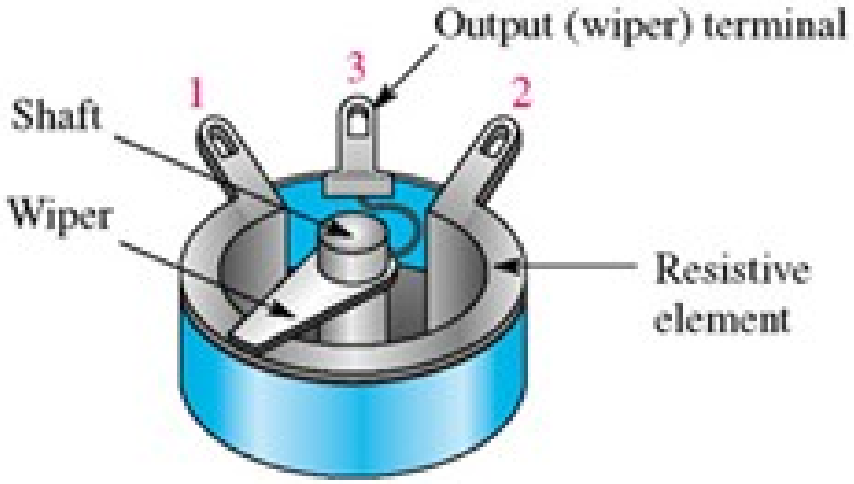




(a) Lead mounted

(b) Surface mounted

Standard Potentiometer



Precision Potentiometer