

# Embedded systems and IOT

*Lab 1*

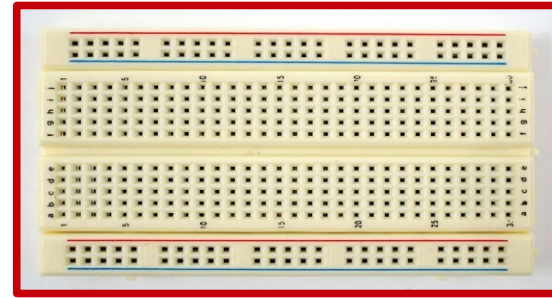
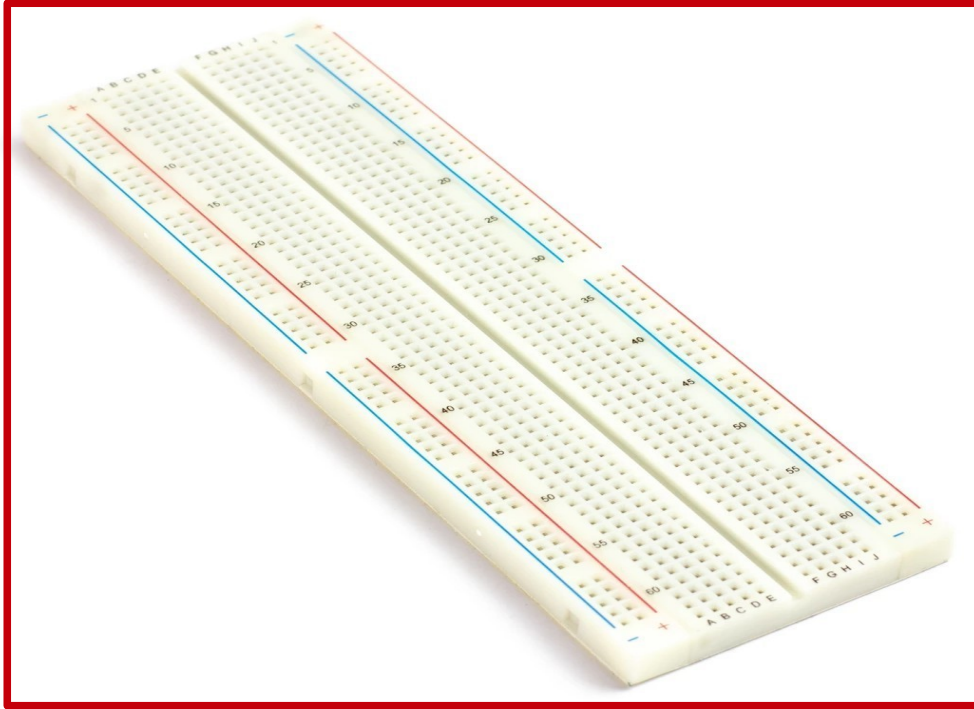
# LAB Requirements

# **Contents**

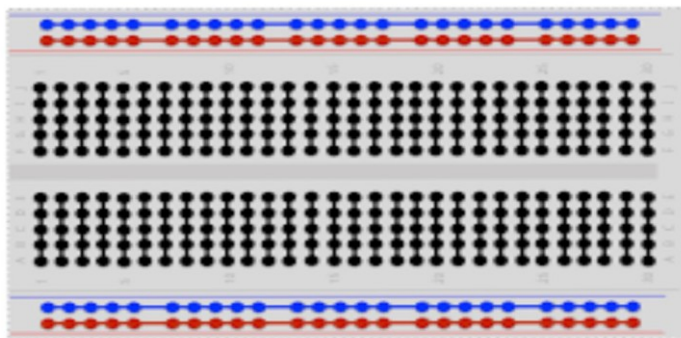
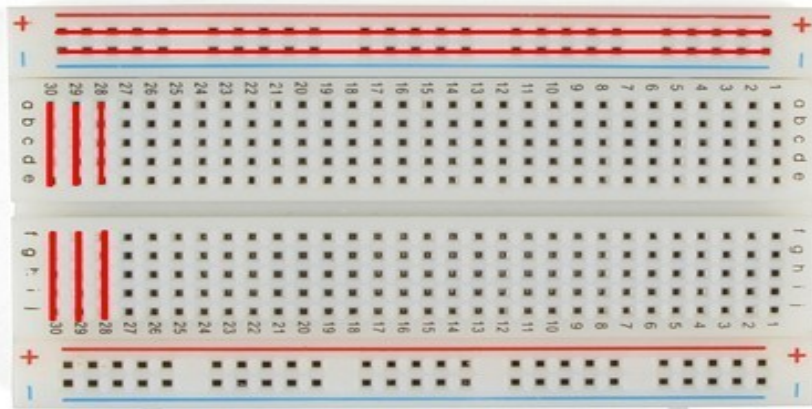
- 1 Tools and Equipments**
- 2 Passive Elements**

# [1] Tools and Equipments

# Breadboard (Sizes)

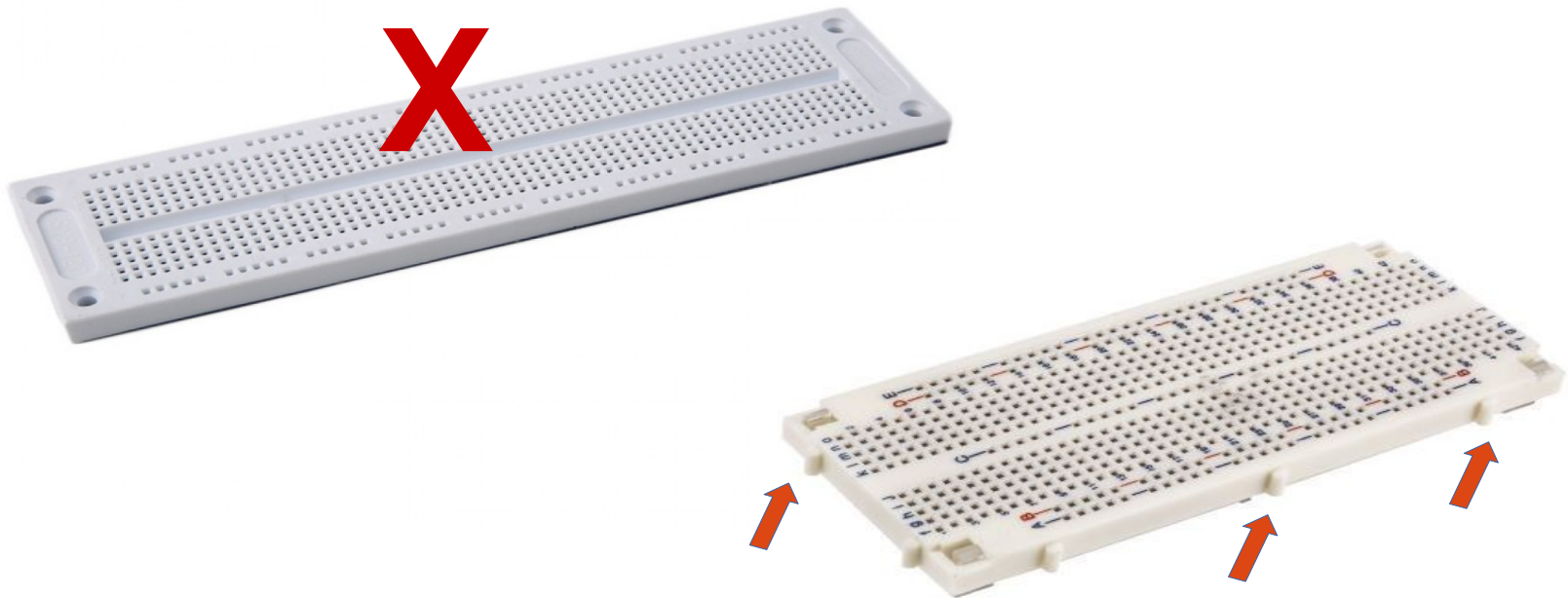


# Breadboard (Connectivity)

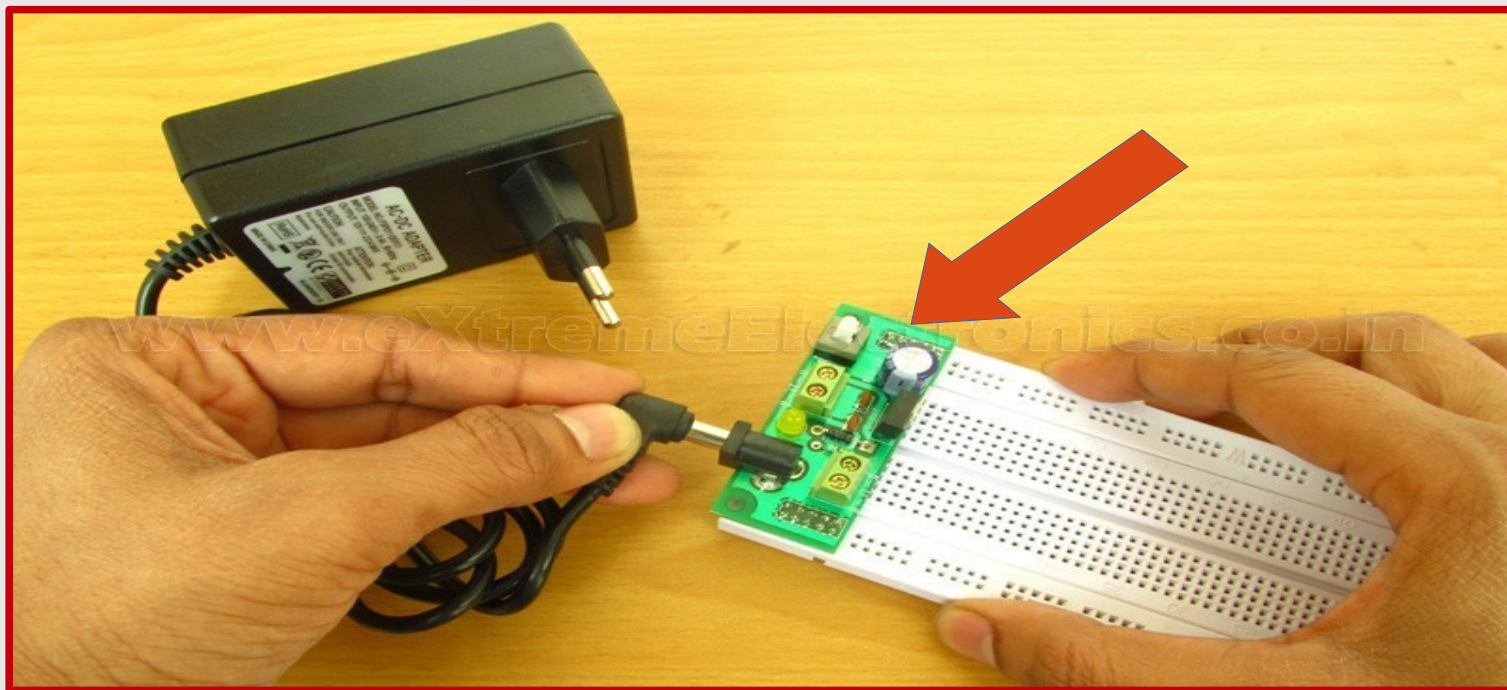


# Breadboard (Expandability)

7



# Breadboard (Power Connectivity)





# Power Adapter

## ( 5 Volts — 5 Volts — 5 Volts )



**Input: 220v**

**Output:**

**Volt: 5 Volts**

**Current: Minimum 1A  
Preferred 2 A**

# Breadboard Wires



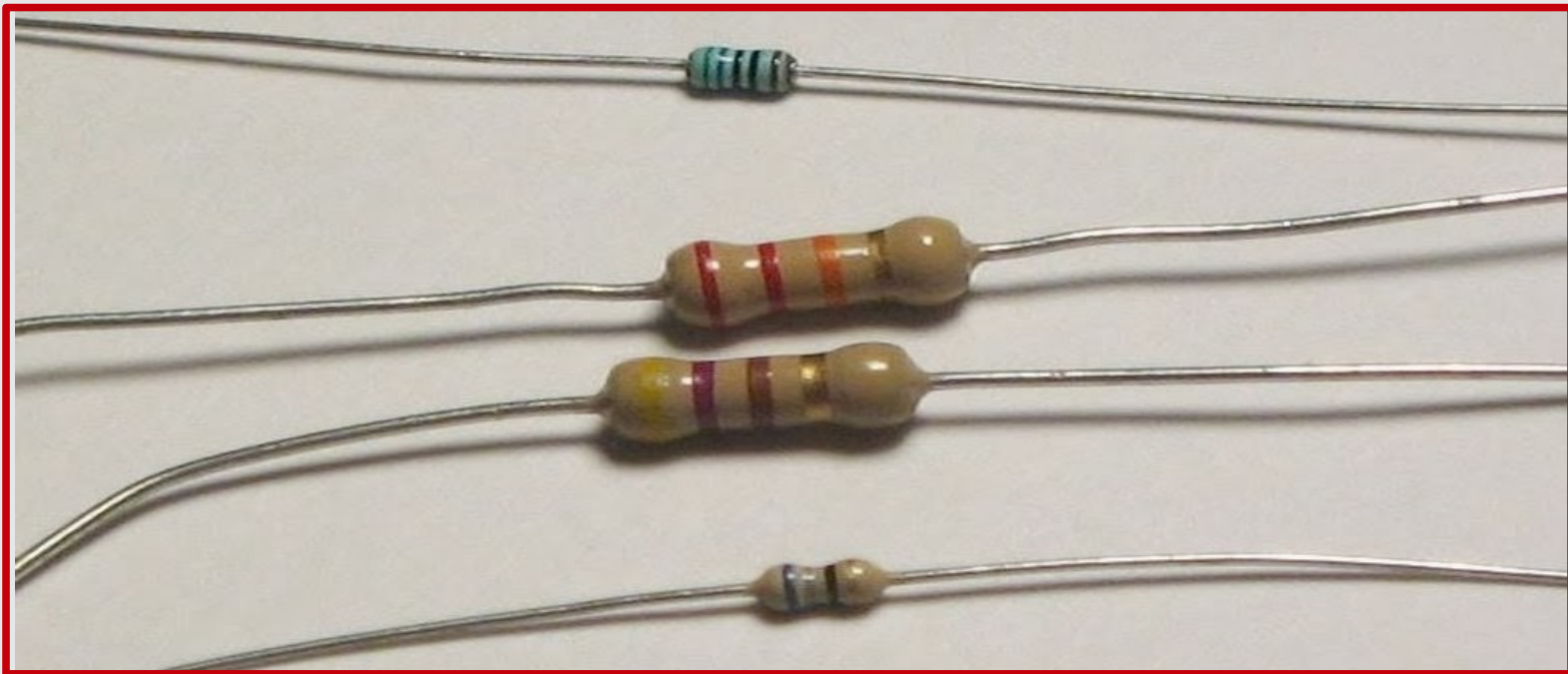
**Different Colors  
Different Sizes**



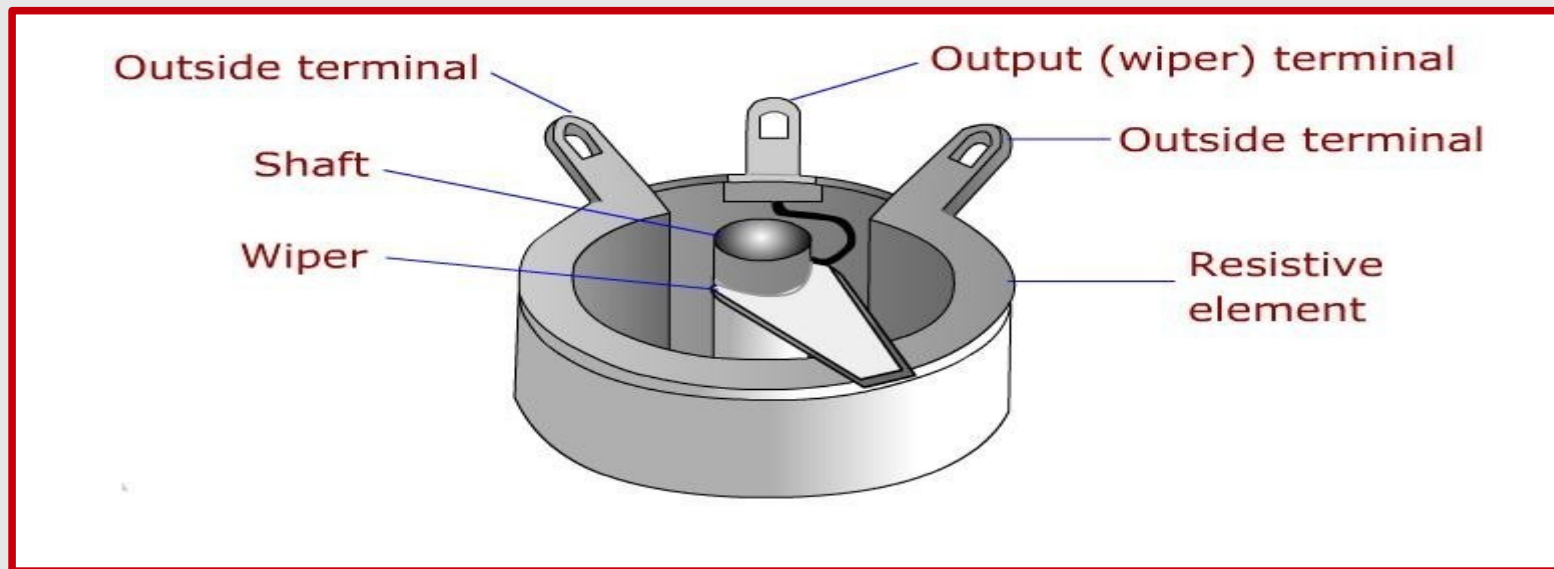
**May use regular long wires  
and cut suitable lengths**

## [2] Passive Elements

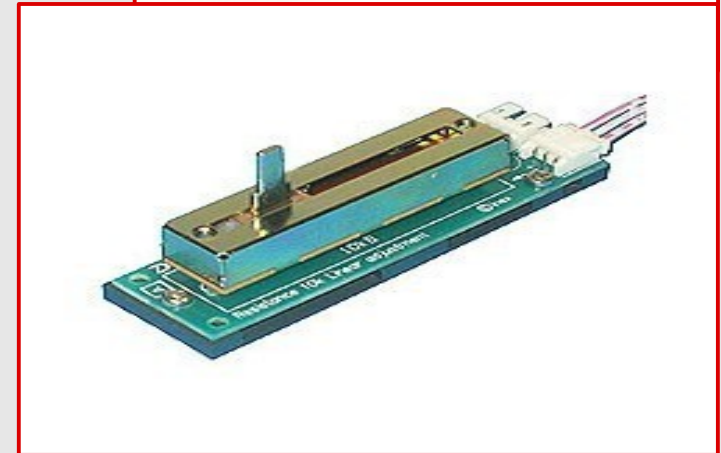
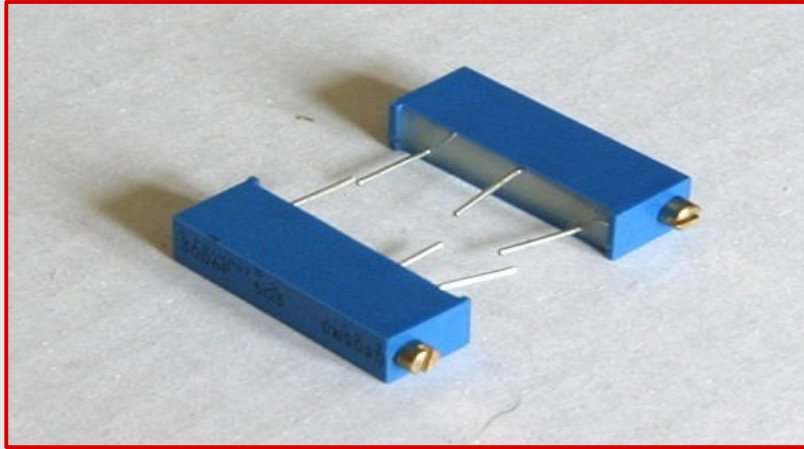
# Fixed Resistors



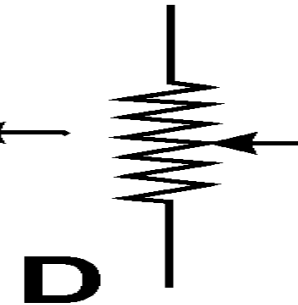
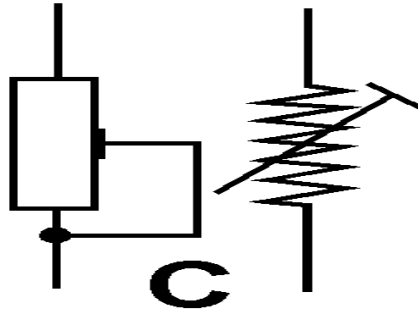
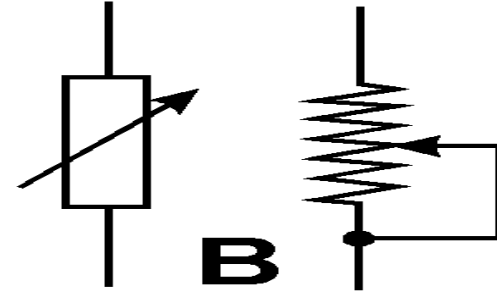
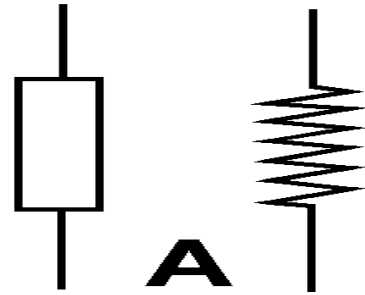
# Variable Resistors



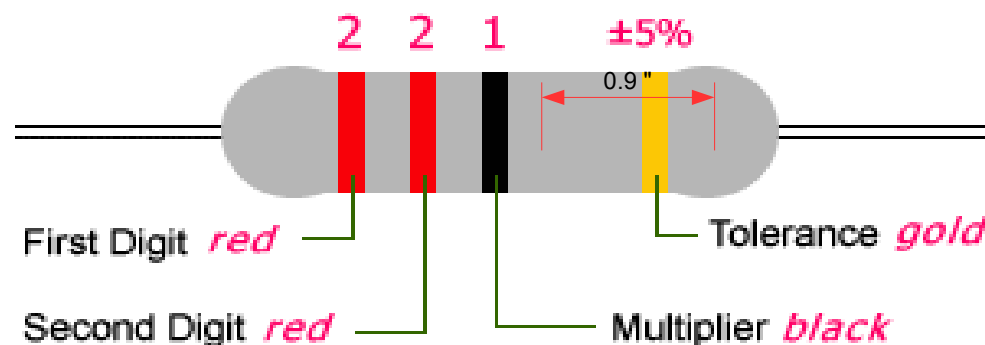
# Variable Resistors



# Resistors Symbols



# Resistors

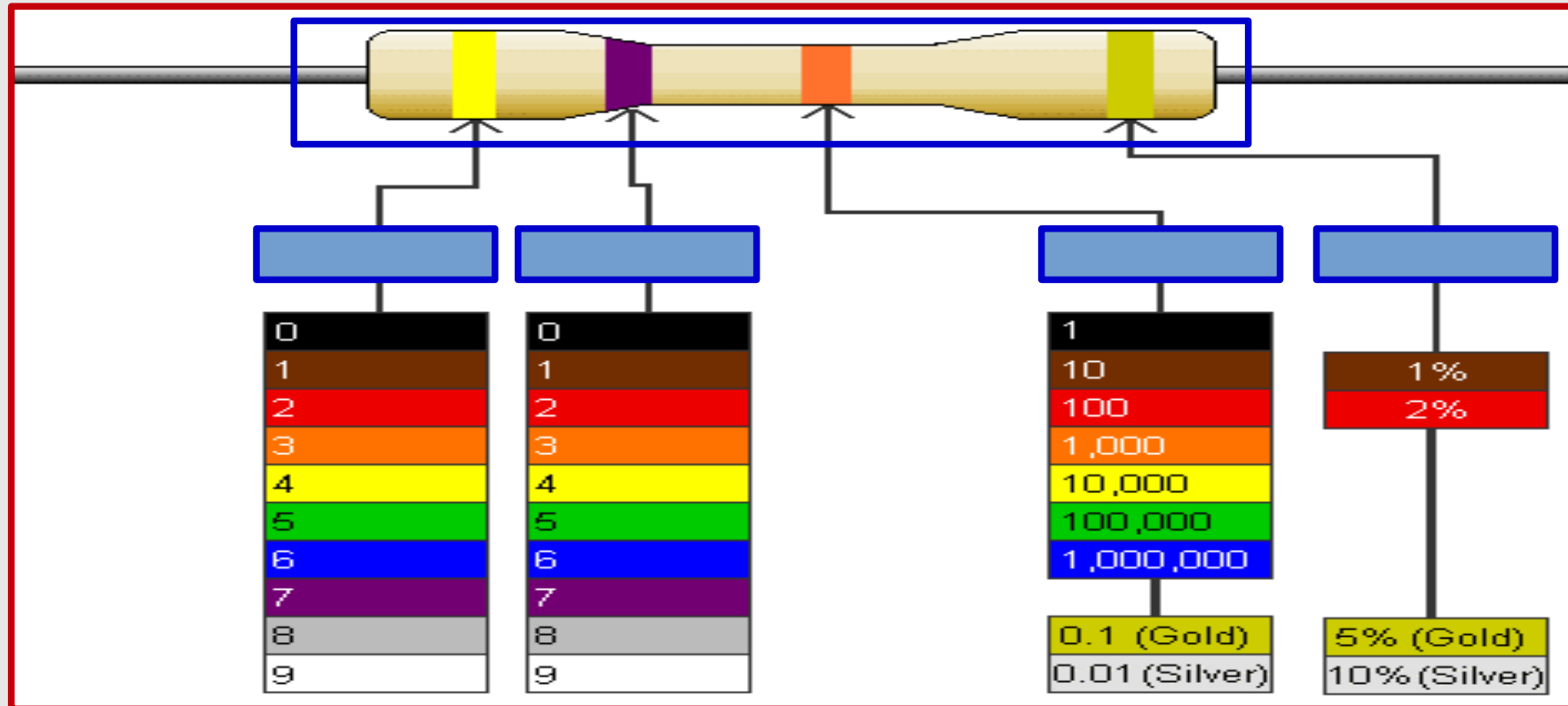


A 22Ω Resistor  
22×1 Ohms with a tolerance rating of ±5%



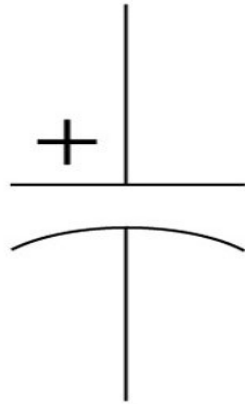
# Resistors

4 7 000 = 47K Ohm  $\pm 5\%$



# Fixed Value Capacitors

- Polarized Electrolytic Capacitors
  - Most electrolytic capacitors are polarized



(a) Schematic symbol

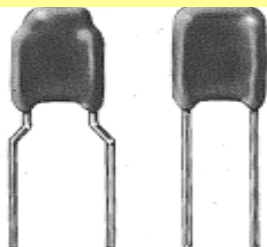


# Styles - Appearance



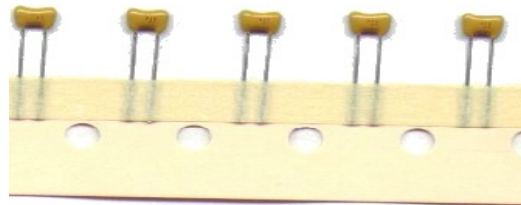
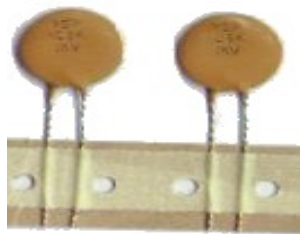
Radial Leaded Ceramic Disc

Radial Leaded "Mono"



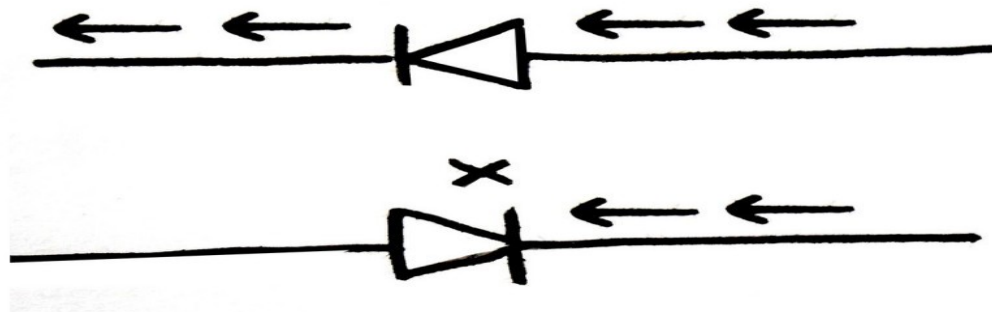
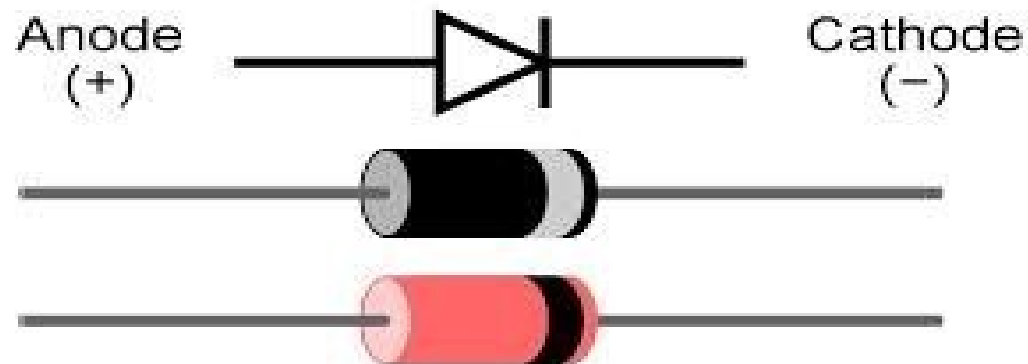
Monolithic Multi-layer Ceramic (MLC)

Axial Leaded "Mono"



Packaged on tape for auto insertion

# Diodes



# Light Emitting Diode (LED)

## Warning:

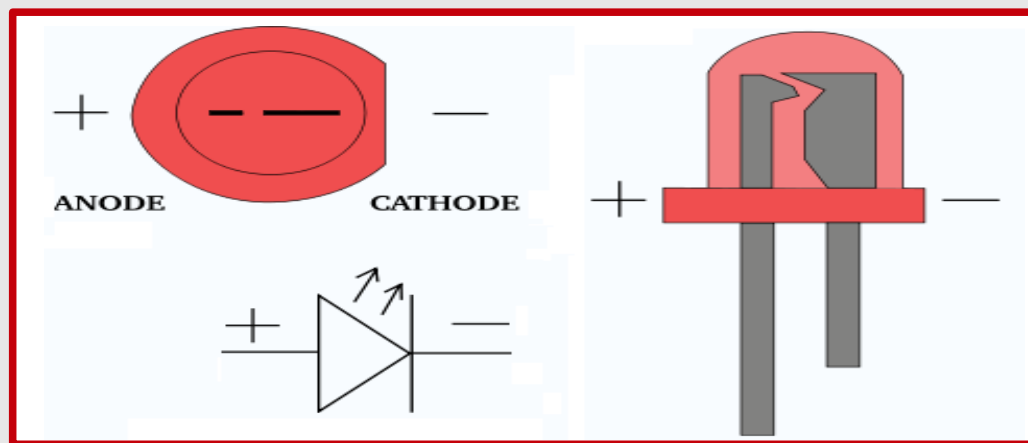
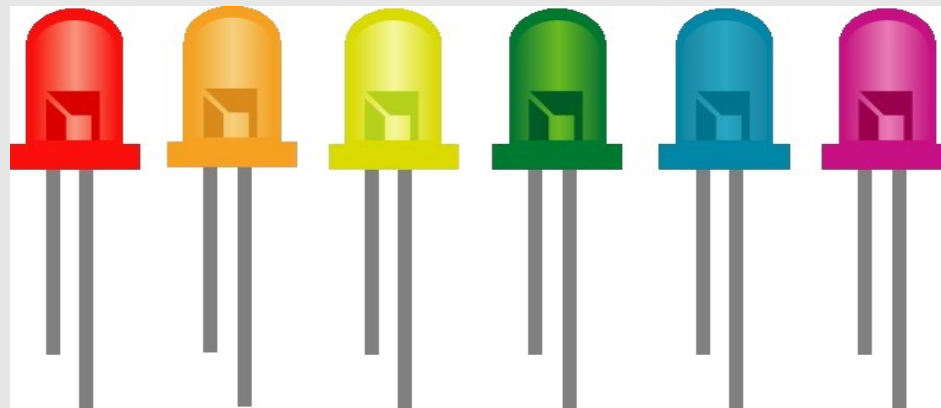
LED Uses 3 Volts ONLY

Use small Resistance in Series with LED

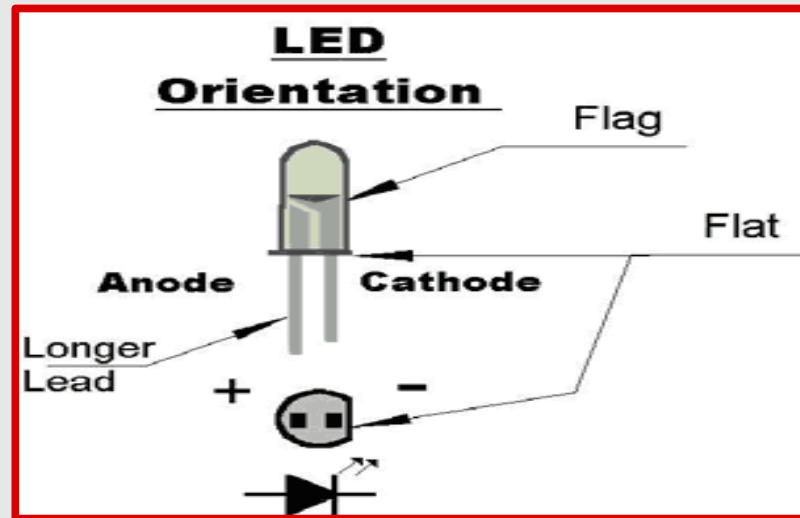
220 Ohm

330 Ohm

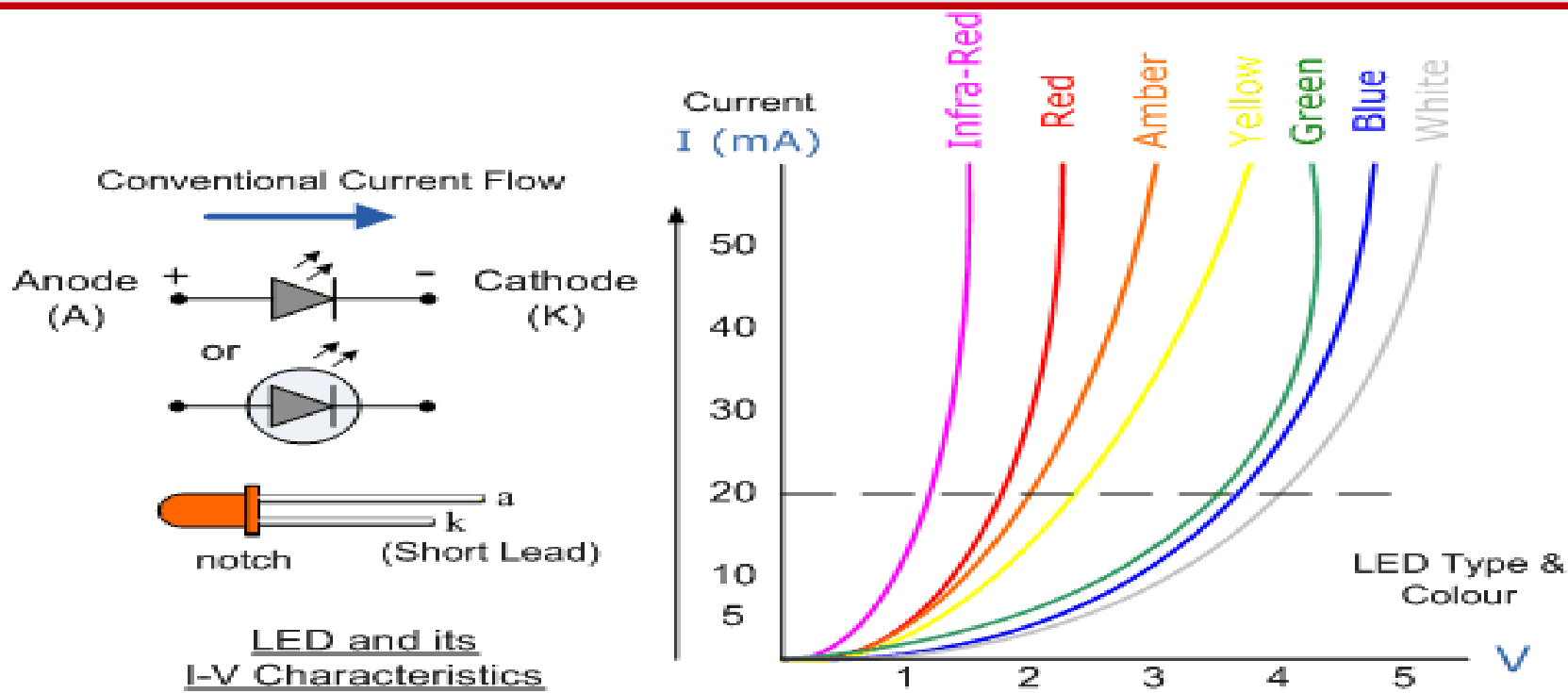
470 Ohm



# Light Emitting Diode (LED)



# Light Emitting Diode (LED)



**Thank you**