

# JOB ROLE – WIREMAN-CONTROL PANEL

Sector – Electronics  
(Qualification Pack Code: ELE/Q7302)



PSS Central Institute of Vocational Education  
Shyamla Hills, Bhopal – 462013 , Madhya Pradesh, India

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# UNIT 3: COMPONENT VALUE IDENTIFICATION

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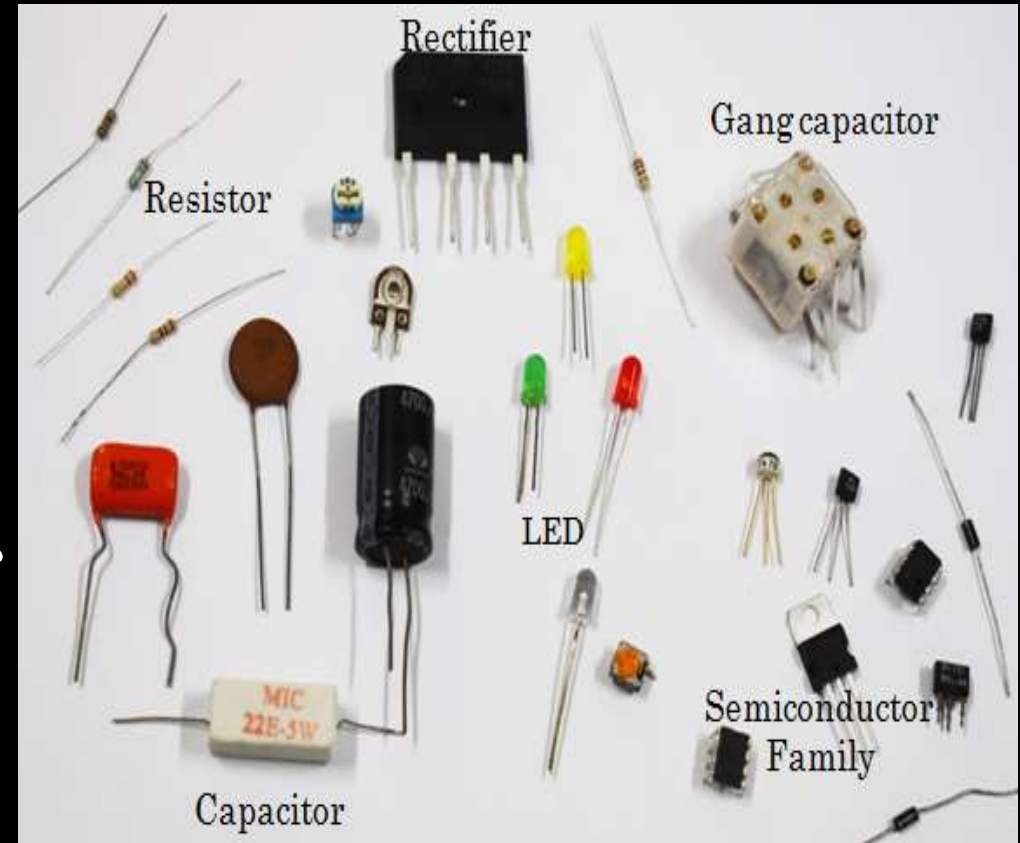
# Unit Objectives

The student will be able to:

- Describe the need of component value identification,
- Identify resistors and its types,
- Calculate the resistance value using colour code method,
- Calculate the resistance value using alphanumeric code method,
- Identify capacitors and describe its types,
- Describe and read the parameters of capacitor.

# Introduction

For a beginner, it is difficult to identify electrical and electronic components. To get an idea about the components, one needs to search for components data sheets. Component selection is a process of selecting a suitable component for an electric circuit. So that, electric circuit can perform its intended operation.



# Need of Component Value Identification

What happen if **fault occur** in the **circuit**?

- It would not work.
- If there is a requirement of component **replacement**, then **component value identification** is necessary.
- Wrong replacement may damage the circuit or it may harm the user.

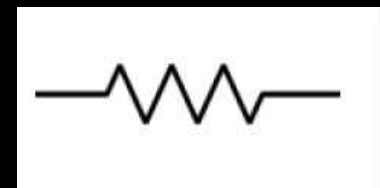


# Identification of Resistors

- Resistors are the fundamental components of electrical and electronic industry.
- Resistance is measured in ohms.
- The ohmic value is mostly printed on the resistor in the form of a code.



Various Resistors



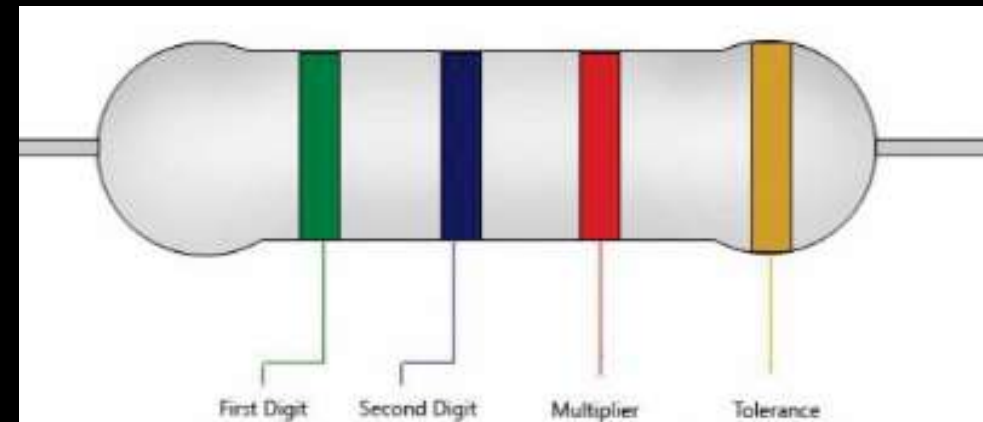
Symbol of resistor

- In a **surface mount resistor** the ohmic value is **printed on the surface**.



Surface Mount Resistor

- In a **carbon film resistor** the ohmic value is printed in the form of **bands of colour code**.



Colour Coded Resistor



# Colour Code Chart

Way to memorise the sequence of colour code:

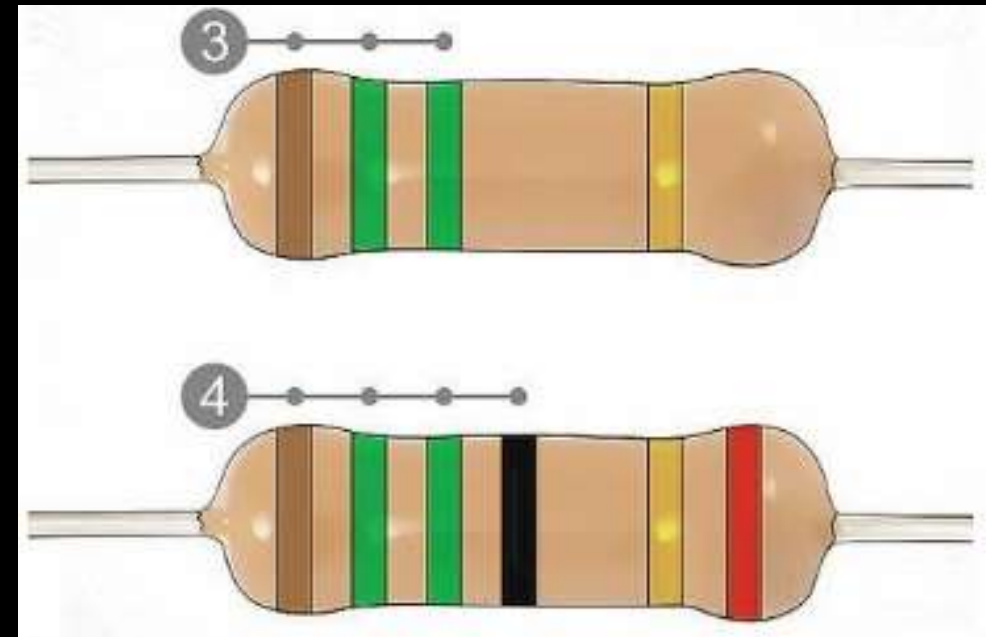
"**B B ROY** Great **B**ritain have **V**ery **G**ood **W**ife".

Colour	Number
black	0
brown	1
red	2
orange	3
yellow	4
green	5
blue	6
violet	7
grey	8
white	9

# Colour Coded Resistor



- Axial resistors are colour coded.
- Two patterns of axial resistor are **four band** or **five band** colour-coded resistors.

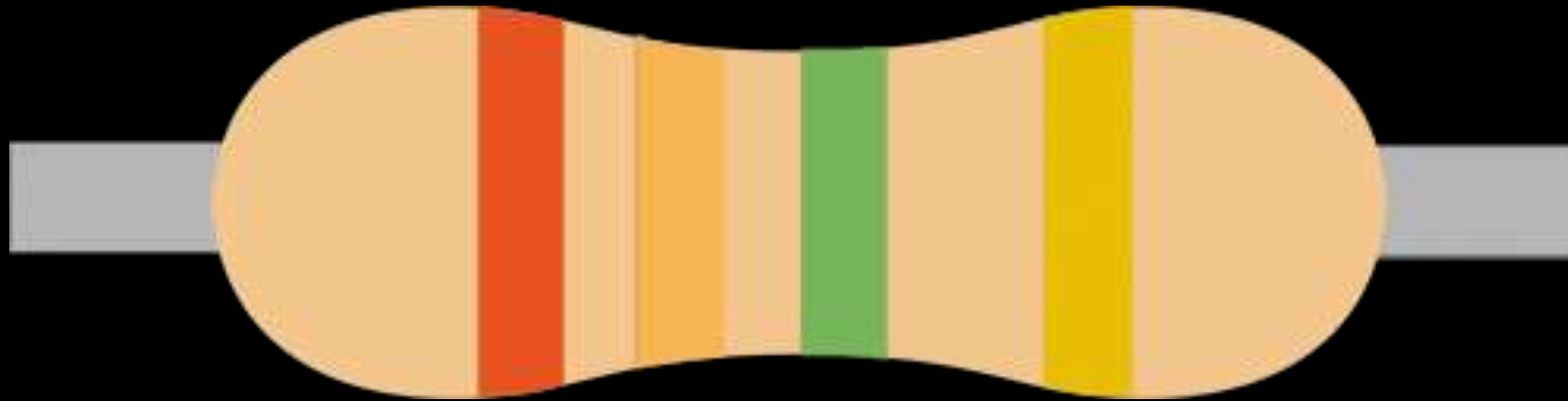


3-band and 4-band Resistors

Continue.....

In case of a four-band resistor:

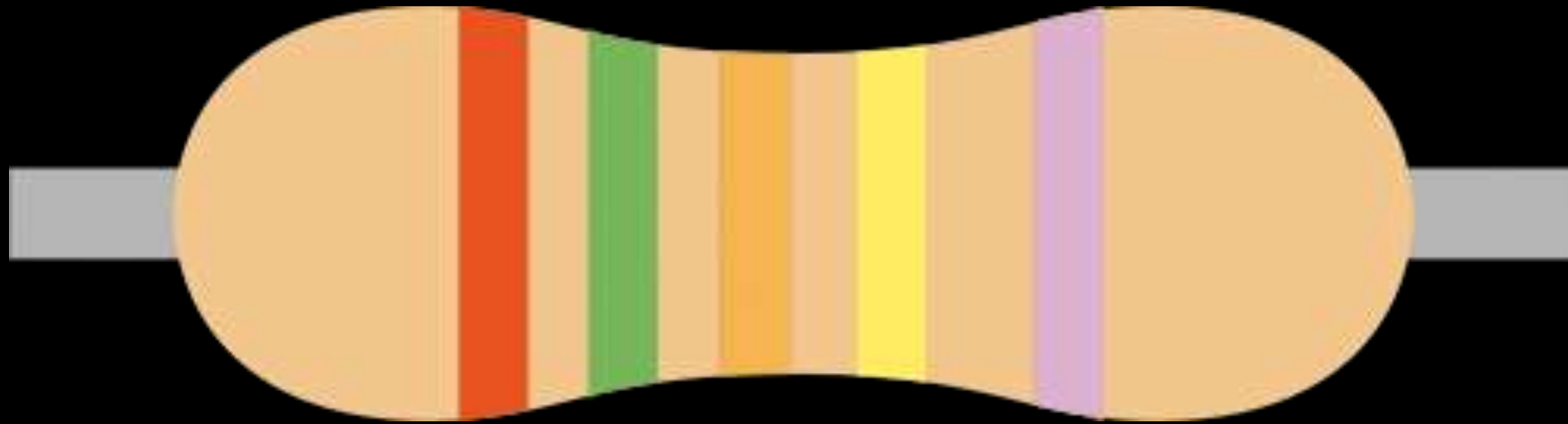
- **First two bands** represent the **significant digit**,
- **Third band** represents **multiplier**,
- **Fourth band** represents **tolerance**.



Four-band resistor

In case of a five-band resistor:

- **First three bands** represent **significant digits**,
- **Fourth band** represents **multiplier**,
- **Fifth band** represents **tolerance**.



Five-band resistor

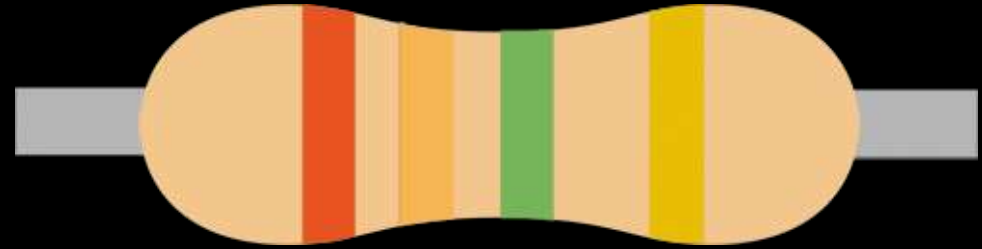
Continue...

# Resistance Calculation of 4-Band Resistor

- **First band** on a resistor is interpreted as the **first number** of the resistance value.
- **Second band** is the **second number of resistance value**.
- **Third band** is called the **multiplier** and represents the **number of zeros**.
- **Fourth colour** represents **tolerance**.

Continue...

- 1st Band – Red (2)
- 2nd Band – Orange (3)
- 3rd Band – Green ( $10^5$ )
- 4th Band – Gold ( $\pm 5\%$ )



So, the resistance is 23 multiplied by 100000, which is equal to  $2.3 \text{ M}\Omega \pm 5\%$ .

# Resistance Calculation of 5-Band Resistor

- **First band** on a resistor is interpreted as the **first number of the resistance value**.
- **Second band** is the **second number of resistance value**.
- **Third band** is the **third number of resistance value**.
- **Fourth band** is called the multiplier and represents the **number of zeros**.
- **Fifth colour** represents **tolerance**.

Continue...

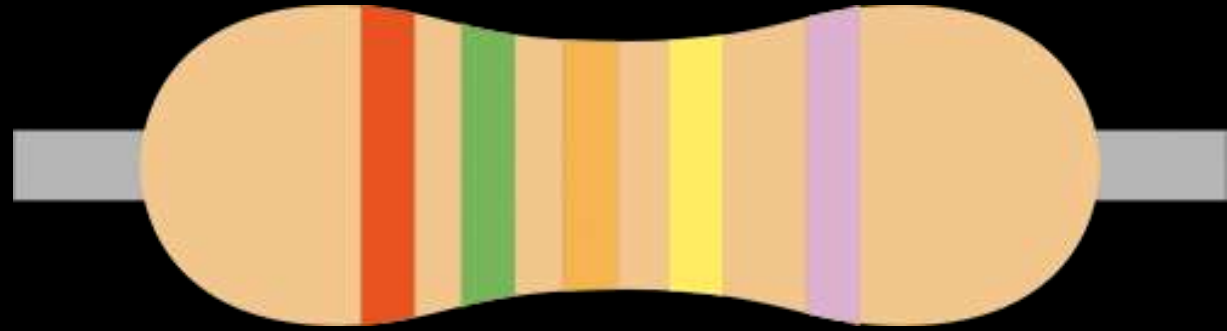
1st Band – Red (2)

2nd Band – Green (5)

3rd Band – Orange (3)

4th Band – Yellow ( $10^4$ )

5th Band – Violet ( $\pm 0.1\%$ )



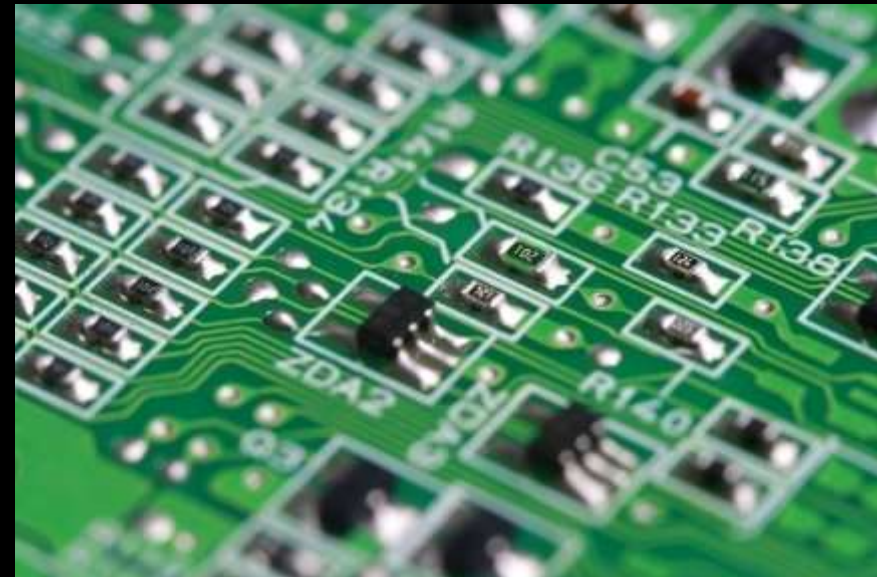
So, the resistance is 253 multiplied with 10,000 which is equal to 2.53 M $\Omega$   $\pm 0.1\%$ . This means for a value of 2.53 M $\Omega$ , the resistance value varies from 2529999.9 ohms to 2530000.1 ohms.

Continue...



# Alphanumeric Coded Resistor

- In surface mount resistor, the **ohmic value** is printed on the **surface**.
- This type of resistors are mounted on the **printed circuit board**.



Surface mount resistor mounted on circuit board

# Resistance Calculation of Alphanumeric Coded Resistor

- Surface-mounted resistors are rectangular in shape.
- First 2 or 3 numbers printed on the surface mount resistor represents significant digits and the last digit represents the number of zero that should follow.
- Alphabet at the end of the code represents tolerance value.

For example, a code on surface mount resistor is **1252** indicates a value **125200** ohm, letter '**B**' at the end of the code will give 0.1% tolerance value.

Tolerance value for various alphabets are as follows:

**A: 0.05% tolerance**

**B: 0.1% tolerance**

**C: 0.25% tolerance**

**D: 0.5% tolerance**

**F: 1% tolerance**

**G: 2% tolerance**

**J : 5% tolerance**

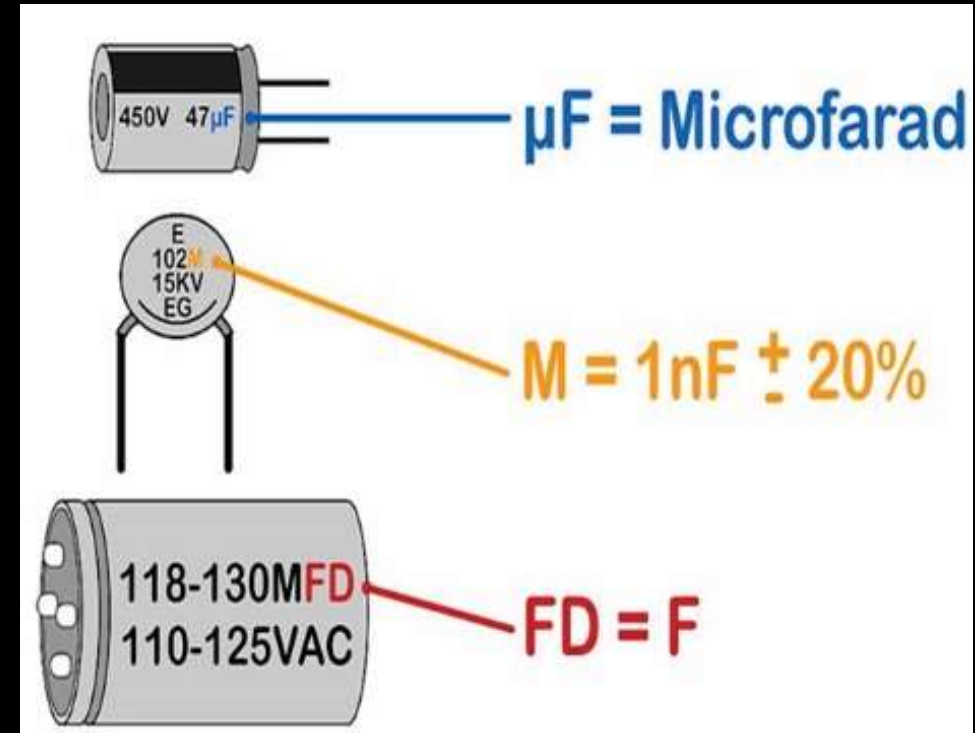
**K: 10% tolerance**

**M: 20% tolerance**



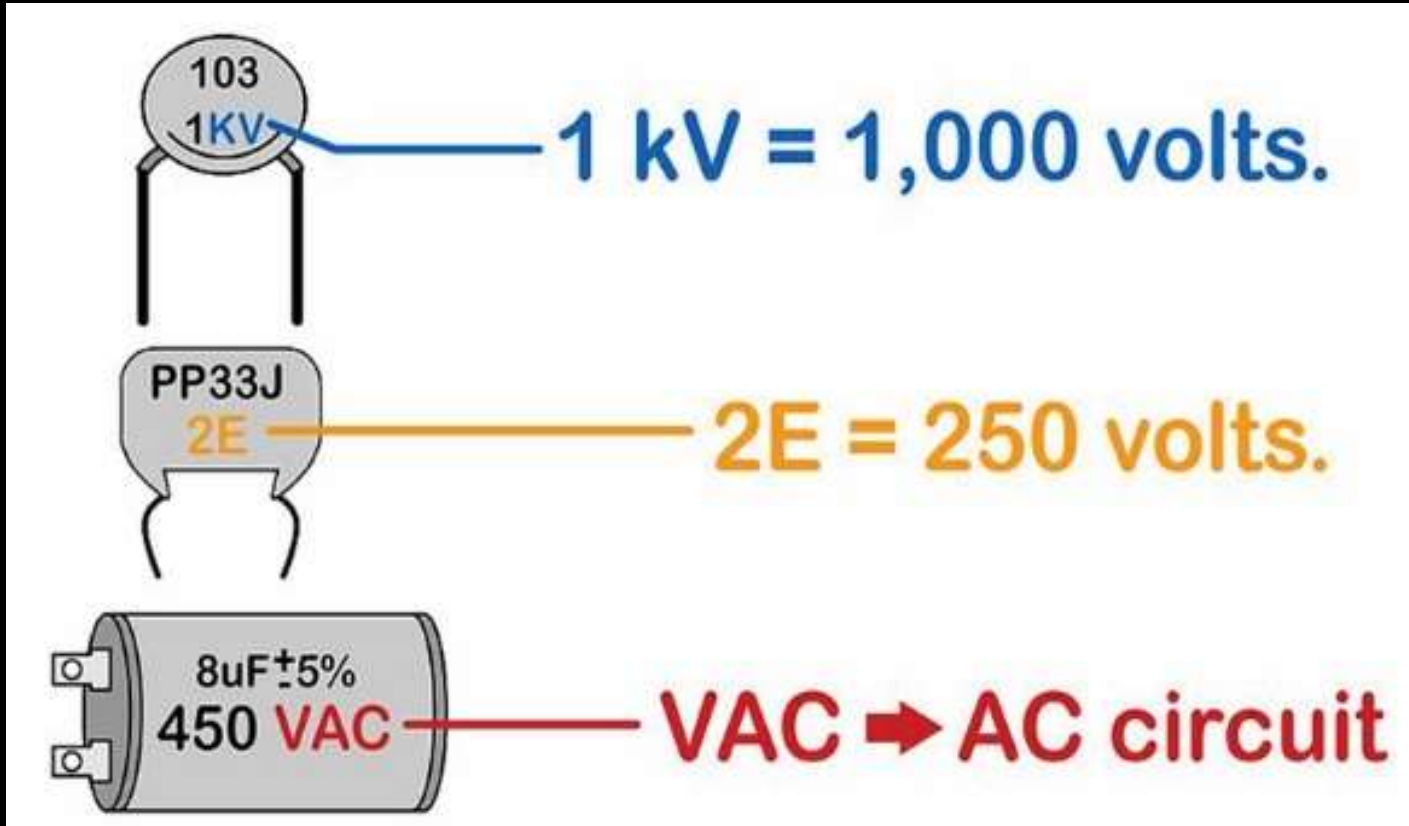
# Reading Capacitor Parameter

- Capacitor uses a wide variety of codes to describe its characteristics.
- Capacitance value printed on the capacitor.



Parameters on capacitor

# Voltage Rating of Capacitor



- Small values of capacitance, the metric system is used as given below.

$$1 \text{ mF} = 0.001 \text{ farad} = 10^{-3} \text{ farads}$$

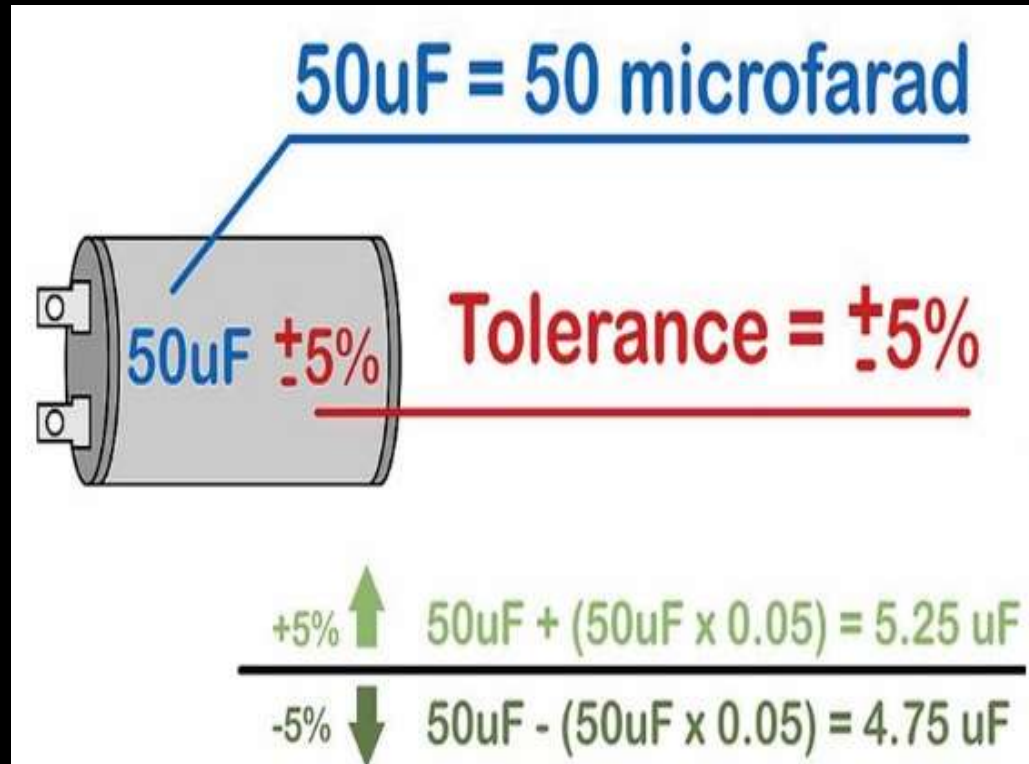
$$1 \text{ }\mu\text{F} = 0.00001 \text{ farad} = 10^{-6} \text{ farads}$$

$$1 \text{ nF} = 0.00000001 \text{ farad} = 10^{-9} \text{ farads}$$

$$1 \text{ pF} = 0.000000000001 \text{ farad} = 10^{-12} \text{ farads}$$

# Tolerance Value of Capacitor

Tolerance value of capacitor is the maximum acceptable range of capacitance till the capacitor can work without damage.



Tolerance value on capacitor

# Summary

- Resistor can be colour and alphanumeric coded.
- Resistance value determination using colour coded method.
- Resistance value determination using alphanumeric coded method.
- Parameters of capacitor are printed on the body of capacitor.



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