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Resistor Fundamentals

What is Resistor?

A resistor is basic electrical components which exhibits the feature of electrical resistance in circuits.

A resistor opposes the flow of electric current. We can regard resistor as a current limiting component. The flow of electric current in a circuit can be controlled using a resistor.

From Ohm's Law the current flowing through a conductor is inversely proportional to the resistance.

$$I = 1/R$$

So by varying the resistance of circuit we can actually control current passing through it.

The figure below displays a two terminal carbon composition resistor:



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Carbon & Metal film Resistors

By far the carbon composition resistors are most popular resistors in low edged applications. Such resistors usually have 4 colored bands on their bodies. The bands indicate the amount of resistance and tolerance value of resistance. The figure below displays a carbon composition resistor. Carbon composition resistors usually have a tolerance value of $\pm 5\%$.



Besides carbon composition resistors the metal film resistors are most popular. They usually have tolerance value of $\pm 1\%$. Such resistors are usually available in blue color and has 5 bands over its body.

The figure below displays 1K ohm $\pm 1\%$ metal film resistor having wattage rating of $\frac{1}{2}$ watt.



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Resistor Color Coding

In previous section we observed the resistors having different colored bands. These bands actually indicate the amount of resistance which is calculated from color coding charts.

Resistors can either contain 4, 5 or 6 colored bands.

On four band resistor first band and second bands are digits for 1st and 2nd digit of resistance. The second band indicates multiplier value, while the third one indicates the tolerance value.

Chart for 4 band resistors is shown on next page.



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4 Band resistor Color Coding Chart

Color	1 st Band	2 nd Band	Multiplier	Tolerance
Black	0	0	1 Ω	
Brown	1	1	10 Ω	$\pm 1\%$
Red	2	2	100 Ω	$\pm 2\%$
Orange	3	3	1k Ω	
Yellow	4	4	10k Ω	
Green	5	5	100k Ω	$\pm 0.5\%$
Blue	6	6	1M Ω	$\pm 0.25\%$
Violet	7	7	10M Ω	$\pm 0.10\%$
Grey	8	8		$\pm 0.05\%$
White	9	9		
Gold			0.1 Ω	$\pm 5\%$
Silver			0.01 Ω	$\pm 10\%$

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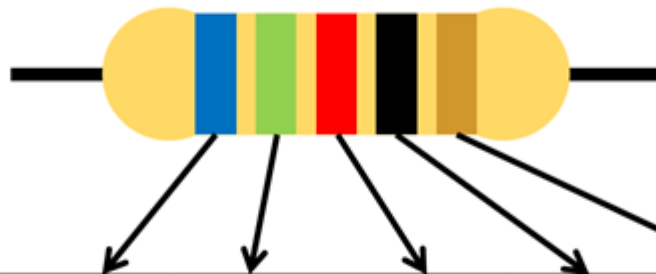


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5 Band Resistor Coding Chart

652Ω ±5%



Color	1 st Band	2 nd Band	3 rd Band	Multiplier	Tolerance
Black	0	0	0	1Ω	
Brown	1	1	1	10Ω	±1%
Red	2	2	2	100Ω	±2%
Orange	3	3	3	1kΩ	
Yellow	4	4	4	10kΩ	
Green	5	5	5	100kΩ	±0.5%
Blue	6	6	6	1MΩ	±0.25%
Violet	7	7	7	10MΩ	±0.10%
Grey	8	8	8		±0.05%
White	9	9	9		
Gold				0.1Ω	±5%
Silver				0.01Ω	±10%

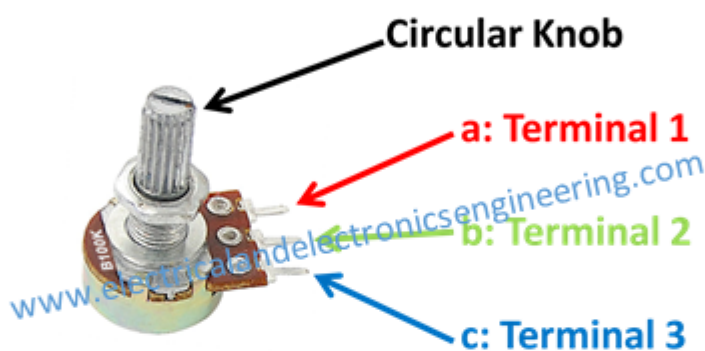


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Potentiometer

A potentiometer is one of most popular types of resistor that is used in electric circuits for obtaining variable resistance.

It is a three terminal device having a circular knob that can be used for varying resistance in connected circuit.



During its working either two or three terminals are used. If the circular knob is rotated the resistance between terminal 1 to 2 and 2 to 3 varies. However the overall resistance always remains same between 2 and 3.

Practically potentiometer is used for fan speed control, in radio frequency matching applications and for providing variable resistance in circuits.

So that was all about fundamental concepts of resistors.



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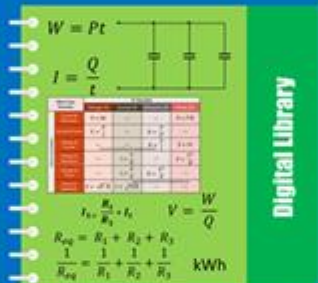
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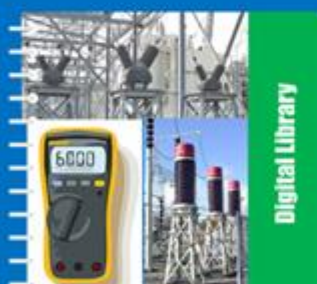
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