

Resistors

A resistor is a passive component with a specified resistance value. Resistors are the most commonly used components in electronic equipments. As its name states, a resistor is a device that resists the flow of current passed through it.

The resistance of any material related to its dimensions and the resistivity of the material by using the formula:

$$R = (\rho * l) / A$$

The above equation shows that the resistance of a material is directly proportional to:

1. The length of the material used.
2. The specific resistance (The nature of the taken material)

And inversely proportional to:

1. The area of cross section.

Now we are going to discuss about the specifications of resistors:

Specifications of a resistor:

The important specifications of a resistor are:

1. Resistance value.

2.Tolerance and

3.Wattage rating.

In addition to these specifications, specifications like voltage coefficient of resistance, voltage rating and temperature coefficient are also mentioned for different applications.

The value of a resistor is the resistance value. The unit of resistance is expressed in ohms. The resistance value can be either written on its body or it can use color codes. The percentage deviation from the rated value is called as the 'tolerance' of a resistor.

The maximum power that the resistor can dissipate safely is the 'wattage rating or power rating'. The temperature rise should be very high beyond this rating that the resistor gets damaged. The physical size of of a resistor gives its wattage (power) rating.

As we know the resistivity of a material is generally temperature dependent, so the resistance value changes with change in temperature

Colour Coding of Resistors:

Carbon resistors are very small size resistors. The colour code of the resistors will indicate the resistance values. The Electronic Industries Association (EIA)

standardized the colour coding of resistors. The given table shows the colour coding schemes of resistors.

Colour	Digit	Multiplier	Tolerance
Black	0	10^0	-
Brown	1	10^1	(+ -)1%
Red	2	10^2	(+ -)2%
Orange	3	10^3	-
Yellow	4	10^4	-
Green	5	10^5	-
Blue	6	10^6	-
Violet	7	10^7	-
Gray	8	10^8	-
White	9	10^9	-
Gold	10	10^{-1}	(+ -)5%
Silver	11	10^{-2}	(+ -)10%
NO colour	12	-	(+ -)20%

The colour bands are printed at one end of the resistor. The colour bands are read from left to right. The first colour indicates the first digit, the second colour the second digit and third colour gives the multiplier (the number of zeros to be added after the first two digits). The tolerance value is given by the fourth colour. The fifth band (it is an optional band) indicates the reliability level (failure rate) for which the colour code is given by:

Brown = 1%

Red = 0.1%

Orange = 0.01%

Yellow = 0.001%

Consider an example for the colour code: A resistor with colour code Blue, Green, Red, Gold will give a value of $(652 \pm 5\%) \Omega$.

Consider another example:

If the colour code is Red, Gray, Brown, Silver then the resistance value is $(281 \pm 10\%)$

Another type of resistance code is basically based on B.S1825 code. Here the letters R,K,M denote the value of the resistor in ohms, kilo ohms and mega ohms.

The tolerance code is given in the table:

Letter	Tolerance
F	$\pm 1\%$
G	$\pm 2\%$
J	$\pm 5\%$
K	$\pm 10\%$
M	$\pm 20\%$

Here 58Ω is denoted as 58R, 5800Ω is denoted as 5K8 and $58M\Omega$ as M58.

Source:

<http://www.electronicsandcommunications.com/2012/08/resistance-specifications.html>