

RESISTORS AND ITS TYPES

To oppose the flow of electrons (current). The symbols are shown below.

Resistance is measured in units called “Ohm”. 1000 ohms is shown as 1k ohm (10³ ohm) and 1000 k ohm is shown as M.ohms (10⁶ohm).

Resistors can be broadly of two types.

- Fixed Resistors and Variable Resistors.

Fixed Resistors:

Carbon Film (5%, 10% tolerance) and Metal Film Resistors (1%,2% tolerances) and wire wound resistors. A fixed resistor is one for which the value of its resistance is specified and cannot be varied in general.

Resistance Value

The resistance value is displayed using the color code (the colored bars/the colored stripes), because the average resistor is too small to have the value printed on it with numbers. The resistance value is a discrete value.

For example, the values [1], [2.2], [4.7] and [10] are used in a typical situation.

Types of Resistance



CARBON FILM RESISTORS

This is the most general purpose, cheap resistor. Usually the tolerance of the resistance value is $\pm 5\%$. Power ratings of 1/8W, 1/4W and 1/2W are frequently used. The disadvantage of using carbon film resistors is that they tend to be electrically noisy.

METAL FILM RESISTORS

Metal film resistors are used when a higher tolerance (more accurate value) is needed. Nichrome(Ni-Cr) is generally used for the material of resistor. They are much more accurate in value than carbon

film resistors. They have about $\pm 0.05\%$ tolerance.

OTHER RESISTORS

There is another type of resistor called the wire wound resistor. A wire wound resistor is made of metal

resistance wire, and because of this, they can be manufactured to precise values. Also, high-wattage resistors can be made by using a thick wire material. Wire wound resistors cannot be used for high-frequency circuits.

Ceramic Resistor

Another type of resistor is the Ceramic resistor. These are wire wound resistors in a ceramic case, strengthened with a special cement. They have very high power ratings, from 1 or 2 watts to dozens of watts. These resistors can become extremely hot when used for high power applications, and this must be taken into account when designing the circuit.

SINGLE-IN LINE NETWORK RESISTORS

It is made with many resistors of the same value, all in one package. One side of each resistor is connected with one side of all the other resistors inside. One example of its use would be to control the current in a circuit powering many light emitting diodes (LEDs). The face value of the resistance is printed.

4S-RESISTOR NETWORK

The 4S indicates that the package contains 4 independent resistors that are not wired together inside. The housing has eight leads instead of nine.

VARIABLE RESISTORS

There are two general ways in which variable resistors are used. One is the variable resistor whose value is easily changed, like the volume adjustment of Radio. The other is semi-fixed resistor that is not meant to be adjusted by anyone but a technician. It is used to adjust the operating condition of the circuit by the technician.

Semi-fixed resistors are used to compensate for the inaccuracies of the resistors, and to fine-tune a circuit. The rotation angle of the variable resistor is usually about 300 degrees. Some variable resistors must be turned many times(multi-turn Pot) to use the whole range of resistance they offer.

This allows for very precise adjustments of their value. These are called “Potentiometers” or “Trimmer Potentiometers” or “presets”.

LIGHT DEPENDENT RESISTANCE (LDR)

Some components can change resistance value by changes in the amount of light falling on them. One type is the Cadmium Sulfide Photocell. It is a kind of resistor, whose value depends on the amount of light falling on it. When in darkness its resistance is very large and as more and more light falls on it its resistance becomes smaller and smaller.

There are many types of these devices. They vary according to light sensitivity, size, resistance value etc.

THERMISTOR

They are thermally sensitive resistor. The resistance value of the thermistor changes according to temperature. They are used as a temperature sensor. There are generally two types of thermistors, with Negative Temperature Coefficient(NTC) Positive Temperature Coefficient(PTC). The resistance of NTC thermistors decreases on heating while that of PTC thermistors increases.

ELECTRIC POWER RATING

For example, to power a 3V circuit using a 12V supply, using only a resistor, then we need to calculate the power rating of the resistor as well as the resistance value. The current consumed by the 5V circuit needs to be known.

Assume the current consumed is 250 mA (milliamps) in the above example. That means 9V (=12-3 V) must be dropped with the resistor. The resistance value of the resistor becomes $9V / 0.25A = 36(\text{ohm})$.

The consumption of electric power for this resistor becomes $0.25A \times 0.25A \times 36\text{ohm} = 2.25W$. Thus the selection of resistors depends on two factors namely tolerance and electric power ratings.

OHM'S LAW

Important and useful law. The current(I) flowing through a conductor is proportional to the voltage (V) applied across its ends. This can be written in algebraic form as $V \propto I$ Or $V = IR$ where R is the proportionality constant. R is called Resistance and is measured in 'Ohms' (Ω). Usually resistors are also specified in circuits in kilo Ohms($k\Omega$) and Mega Ohms($M\Omega$). The other useful relationships are $V = RI$, and $R=V/I$.

Source : <http://electronichobbyist.wordpress.com/2012/03/02/basic-electronics-2/>