

Resistors

About Resistors

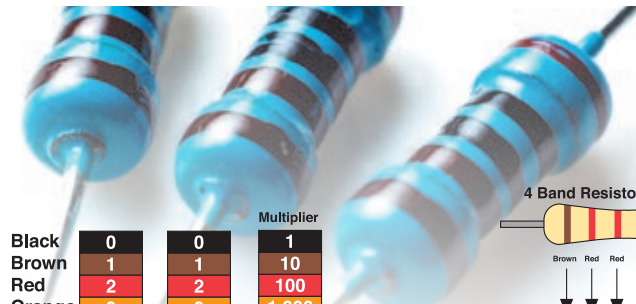
A resistor will limit the current flow through itself to a calculable value based upon its resistance and the applied voltage (see 'Ohms Law' below). This means a resistor can be used to run a low voltage device from a higher voltage power supply by limiting the required power to a predetermined level. Resistors are not polarity sensitive.

Tolerance The tolerance of a resistor refers to how close its actual resistance has to be to the value marked on it. Common tolerances are 5% and 1%.

Wattage Depending on the power requirements of a circuit, resistor wattage needs to be calculated to ensure that they don't over heat. The more common ratings available for resistors are 1/4 Watt, 1/2 Watt, 1 Watt & 5 Watt. The wattage required for different circuits can be calculated by using the power formula described later.

Values Because it would be impractical to carry every possible value of resistor, they are available in pre-selected ranges. These ranges are known as preferred values. The E 12 series, which is the most common series, (12 Values per 100) is denoted as: 10Ω, 12Ω, 15Ω, 18Ω, 22Ω, 27Ω, 33Ω, 39Ω, 47Ω, 56Ω, 68Ω, 82Ω. This does not limit the range of resistors to a total of twelve values, but each resistor value must begin with a number from the series and be a multiple of x0.1, x1, x10, x100, x1000, x10000 etc. i.e. 1.5Ω, 15Ω, 150Ω, 1500Ω, 15,000Ω.

The E 24 series has 24 values per 100 which includes the above sequence plus these extra values: 11Ω, 13Ω, 16Ω, 20Ω, 24Ω, 30Ω, 36Ω, 43Ω, 51Ω, 62Ω, 75Ω, 91Ω.



Multiplier

Black	0	0	1
Brown	1	1	10
Red	2	2	100
Orange	3	3	1,000
Yellow	4	4	10,000
Green	5	5	100,000
Blue	6	6	1,000,000
Violet	7	7	
Grey	8	8	
White	9	9	

Tolerance

Brown	1%
Red	2%
Gold	5%
Silver	10%

4 Band Resistors (Example 1)
Brown Red Red Gold
1 2 x100 = 1200 or 1.2k

5 Band Resistors (Example 2)
Brown Red Black Brown Brown
1 2 0 x10 = 1200 or 1.2k

Resistors in Series

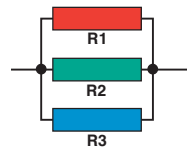
When two or more resistors are placed in series, (in line with each other), the overall resistance of the resistor network will change. The new value can be calculated from:

$$R_{\text{Total}} = R_1 + R_2 + R_3 + \text{etc...}$$



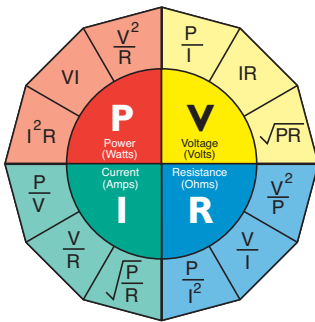
Resistors in Parallel

Calculating resistors in parallel is a little more complicated than resistors in series.



$$R_{\text{Total}} = \frac{1}{\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \text{etc...}\right)}$$

The Formula Wheel



Using this formula wheel it is possible to calculate power, volts, amps or resistance for a given problem. i.e. if you have two of the variables, for example power and volts, it is possible to find the amps in a circuit. This wheel expresses volts as V, however, in old text books you may see volts shown as E.

POWER (Watts)

This formula is used in many situations, from calculating the wattage of a resistor, to working out if an appliance will overload a particular power source.

$$\text{Power (Watts)} = \text{Current (Amps)} \times \text{Voltage (Volts)}$$

$$P = I \times V$$

Where: V = Volts, I = Amps

A useful variation of this formula is :-

$$P = I^2 \times R$$

OHMS LAW

Ohms law is undoubtedly the most commonly used formula in electronics today. It defines the relationship between voltage, current and resistance. Its uses vary from calculating the value of a resistor to protect a LED (Light Emitting Diode) from destruction when run on a higher voltage supply than recommended, to calculating the current that a heater element will draw.

$$\text{Voltage (Volts)} = \text{Current (Amps)} \times \text{Resistance (Ohms)}$$

$$V = I \times R$$

Where: V = Volts, I = Amps, R = Resistance

SMD Service/Prototype Resistor Packs

Contain 50pcs each of 72 of popular resistor values (E12 series) from 2.4Ω to 10MΩ. 5% tolerance. Approx 3600 pieces.



ROHS

Price Per Pack	RRP	4+
R 3502 SMD 0805 0.125W Resistors	79.00	74.00
R 3503 SMD 0603 0.10W Resistors	69.00	65.00

Resistor Bulk Packs

Stock up the workbench with these handy component packs containing popular values of resistors.



R 3501

Price Per Pack	RRP	4+
R 3501 1/4W 5% Carbon Film Pk ≈ 300	10.95	9.75
R 3505 1/4W 1% Metal Film Pk ≈ 150	10.95	8.65

Component Leg Bending Tool

Enables accurate bending of axial leaded components in preparation for PCB loading. Five bending widths: 7.5, 10, 12.5, 15, 17.5mm. Suitable for use with resistors, diodes etc. A real timesaver when building kits or prototypes.



Price Each	RRP	4+	10+
T 1495	3.95	3.70	3.45

Light Dependant Resistors (LDR)

SPECIFICATIONS

Max power: 100mW
Size (mm): 5.10 x 2.4mm
Lead spacing: 3.4mm



ROHS

Price Each	Light Res.	Dark Res.	RRP	10+	25+
Z 1618	135kΩ - 420kΩ	10MΩ	1.55	1.35	1.16
Z 1619A	45kΩ - 140kΩ	10MΩ	2.90	2.55	2.00
Z 1621A	5kΩ - 10kΩ	1MΩ	2.90	2.55	2.00