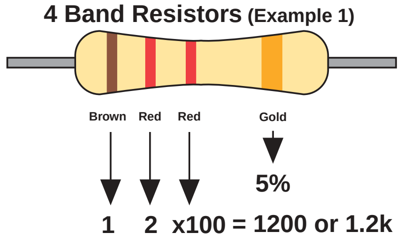
Reading Resistor Colour Codes

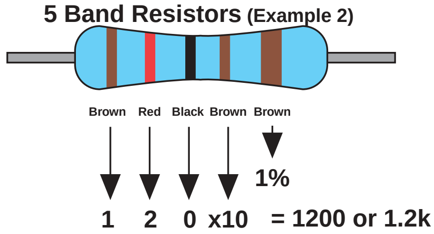
Colour	1st Band	2nd Band	Multiplier
Black	0	0	1
Brown	1	1	10
Red	2	2	100
Orange	3	3	1,000
Yellow	4	4	10,000
Green	5	5	100,000
Blue	6	6	1,000,000
Violet	7	7	
Grey	8	8	
White	9	9	
Gold			0.1
Silver			0.01

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

4 Band Resistors (Example 1)



5 Band Resistors (Example 2)



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

RESISTOR 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.**

RESISTOR 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%.

RESISTOR WATTAGE

Depending on the power requirements of a circuit, resistor wattage needs to be calculated to ensure that they don't over heat and burn out. 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.

RESISTOR COLOUR CODES

A normal resistor has 4 colour bands on its body. The first two bands represents the number from the E series. The third band refers to the multiplier, and the fourth band indicates the tolerance.

Follow these examples through with the colour chart.
Four Banded Resistors (Example 1)
Colour code: Brown, Red, Red and Gold. These are translated as:
Brown = 1, Red = 2, Red = x 100, Gold = 5%
Then we combine these numbers together:
1 2 x100 = 1200Ω = 1.2k = 1k2 at 5% tol.
Five Banded Resistors (Example 2)
Its colour code is Brown, Red, Black, Brown and Brown. These colours are translated as:
Brown = 1, Red = 2, Black = 0, Brown = x 10
Brown = 1%
Then we combine these numbers together:
1 2 0 x10 = 1200Ω = 1.2k = 1k2 at 1% tol.

RESISTORS IN SERIES

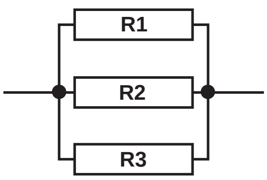
When two or more resistors are placed in series, (in line with each other), the overall resistance of the resistor network will change. The new value can be calculated from:-

$$R_{Total} = R1 + R2 + R3 + etc.....$$

RESISTORS IN PARALLEL

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

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



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 Amps that a heater element will draw.

Voltage	=	**Current**	x	**Resistance**
(Volts)		(Amps)		(Ohms)
V	=	**I**	x	**R**

Variations Include:

$$R = \frac{V}{I} \qquad I = \frac{V}{R}$$

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

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