

Fundamentals of Reading

Resistor Color Code

Ver: 1.0

Digital/Non-printable Version

Commercial and Academic Use

The resistance value of resistors are not printed on the resistors in numerical format. Resistors simply don't have enough space on them. Instead, a combination of colors are used to print the resistance values on the body of the resistor itself. Color code allows large numbers to be printed on very limited space.

The colors are printed on the resistor as rings or "Bands". Each color denotes a single numerical value. Each position of band has a specific weight or significance. By placing multiple bands in sequential order, virtually any resistance value can be printed on the limited space of the resistor body surface. Color codes are generally used in axial resistors.

Color Band Basics:

These colored rings are called "Band"
This is a 4 band resistor
5 band resistor has 5 rings
6 band resistor has 6 rings

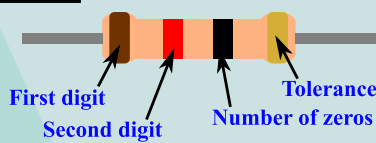


Start reading from the color adjacent to the Tolerance Band

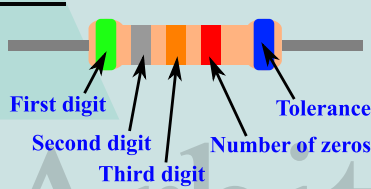
Tolerance Band (Always on the right side)

Always hold the resistor such that the tolerance band is on the right side.

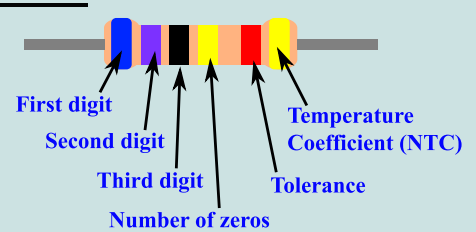
4 band



5 band



6 band



Notice that for 5 & 6 band resistors, there is a wider spacing between the Number of Zeros & Tolerance band. Precision resistors have similar colors as digits to define Tolerance and NTC, This gap shows the where the tolerance and NTC bands are located.

Digit	
Color	Number/Digit
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9

Tolerance	
Color	Tolerance (%)
Silver	10
Gold	5
Red	2
Brown	1
Green	0.5
Blue	0.25
Violet	0.1

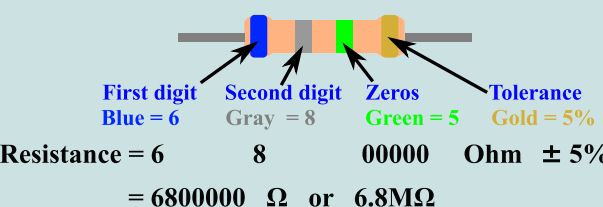
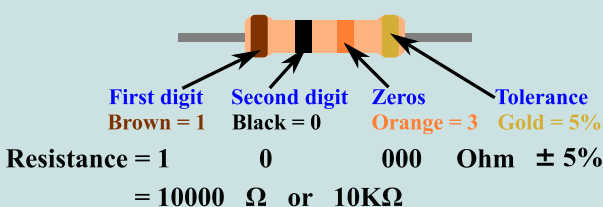
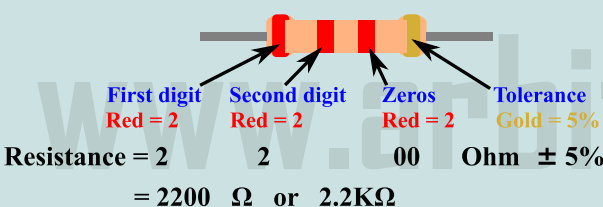
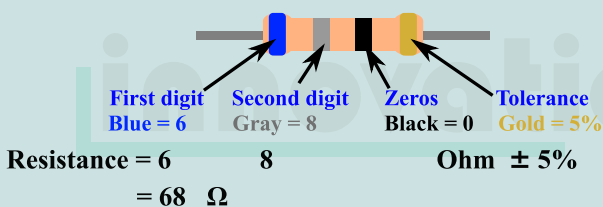
Temperature Coefficient	
Color	Temperature coefficient (ppm)
Brown	100
Red	50
Yellow	25
Orange	15

100 ppm°C means for every 10°C change in temperature, the resistance changes by 1000ppm (0.1%)

- ! A 5 band resistor is a precision resistor and has an extra band to show the resistance value more accurately.
- ! A 6 band resistor is a precision resistor with temperature coefficient to show how much the resistance will be altered as the ambient & surface temperature changes.

Color Code Reading Method:

Tip: Always keep Gold/Silver color and wider gaps on the right hand side



Because of the tolerance, the actual resistance will always be within 5% of the printed value (tolerance is 5% for gold band)

Note:

Resistance values in diagrams are written as numerical value, however, it is traditional in electronics design engineering community to write resistance values without using a decimal point and the Ω sign. It is because, a missing decimal point will drastically alter a resistance value e.g. 2.2KΩ will become 22KΩ and a Ω is an extra weird character. We can easily omit using Ω and it works just fine.

1.8KΩ can be written as 1K8, decimal replaced by the multiplier (1000 i.e. Kilo/K) and Ω (omega) is omitted

18Ω is written as 18R (as multiplier is 1) and Ω is omitted/replaced by R

Example: 2.2KΩ is written as 2K2, 4.7KΩ as 4K7
10Ω is written as 10R, 1Ω as 1R, 4.7Ω as 4R7

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