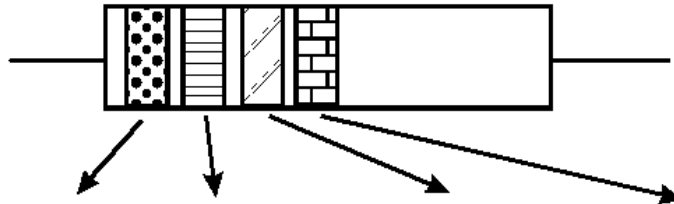


Appendix A

The “Resistor Color Code”:

Resistor values are usually marked on the resistor itself by using color rings or bands. Because the range of resistor values used in electronics goes from fractions of an ohm to tens of megohms, it is impossible to manufacture resistors in every possible value, so resistors are produced in “preferred values”. Resistors are marked with their preferred value, and a tolerance value, which indicates the spread of the resistance value you can expect.



Color	1st ring = 1st digit of value	2nd ring = 2nd digit of value	3rd ring = multiplier	4th ring = tolerance %
None				±20%
Silver			$10^{-2} \Omega = 0.01 \Omega$	±10%
Gold			$10^{-1} \Omega = 0.1 \Omega$	±5%
Black	0	0	$10^0 \Omega = 1.0 \Omega$	
Brown	1	1	$10^1 \Omega = 10 \Omega$	±1%
Red	2	2	$10^2 \Omega = 100 \Omega$	±2%
Orange	3	3	$10^3 \Omega = 1 \text{ k}\Omega$	
Yellow	4	4	$10^4 \Omega = 10 \text{ k}\Omega$	
Green	5	5	$10^5 \Omega = 100 \text{ k}\Omega$	±0.5%
Blue	6	6	$10^6 \Omega = 1 \text{ M}\Omega$	
Violet	7	7	$10^7 \Omega = 10 \text{ M}\Omega$	
Grey	8	8	$10^8 \Omega = 100 \text{ M}\Omega$	
White	9	9	$10^9 \Omega = 1000 \text{ M}\Omega$	

The Table shows the color code and the tolerance colors for the four ring color code. For five ring color code. The first two is the same with above, the third ring = 3rd digit of value. Color has the same meaning with the first two. The last two have the same meaning with the last two colors in the above table.