10-12 PLTW Engineering

10-12/Electronic Components

April 8, 2020

10-12/Digital Electronics
Lesson: **4/8/2020**

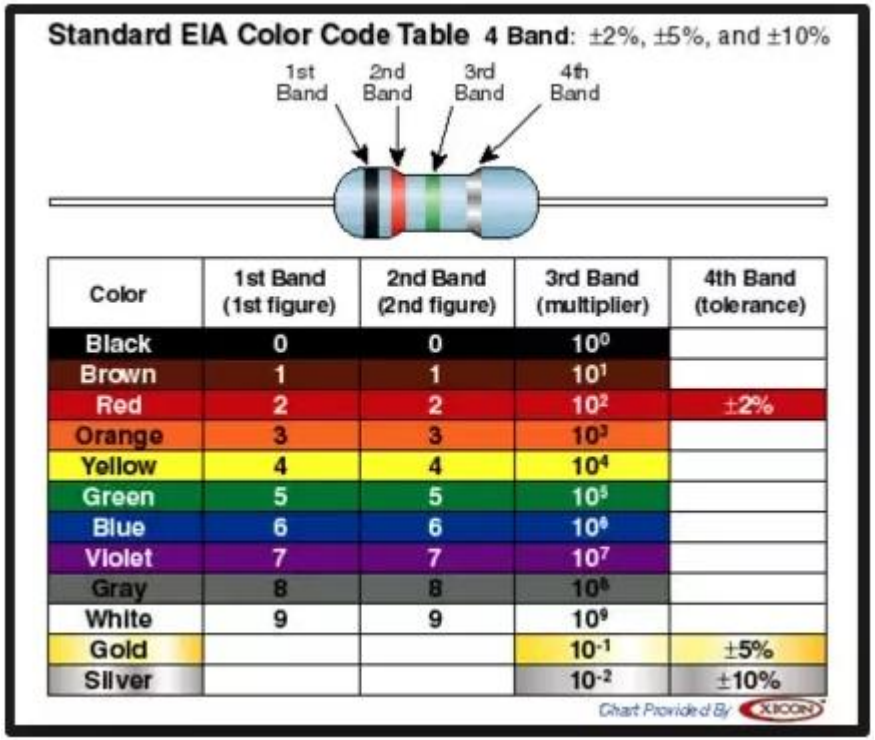
Objective/Learning Target:
Students will be able to read the resistance value in Ohms of a common resistor and identify common electronics components.

Resistors

- Resistors are an electronic component that resist the flow of current in an electrical circuit
- They are measured in Ohms (Ω)

- The different colored bands represent how much current flow that specific resistor can oppose
- They are useful for reducing current before indicators like LED lights and buzzers.

Resistors



To read the resistors we use a Color Code Table

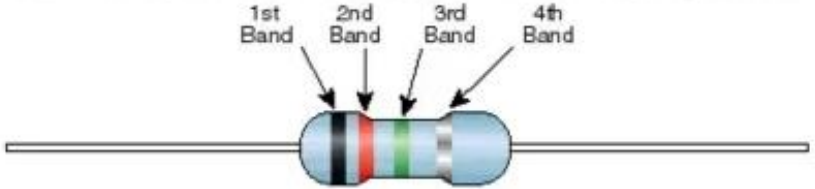
1. Starting at the end with the band closest to the end, we match the color with the number on the chart for the first 2 bands.

2. The 3rd band is designated as the multiplier. This indicates how many zeros to add to the number you got reading the first to bands.

3. The 4th band is designated as the tolerance. This tells us how much the actual resistance value may vary from what is represented on the chart.

Resistors

Standard EIA Color Code Table 4 Band: ±2%, ±5%, and ±10%



Color	1st Band (1st figure)	2nd Band (2nd figure)	3rd Band (multiplier)	4th Band (tolerance)
Black	0	0	10^0	
Brown	1	1	10^1	
Red	2	2	10^2	±2%
Orange	3	3	10^3	
Yellow	4	4	10^4	
Green	5	5	10^5	
Blue	6	6	10^6	
Violet	7	7	10^7	
Gray	8	8	10^8	
White	9	9	10^9	
Gold			10^{-1}	±5%
Silver			10^{-2}	±10%

Chart Provided By XICON

Lets do an example using the Color Code Table

Starting at the end with the band closest to the end, we see the 1st band is Red, 2nd band is Violet.

So, we have **27** so far. Next is the multiplier. In this case Brown, or 1. So we only add 1 zero.

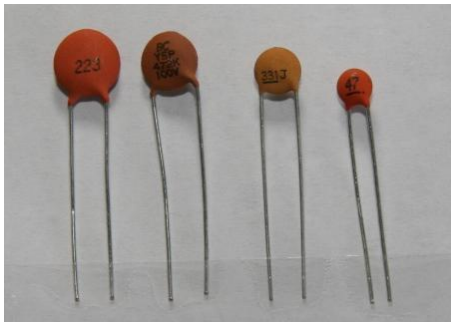
This puts the value of the resistor at 270 ohms.

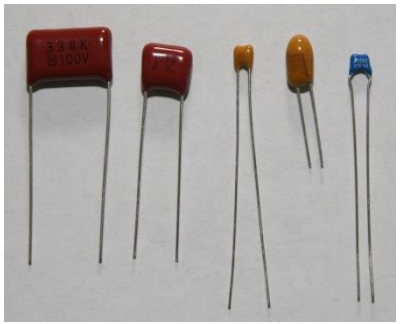
Finally, the tolerance is Gold or +-5%.

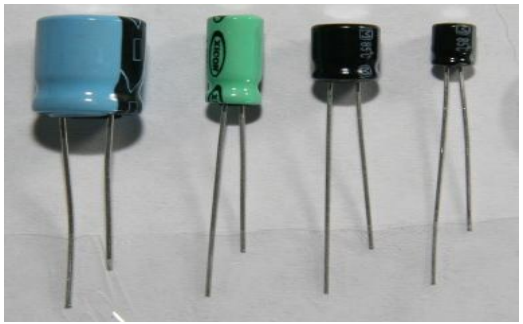
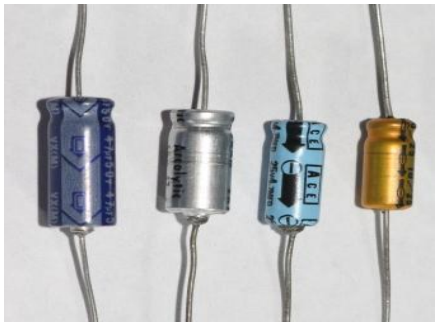
So overall, the value of this resistor is **270Ω +-5%**

Capacitors

- .Another common electronic component are capacitors.
- Capacitors are used to store voltage momentarily.
- They come in a few different designs.
- They are measured in Farads (F)

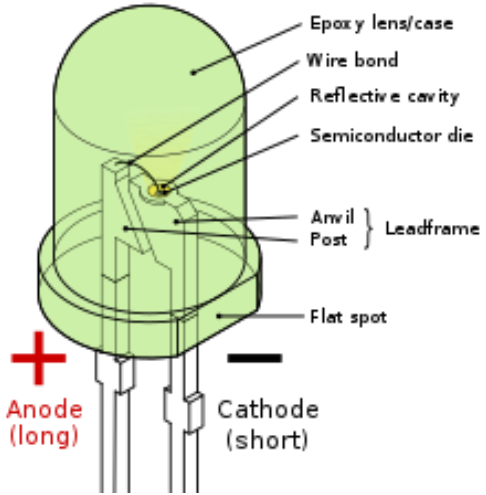




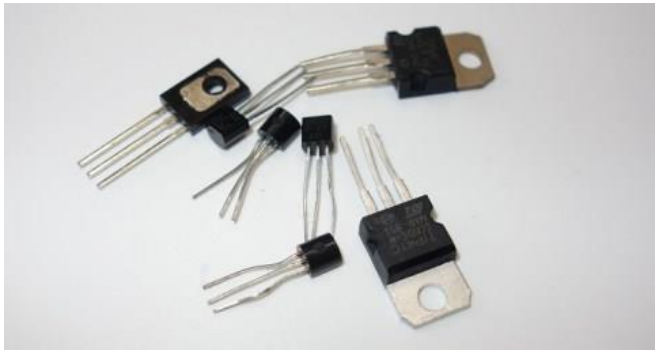
LED (Light Emitting Diode)

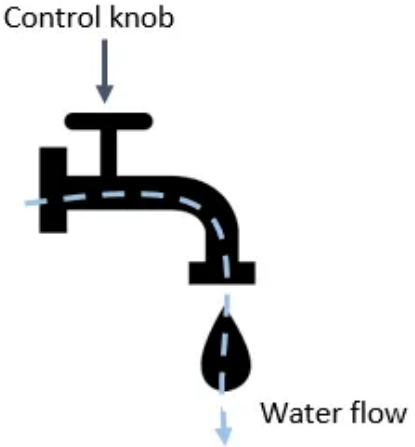
- . Another common electronic component is the LED light.
- They take very little voltage to power.
- They are bright and last 60% - 70% longer than traditional filament type light bulbs

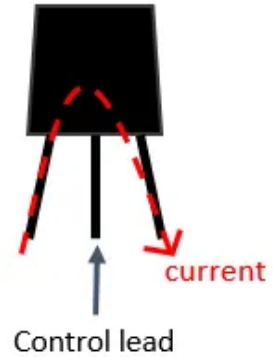


Transistors

- Another common electronic component is a Transistor
- They can work as a switch or an amplifier
- Just like a faucet, the control lead works like a control knob. It regulates how much current gets through.

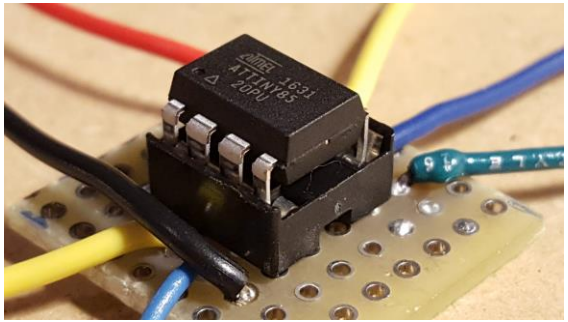


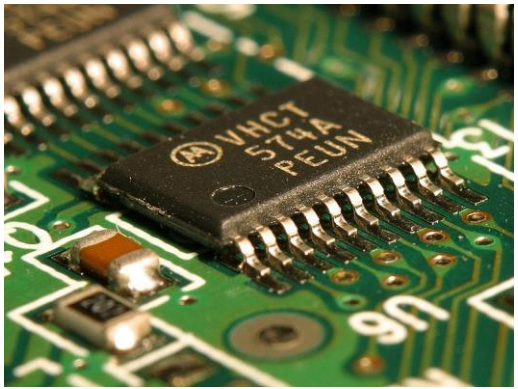




Integrated Circuits

- Another common electronic component are integrated circuits.
- They work like a very short computer program, executing routine that takes an input signal, and changes or combines that signal before outputting it.





Summary

- These are just a few of the hundreds of different types of electronic components
- They represent the most commonly used in digital electronics and circuit prototyping
- Future lessons will look more in-depth of how these components work and how they are used together.

Helpful Links

Makerspace guide to electronic components

Guide to electronic components and their funtions