

BASIC COMPONENTS AND SYMBOLS

Lesson 2
EET 150



Components and Symbols Learning Objectives

- ▣ In this lesson you will:
- ▣ learn how schematic diagrams represent electric circuits
- ▣ study the different types components found in electric/electronic circuits.
- ▣ see the actual components and their schematic symbols
- ▣ learn how to read component values from color codes



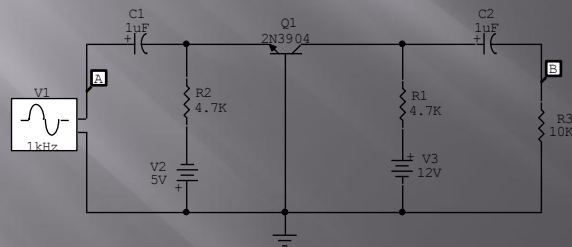
Fundamental Components

Schematic Diagrams and Components

Symbols representing actual devices

Show connections and give component values

Differ from physical layout



Example Schematic circuit



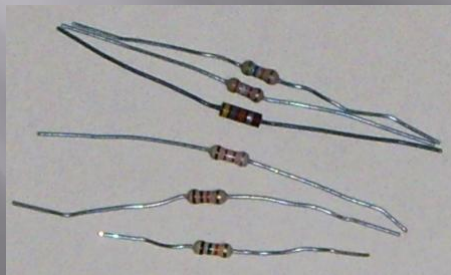
Fundamental Components

Resistors

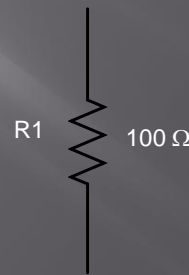
Resistors limit currents and dissipate active power (Heat)

Symbol: R

Units: ohms (Ω) also $k\Omega$ (x1000) and $M\Omega$ (x1,000,000)



Actual Resistors 1/4 Watt various values

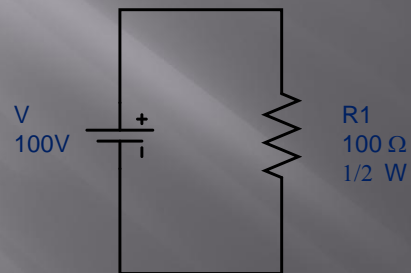


Schematic Symbol



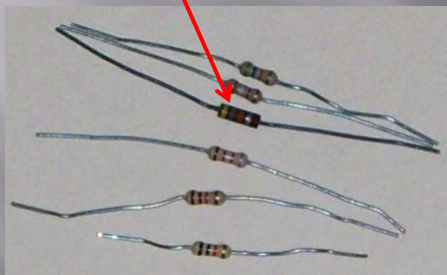
Fundamental Components Resistors

Simple Schematic Circuit



Finding Resistor Values Resistor Color Codes

Resistor values determined by colored bands on resistor body



Two bands determine value
One band the multiplier
One band tolerance (accuracy)



Resistor Color Code

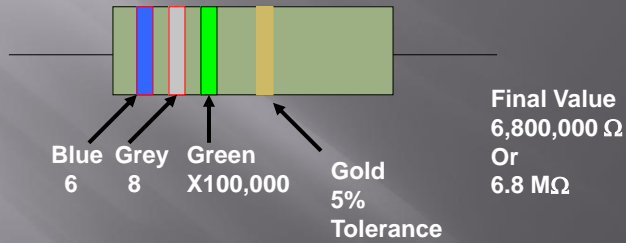
Colors	Digit	Multiplier	Add This Number of Zeros
Black	0	1	0
Brown	1	10	1 (0)
Red	2	100	2 (00)
Orange	3	1,000	3 (000)
Yellow	4	10,000	4 (0,000)
Green	5	100,000	5 (00,000)
Blue	6	1,000,000	6 (000,000)
Violet	7	10,000,000	7 (0,000,000)
Gray	8	100,000,000	8 (00,000,000)
White	9	1,000,000,000	9 (000,000,000)
Gold		0.1	5% Tolerance
Silver		0.01	10% Tolerance



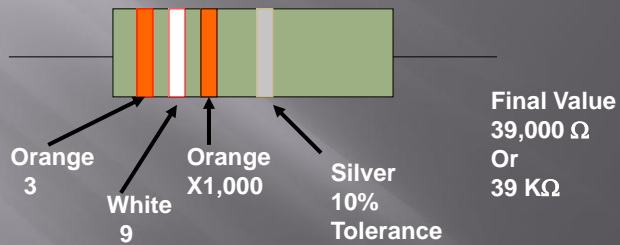
Resistor Color Code Examples



Resistor Color Code Examples



Resistor Color Code Examples



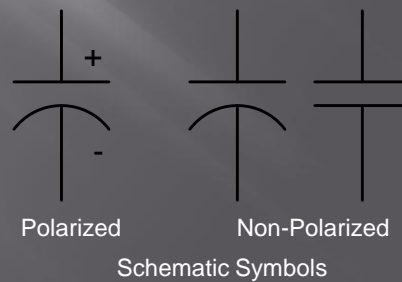
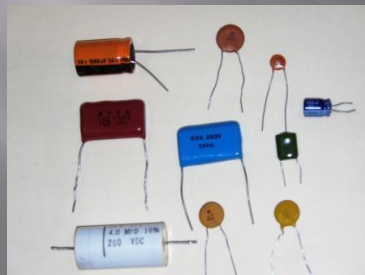
Resistor Color Code Examples



Fundamental Components Capacitors

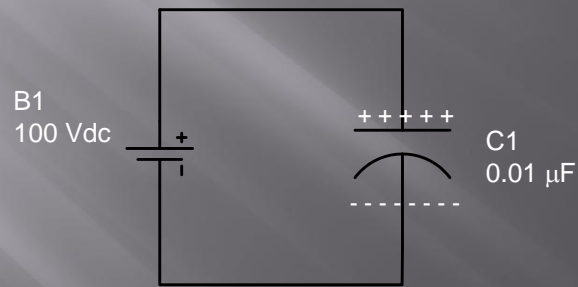
Capacitors stores charges (electrons) on plates separated By insulators. Block dc current, oppose voltage changes
Symbol: C

Units: Farads (F) also μF (1/1,000,000)
and pF (1/1,000,000,000,000)



Fundamental Components Capacitors

Simple Schematic Circuit

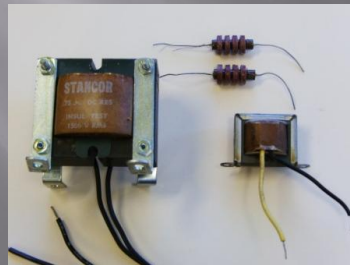


Fundamental Components Inductors

Inductors stores energy in magnetic field. Constructed of wire coiled around form (air) or iron core. Opposes current changes

Symbol: L

Units: Henrys (H) also μH (1/1,000,000) and mH (1/1,000)



Air core

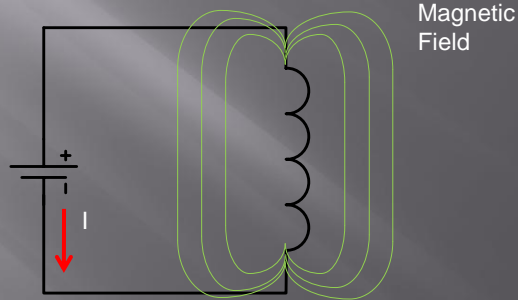
Iron core

Schematic symbols



Fundamental Components Inductors

Simple Schematic Circuit

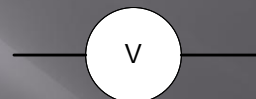


Fundamental Components Measurement Symbols

Schematic Symbols that indicate measurement devices

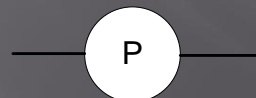


Ammeter
Measures Current



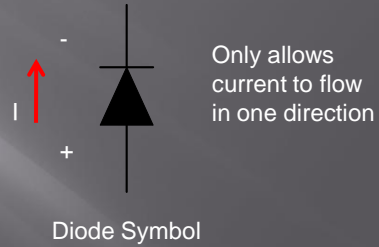
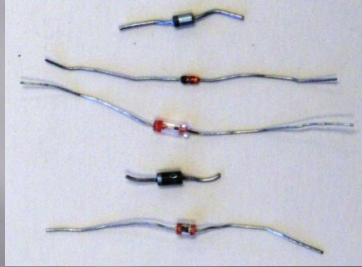
Voltmeter
Measures Voltage

Wattmeter
Measures Power



Semiconductor Devices

Devices used to switch, direct, and amplify electric/electronic signals



Special Types of Diodes

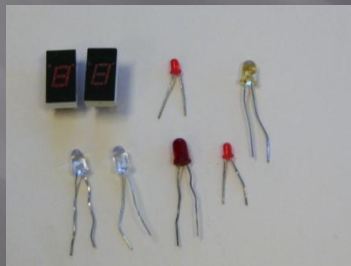
Zener Diodes - regulate voltage

Photo Diodes - conduct based on light intensity

Light Emitting Diodes (LED) – light up when connected to power



Semiconductor Devices Special Diodes



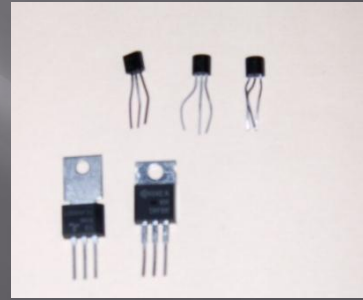
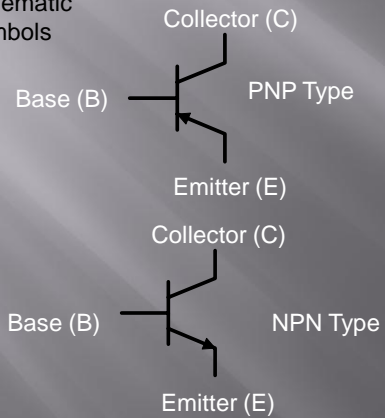
Types of LED's



Semiconductor Devices Transistors

Transistors Amplify and Switch Currents in Electronic Circuits

Schematic
Symbols



Actual Devices



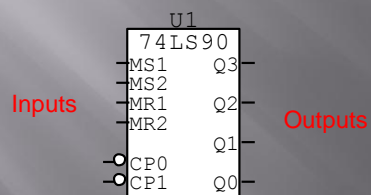
Semiconductor Devices Integrated Circuits (ICs)

Integrated Circuits (ICs or Chips) encase many transistors and perform thousands of functions.

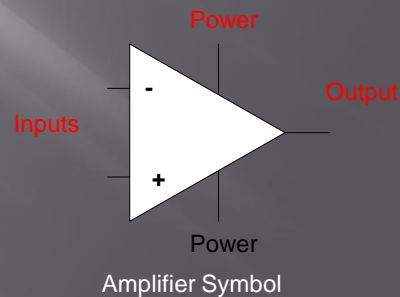
Functional Classes

Digital (Computer chips)

Analog (Amplifiers)



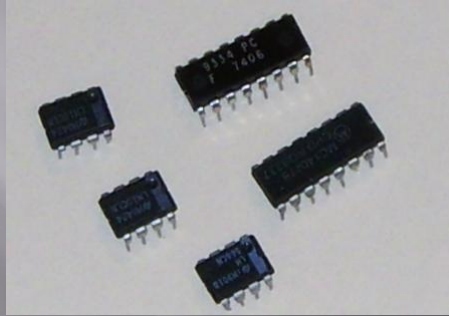
Digital Component Symbol
Decade Counter



Amplifier Symbol



Integrate Circuit Packages



ICs come in many package sizes and types.

Dual In-line Package (DIP)

Pin Counts of 8, 14, 16, 20, 24.

Good for experimenting

Surface mount:
Very small size



Basic Components and Symbols

End Lesson 2 EET 150

Coming Next: Fundamentals of Electricity

