

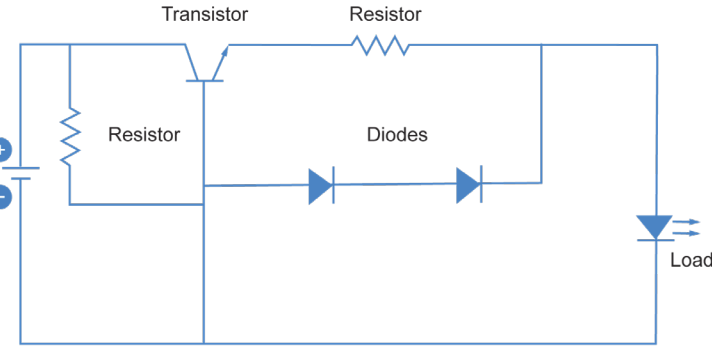
# Passive Electronic Circuit Basics

eLearning courses designed to increase productivity and profits

## Learning Made Simple, Visual, and Interactive

The THORS *Passive Electronic Circuit Basics* course focuses on electronic circuits that can be built using passive electronic components. This course covers the different types of passive electronic circuits built using resistors and reactive components, such as capacitors, inductors, and transformers, along with their working principles. Interactive quizzes are incorporated to enhance the learning journey, enabling learners to assess their comprehension and retention of visually stimulating content.

Credit Hours **2**



## Learning Objectives

- 💡 Recognize the various passive electronic circuits that are built using fixed resistors, potentiometers, capacitors, inductors, and transformers.
- 💡 Identify the applications of potential dividers, current limiters, current controllers, resistor biasing circuits, filter circuits, intensity controllers, and volume controllers.
- 💡 Describe the working principle and uses of coupling capacitors, bypass capacitors, snubber circuits, decoupling capacitors, and smoothing capacitors.
- 💡 Explain how bandpass filter and bandstop filter circuits are built.
- 💡 Distinguish the types of transformers, such as isolated transformers and autotransformers.

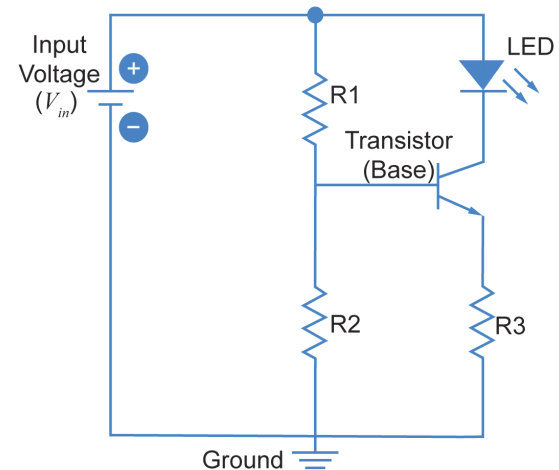
## Table of Contents

### I. Resistor

- **Fixed Resistor**
  - ▣ Potential Divider
  - ▣ Current Limiter
  - ▣ Current Controller
  - ▣ Resistor Biasing Circuit
    - Pull-Up Resistor
    - Pull-Down Resistor
  - ▣ Filter
    - Low Pass Filter
    - High Pass Filter
- **Potentiometer**
  - ▣ Intensity Controller
  - ▣ Volume Controller

### II. Reactive Components

- **Capacitor**
  - ▣ Coupling Capacitor
  - ▣ Bypass Capacitor
  - ▣ Snubber Circuit
  - ▣ Decoupling Capacitor
  - ▣ Smoothing Capacitor
- **Inductor**
  - ▣ Connections
  - ▣ Bandpass Filter
  - ▣ Bandstop Filter
- **Transformer**
  - ▣ Isolated Transformer
  - ▣ Autotransformer



Reactive Components > Inductor > Connections

**Parallel Connection**  
When inductors are connected in parallel, the current is divided among the parallel ones, and the voltage drop across each inductor is also reduced. The total inductance of inductors connected in parallel is the sum of a fraction of the inductance of the individual inductors. Therefore, the total inductance offered by the circuit is less than the inductance values offered by individual inductors. The formula to calculate the total inductance of inductors connected in parallel is shown here.

Where  $L_T$  is the total inductance,  $L_1$ ,  $L_2$ , and  $L_3$  are the inductance values of the individual inductors.

**BUILDING A CURRENT LIMITER CIRCUIT**

Power Supplies, Battery Chargers, Motors

**Narration**  
A current limiter circuit of resistors and transformers. Resistors and transformer: the amount of current flow, and alter the voltage across the flow of current. The two types of current resistor current limiter on current limiter circuit. A resistor current limiter incorporating a resistor component that needs to. The resistor restricts the prevents it from exceeding. The value of the resistor desired current limit and characteristics. A resistor current limiter voltage in the circuit is  $V_{in}$ .

Resistor > Fixed Resistor > Filter > High Pass Filter

**High Pass RC Filter**  
A high pass RC filter is created by connecting a power source in parallel with a resistor, which is represented as the letter 'R' and in series with a capacitor, which is represented as the letter 'C'. The capacitor in a high pass RC filter provides low resistance and allows high frequency signals into the circuit, while providing high resistance to the low frequency signals. The high frequency signals take a lower resistance path and pass through the capacitor to the output, and the low frequency signals are blocked.

Learning Moment