

PROPERTIES OF A CIRCUIT

Electric circuits are closed paths where current flows. In order to have a continuous flow of current, a circuit must have a **load**, that is a unit which converts electrical energy into another form of energy or work; a **source**, which supplies electricity such as batteries or a generator; **paths** or lines, which are wires that connect the load to the source; some **control devices** such as switches, push buttons, or relays. Now let's see the main properties of a circuit.



GLOSSARY

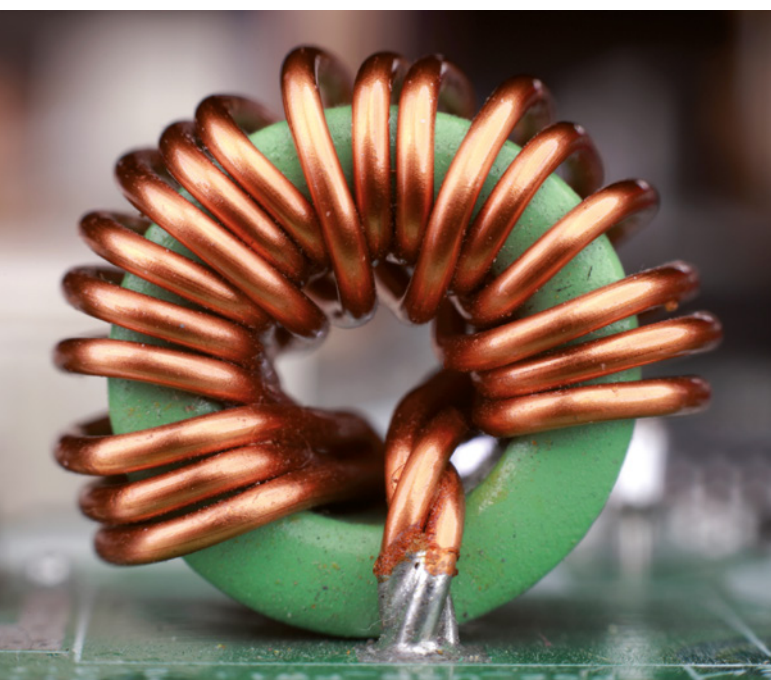
- 1 accumulated
- 2 quantity
- 3 elements

INDUCTANCE

Inductance refers to the property of a circuit by which energy is stored¹ in the form of an electromagnetic field while a current passes through it. The symbol of inductance is L and its measuring unit is the **henry**. A piece of wire wound into a coil form has the ability to produce a **counter electromotive force** (or back EMF) and therefore has a value of inductance.

CAPACITANCE

It is the capability of a body, system, circuit, or device to store electric charge. The measuring unit of **capacitance** is the **farad**, and its symbol is C. In an electrical circuit the device designed to store charge is the **capacitor**. The amount² of electricity stored in a circuit depends on the voltage applied and on the electrical characteristics of the capacitor.



REACTANCE AND IMPEDANCE

Reactance is the property of resisting the flow of AC current or AC voltage in inductors and capacitors. The measuring unit of reactance (X) is the **ohm**. When an AC current flows through an inductor, a voltage develops opposing any change in the initial current of a circuit. This opposition is measured as **inductive reactance**.

When an AC voltage flows through a capacitor, an opposing change in the initial voltage occurs, which is measured in terms of **capacitive reactance**.

Impedance (Z) refers to the total passive opposition offered to the flow of electric current. Impedance is determined by the particular combination of resistance, inductive reactance, and capacitive reactance in a given circuit. As reactance, impedance also is measured in ohms.

OHM'S LAW

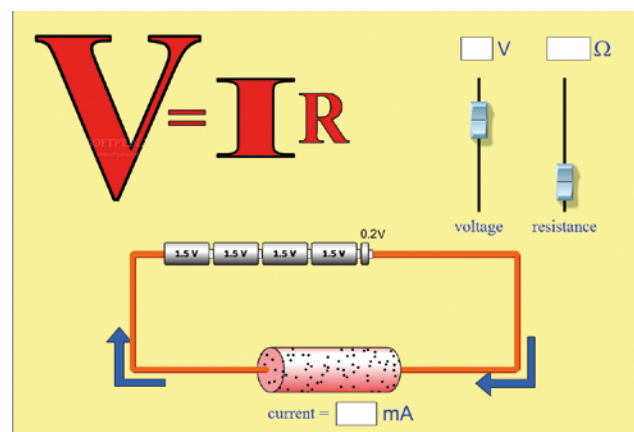
The most fundamental equation in electrical circuits is called **Ohm's Law**. While doing experiments on how well metals conducted electricity, the German physicist Georg Ohm discovered the law in 1827. Ohm's Law is the equation $V = I \times R$ and is used in both AC and DC circuits. Knowing two items³ in this equation allows you to calculate the third.

Ohm's Law states that in a simple electrical circuit, the voltage equals the electrical current multiplied by the resistance.

$$V = I \times R$$

where:

- V** is the **voltage** in volts
- I** is the **current** in amperes or amps
- R** is the **resistance** in ohms



READING COMPREHENSION

ACTIVITIES



● Complete the table below with the missing information.

PROPERTY	DESCRIPTION	MEASURING UNIT	SYMBOL
Inductance	The property of a circuit to store energy in the form of an electromagnetic field while current passes through it	henry	L
Capacitance
Reactance
Impedance

SPEAKING

● Explain in your own words the following properties of a circuit.

- 1 Inductance
- 2 Capacitance
- 3 Reactance
- 4 Impedance

WRITING

● Write Ohm's Law and then answer the questions below.

- 1 A 65-ohm circuit is powered by a 110-volt energy source. What is the current flowing in the circuit?
- 2 What is the voltage of a circuit with a resistance of 200 ohms and a current of 1.45 amps?
- 3 A 70-ohm circuit is powered by a 110-volt energy source. What is the current flowing in the circuit?

