

Foundations of Electrical and Computer Engineering

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Analog Circuit Fundamentals

1. Current \equiv the flow of charge around a closed path in a circuit.
Symbol $\equiv i(t)$ or i
Unit \equiv Amperes, Amps or (A)
Current is a vector of Amperes and direction. It may be defined at any one point along a circuit with either positive or negative values. A negative value current is equivalent to a positive value but opposite direction current.
2. Voltage \equiv the measure of potential difference between two points in a circuit.
Symbol $\equiv v(t)$ or v
Unit \equiv Volts or (V)
Voltage is a vector of voltage and polarity. The point with positive polarity is the point where the potential difference is greatest. Voltage may also be either positive or negative, and a negative voltage is equivalent to a positive voltage with reversed polarity.
3. Power \equiv a measure of useful output of a circuit.
Symbol $\equiv p(t)$ or p
Unit \equiv Watts or (W)
Relationship $\equiv p(t) = v(t) * i(t)$ or $p = vi$
Conservation of Power \equiv in a valid circuit, the total power supplied is equivalent to the total power absorbed. Power can be absorbed or supplied by a given element. Circuit validity, as used in the of Conservation of Power is true as a consequence of the law. That is to say, a circuit that does not satisfy the Conservation of Power is not a valid circuit.

To determine if an element absorbs or supplies power:

1. Take measurements of current and voltage before and after the element, in terms of positive values.

2. If current flows into the positive side \rightarrow the element absorbs power.
If current flows into the negative side \rightarrow the element supplies power.