Current: Rate at which charge flows through a cross-sectional area, A.

$I \equiv \frac{\Delta Q}{\Delta t}$ ΔQ is the amount of charge that passes through A in time interval, Δt

(SI Units: 1 ampere = 1 A= 1 C/s)

Direction of "I" is direction of flow of positive charge, or in direction opposite flow of electrons.

$I = \frac{\Delta Q}{\Delta t} = nqv_d A$

n = # charge carriers/volume

q = charge per carrier

v_d = drift speed = avg. speed of charge carriers

OHM's Law

Current, I, in a conductor is directly proportional to applied voltage. (i.e. $I \propto V$)

$V = IR$ where R, Resistance, is constant of proportionality

Resistance, R:

R depends on temperature, and geometry of resistor, and properties of conducting material.

$R = \rho \frac{l}{A}$ (T = constant)

ρ = *resistivity*
l = *length*
A = *area*

$R = R_o[1 + \alpha(T - T_o)]$

R_o & T_o = initial R & T
α = temperature coefficient of resistivity