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# Volts, Amps, Ohms, Watts, Coulombs

## Volts

* This is the EMF (electromotive or electron moving force).
* Measured using a volt meter in parallel with the component or subsystem being measured.
* There is no current through an ideal volt meter.

## Potential and Potential Difference – measured in Volts

* PD is the volts measured across a component without reference to the earth or ground potential.
* Potential is the volts measured relative to the earth or ground potential.

## Amps

* This is electric current.
* In a metal it is a net flow of electrons.
* In an N Type semiconductor, it is a net flow of electrons.
* In a P Type semiconductor, it is a flow of holes (spaces where an electron is missing).
* An amp is one Coulomb of charge flowing per second.
* A Coulomb is 6.24 × 1018 electrons (6 240 000 000 000 000 000) or quite a lot!

## Ohms

* This is resistance.
* Resistance opposes the free flow of electrons making it more difficult for the electrons to flow.

## Ohm’s Law

* Current, voltage and resistance are related to each other mathematically.
* R = V / I V = I R I = V / R

## Power – Heat or other energy given out by the circuit per second.

* Power is measured in Watts.
* P = I V P = I2 R P = V2 / R

## Calculating Resistance

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**R = V / I = 3 / 2 = 1.5 Ω**

## Calculating Power

* P = I V = 2 x 3 = 6 Watts (This is quite a lot of heat. A soldering iron might be 20 Watts).