CHAPTER 1
CIRCUIT FUNDAMENTALS

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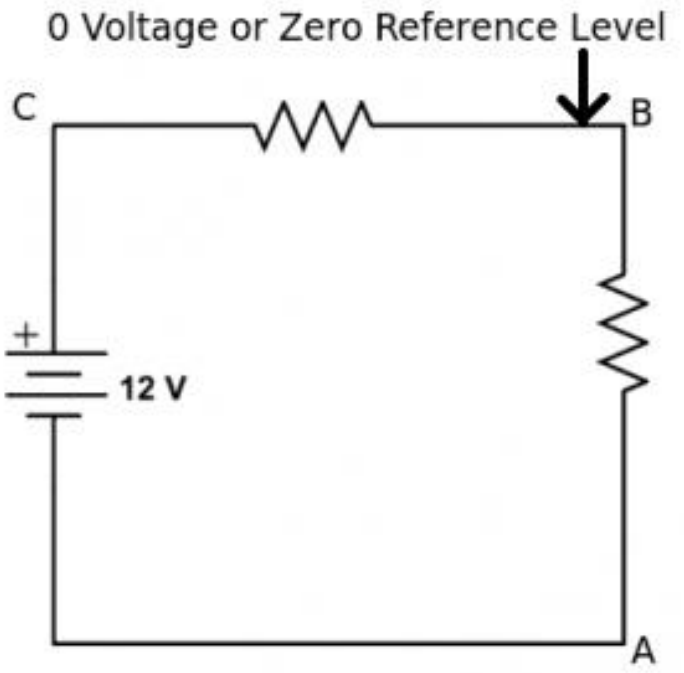
1.1.Zero reference level:

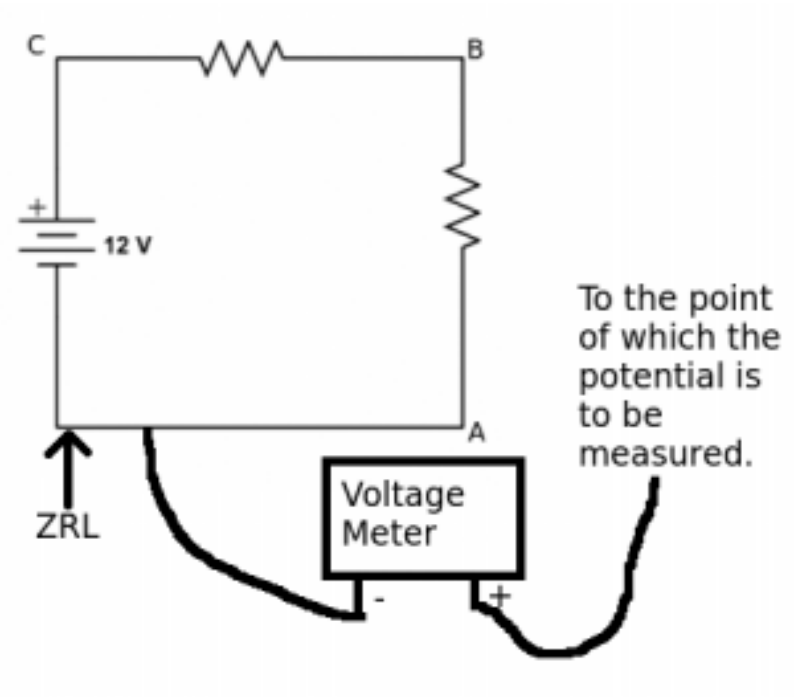
- Some common point which is consider to be at zero potential
- All circuit voltage whether positive/negative are measured with respect to that point
- It can be any point in the circuit & needed not to be necessarily zero.
- Voltage of the other points in the circuit are stated with reference to this point

This point is on 12 V potential with reference to the ZRL point or the negative terminal.

Refered to as Zero Reference Level or of potential '0'.

Example:

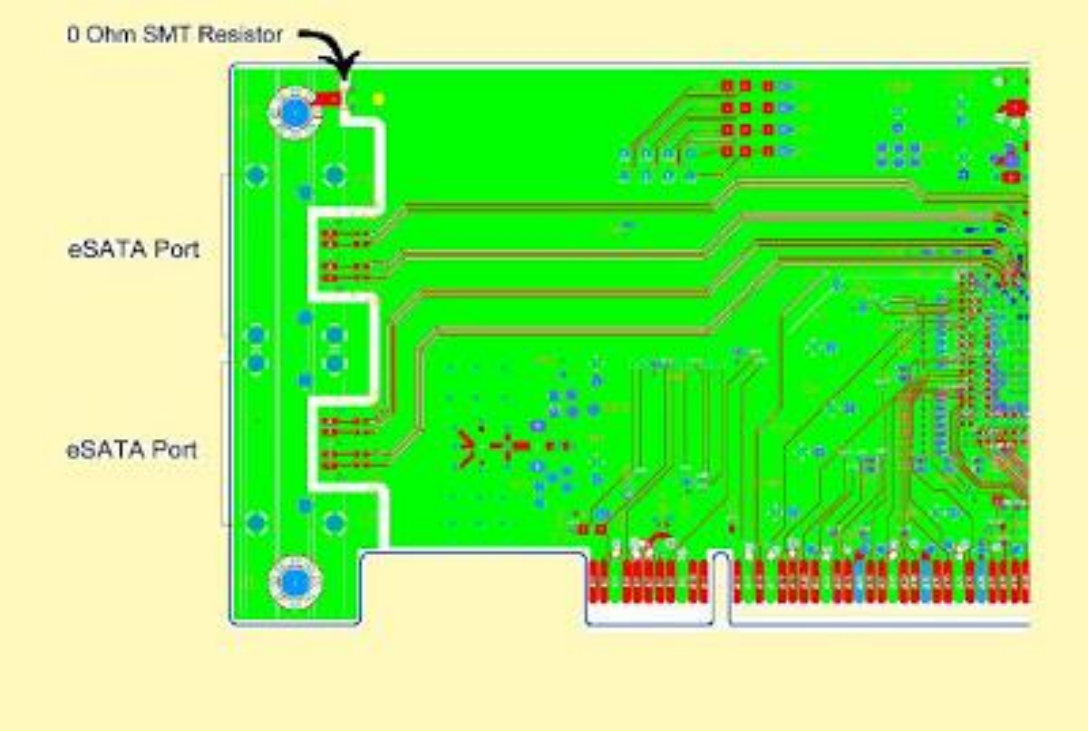

0 Voltage or Zero Reference Level
C
B
+
12 V
A

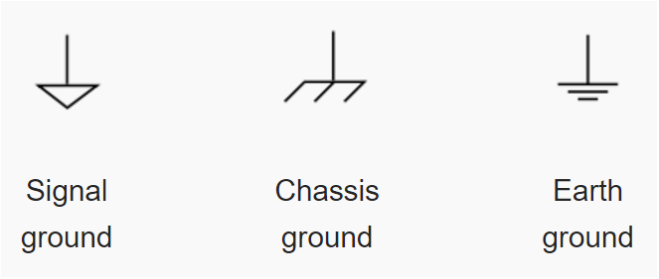

C
B
+
12 V
A
ZRL
Voltage Meter
-
+
To the point of which the potential is to be measured.

1.2. Chassis Ground:

- A chassis ground is a ground-collection point that connects to the metal enclosure of an electrical device. A chassis ground may be used for shielding and grounding to prevent electrical shock. Mains' earth ground and the (theoretically) 0V power rails are all tied together and connected to the chassis at that one point. For example, with multilayer printed circuit boards, one or more of the conducting layers may be used as a chassis ground. A chassis ground is typically only made at one point. This prevents a return current path through an available but undesirable means and prevents current circulating through the chassis.

Examples:


0 Ohm SMT Resistor
eSATA Port
eSATA Port


Signal ground
Chassis ground
Earth ground

1.3.Ohm's law:

- **Ohm's law** states that the current through a conductor between two points is directly proportional to the voltage across the two points. Introducing the constant of proportionality, the resistance,[1] one arrives at the usual mathematical equation that describes this relationship

$$I=V/R$$

I=current in amperes

V=applied voltage

R=resistance in ohms

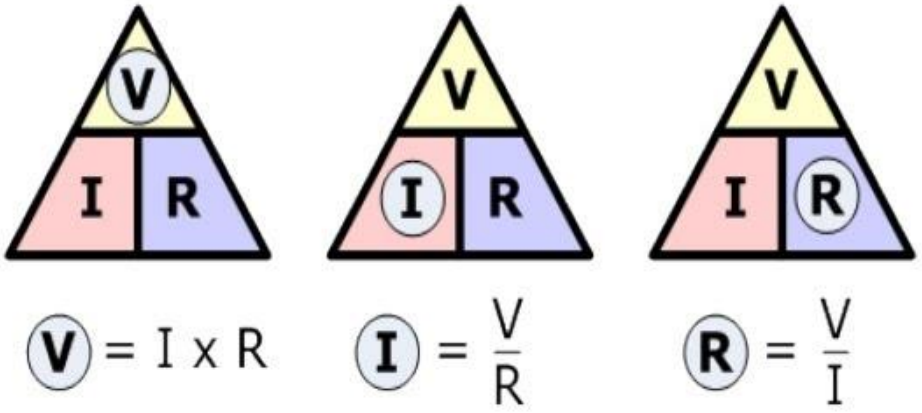
George Ohm

1.4.Formula variation of Ohm's Law:

- The three formula variation of Ohm's law are

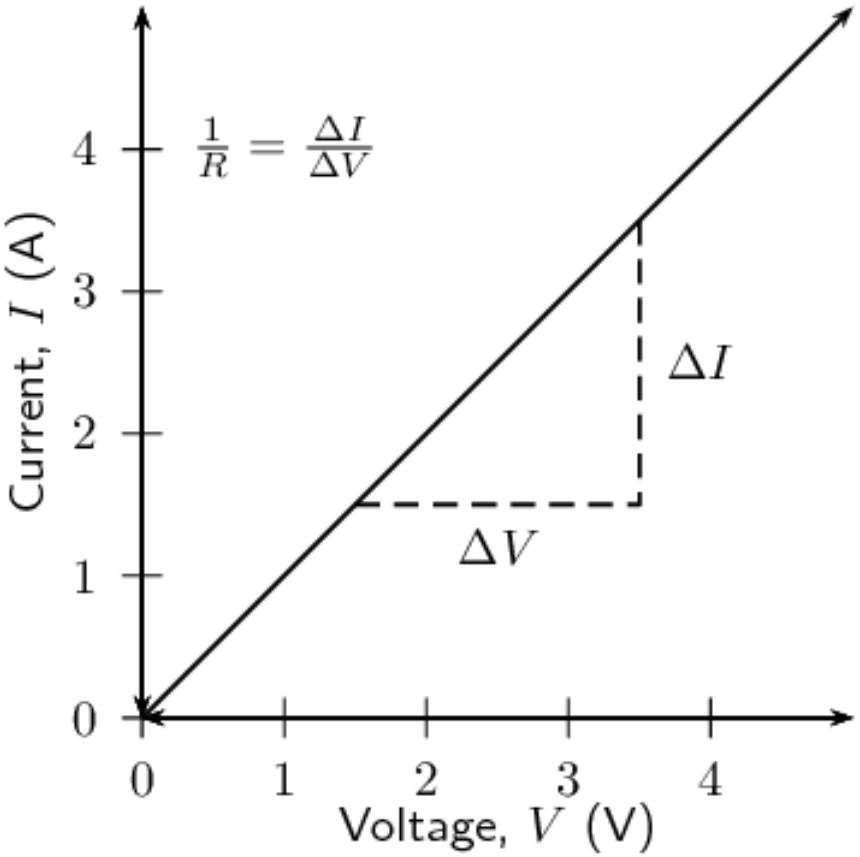
1. I=V/R
2. R=V/I
3. V=I/R

Ohm's Law Triangle



1.5.Graphical representation of Ohm's law:

- Ohm's Law tells us that if a conductor is at a constant temperature, the current flowing through the conductor is directly proportional to the voltage across it. This means that if we plot voltage on the x-axis of a graph and current on the y-axis of the graph, we will get a straight-line.



1.6.Linear resistor /1.7.non-linear resistor

- A linear resistor is one whose value remains constant i.e., it does not depend on the applied voltage.
- The V-I characteristics of such resistor is a straight line.

- It is that resistor in which V&I are not directly proportional to each other, if applied voltage is doubled the resultant current is not exactly double of its previous value.
- Example: tungsten filament in an electric bulb