EEE104
Circuit Analysis I

Ankara University

Faculty of Engineering

Electrical and Electronics Engineering Department

Circuit Elements

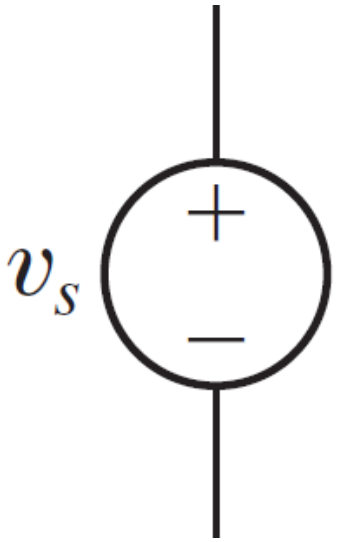
EEE104 Circuit Analysis I

Lecture 2

Agenda

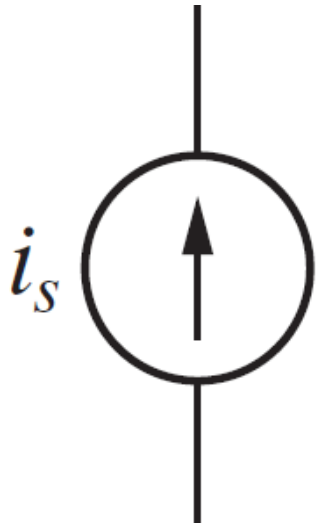
- Voltage Sources
- Current Sources
- Electrical Resistance

Voltage Source



Ideal independent voltage source

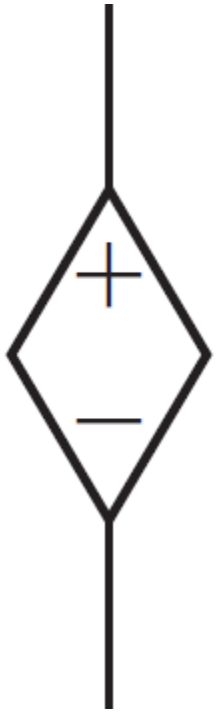
Current Source



Ideal independent current source

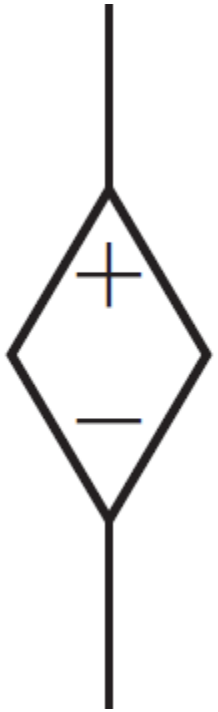
Ideal dependent voltage-controlled voltage source

$v_s = a v_b$



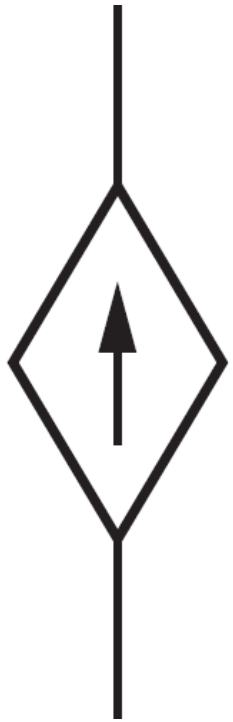
Ideal dependent current-controlled voltage source

$v_s = c i_b$



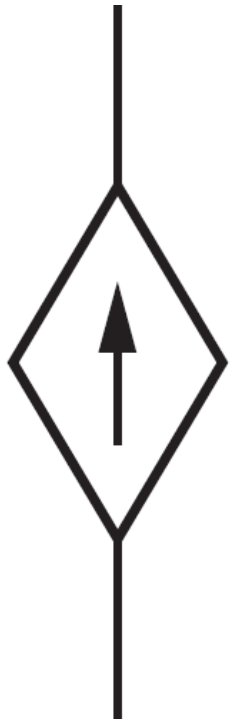
Ideal dependent current-controlled current source

$i_s = d i_e$

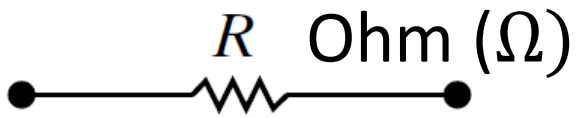


Ideal dependent voltage-controlled current source

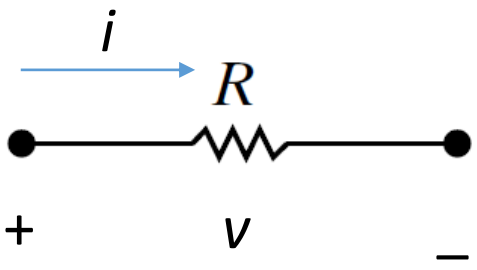
$i_s = d v_y$



Electrical Resistance



Ohm's Law



$v=iR$

Resistor

- Conductance:

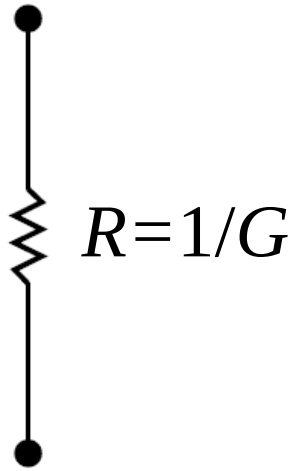
$$G = \frac{1}{R}\ Siemens\ (S) \text{ or } Mho\ (\mho)$$

$$i = \frac{v}{R}$$

$$i = vG$$

Power dissipated in resistor:

$$p = vi \qquad v = iR$$



$$p = i^2 R = \frac{i^2}{G}$$

$$p = v^2 G = \frac{v^2}{R}$$

Reference

- Electric Circuits, Tenth Edition, James W. Nilsson, Susan A. Riedel Pearson, 2015