Linear Circuits

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An introduction to linear electric circuit elements and a study of circuits containing such devices.

Maximum Power Transfer

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Previous Lesson

- Obtaining Circuit Equations
  - Node-voltage
  - Mesh-current
  - Thévenin equivalent
  - Norton equivalent

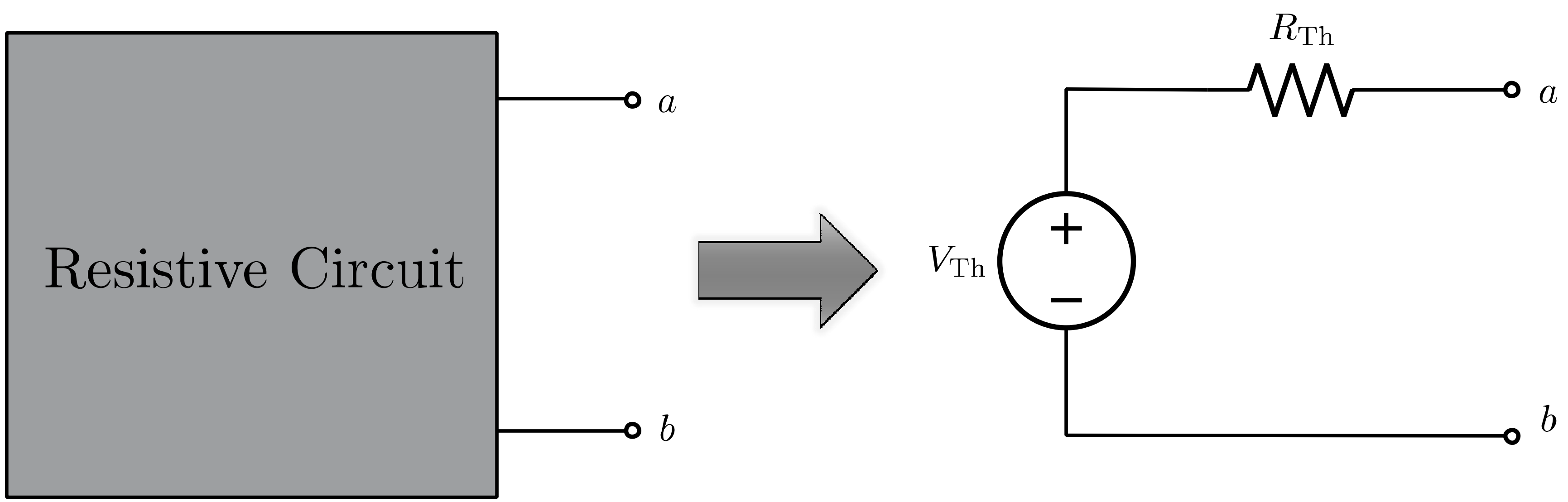
Module 2: Resistive Circuits

- Resistance
- Kirchhoff’s Laws
- Resistors
- Superposition
- Systematic Solution Methods
- Maximum Power Transfer
- Wye-Delta and Wheatstone Bridge
- Application: Sensors

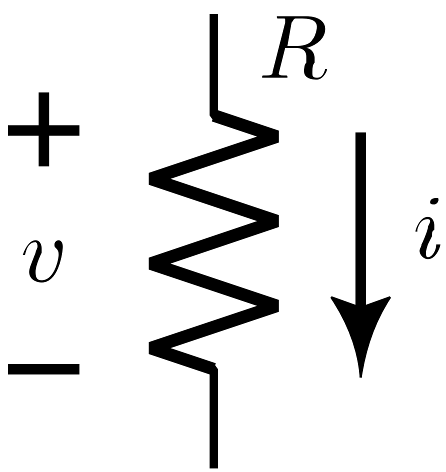
Lesson Objectives

- Find the load resistance that gives maximum power transfer to the load
- Calculate this power consumed by the load resistor giving maximum power transfer

Two-Terminal Linear Circuits



Power Equations for Resistors

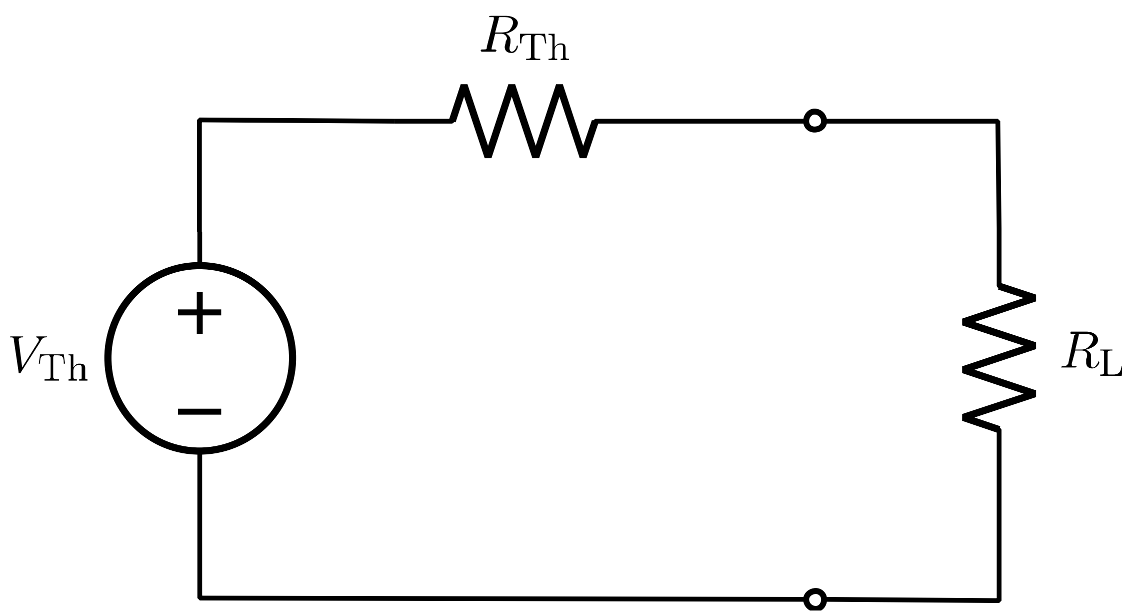


$$p = iv$$

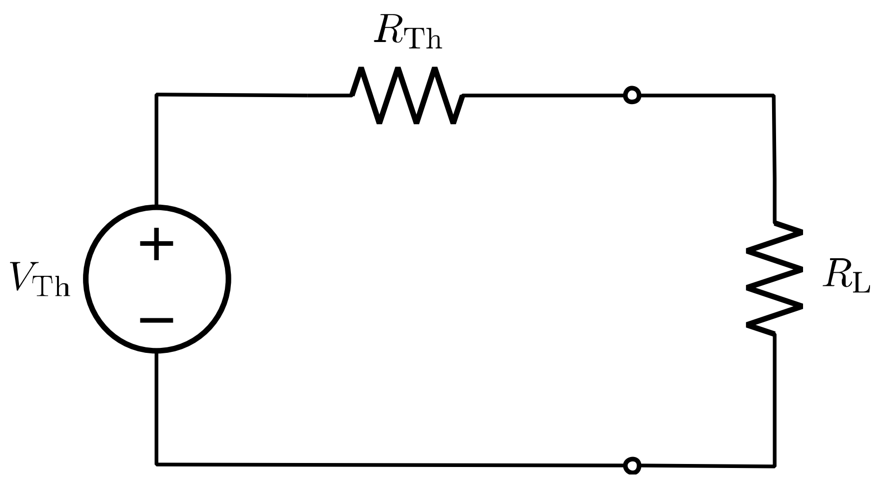
$$v = iR$$

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

Load Resistance



Maximum Power Transfer



$$p = i^2 R$$

$$p = \frac{{V_{\mathrm{Th}}}^2}{(R_{\mathrm{Th}} + R_{\mathrm{L}})^2} R_{\mathrm{L}}$$

$$p = \frac{{V_{\mathrm{Th}}}^2}{4R_{\mathrm{Th}}} \text{ for } R_{\mathrm{L}} = R_{\mathrm{Th}}$$

Summary

- Specified power equations for resistors
- Matched load resistance to system resistance for maximum power transfer
- Specified equation for maximum power transfer

Next Lesson

- Wye-Delta Transformations
- Wheatstone Bridge