Feng Chia University

Electrical Engineering Fundamentals I Lab

Laboratory 2

Equivalent Circuit

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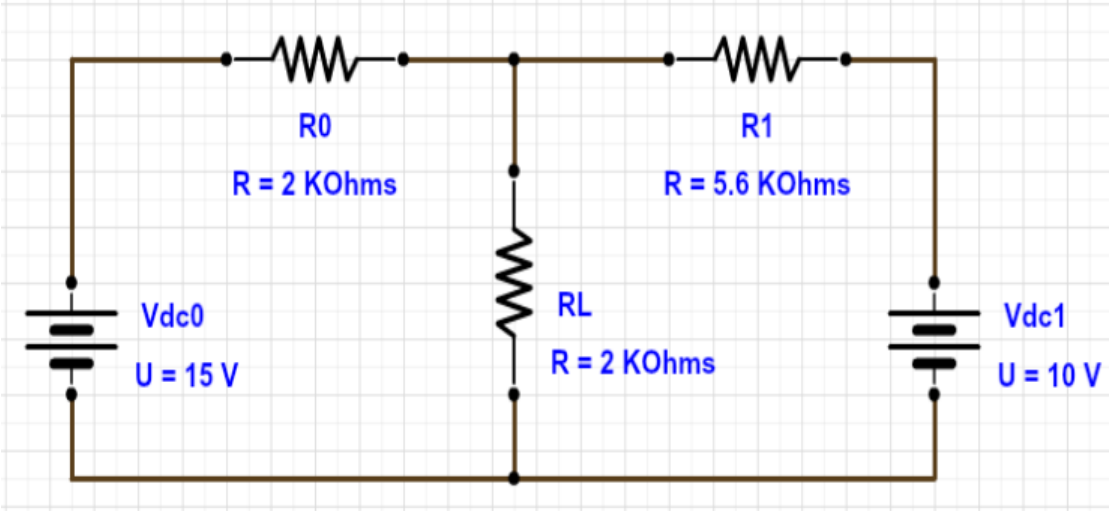
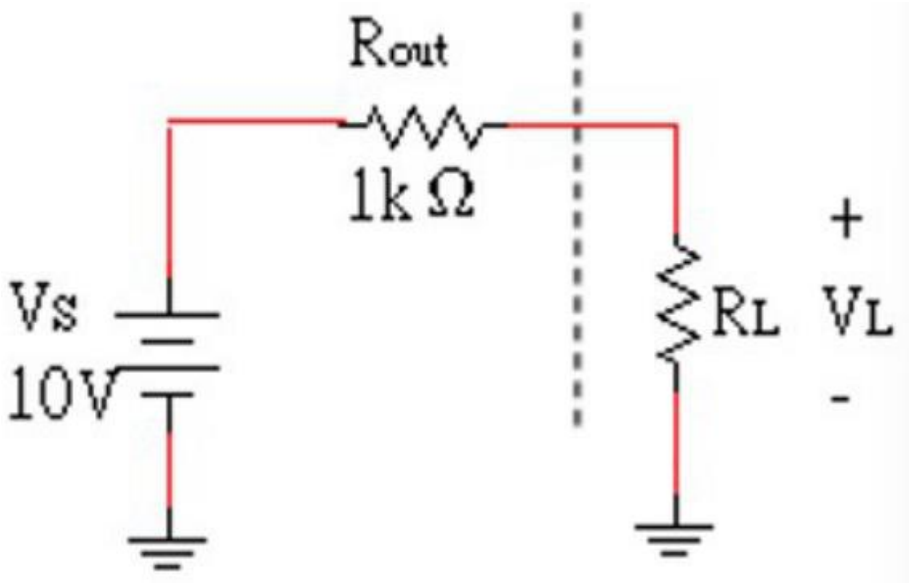
I. Introduction
   a. To be familiar with Thevenin equivalent, Norton equivalent
   b. To be familiar with maximum power transfer theorem

II. Materials
   a. Digital Multimeter
   b. Triple Output Power Supply
   c. Resistors
      1. 2 kΩ×2, 5.6 kΩ, 1 kΩ
      2. 100 Ω, 1 kΩ, 2.2 kΩ, 10 kΩ

III. Circuit diagram



▲ Figure 1. Circuit of Experiment 2.a Examples of Thevenin equivalent



▲ Figure 2. Circuit of Experiment 2.b Maximum power transfer theorem

IV. Methods

V. Experiments data

a. Experiment 2.a

Table 1: Results of the V_{Th} and R_{Th} Measurements

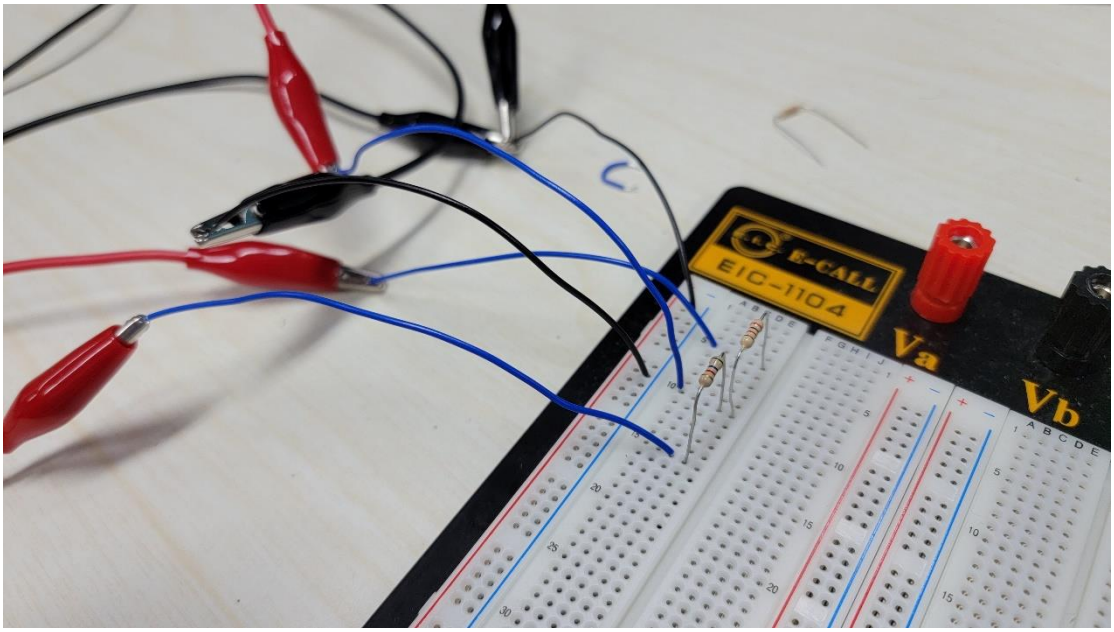
	Pratical	Theorem	% Error
V_{Th}	13.8700 V	13.6842 V	1.36%
R_{Th}	1.5007 kΩ	1.4737 kΩ	1.83%

b. Experiment 2.b

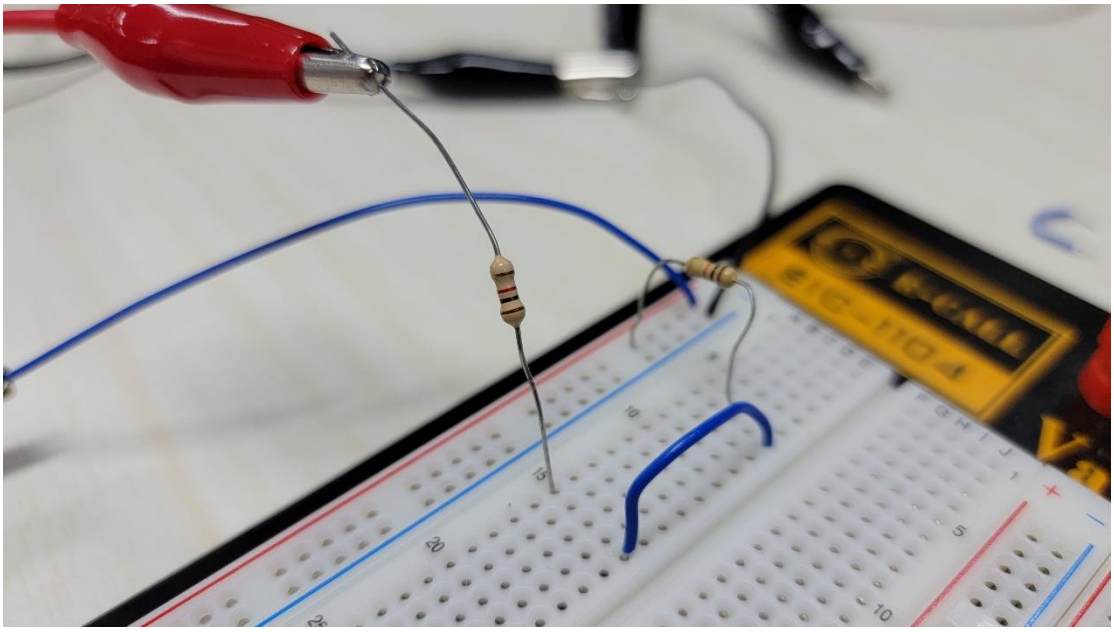
Table 2: Results of the V_L and I_L Measurements, and calculation of P_L

R_L	100 Ω	1 kΩ	2.2 kΩ	10 kΩ
V_L	0.9049 V	4.9905 V	6.8624 V	9.0906 V
I_L	9.2188 mA	5.0675 mA	3.1713 mA	0.9176 mA
P_L	8.3421 mW	25.2894 mW	21.7627 mW	8.3415 mW

VI. Results



▲ Figure 3. Photo of Experiment 2.a Examples of Thevenin equivalent



▲ Figure 4. Photo of Experiment 2.b Maximum power transfer theorem

VII. Discussion

With the R_L closing to R_{out}, the power dissipation will be maximum and become larger than the R_L away from R_{out}.

VIII. Conclusion

By measuring the equivalent circuit, it's easy to understand the Thevenin and Norton equivalent and maximum power transfer theorem.