Feng Chia University

Electrical Engineering Fundamentals I Lab

Laboratory 2

Equivalent Circuit

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1. Introduction
2. To be familiar with Thevenin equivalent, Norton equivalent
3. To be familiar with maximum power transfer theorem
4. Materials
   1. Digital Multimeter
   2. Triple Output Power Supply
   3. Resistors
      1. 2 kΩ×2, 5.6 kΩ, 1 kΩ
      2. 100 Ω, 1 kΩ, 2.2 kΩ, 10 kΩ
5. Circuit diagram

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自動產生的描述

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

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

1. Methods
2. Experiments data
   1. Experiment 2.a

Table 1: Results of the VTh and RTh Measurements

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pratical | Theorem | % Error |
| VTh | 13.8700 V | 13.6842 V | 1.36% |
| RTh | 1.5007 kΩ | 1.4737 kΩ | 1.83% |

* 1. Experiment 2.b

Table 2: Results of the VL and IL Measurements, and calculation of PL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RL | 100 Ω | 1 kΩ | 2.2 kΩ | 10 kΩ |
| VL | 0.9049 V | 4.9905 V | 6.8624 V | 9.0906 V |
| IL | 9.2188 mA | 5.0675 mA | 3.1713 mA | 0.9176 mA |
| PL | 8.3421 mW | 25.2894 mW | 21.7627 mW | 8.3415 mW |

1. Results

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

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

1. Discussion

With the RL closing to Rout, the power dissipation will be maximum and become larger than the RL away from Rout.

1. Conclusion

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