

Title [Rectifier Analysis and Design]

[Due at 00:12(Noon) Monday 4 November]

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Abstract

Provide a brief summary of the report (roughly with 150 to 200 words). This typically consists of the motivation of the work, objectives of the work, methodologies used, and any key outcomes and findings of the work. Abstract is typically written during the last stage of report writing, where you can better evaluate your results in a wider context, also putting emphasis on any key aspects of your work. Think about the abstract as a “selling point” of your work. Readers typically read the title, abstract and key results (diagrams or figures) and still should be able to grasp the idea of the report.

1. Introduction

Please note that the report is a group report (i.e. by two students per group). It should be maximum 8 A4 pages, using 12 point Times-Roman font. Make sure all figures and tables have proper numbers and informative captions. If you copied images from somewhere else, put the references in captions. The report will be marked based on your understanding and insightful discussions as well as the presentation quality. You need to submit a pdf-file to Wattle on due date. Please note that this report template and section headings are only a recommendation and you can use any other formats you think effective.

Provide a brief introduction on power rectifier circuits using. Provide some context of the work. You probably need to provide some references and related work. Please note that any direct copy and paste of texts from internet will risk loss in your report marks. Instead try to paraphrase them in your own words if possible. At the end of this section, briefly outline the following sections.

2. Theoretical Analysis

Provide theoretical analysis results on the full-wave rectifier circuit with and without a smoothing capacitor. Provide a schematic diagram (for example a pspice circuit schematic can be used here) and calculate the output voltages (please refer the lecture slides). As for the input voltage, you need to use the measured voltage value from the transformer during your HLAB4, so that you can compare the results with that of proto-board.

3. Pspice Simulation

Perform a Pspice simulation for the circuit (Figures 1 and 2 in the HLAB4 worksheet, the pspice schematic is also available on wattle). We will use the diode model 1N4002 rather than 1N4001 which has a different current rating but would not affect the simulation performance. Provide rectifier results with and without the capacitor. Provide plots of the output waveform overlayed with the input voltage.

4. Hardware Implementation

Provide details of hardware implementation on a proto-typing board. Include photos of soldered circuit (both top circuit and bottom soldered sides) with appropriate labelling. Attach a LED and a resistor to indicate the output voltage. Provide the measured values of the output voltage with the smoothing capacitor. Presenting the data sensibly is itself a test of understanding of the experiment. Try to use graphs and table if possible and make sure the legend are informative and explains what is shown and that you label graph axes. You don't need to repeat the lab procedures in the report. Instead try to briefly summarise them with reference.

5. Discussions

This is supposed to be the major part of the report. You need to explain what it all means here and should take most thought. You need to evaluate the performance of the soldered rectifier circuit and compare the performance with the simulation and theoretical analysis results. You may also explain any results or observations which were unexpected. Try to think beyond blaming poor measurement/electrical system to the implications of your results. In such case, supporting evidence should be provided. For example if you claim the error was due to measurement errors, then you need to provide the accuracy of the measuring devices. Another example is if you claim that the wire is not ideal and introduced some voltage drop due to some resistance, then you should measure and provide the resistance and related voltage drop. It is still possible to get a good mark for an experiment which did not work as expected if you can think of convincing explanations and demonstrate knowledge and understanding of the theory.

6. Conclusion

Summarise your work here. Try to think about this in three steps: why you did this work, what you did and how. Try to draw any implications of your findings. Suggest any further improvement of your circuit as a future work.

References

[1] Nilsson and Riedel, Electric Circuits, 9th Edition, Pearson.

Reflection

It would be appreciated if you could provide one or two paragraphs of your reflection on the learning experience during this experiment. This is not part of assessment.

Appendix

You can put some technical information or data record for your reference. This is not part of assessment nor counted as part of the page limit.