DC TO DC CONVERTER:

CUK CONVERTER WITH UNIVERSAL INPUT FOR LEDS LAMP DRIVER

This thesis is presented in partial fulfillment for the award of the

Bachelor of Engineering (Hons.) in Electrical Engineering

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ACKNOWLEDGEMENT

Upon the completion of this Final Year Project, I would like to dedicate my thanks to some individuals that have been helping me throughout the process of completing this Final Year Project.

Firstly, I would like to thank the Al-Mighty Creator, Allah S.W.T The Most Merciful and the Most Gracious that has given me the strength and ability to complete this Final Year Project. Without his concern, I would not be able to finish this project.

Secondly is my beloved supervisor, Dr. Mohammad Nawawi Seroji for his invaluable guidance, assistant, support, encouragement and advice. He has been trying his best in accompanying and guiding me to understand this project correctly and who has given me a lots of motivation so that I can complete this Final Year Project successfully.

My appreciation also goes to the technician who has allowed me to use the Power Electronic laboratory equipments in order to complete my experiments and project.

I am proud with my commitment and dedication during doing this Final Year Project. I also want to express my special thanks to my beloved parents and all my friends who have encourage and support me along the way.

The last but not least, thanks to the entire individual who has involve directly or indirectly during the time of completing my Final Year Project. Thanks a lot to all of you.

ABSTRACT

This report presents the use of Cuk converter with universal voltage supply of $240V_{rms}$ in high frequency switching mode. The main purpose is to control current for driving LEDs Lamp Xlamp7090XR-E®. The used of microcontroller in driver circuit gives more accuracy and efficiency in switching mode. High frequency switching used in the Cuk converter allows the use of smaller inductor, transformer, and capacitor in order to handle the same voltage level compared to the converter that used low frequency switching. The use of suitable formulas, PSIM simulation software, and prototype of the Lamp driver lead to planned project. The characteristic and performance of the lamp driver was proved with the results and findings from conducted experiment with the prototype and the simulation circuit. Finally, complete model of Cuk converter with microcontroller and Gate drive circuit was presented.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

DC-DC converters are electronic devices used whenever to change DC electrical power efficiently from one voltage level to another. They are needed because unlike AC, DC cannot simply be stepped up or down using a transformer. In many ways, a DC-DC converter is the DC equivalent of a transformer.

Typical applications of DC-DC converters are where 24V DC from a truck battery must be stepped down to 12V DC to operate a car radio, CB transceiver or mobile phone; where 1.5V from a single cell must be stepped up to 5V or more, to operate electronic circuitry; where 6V or 9V DC must be stepped up to 500V DC or more, to provide an insulation testing voltage. All of these applications are to change the DC energy from one voltage level to another, while wasting as little as possible power in the process.

Most modern DC-DC converters operate at a relatively high frequency, compared with the 50-60Hz of the AC power mains. The use of high frequency switching allows the use of smaller inductors, transformers, and capacitors in order to handle the same power level. And this in turn allows a reduction in both the size and material cost of the converters.