LAPORAN AKHIR

PENELITIAN UNGGULAN PERGURUAN TINGGI (P)

PENGEMBANGAN RANCANG BANGUN *LED* DAN *LED DRIVER* UNTUK MENCAPAI PENINGKATAN EFISIENSI KERJA DAN PENURUNAN KONSUMSI ENERGI

Tahun ke 1 dari rencana 2 tahun

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ABSTRAK

Laporan ini menyajikan pengembangan desain LED driver dan prototip rangkaiannya berdasarkan modul FPGA, yang berfungsi sebagai pengatur switching, untuk LED daya tinggi. *Boost-converter* terpilih sebagai topologi konverter daya yang optimum, karena menunjukkan gain tegangan yang relatif lebih tinggi dibandingkan topologi converter lainnya. Model simulasi dengan software B2SPICE dan pengujian modul FPGA berhasil dilakukan. Pengukuran rangkaian *driver* menggunakan lampu LED yang terhubung seri telah berhasil dilakukan, dan diperoleh efisiensi sekitar 90%.

Kata kunci: *LED driver, power converter, B²SPICE*

ABSTRACT

This paper presents the development of the LED driver's design and its prototype based on FPGA module for high power LEDs. The boost converter was selected as the optimum power converter topology which showed relatively high voltage gain. Model simulation by B^2SPICE software and measurements test of the FPGA module were successfully performed. The measurement using LEDs in series was performed, and an efficiency of 90% was obtained.

Keywords: LED driver, power converter, B^2SPICE

SUMMARY

The development of the design and implementation of LED and LED Driver for applications DC (Direct Current) system was presented.

The first phase of the study was to simulate the power converters design using software B²SPICE. The LED driver should be cost-effective, simple and efficient in energy. For this purpose several power converter topologies were selected based on the theory, i.e. Buck-, Boost-, Buck-boost, and Cuk-Converter, with various inductive load. The next stage was simulation of the reference LED Driver real circuit which was commercially available. Implementation would be the next step after modeling with the software were performed and optimal results were obtained. The LED driver's prototype was built in the Digital Systems Laboratory at the Department of Electrical Engineering, Brawijaya University.

Boost converter topology was selected as part of the driver, since it showed a relatively higher voltage gain than other converter topologies. FPGA module was used as a switching controller of the converter. Measurements were performed for the driver with no-load, with dummy load resistor and with LEDs load. The efficiency of approximately 90% was achieved.

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