ABSTRACT

Power plant generally uses fossil fuels which can cause global warming. In another case, solar power as one of alternative energy sources, is economic and safe for environment especially tropical regions such as Indonesia. One of the problems faced by solar power plant is the output voltage of solar panels. Tend to be fluctuating. The voltage always changes according to intensity of sun light obtained by solar panels thus can harm battery charging and load rationing system if they are connected directly.

In this thesis, a DC to DC converter with Synchronous Buck was designed to adjust the voltage level of solar panels. Synchronous Buck is able to reduce input voltage from Skytech Solar SIP – 30 solar panels with maximum 20 V to 13,8 V by using switching process for charging 12V/5Ah battery to prevent breakdown of the battery. The main components of the DC to DC Converter are IRFP260N MOSFETs, MOSFET driver IR2111, 1,5 mh inductor, capacitor 6800uf/50V. In addition, it is equipped with a relay system that manages connection between Synchronous Buck with a battery and a battery with light 12 Volt/3Watt

The system has been implemented and tested until it can generate desired output. Synchronous Buck can produce the±13,8V output voltage. It is proven that the highest percentage of power efficiency is 94.75 % with a resistive load of 56 ohms 20 watts. Synchronous Buck can charge the battery without a load for 240 minutes using solar panels SIP - 30 with value highest charging current is 0.505 A. In addition, Synchronous Buck can charge the battery and 12 Volt/3Watt lamp as load for 240 minutes using SIP - 30 with value of highest charging current is 0.668 A. From the test results and analysis it can be concluded that Synchronous Buck is able to charge the 12Volt/5Ah battery with output voltage is ± 13,8V.

Keywords: DC to DC Converter, Synchronous Buck, Accu, Solar Cells, Relay