

The New Design of Rectifier and Electric Booster for Micro Energy Harvesting Device

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ABSTRACT

One way to produce micro and renewable electrical energy is using energy harvesting devices. Energy harvesting devices use alternative energy sources to replace energy sources that are not renewable and have low costs. However, the electrical energy produced by energy harvesting devices is still relatively low. Based on these problems, researchers made an innovation entitled "The New Design of Rectifier for Micro Energy Harvesting Device", by making an electric multiplier circuit that can convert AC electricity to DC and produce output voltage (V), current (A), and power (W). the greater one. This study uses an experimental method with a quantitative approach. The design of this study used 2 variables, namely input voltage (A) (1V, 2V, 3V, 4V) and capacitance value (B) (1000 μ F, 2000 μ F, 3000 μ F, 4000 μ F, 5000 μ F, 6000 μ F, 7000 μ F, 8000) μ F, 8000 μ F, 9000 μ F, 10000 μ F) Based on the test results of voltage, current, and power as well as the speed of increase in voltage and output current, the best sample for each input voltage in this study is sample A1B10 (1V and 10000 μ F) with 3.34 V, 0.4065 mA, and 0.014322 Watt; A2B10 (2V and 10000 μ F) with 8.49 V, 4.72 mA, and 0.0410168 Watt; A3B10 (3V and 10000 μ F) with 14.72 V, 4.76 mA, and 0.0676872 Watt; and A4B10 (4V and 10000 μ F) with 19.91 V, 0.0667 mA, and 1.3286 Watt. Besides, the researcher conducted a direct test on the A3B10 sample where the results of the direct trial showed that the direct trial results were slightly lower than the simulation results. From the research results, it can be concluded that all the modified electric multiplier samples in this study can convert AC electricity to DC and produce a greater power output than the comparison sample, namely the Villard voltage multiplier, Karthaus-Fischer Cascade voltage doubler, and Dickson voltage multiplier. This modification of the circuit can also perform optimally and has the potential to strengthen the energy harvesting device system.

Keywords: *Electric Multiplier, Energy Harvesting Device, , Electrical Energy, Capacitance Value.*