

DESIGNING AND DEVELOPING A UNIVERSAL MULTI-OUTPUT POWER SUPPLY WITH FAST CHARGING OUTPUT FOR ELECTRICAL ENGINEERING LABORATORY

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ABSTRACT

The rapid advancement of electronic devices has increased the demand for flexible, efficient power supply systems that support various fast-charging standards. This study aims to design and develop a universal multi-output power supply capable of manually adjusting voltage and current across three separate outputs, along with a fast charging feature for mobile devices. The system consists of three primary modules: a 9A auto buck-boost converter module, a 4A DC-DC auto buck-boost converter module, and a 24-pin ATX power supply adapter module. Testing was conducted using various loads such as a 12V water pump and a 12V battery, showing stable voltage and current across all modules. In addition, the fast-charging feature successfully recognized compatible devices and delivered power according to the appropriate protocol. The results indicate that the system is highly feasible for use in electrical engineering laboratories, offering a cost-effective and practical alternative to using multiple conventional power supplies separately.

Keywords: power supply, multi output, fast charging, DC converter, current protection.