

100W, 12V DC AND 240V AC BUS WITH SHORT CIRCUIT/OVERLOAD PROTECTION

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ABSTRACT

The goal of this project is to provide a power supply for home appliances using either AC or DC power. However, this system should incorporate the use of solar energy to charge a sufficient battery which drives the power supply system. Therefore, this system is required to convert solar energy into electricity and power home appliances.

The first stage of this system is a battery charger circuit which involves the use of a solar panel of 5W, 18V rating delivering a charging current of 200-300mA to charge a sealed lead-acid battery of 12V, 36Ah. The circuit design of this system features a charger indicator using a LED and a charge controller using zener diodes. Voltage regulation from this circuit gives a stabilized output to charge the battery using LM317.

The second stage of the system is the conversion of DC to AC using a power inverter providing a square-wave output of 240V at 100W. The system comprises of an oscillator, pre-amplifier, power amplifier and a transformer. The battery is used as the DC source and its voltage regulated to operate the circuit. CD4047 is used as the oscillator, TIP122 transistors used as the pre-amplifier, and 2N3055 transistors used for the power amplification of the system.

The third stage is the short circuit/overload protected bus bar system, which consists of two buses connected to AC and DC. These buses are used to connect the load to supply, which in this case are home appliances. The AC bus is directly connected to the transformer secondary windings, whereas the DC bus is connected to the output of the solar battery charging circuit.

Keywords: battery charger, power inverter, short circuit/overload, power amplification