

Solar Charger for Cellphones

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Abstract

The goal of the project is to make a portable solar powered device with an output voltage of 3.8 Volts DC and an output charge current of 150 milliamps DC to recharge small electronic devices, such as a cell phone. To begin with, the designed project requires a 10 by 7 centimeters solar panel with an output voltage of 5.0 Volts DC, an output current of 200 milliamps DC and an output power of 1.0 Watts. Then, this panel is able to generate enough electricity for a designed circuit consisting of electrical components and a voltage regulator to get a fixed output voltage of 3.8 Volts regardless of changes to the input voltage. To achieve greater efficiency, a synchronous switch-mode battery charge controller for solar power with maximum power point tracking called bq24650 is used. The bq24650 charges the battery in three phases: pre-conditioning, constant current and constant voltage. The charge is terminated when the charge current reaches 0.10 of the charge rate. The pre-charge timer is set at 0.50 hours. It automatically restarts the charge cycle if the battery voltage falls below a programmed internal threshold. It enters sleep mode when the input voltage falls below the battery voltage. This integrated circuit also provides input voltage regulation. It reduces charge current when input voltage falls below a configured level. When the input is provided by portable solar panel it lowers the charge current so that the solar panel can provide maximum power output. Finally, the voltage regulator is connected to a rechargeable battery, whose capacity is 2 Amp-hour or 7.6 Watt-hour, by a USB connector. All the components are placed in a small black box covered by luminous paint to ensure safety as well as convenience. The design has undergone testing in the laboratory. The output voltage and current to the integrated circuit achieved 3.8 volts DC and 150 milliamps DC

respectively, which is set as goal. While a maximum charging current of 150 milliamps is allowed for Lithium-Ion battery, charging at a lower rate is also possible with a correspondingly longer charge time. Most importantly, it performed correctly as a solar charger to charge the cellphones.