APPLICATION OF DIODES IN POWER SUPPLIES

Application of Diodes in Power Supplies

- Power supply circuits for home applications:
- Battery charger:
- Power supplies: Diodes are used in power supplies to convert AC power to DC power.
- Battery chargers: Diodes are used in battery chargers to convert AC power to DC power for charging batteries.

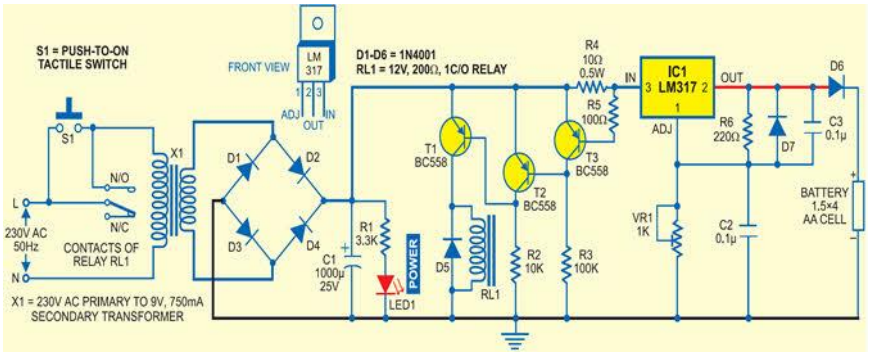
Mobile battery charger circuit is a device that can automatically recharge a mobile phone's battery when the power in it gets low. Nowadays mobile phones have become an integral part of everyone's life and hence require frequent charging of battery owing to longer duration usage.

Battery chargers come as simple, timer-based, intelligent, universal battery charger-analyzers, fast, pulse, inductive, USB based, solar chargers, and motion powered chargers. These battery chargers also vary depending on the applications like a mobile phone charger, battery charger for vehicles, electric vehicle batteries chargers and charge stations.

Charging methods are classified into two categories: fast charge method and slow charge method. Fast charge is a system used to recharge a battery in about two hours or less than this, and the slow charge is a system used to recharge a battery throughout the night. Slow charging is advantageous as it does not require any charge detection circuit. Moreover, it is cheap as well. The only drawback of this charging system is that it takes maximum time to recharge a battery.

Auto-Turn off Battery Charger

The aims to automatically disconnect a battery from the mains when the battery gets fully charged. This system can be used to charge partially discharged cells as well. The circuit is simple and consists of AC-DC converter, relay drivers, and charge stations.



Mobile Battery Charger Circuit

Circuit Description

In an AC-DC converter section, the transformer step-downs the available AC supply to 9v AC at 75o mA which is rectified by using a full-wave rectifier and then filtered by the capacitor. The 12v DC charging voltage is provided by the regulator and when the switch S1 is pressed, the charger starts working and the power-on LED glows to indicate the charger is 'on'.

The relay driver section consists of PNP transistors to energize the electromagnetic relay. This relay is connected to the collector of the first transistor and it is driven by a second PNP transistor which in turn is driven by the PNP transistor.

In the charging section, the regulator IC is biased to give about 7.35V. To adjust the bias voltage, preset VR1 is used. A D6 diode is connected between the output of the IC and a limiting output voltage of the battery up to 6.7V is used for charging the battery.

When the switch is pushed, it latches relay and starts charging the battery. As the voltage per cell increases beyond 1.3V, the voltage drop starts decreasing at R4. When the voltage falls below 650 mV, then the T3 transistor cuts off and drives to T2 transistor and in turn, cuts off transistor T3. As a result, relay RL1 gets de-energized to cut off the charger and red LED1 is turned off.

The charging voltage, depending on the NiCd cell, can be determined with the specifications provided by the manufacturer. The charging voltage is set at 7.35V for four 1.5V cells. Currently, 700mAH cells, which can be charged at 70 mA for ten hours, are available in the market. The voltage of the open circuit is about 1.3V.

The shut-off voltage point is determined by charging the four cells fully (at 70 mA for fourteen hours) and adding the diode drop (up to 0.65V) after measuring the voltage and bias LM317 accordingly.