



SLM6335

28V Withstand Voltage Buck Li-Battery Charger

Description

SLM6335 is a 2.5A lithium ion battery charger for 5V adapter. It is a synchronous buck converter with a fixed frequency of 550kHz. It has a charging efficiency of more than 90% and a very small calorific value.

SLM6335 integrates 28V high-voltage devices, which can effectively prevent chip is damaged by surge voltage or incorrect connection of high-voltage adapter, and has high security.

The SLM6335 includes a complete charging termination circuit, automatic recharging and a 4.35V preset charging voltage with an accuracy of $\pm 1\%$. The SLM6335 has many functions, such as anti back filling protection, output short circuit protection, chip and battery temperature protection.

SLM6335 is packaged in a miniaturized DFN3x3-10L package, which requires only a small number of peripheral components and a very small area of PCB board. Therefore, SLM6335 can be embedded in various handheld applications as an efficient charger for large capacity batteries.

Maximum Rating

- Input power voltage(V_{IN}): -0.3V~28V
- VGC: $V_{IN}-7V \sim V_{IN}+0.3V$
- NCHRG, NSTDBY: -0.3V~28V
- BAT: -0.3V~14V
- VS: -0.3V~14V
- LX: -0.3V~28V
- Others: -0.3V~7V
- Short circuit duration of BAT: continuous
- Maximum junction temperature: 145°C
- Working environment temperature range: -40°C~85°C
- Storage temperature range: -65°C~125°C
- Welding temperature (10 seconds): 260°C

Features

- The highest withstand voltage can reach 28V
- 6.3V input overvoltage protection
- Fixed switching frequency of 550kHz
- High output efficiency of more than 90%
- Maximum adjustable output current of 2.5A
- Automatic identification of input current and adaptive adapter
- There is no need to prevent reverse current diode
- No external power MOS transistor or freewheeling diode is required
- Accuracy of 4.35V charging voltage with accuracy of $\pm 1\%$
- It can withstand 28V high voltage charging state dual indication output
- Shutdown current is only 20uA
- 2.9V trickle charging
- Soft start limits surge current
- Battery temperature monitoring function
- Output short circuit protection function
- DFN3x3-10L package

Applications

- Electronic cigarette
- Electric toys
- Power tools
- MP3 and MP4 players
- Digital camera
- Electronic dictionary
- GPS
- Portable equipment, various chargers

Complete Charge Cycle

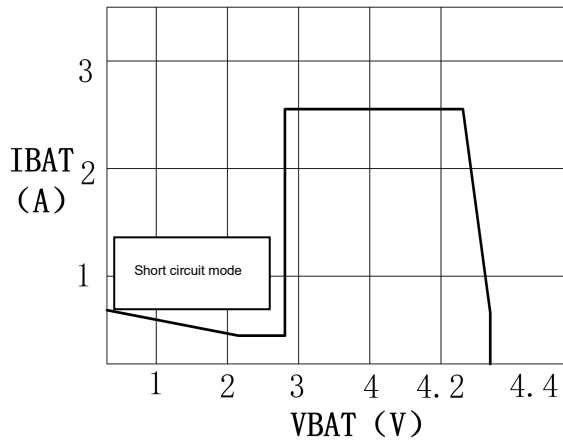


Figure1

Typical Application

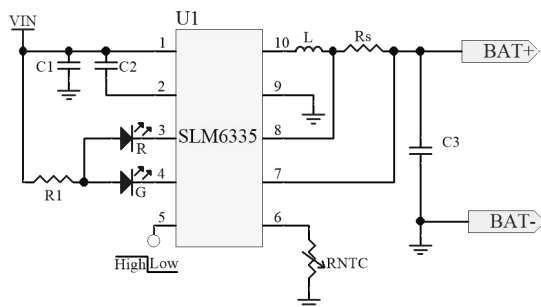


Figure 2

Application Tips

The efficient heat dissipation of the chip is the premise of maintaining a large charging current for a long time.

DFN3x3-10L package has a small size, so the layout of PCB board should be paid special attention to in consideration of heat dissipation. The heat dissipation path for dissipating heat generated by IC is from the chip to the lead frame, and reaches the copper surface of PCB through

the heat sink at the bottom. As the main radiator of IC, the copper foil of PCB board should be as wide as possible, and extend outward to the larger copper foil area, so as to spread the heat to the surrounding environment.

Placing vias in the PCB to the inner layer or back layer also has a significant effect on improving the overall thermal performance of the charger, as shown in Figure 3. A 1.7mm * 3.0 mm square pad is placed at the SLM6335 position of PCB board as the heat sink of SLM6335, and several through holes of 0.8 mm diameter are placed on the pad as heat dissipation holes. During chip welding, solder is poured into the back layer of PCB to effectively connect the heat sink at the bottom of SLM6335 and the heat sink of PCB board, so as to ensure the efficient heat dissipation of SLM6335. **The efficient heat dissipation of the chip is the premise of maintaining a large charging current for a long time.**

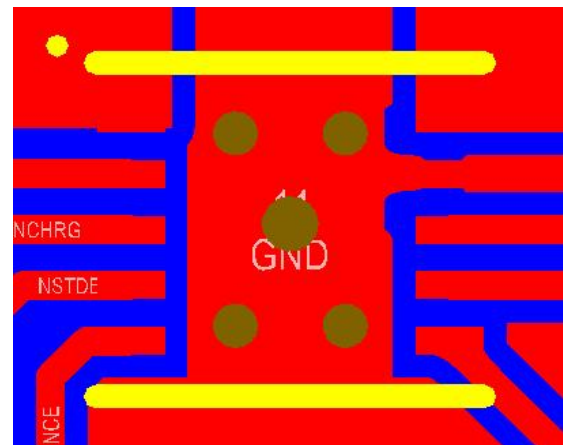


Figure 3

When PCB layout is designing, other heat sources independent of charging IC should be considered, because their own temperature will affect the overall temperature rise and maximum charging current.

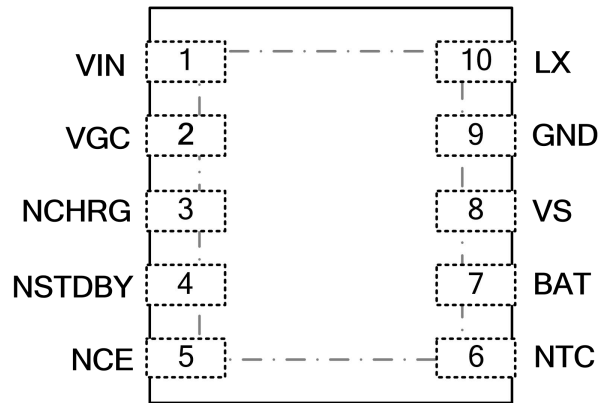


Figure 4. SLM6335 pin package

PIN	Symbol	Function
1	VIN	Input power terminal
2	VGC	Internal drive clamp end
3	NCHRG	Battery charging indicating terminal
4	NSTDBY	Battery charging completion indicator
5	NCE	Enable control terminal
6	NTC	Battery temperature detection input
7	BAT	Battery voltage detection terminal
8	VS	Battery current detection terminal
9	GND	Land
10	LX	Switch end

PIN Configuration

VIN (PIN 1): Input voltage terminal, the maximum withstand voltage of this terminal is 28V, and the charging working voltage is 4.2 ~ 6.0V.

VGC (PIN 2): Gate voltage clamp of internal driving tube, and a capacitance of 0.1uF is connected between this end and VIN.



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NCHRG (PIN 3): State of charge indication terminal. When the charger charges the battery, the pin is pulled to the low level by the internal switch, indicating that the charging is in progress, otherwise the pin is in the high resistance state.

NSTDBY(PIN 4): Charging completion indication terminal. When the battery charging is completed, the pin is pulled to the low level by the internal switch, indicating that the charging is completed; otherwise, the pin is in the high resistance state.

NCE(PIN 5): Enable control terminal. The input low level will make the chip in the normal working state; the input high level will make the chip in the charging forbidden state. NCE pin can be driven by TTL level or CMOS level.

NTC (PIN 6): Battery temperature detection input. Connect the pin to the output terminal of the NTC sensor of the battery. If the voltage of NTC pin is less than 180mv or greater than 1.35v, it means that the battery temperature is too high or too low, and charging is suspended. If the NTC is suspended, the battery temperature detection function is cancelled and other charging functions are normal.

BAT (PIN 7): Battery voltage detection terminal. When the charging is stopped, the leakage current of bat pin is less than 3uA.

VS (PIN 8): Battery current detection terminal. A high-precision milliohm resistor R_S is connected between this terminal and bat, which is used to set the charging current during fast charging. The calculation formula is $I_{BAT} = 0.0667 \div R_S \text{ (A)}$

GND (PIN 9): Power ground. The GND terminal must be reliably connected with the heat sink at the bottom of the chip and the copper laying on the PCB board.

LX (PIN 10): Built in power MOSFET connection point. LX is the current output terminal of SLM6335, which is connected with external inductance as the input of battery charging current.