ACE4251P

28V/800mA, Single Li-ion Battery Linear Charger

Description

The ACE4251P is a complete constant-current/ constant voltage linear charger for single Lithium-Ion battery with high input voltage rating and large current. The largest input voltage is up to 28V and charge current is up to 800mA. The input over voltage protection thread is 6.8V and the lowest input voltage is 3.75V, which can meet the requirement of voltage-adjustment to reduce charging power consumption and improve overall efficiency. External isolation diodes are not required due to the internal PMOS architecture and anti-reverse charging circuit. Thermal feedback regulates the charge current to limit the die temperature during high power operation or high ambient temperature. The charge voltage is fixed at 4.0V/4.1V/4.15V/4.2V/4.35V/4.4V/4.45V, and the charge current can be programmed externally with a single resistor. The ACE4251P automatically terminates the charge cycle when the charge current drops to 1/10 the programmed value after the final float voltage is reached.

When the input voltage (supplied by AC adapter or USB power supply) is removed, the ACE4251P automatically enters a low current state, decreasing the battery leakage current to less than 1μA. Other features of ACE4251P include over temperature protection, under voltage lockout, automatic recharge and charging state indication (two LED pins to show charge state and charge-ending state).

Features

- Maximum Input Voltage: up to 28V
- Minimum Input Voltage: 3.75V (Typ.)
- Input Over Voltage Protection: 6.8V (Typ.)
- Maximum BAT Withstand Voltage up to 20V
- Battery Reverse Connection Protection
- Programmable Charge Current up to 800mA
- No Anti-Back Charge MOSFETs, Detection Resistors, or Isolation Diodes are Required
- Thermal Regulation to Maximize Charge Rate Without Risk of Overheating
- 1% Charge Voltage Accuracy
- Charging Status and Fault Status Indication
- C/10 Termination Charge Current, Automatically Recharge
- Trickle Charge Threshold: 2.9V (Typ. Float Voltage: 4.2V)
- Soft-Start and Surge Current Limit
- Available SOT-23-6 Package

Applications

- Mobile Phone, PDA, GPS
- Standby Power Supply/ Portable Power Source
- Portable Devices, Various Charger

Absolute Maximum Ratings (Note)

Symbol	Items	Value	Unit
V_{CC}	Input Voltage	-0.3~28	V
V_{BAT}	BAT Voltage	-5~20	V
V_{CHG}, V_{FULL}	CHG/FULL Voltage	-0.3~28	V
V_{PROG}	PROG Voltage	-0.3~7	V
I_{BAT}	BAT Pin Current	1000	mA
P_{DMAX}	Maximum Power Dissipation	0.5	W
$R_{\theta JA}$	Junction to Ambient Thermal Resistance	270	°C/W
T_J	Junction Temperature	-40 to 150	°C
T_A	Ambient Temperature	-40 to 85	°C
T_{STG}	Storage Temperature	-55 to 150	°C
T_{SOLDER}	Soldering Temperature	260°C, 10s	

Note:

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Condition

Symbol	Items	Min	Max	Unit
V_{CC}	Input Voltage Range	3.75	25	V
I_{BAT}	Charge Current Range	100	800(Note)	mA
R_{PROG}	Charge Current Programming Resistor	1.25	10	KΩ

Note:

To meet the maximum charging current, the power consumption P_D of the chip should be controlled within 0.8W.

At normal indoor temperature, the PCB has good heat dissipation, and $V_{CC} \geq V_{BAT}+V_{DROP}$. Chip power consumption $P_D= (V_{CC}-V_{BAT}) *I_{CC}$. V_{DROP} ranges from 0.6V to 0.9V@800mA, V_{BAT} from 3V to 4.2V. Generally, the $V_{CC}-V_{BAT}$ is controlled within the range of V_{DROP} ~1V to meet the charging demand of the maximum current. There is a temperature loop inside the chip that keeps the temperature of the chip from exceeding 130°C. If the temperature reaches 120°C (typical), the chip starts to reduce the I_{BAT} current to ensure that the chip is not overheated. The reduction of V_{CC} voltage can be achieved by series connecting power resistors; If V_{CC} is a controlled voltage source, setting V_{CC} to track V_{BAT} voltage can maximize charging current and efficiency.

Ordering Information

ACE4251P XX XX + H

- Halogen - free
- Pb - free
- GM: SOT-23-6
- Float Voltage:
  4.0V/ 4.1V/ 4.15V/ 4.2V/ 4.35V/ 4.4V/ 4.45V

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Technology Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.