ACE45677D

Standalone 1A Linear Lithium Battery Charger With Thermal Regulation

Description

The ACE45677D is a complete constant-current/ constant-voltage linear charger for single cell lithium rechargeable battery. No external sense resistor is needed, and no blocking diode is required due to the internal P-MOSFET architecture. Furthermore, the ACE45677D is specifically designed to work within USB power specifications. Its low external component count makes the ACE45677D ideally suited for portable applications. Thermal feedback regulates the charge current to limit the die temperature during high power operation or high ambient temperature. The charge current can be programmed externally with a single resistor. The ACE45677D automatically terminates the charge cycle when the charge current drops to 1/10th the programmed value after the final float voltage is reached. When the input supply (wall adapter or USB supply) is removed, the ACE45677D automatically enters a low power sleep mode, dropping the battery drain current to less than 2μA. The ACE45677D can be put into shutdown mode, reducing the supply current to 50μA. Other features include battery pack temperature monitor, undervoltage lockout, automatic recharge and two status pins to indicate charging and charge termination. The ACE45677D is available in thermally enhanced 8-pin SOP package.

Features

- Charges Single Cell Lithium Battery Directly from USB Port or AC Adapter
- Input Voltage Range From 4.5V to 6.5V
- No External MOSFET, Sense Resistor or Blocking Diode Required
- Preset 4.20V/4.35V Charge Voltage
- Continuous Programmable Charge Current Up to 1A
- Recharge Conditioning for Reviving Deeply Discharged Cells and Minimizing Heat Dissipation During Initial Stage of Charge
- Constant-Current/Constant- Voltage/Constant-Temp Operation with Thermal Regulation to Maximize Charge Rate Without Risk of Overheating
- Automatic Recharge
- Battery Temperature Sensing
- Charge state pairs of output, no battery and fault status display
- Charge Current Monitor Output for Gas Gauging
- Automatic Low Power Sleep Mode When Input Supply Voltage is Removed
- Soft-Start Limits Inrush Current
- Chip Enable Input

Application

- Cellular phones, PDAs
- Portable Media Players
- Digital Still Cameras
- Bluetooth & GPS Applications
- Mobile Internet Device
- Charging Docks and Cradles

Absolute Maximum Ratings (1)

Parameter	SYMBOL	Max	Unit
Input Supply Voltage(2)	V_{CC}	-0.3~10	V
TEMP, CE, PROG Pins Voltage(2)		-0.3~VCC+0.3	
BAT Pin Voltage(2)		-0.3~8	
$\overline{CHRG}$ $\overline{DONE}$ Pins Voltage(2)		-0.3~10	
BAT Short-Circuit Duration		Continuous	
BAT Pin Output Current (Continuous)	I_{BAT}	1200	mA
Output sink current	$I_{\overline{CHRG}}$,$I_{\overline{DONE}}$	10	mA
Power dissipation	PD	1200	mW
Operating Ambient Temperature Range (3)	TA	-40~85	°C
Junction Temperature	TJ	-40~150	°C
Storage Temperature	Tstg	-40~125	°C
Lead Temperature (Soldering, 10s)	Tsolder	260	°C
ESD rating (4)	HBM	2000	V
	MM	200	V

1. Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.
2. All voltages are with respect to network ground terminal.
3. The ACE45677D are guaranteed to meet performance specifications from 0°C to 70°C. Specifications over the –40°C to 85°C operating temperature range are assured by design, characterization and correlation with statistical process controls.
4. The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. The machine model is a 200pF capacitor discharged directly into each pin.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Units
Input voltage range (5)	V_{CC}	4.5	6.5	V
BAT Pin Output Current (Continuous)	I_{BAT}		1000(6)	mA
Fast-charge current programming resistor (7)	R_{PROG}	1	10	kΩ

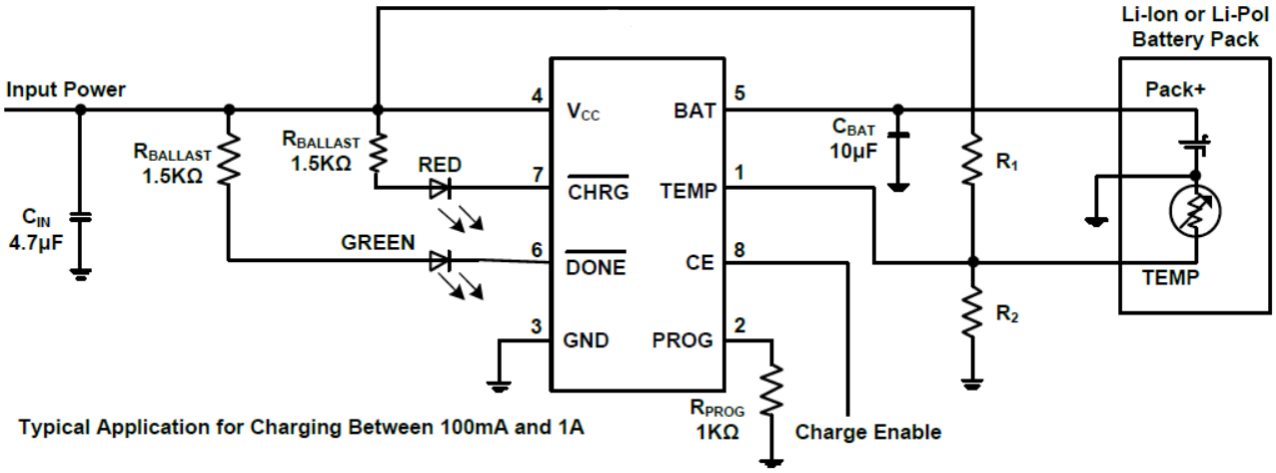
5. If VCC is between UVLO and 4.5V, and above the battery voltage, then the IC is active (can deliver some charge to the battery), but the IC will have limited or degraded performance (some functions may not meet data sheet specifications). The battery may be undercharged (VFLOAT less than in the specification), but will not be overcharged (VFLOAT will not exceed specification).
6. The thermal regulation feature reduces charge current if the IC's junction temperature reaches 125°C; thus, without a good thermal design the maximum programmed charge current may not be reached.
7. Use a 1% tolerance metal film resistor for RPROG to avoid issues with the RPROG short test when using the maximum charge current setting.

Ordering information

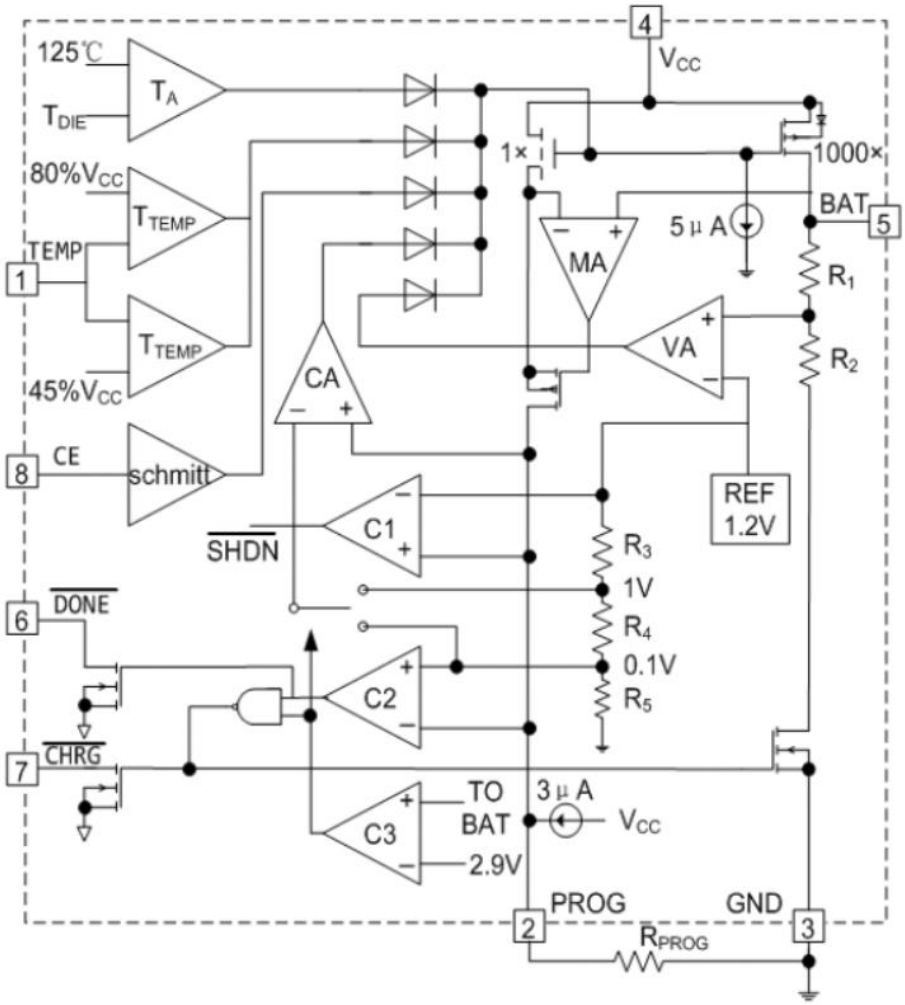
ACE45677D XX XX+ H

- Halogen - free
- Pb - free
- FM: SOP-8
- Blank:4.2V
  B: 4.35 V

Typical Application Circuit



Block Diagram



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.