



### Features

- Programmable Charge Current Up to 700mA
- No MOSFET, Sense Resistor or Blocking Diode Required
- Constant-Current/Constant-Voltage Operation with Thermal Regulation to Maximize Charge Rate
- Without Risk of Overheating
- Charges Single Cell Li-Ion Batteries Directly from USB Port
- Preset 4.2V Charge Voltage with 1% Accuracy
- Automatic Recharge
- 2.9V Trickle Charge Threshold
- Available in SOP8-PP Package

### Applications

- Charger for Li-Ion Coin Cell Batteries
- Portable MP3 Players, Wireless Headsets
- Multifunction Wristwatches
- Bluetooth Applications

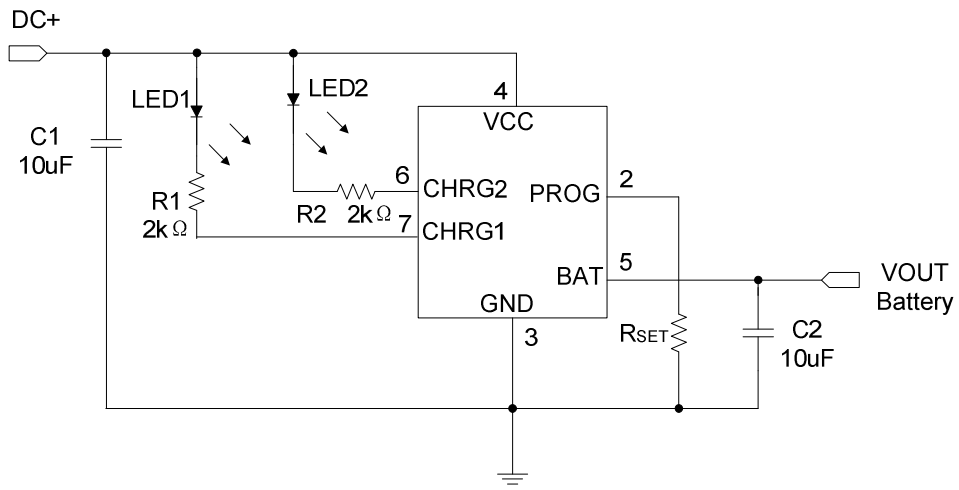
### Description

The HX6009 is a complete constant-current/constant voltage linear charger for single cell lithium-ion batteries. Its package and low external component count make the HX6009 ideally suited for portable applications. Furthermore, the HX6009 is specifically designed to work within USB power specifications.

The charge voltage is fixed at 4.2V, and the charge current can be programmed externally with a single resistor. The HX6009 automatically terminates the charge cycle when the charge current drops to 1/10<sup>th</sup> the programmed value after the final float voltage is reached.

The HX6009 converters are available in the industry standard SOP8-PP power packages (or upon request).

## Typical Application



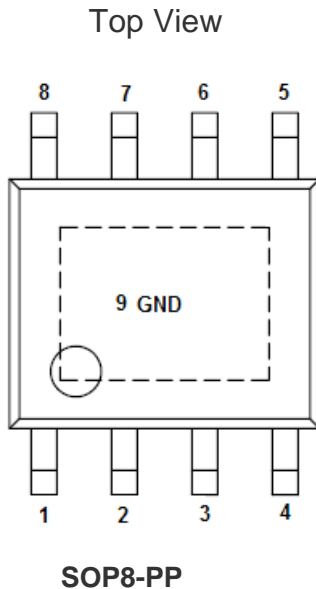
**Figure 1: Typical Application Circuit with Two LEDs**

Condition	LED1	LED2
Battery charging	ON	OFF
Charge complete	OFF	ON

\*  $I_{BAT} = (V_{PROG}/R_{SET}) * 900$

\* When charging in constant-current mode, the  $V_{PROG}$  is usually 1V.

## Pin Assignment



PIN NUMBER SOP8-PP	PIN NAME	DESCRIPTION
1,8	N/C	No Connect
2	PROG	Charge Current Program
3, 9	GND	Ground
4	VCC	Positive Input Supply Voltage
5	BAT	Charge Current Output
6	CHRG2	Charge Complete Status Output
7	CHRG1	Open-Drain Charge Status Output

## Absolute Maximum Ratings (Note 1)

- Input Supply Voltage (Vcc) ..... -0.3V to 7V
- PROG..... - 0.3V to Vcc + 0.3V
- BAT ..... -0.3V to 7V
- CHRG1, CHRG2..... -0.3V to 7V
- BAT Pin Current ..... 800mA
- Maximum Junction Temperature ..... 125°C
- Operating Ambient Temperature Range (Note 2)..... -40°C to 85°C
- Storage Temperature Range ..... -65 °Cto 125°C
- Lead Temperature (Soldering, 10 sec)..... 300°C

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of the device may be impaired.

**Note 2:** The HX6009 is 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.

## Pin Description

**N/C (Pin 1, 8):** No Connect.

**PROG (Pin 2):** Charge Current Program, Charge Current Monitor and Shutdown Pin. The charge current is programmed by connecting a 1% resistor,  $R_{PROG}$ , to ground. When charging in constant-current mode, this pin serves to 1V. In all modes, the voltage on this pin can be used to measure the charge current using the following formula:  $I_{BAT} = (V_{PROG}/R_{SET}) * 900$ .

**GND (Pin 3, 9):** Ground.

**VCC (Pin 4):** Positive Input Supply Voltage. It Provides power to the charger VCC can range from 4.5V to 6.5V and should be bypassed with at least a 1uF capacitor.

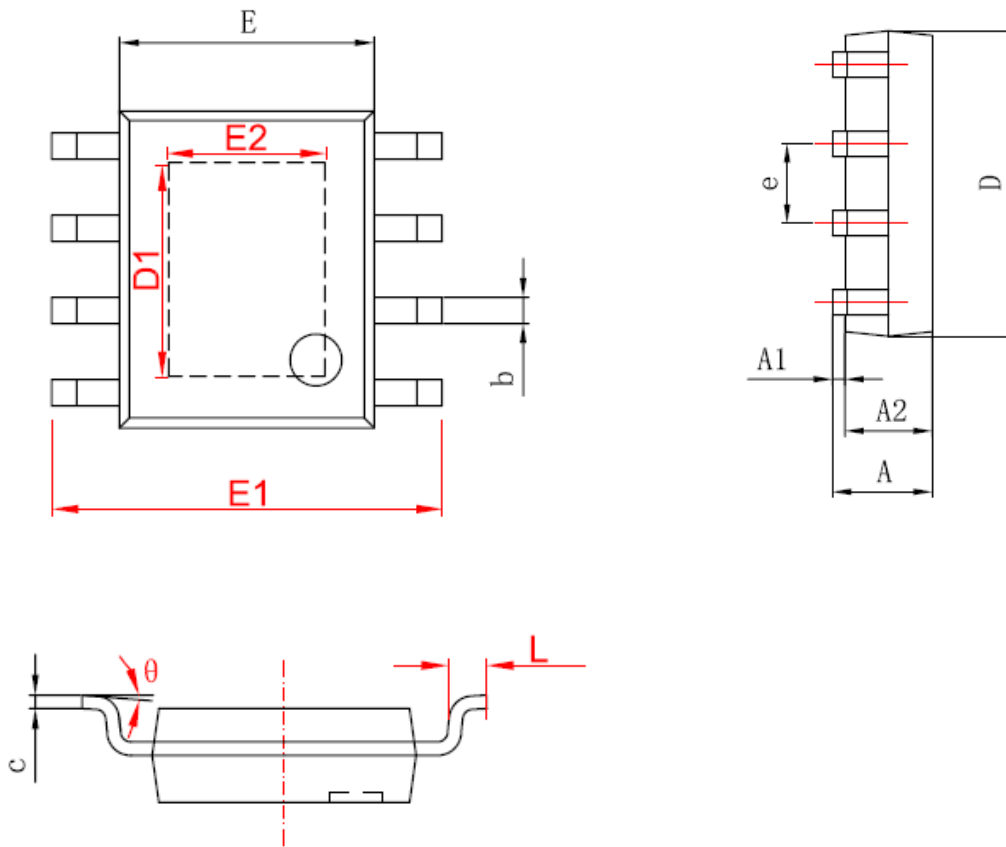
**BAT (Pin 5):** Charge Current Output. It should be bypassed with at least a 1uF capacitor. It Provides charge current to the battery and regulates the final float voltage to 4.2V. An internal precision resistor divider from this pin sets the float voltage which is disconnected in shutdown mode.

**CHRG2 (Pin 6):** Charge Complete Status Output. See CHRG pin (Pin 7).

**CHRG1 (Pin 7):** Open-Drain Charge Status Output. When the battery is charging, the CHRG1 pin is pulled low by an internal N-channel MOSFET. When the charge cycle is completed, high impedance is forced to the CHRG1 and CHRG2 (pin 6) is pulled low, indicating an “AC present” condition.

## Packaging Information

### SOP8-PP (EXP PAD) Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°

Subject changes without notice.

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