High Accuracy Linear Li-ion Battery Charger

■ General Description

The XT2057 is a complete constant-current/ constant voltage linear charger for cell lithium-ion batteries. Its package and low external component count make the XT2057 ideally suited for portable applications. The charge current can be programmed externally with a single resistor. XT2057 determines the charge mode by detecting the battery voltage: Pre-charge, constant current charging, constant voltage charging. The charge current of pre-charging and constant –current charging is adjustable. The XT2057 is monitored by temperature monitor during the constant-current and constant-voltage charging. There are two LEDs indicate the charge mode.

The XT2057 charger converters are available in the SOP-8 packages (or upon request).

■ Applications

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

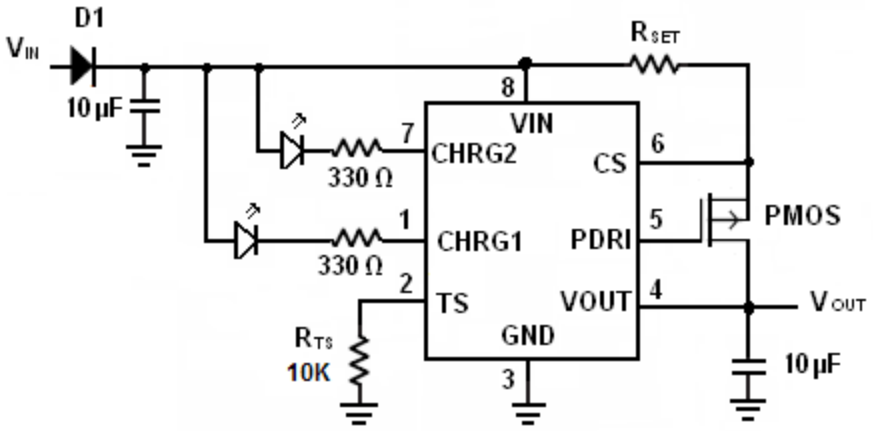
■ Features

- Preset 8.4V Charge Voltage with 1% Accuracy
- Input Voltage: ≥8.8V
- Pre-Charging, the Charge Current is adjustable
- Ideal for Dual-Cell（8.4V）Li-Ion Batteries
- Constant -Current Charging, the Charge Current is adjustable
- Constant-Voltage Charging
- Constant-Current/Constant-Voltage
- Charging with Temperature Monitoring
- Automatic Recharge
- Double LEDs Charge Status Indication
- Available in SOP-8 Package

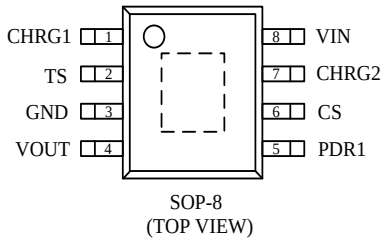
■ Package

- SOP-8

■ Typical Application Circuit



■ Pin Assignment



SOP-8
(TOP VIEW)

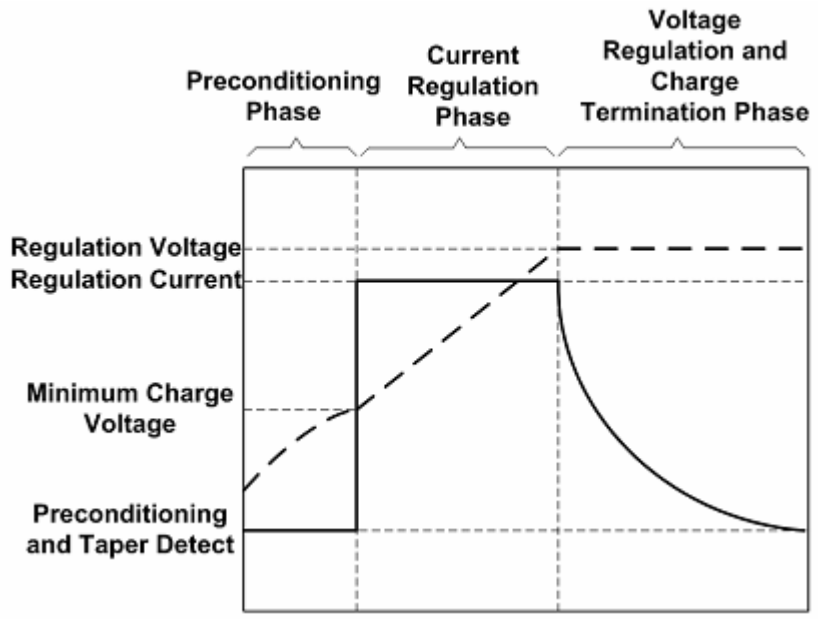
SOP-8	Pin Name	Function
1	CHRG1	Open-Drain Charge Status Output
2	TS	Temperature Sense
3	GND	Ground
4	VOUT	Charge Current Output
5	PDR1	Charge Current Monitor And Shutdown Pin
6	CS	Charge Current Program
7	CHRG2	Open-Drain Charge Status Output
8	VIN	Positive Input Supply Voltage

■ Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
Input Supply Voltage	VIN	-0.3～18	V
TS、CHRG1、CHRG2、PDRI、CS	VOUT	-0.3～VIN +0.3	
Maximum Junction Temperature	Tj	125	℃
Operating Temperature Range	Topr	-40～＋85	
Storage Temperature	Tstg	-65～＋125	
Lead Temperature(Soldering,10 sec)	Tlt	300	

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

■ Typical Charge Profile



■ Electrical Characteristics

Operating Conditions:TA=25℃

Parameter	Symbol	Cinditons	MIN	TYP	MAX	Units
Input supply current	I_{VIN}		0.15	0.7	1.1	mA
Vin sleep current	I_{SLEEP}	VIN=7V VOUT=8V			7.8	μA
Input bias current on VOUT Pin	$I_{IV(VOUT)}$	VOUT=8.4V	10		65	μA
Battery Voltage Regulation Constant-Current Charge						
Output voltage	$V_{O(REG)}$		8.317	8.4	8.484	V
Current regulation threshold	$V_{(CS)}$	Voltage at pin CS , relative to VIN	180	200	220	mV
Precharge comparator						
Precharge threshold	$V_{(MIN)}$		5.6	6	6.2	V
Precharge current regulation						
Precharge current regulation	$I_{(PRECHG)}$	Voltage at pin CS, relative to VIN, R_{SET} =1Ω.		18		mA
		Voltage at pin CS, relative to VIN, R_{SET} =1Ω,VIN=9V	10		35	mA
V_{RCH} comparator (Battery Recharge Threshold)						
Recharge threshold	$V_{(RCH)}$			$V_{O(REG)}$ -400mV		V
STAT Pin						
Output（low）voltage	$V_{OL(STAT)}$	I_{OL}=10mA		1.5		V
Output（high）voltage	$V_{OH(STAT)}$	I_{OH}=5mA	VIN-2			V

■ Application Information

- **PIN ASSIGNMENT**

CHRG1 (Pin 1): Charge Status Indication. When the battery is charging, the CHRG1 pin is pulled low. When the charge cycle is completed or reverse battery lockout / No AC is detected, CHRG is forced high impedance. The battery is not working properly or when the temperature exceeds the set range, output 50% duty cycle of 2Hz pulse, the PIN is available through 330 ohm resistors and indicates that the light-emitting diode connected.

TS (Pin 2): Temperature Sense.

GND (Pin 3): Ground.

VOUT (Pin 4): Charge Current Output. It should be bypassed with at least a 10uF capacitor. It provides charge current to the battery and regulates the final float voltage to 8.4V.

PDRI (Pin 5): Driving side. Connect to the grid of the PMOS.

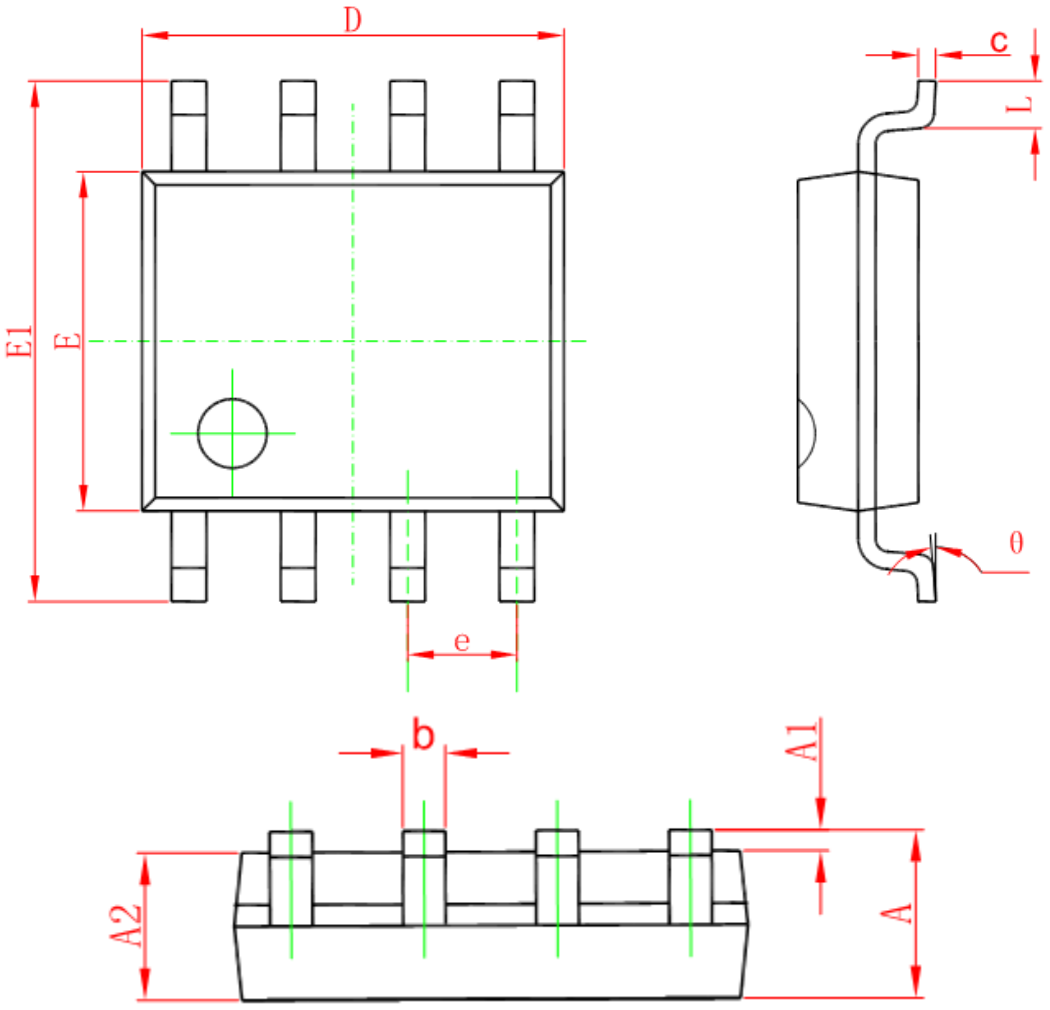
CS (Pin 6): Charge Current Program, Charge Current Monitor and Shutdown Pin. The charge current is programmed by connecting a resistor, RSET, ISET = V（CS）/RSET.

CHRG2 (Pin 7): End-of-Charge Status Indication. When the battery is charging, the CHRG2 pin is forced high impedance. When the charge cycle is completed, CHRG2 is pulled GND.

VIN (Pin 8): Positive Input Supply Voltage. It Provides power to the charger VIN and should be bypassed with a 10uF capacitor.

■ Package Information

- **SOP-8**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	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
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°