



## Description

SE9022 is a complete Current-Limit & constant voltage charger for single cell Lithium-ion and Lithium-Polymer batteries. Its DIP8/COB packages and low external component count make SE9022 ideally suited for portable applications. Furthermore, the SE9022 is specifically designed to work within Universal Travel Charger.

SE9022 has a built-in detector that will automatically detect the polarity of the inserted battery and charge the battery at the correct polarity. The charge voltage is fixed at 4.25V. The SE9022 automatically terminates the charge cycle when the charge current drops to 30mA after the final float voltage is reached.

When the input supply is removed, the SE9022 automatically enters a low current stage, dropping the battery drain current to less than 7mA. The SE9022 can be put into shutdown mode, reducing the supply current to 30uA.

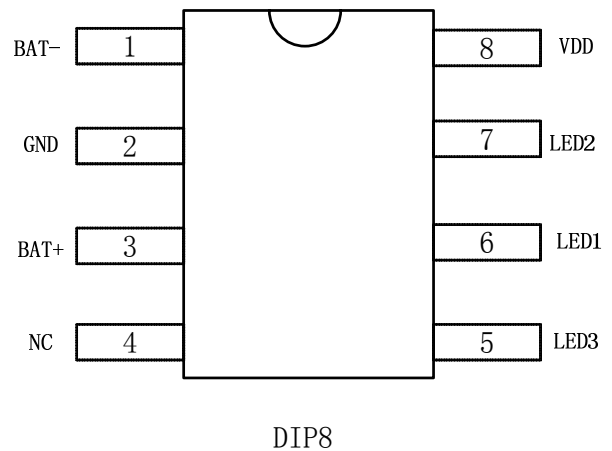
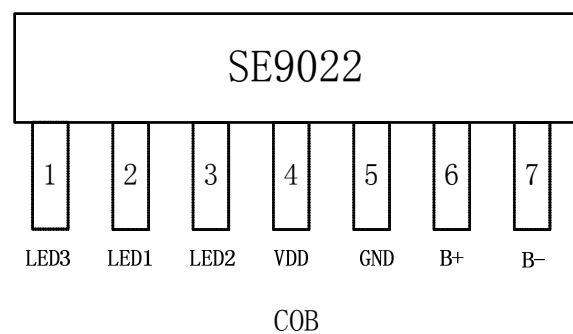
## Features

- Automatically Identifies the polarity of the battery
- Typical-Current to 250mA
- Internal Voltage Reference
- Short-Circuit Protection
- Low external component
- Build in high precision reference voltage
- Preset 4.25V Charge Voltage with Min/Max between 4.15V and 4.30V.
- 20uA Supply Current in Shutdown.
- Support Standalone Battery Charger.
- Available in DIP-8 and COB-7 Packages.
- RoHS Compliant and 100% Lead (Pb)-Free

## Application

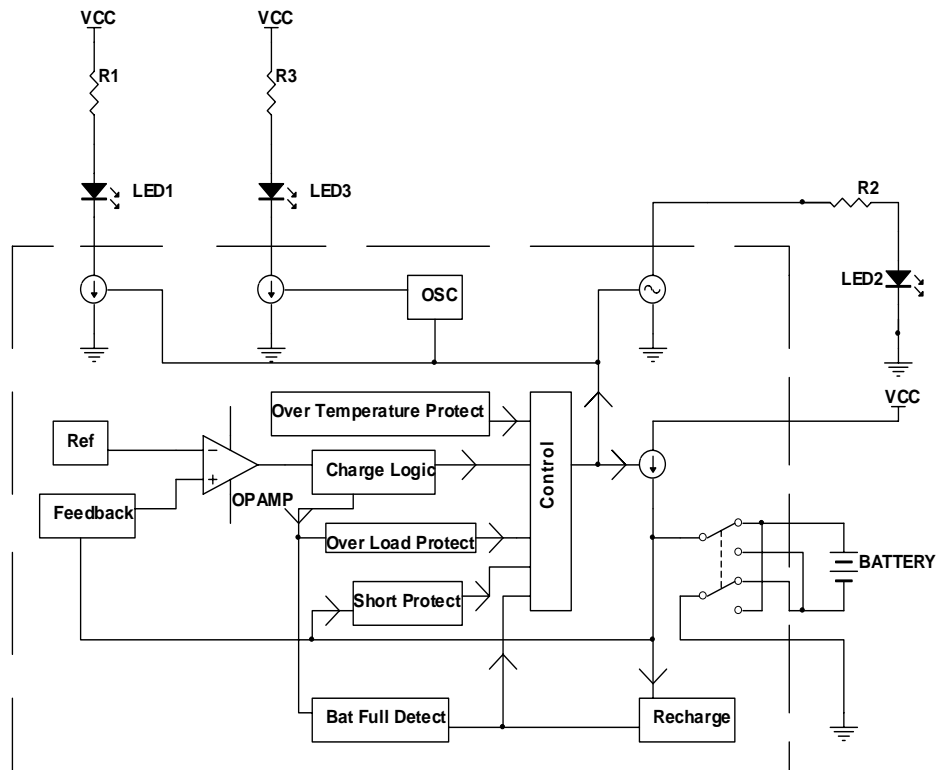
- Universal Travel Charger
- USB Charger

## Pin Configuration





Block Diagram





**Absolute Maximum Rating <sup>(1)</sup>**

Parameter	Symbol	Value	Units
Input Supply Voltage	$V_{in}$	8	V
BAT Voltage	$V_{BAT+}$	7	V
BAT Voltage	$V_{BAT-}$	7	V
LED1	$V_{LED1}$	7	V
LED2	$V_{LED2}$	7	V
BAT Short-Circuit Duration		Continuous	
Thermal Resistance, Junction-to-Ambient	$\Theta_{JA}$	250 (SOT-23-6)	°C/W
BAT Pin Current	$I_{BAT}$	250	mA
LED1/2/3 Current	$I_{LED}$	10	mA
Maximum Junction Temperature	$T_J$	125	°C
Storage Temperature	$T_S$	-45 to +125	°C
Lead Temperature (Soldering, 10 sec)		300	°C

**Operating Rating <sup>(2)</sup>**

Parameter	Symbol	Value	Units
Supply Input Voltage	$V_{IN}$	+4.75 to +6	V
Junction Temperature	$T_J$	-40 to +85	°C

**Electrical Characteristics**

$V_{IN} = 5V$ ;  $T_J = 25^\circ C$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{in}$	Input Supply Voltage		4.75		6	V
$V_{Term}$	Regulated Output (Terminal) Voltage	$V_{in}=6V$ , $I_{BAT} = 30mA$ .	4.150	4.25	4.300	V
$V_{Float}$	Floating Voltage	$V_{in}=6V$ , $I_{BAT} = 0$ . Note #1.		0		V
$I_{BAT}$	BAT Pin Current	$V_{in}=6V$ , $ V_{btp}-V_{btn} <3.5V$		250		mA
$V_{Short}$	Short Circuit Protection Voltage	$V_{in}=6V$ , $ V_{btp}-V_{btn}  :3V \text{ to } 0V$		2.5		V
$F_{OSC}$	Flashing Frequency	$V_{in}=6V$ , $ V_{btp}-V_{btn} =3.5V$		4		Hz

**Notes:**

#1. When the battery disconnected to the charger, SE9022 disables the internal charging transistor. This will cause the Vbat to float to 0V.

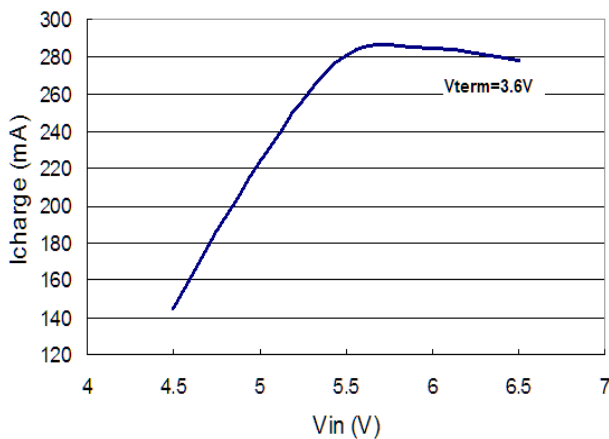


**Pin Functions**

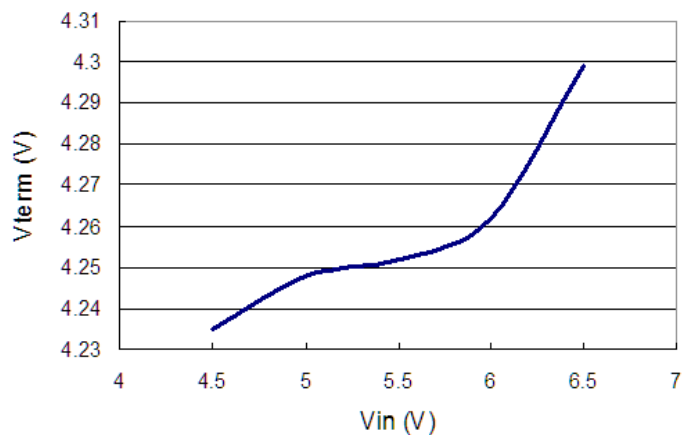
Pin	Pin Function Description	Pin	Pin Function Description
<b>Vin</b>	Positive Input Supply Voltage. Provides power to the charger. Vin can range from 4.75V to 6V and should be bypassed with at least one 1 $\mu$ F capacitor.	<b>BAT-</b>	Charge Current Output. Provides charge current to the battery and regulates the final charge voltage to 4.2V. SE9022 will automatically identify the polarity so this pin can be connected to BAT+ also.
<b>GND</b>	Ground.	<b>LED1</b>	LED1 sinks 10mA, or ON, when the Lithium battery is successfully connected to the IC. A series resistor is advised if the LED needs smaller current.
<b>BAT+</b>	Charge Current Output. Provides charge current to the battery and regulates the final charge voltage to 4.2V. SE9022 will automatically identify the polarity so this pin can be connected to BAT- also.	<b>LED2</b>	LED2 is the Charge Full LED driver.when the battery is full,LED2 will ON. It would source 10mA to a LED connected between this pin to GND. A series resistor is advised if the LED needs smaller current.
<b>LED3</b>	The LED3 will flash at 4Hz frequency during charging. When the battery is full. LED3 will be pulled high, and the LED will be OFF. If the LED needs smaller current, a series resistor is advised..	<b>NC</b>	With DIP-8 package NC is the unused PIN

**Typical Operating Characteristics**

**Icharge Versus Vin**

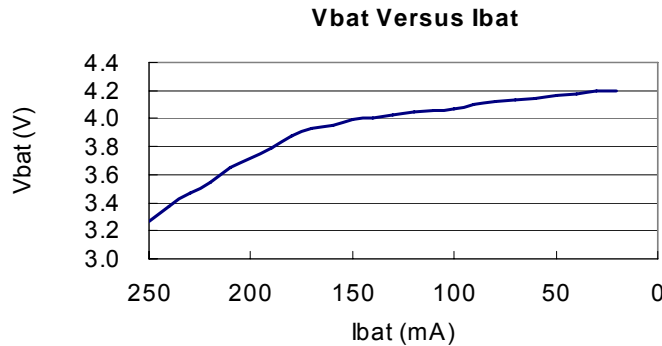


**Vterm Versus Vin**

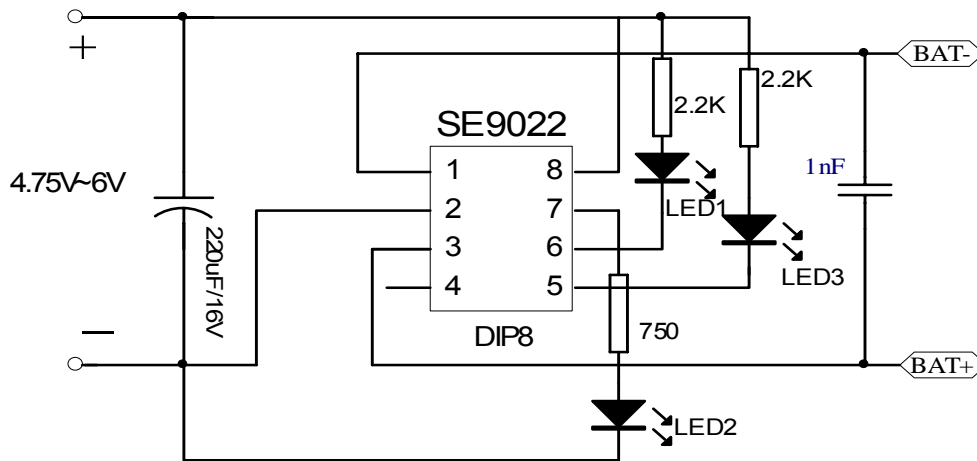




Typical Operating Characteristics



Application Notes:

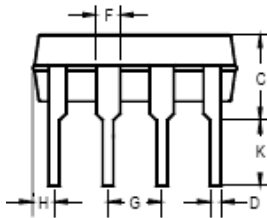
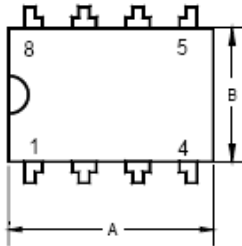


**SE9022 Application..**The Logic of LED's is shown in the table below.

Detection Description	Power Supply Condition	Battery Condition	LED1	LED2	LED3
Battery Detection	Disconnected	Connected	ON	OFF	OFF
	Connected	Disconnected	ON	OFF	OFF
Battery Unload	Connected	Disconnected	ON	OFF	OFF
Battery Charge		Connected	ON	OFF	Flash
Battery Full			ON	ON	OFF
Battery Shorted		Shorted	ON	OFF	OFF



## OUTLINE DRAWING DIP-8



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.355	0.365	0.400	9.02	9.27	10.16
B	0.240	0.250	0.280	6.10	6.35	7.11
C	-	-	0.210	-	-	5.33
D	-	0.018	-	-	0.46	-
F	-	0.060	-	-	1.52	-
G	-	0.100	-	-	2.54	-
H	0.050	-	0.090	1.27	-	2.29
J	0.008	-	0.015	0.20	-	0.38
K	0.115	0.130	0.150	2.92	3.30	3.81
L	0.300 BSC.			7.62 BSC.		
M	-	7°	15°	-	7°	15°



## Customer Support

### Seaward Electronics Incorporated – China

Section B, 2nd Floor, ShangDi Scientific Office Complex, #22 XinXi Road

Haidian District, Beijing 100085, China

Tel: 86-10-8289-5700/01/05

Fax: 86-10-8289-5706

### Seaward Electronics Corporation – Taiwan

2F, #181, Sec. 3, Minguan East Rd,

Taipei, Taiwan R.O.C

Tel: 886-2-2712-0307

Fax: 886-2-2712-0191

### Seaward Electronics Incorporated – North America

1512 Centre Pointe Dr.

Milpitas, CA95035, USA

Tel: 1-408-821-6600

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