# Standalone Linear Li-ion Battery Charger with Thermal Regulation

## Description

The FH5101 is a complete constant-current/constant-voltage linear charger for single cell lithium-ion batteries. Its package and low external component count make the FH5101 ideally suited for protable applications. Furthermore, the FH5101 is specifically designed to work within USB power specifications.

No external sense resistor is needed, and no blocking diode is required due to the internal MOSFET architecture. The charge voltage is fixed at 4.35V, and the charge current can be programmed externally with a single resistor.

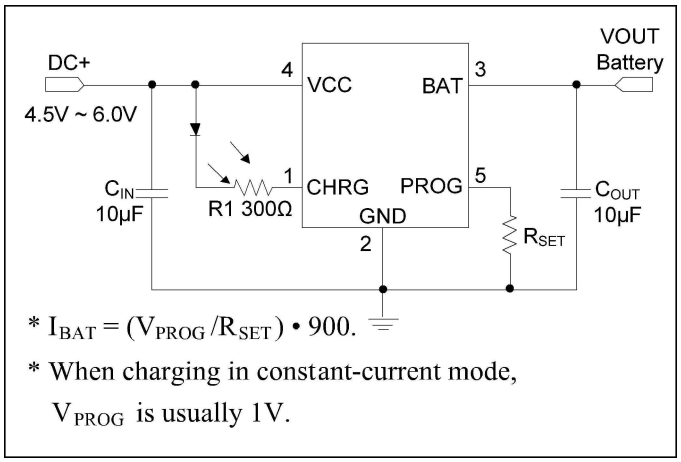
The FH5101 automatically terminates the charge cycle when the charge current drops to $1/10^{th}$ the programmed value after the final float voltage is reached.

The FH5101 converters are available in the industry standard SOT-23-5L power packages (or upon request).

## 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
- Charges Single Cell Li-Ion Batteries Directly from USB Port
- Preset 4.35V Charge Voltage with 1% Accuracy
- Automatic Recharge
- 2.90V Trickle Charge Threshold
- Available in 5-Lead SOT-23 Package

## Typical Application Circuit

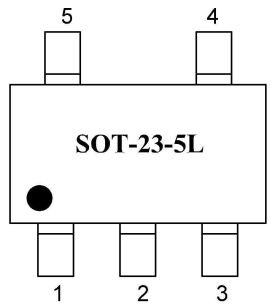



* $I_{BAT} = (V_{PROG} / R_{SET}) \cdot 900$.
* When charging in constant-current mode, $V_{PROG}$ is usually 1V.

## Applications

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

## Pin Assignment and Description




| PIN | NAME | DESCRIPTION |
|---|---|---|
| 1 | CHRG | Open-Drain Charge Status Output |
| 2 | GND | Ground |
| 3 | BAT | Charge Current Output |
| 4 | VCC | Positive Input Supply Voltage |
| 5 | PROG | Charge Current Program |

## Pin Functions

**CHRG (Pin 1):** Open-Drain Charge Status Output.
When the battery is being charged, the CHRG pin is pulled low by an internal N-channel MOSFET.
When the charge cycle is completed or reverse battery lockout/No AC is detected,
CHRG is forced high impedance.

**GND (Pin 2):** Ground.

**BAT (Pin 3):** Charge Current Output. It should be bypassed with at least a 1μF capacitor. It Provides charge current to the battery and regulates the final float voltage to 4.35V. An internal precision resistor divider from this pin sets the float voltage which is disconnected in shutdown mode.

**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 1μF capacitor.

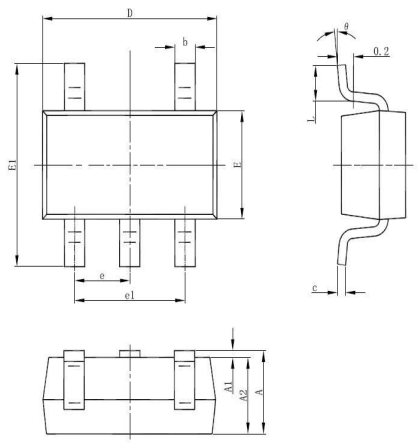
**PROG (Pin 5):** Charge Current Program, Charge Current Monitor and Shutdown Pin. The charge current is programmed by connecting a 1% resistor, $R_{PROG}$, to ground. When charging in constant-current mode, this pin servos to 1V. In all modes, the voltage on this pin can be used to measure the charge current using the following formula:

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

The PROG pin can also be used to shutdown the charger.
Disconnecting the program resistor from ground, the charger enters shutdown mode.
Reconnecting RPROG to ground will return the charger to normal operation.

## Packaging Information

**SOT-23-5L Package Outline Dimension**



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |

## Order Information

| Part No. | Output Voltage | Packaged | SPQ |
|---|---|---|---|
| FH5101PM5 | Denotes:<br>P: 4.35V | Denotes Type:<br>M5: SOT-23-5L | 3000pcs / Reel |