

5.0A Standalone PWM Buck(Step-Down) Li-ion Battery Charger

General Descriptions

The **FH5401** is a PWM Buck switch-mode lithium ion battery charger controller for 2 cell Li-ion battery in a small package using few external components.

The FH5401 is specially designed for charging lithium ion batteries with constant current and constant voltage mode. In constant voltage mode, the regulation voltage is fixed at 8.4V with  $\pm 1\%$  accuracy. The constant charging current is programmable with a single sense resistor.

Deeply discharged batteries are automatically trickle charged at 15% of the programmed constant charging current until the cell voltage exceeds 2.8V/cell. The charge cycle is terminated once the charging current drops to a level set by an on-chip resistor and an external resistor, and a new charge cycle automatically restarts if the battery voltage falls below 4.0V/cell. FH5401 will automatically enter sleep mode when input voltage is lower than battery voltage.

Other features include under-voltage lockout, battery temperature monitoring and status indication, etc.

FH5401 is available in a space-saving 16-pin TSSOP package.

Applications

- Portable DVD, Walkie-Talkie
- Notebook Computers
- Battery-Backup Systems
- Portable Industrial and Medical Equipment
- Standalone Battery Chargers

Features

- Wide Input Voltage: 7.5V to 28.0V
- Complete Charger Controller for 2 cell Li-ion Battery
- Charge Current Up to: 5.0A
- High PWM Switching Frequency: 300KHz
- Constant Charging Voltage Accuracy:  $\pm 1\%$
- Charging Current is programmed with a sense resistor
- Automatic Conditioning of Deeply Discharged Batteries
- End-of-Charge Current can be set by an external resistor
- Battery Temperature Monitoring
- Automatic Recharge
- Charger Status Indication
- Soft Start
- Battery Over-voltage Protection
- Operating Ambient Temperature
- $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in 16 Pin TSSOP Package
- Pb-free, RoHs Compliant, and Halogen Free

Typical Application Circuit

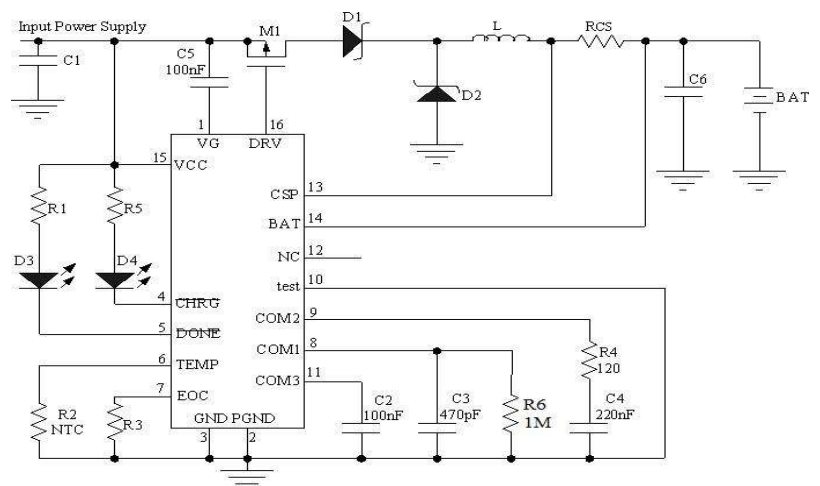
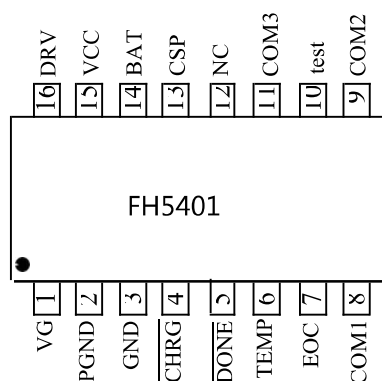


Figure 1. Typical Application Circuit

## ■ Pin Assignment

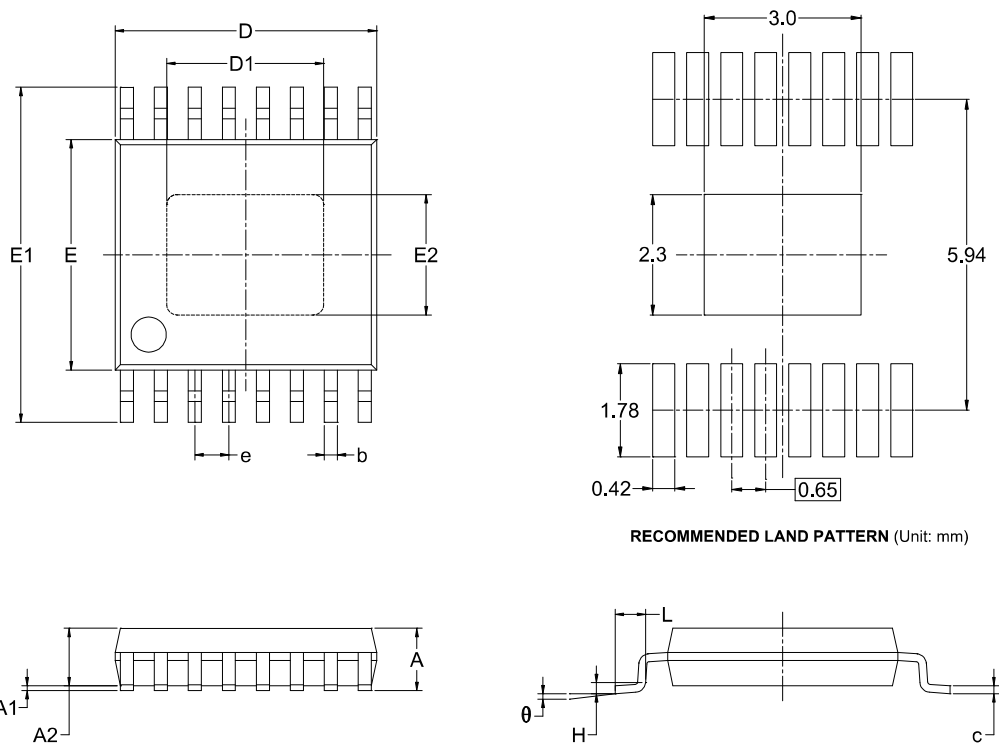


## ■ Pin Description

Pin No.	Name	Descriptions
1	VG	Internal Voltage Regulator. VG internally supplies power to gate driver, connect a 100nF capacitor between VG pin and VCC pin.
2	PGND	Power Ground.
3	GND	Analog Ground.
4	$\overline{\text{CHRG}}$	Open-Drain Output. When the battery is being charged, this pin is pulled low by an internal switch. Otherwise this pin is in high impedance state.
5	$\overline{\text{DONE}}$	Open-Drain Output. When the charging is terminated, this pin is pulled low by an internal switch. Otherwise this pin is in high impedance state.
6	TEMP	Battery Temperature Monitoring Input. Connect an NTC resistor from this pin to GND.
7	EOC	End-of-Charge Current Setting Pin. Connect this pin to GND directly or via a resistor.
8	COM1	Loop Compensation Input 1. Connect a 470pF capacitor from this pin to GND.
9	COM2	Loop Compensation Input 2. Connect a 220nF capacitor in series with an 120Ω resistor from this pin to GND.
10	test	Test pin. Connected this pin to GND.
11	COM3	Loop Compensation Input 3. Connect an 100nF capacitor from this pin to GND.
12	NC	No Connection
13	CSP	Positive Input for Charging Current Sensing. This pin and the BAT pin measure the voltage drop across the sense resistor RCS, to provide the current signals required.
14	BAT	Battery Voltage Sensing Input and the Negative Input for Charging Current Sensing. A precision resistor divider sets the regulation voltage on this pin in constant voltage mode.
15	VCC	External DC Power Supply Input. VCC is also the power supply for internal circuit. Bypass this pin with a capacitor.
16	DRV	Drive the gate of external P-channel MOSFET.

## ■ Package Information

- Type: TSSOP-16L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.100		0.043
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	0.201
D1	2.900	3.100	0.114	0.122
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
E2	2.200	2.400	0.087	0.094
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.02	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°

## ■ Ordering Information

Part No.	Operating Ambient Temperature	Constant Charging Voltage	Package	Top Mark	SQP
FH5401TS16	-40°C to +85°C	8.4V(2 Li-ion Batteries)	TSSOP-16L	FH5401 *****	2500PCS

- FH5401 devices are Pb-free and RoHS compliant.
- The surface prints of our semiconductor devices are subject to change during the production process and do not involve changes in electrical parameters, and we will not separately state the notice.

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➤ Update by Jan.2018