700kHz, #1~3Cell Charger, Switch Mode Li-Ion/Polymer Battery Charger

PRELIMINARY DATASHEET

DESCRIPTION

The FH5403 is a constant current, constant voltage Li-ion battery charger controller that uses a current mode PWM step-down switching architecture. With a 700kHz switching frequency, the FH5403 provides asmall, simple and efficient solution to fast charge one(4.2V) or two(8.4V) or three(12.6V) cell Li-ion batteries.

The FH5403 charges the battery in three phases: conditioning, constant current, and constant voltage. An external sense resistor sets the charge current with ±10% accuracy. An internal resistor divider and precision reference set the final float voltage to 4.20V per cell with ±1% accuracy. An internal comparator detects the near end-of-charge condition while an internal timer sets thetotal charge time and terminates the charge cycle.The FH5403 automatically re-starts the charge if the battery voltage falls below an internal threshold, 4.05V per cell.

The FH5403 also automatically enters sleep mode when DC supplies are removed.

The FH5403 is available in the SOP-8L&TDFN-10L packages.

FEATURES

- Wide Input Supply Voltage Range:
  - ▲ 4.7V to 15V - 4.2V Version (FH5403A)
  - ▲ 8.9V to 15V - 8.4V Version (FH5403B)
  - ▲ 13.5V to 15V - 12.6V Version (FH5403C)
- Switching Frequency: 700kHz
- End-of-Charge Current Detection Output
- 7 Hour Charge Termination Timer
- Charge Voltage Accuracy: ±1%
- Charge Current Accuracy: ±10%
- Low 10μA Reverse Battery Drain Current
- Automatic Battery Recharge
- Automatic Trickle Charging of Low Voltage Battery
- Automatic Sleep Mode for Low Power Consumption
- Battery Temperature Sensing(NTC Feature)
- Stable with Ceramic Output Capacitor
- Packages Type: 8-PIN SOP / 10-PIN TDFN
- RoHs Compliant and 100% Lead (Pb)-Free

APPLICATIONS

- Small Notebook Computer
- Portable PAD
- Handheld Instruments

TYPICAL APPLICATION

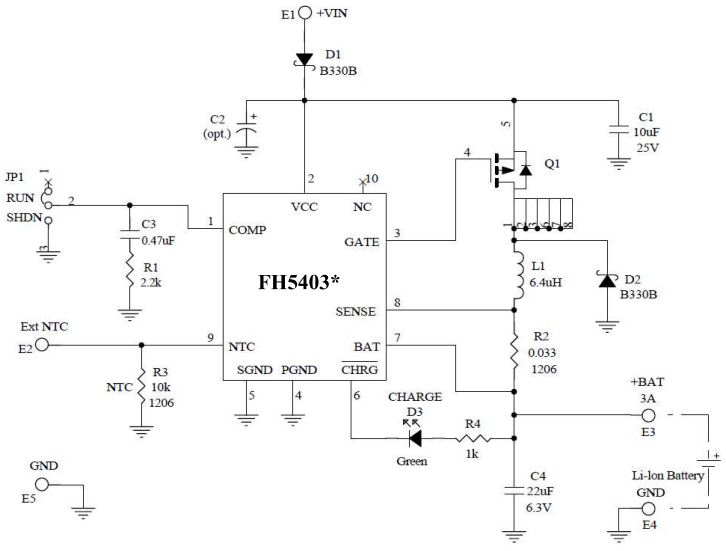
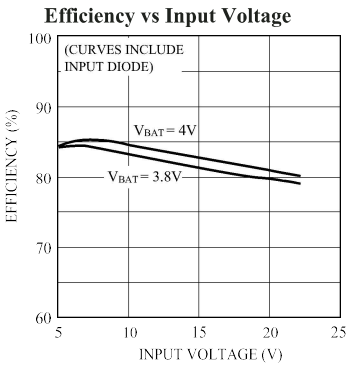
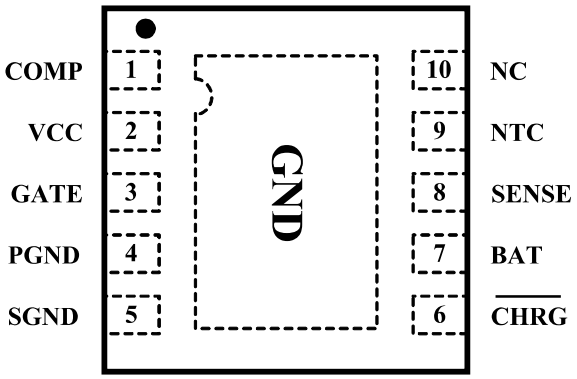


Figure 1. FH5403* Basic Schematic



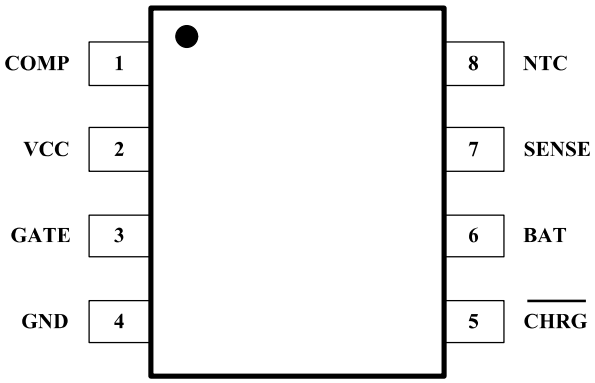
PIN CONFIGURATION

(TOP VIEW)



TDFN3*3-10L

(TOP VIEW)



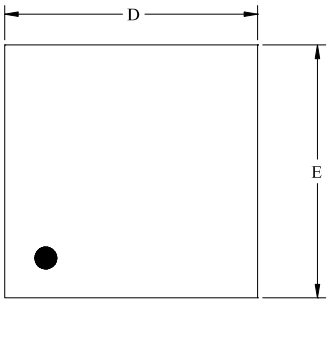
SOP-8L

PIN DESCRIPTION

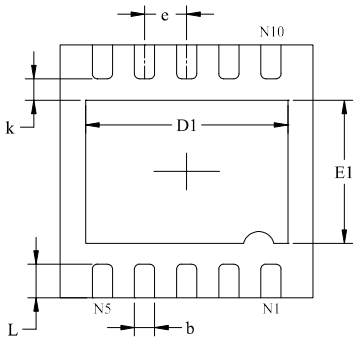
PIN	TDFN-10L	SOP-8L	DESCRIPTION
COMP	1	1	Compensation, Soft-Start and Shutdown Control Pin. Charging begins when the COMP pin reaches 850mV. The recommended compensation components are a 2.2μF (or larger) capacitor and a 0.5k series resistor. A 100μA current into the compensation capacitor also sets the soft-start slew rate. Pulling the COMP pin below 280mV will shut down the charger.
V_{CC}	2	2	Positive Supply Voltage Input.
GATE	3	3	Gate Drive Output. Driver Output for the external P-Channel MOSFET. Thevoltage at this pin is internally clamped to 8V below V_{CC}, allowing a low voltage MOSFET with gate-to-source breakdown voltage of 8.0V or less to beused.
PGND	4	-	IC Ground.
SGND	5	-	
GND	-	4	
CHRG	6	5	Charge Status Output.
BAT	7	6	Battery Sense Input. A bypass capacitor of 22μF is required to minimize ripple voltage. When V_{BAT} is within 250mV of V_{CC}, the FH5403 is forced into sleep mode, dropping I_{CC} to 10μA.
SENSE	8	7	Current Amplifier Sense Input. A sense resistor, RSENSE, must be connected between the SENSE and BAT pins. The maximum charge current is equal to 100mV/RSENSE.
NTC	9	8	NTC (Negative Temperature Coefficient) Therm is tor Input. With an external 10kΩ NTC therm is tor to ground, this pin senses the temperature of the battery pack and stops the charger when the temperature is out of range. To disable the temperature qualification function, ground the NTC pin.
NC	10	-	No Connect.

Packaging Information

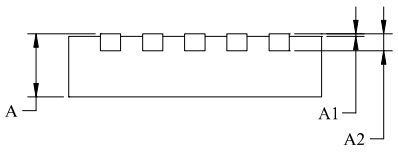
TDFN-3×3-10L



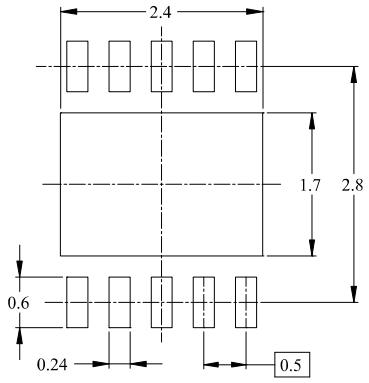
TOP VIEW



BOTTOM VIEW



SIDE VIEW

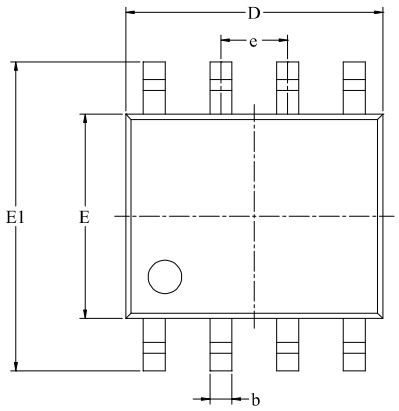


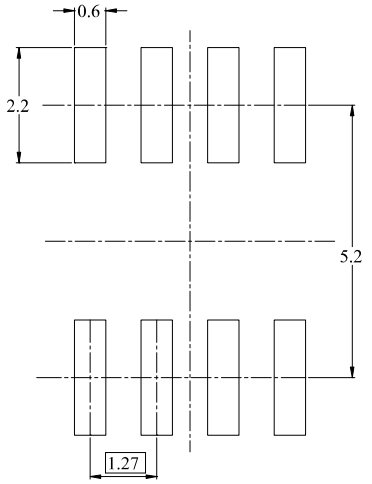
RECOMMENDED LAND PATTERN(Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.103
E	2.900	3.100	0.114	0.122
E1	1.500	1.800	0.059	0.071
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020

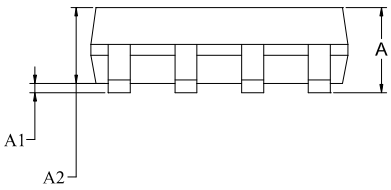
Packaging Information

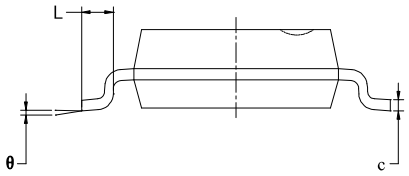
SOP-8L





RECOMMENDED LAND PATTERN(Unit: mm)





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	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

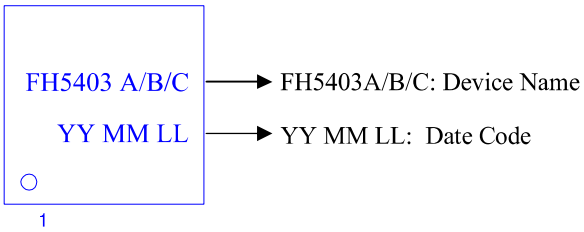
ORDERING INFORMATION

Part Number	Voltage Range	Features	Operating Temperature	Package Type	Top Mark	SPQ
FH5403AD10	4.7V ~ 15.0V	• $V_{BAT(FLT)}$: 4.2V(#1 Cell) • Switching Frequency: 700kHz • Voltage/Current: ±1% /±10%	-40°C to 85°C	TDFN3*3-10L	FH5403A YY MM LL	3000PCS/Reel
FH5403BD10	8.9V ~ 15.0V	• $V_{BAT(FLT)}$: 8.4V(#2 Cell) • Switching Frequency: 700kHz • Voltage/Current: ±1% /±10%	-40°C to 85°C	TDFN3*3-10L	FH5403B YY MM LL	3000PCS/Reel
FH5403CD10	13.5V ~ 15.0V	• $V_{BAT(FLT)}$: 12.6V(#3 Cell) • Switching Frequency: 700kHz • Voltage/Current: ±1% /±10%	-40°C to 85°C	TDFN3*3-10L	FH5403C YY MM LL	3000PCS/Reel
FH5403AS8	4.7V ~ 15.0V	• $V_{BAT(FLT)}$: 4.2V(#1 Cell) • Switching Frequency: 700kHz • Voltage/Current: ±1% /±10%	-40°C to 85°C	SOP-8L	FH5403A YY MM LL	2500PCS/Reel
FH5403BS8	8.9V ~ 15.0V	• $V_{BAT(FLT)}$: 8.4V(#2 Cell) • Switching Frequency: 700kHz • Voltage/Current: ±1% /±10%	-40°C to 85°C	SOP-8L	FH5403B YY MM LL	2500PCS/Reel
FH5403CS8	13.5V ~ 15.0V	• $V_{BAT(FLT)}$: 12.6V(#3 Cell) • Switching Frequency: 700kHz • Voltage/Current: ±1% /±10%	-40°C to 85°C	SOP-8L	FH5403C YY MM LL	2500PCS/Reel

Note:

- **FH5403A/FH5403B/FH5403C** 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.
- If you have any other custom purchase needs, please contact our sales department.
- ForDevices reserves the right to amend and legally interpret the electrical parameters of this chip device. (http://www.fordevices.com)

Device Name: TDFN3*3-10L



Device Name: SOP-8L