

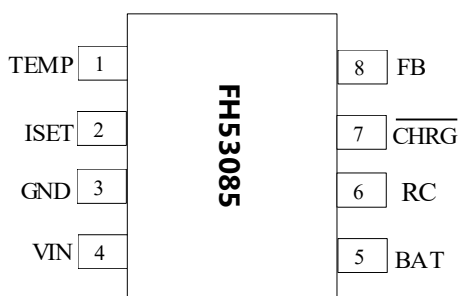
1.0A Nickel-Metal Hydride Battery Charger IC

■ General Description

FH53085 is a charger IC for single to four cell Nickel Metal Hydride (NiMH) batteries. The device contains an on-chip power MOSFET and eliminates the need for the external sense resistor and blocking diode. FH53085 requires few external components, and is suitable for portable applications. Thermal feedback regulates the charge current to limit the die temperature during high power operation or high ambient temperature. The FH53085 integrates a high precision reference voltage and amplifier, which can precisely regulate the charge voltage and charge current. The charge current can be set externally with a single resistor. When the input supply is removed, the FH53085 automatically enters a low power sleep mode, dropping the battery drain current to less than 3.0uA. Other features include under-voltage lockout, automatic recharge, the constant current charging, the maintenance charge mode(timer termination), charge / termination indicators and battery temperature monitoring.

The FH53085 is available in thermally-enhanced 8-pin ESOP8 package. (ESOP-8L).

■ Pin Assignment



■ Features

- On-chip Power MOSFET
- Voltage accuracy: 1%
- Precharge Conditioning for reviving deeply discharged cells and minimizing heat dissipation during initial stage of charge
- Charge Current: Up to 1.0A
- Constant-Current | Constant-Temperature operation with thermal regulation to maximize charge rate without risk of overheating
- Automatic Low-Power Sleep Mode when input supply voltage is removed
- Indicators for Charge and termination status
- Maintenance Charge Mode(Timer Termination)
- Automatic Recharge
- Battery Temperature Monitoring
- Available in ESOP-8L Packaged
- Pb-free, RoHs compliant and Halogen free

■ Applications

- Digital Camera
- Electronic Dictionary
- Portable Devices
- Nickel Metal Hydride Battery Charger

■ Pin Description

Pin No.	Name	Function Description
1	TEMP	<p>Temperature Sense Input.</p> <p>Connecting TEMP pin to NTC thermistor. If TEMP pin's voltage is below 45% or above 80% of supply voltage VIN , this means that battery's temperature is too high or too low, charging is suspended. If TEMP's voltage level is between 45% and 80% of supply voltage, battery fault state is released, and charging will resume.</p> <p>The temperature sense function can be disabled by grounding the TEMP pin.</p>
2	ISET	<p>Charge Current Setting and Monitoring Pin.</p> <p>The charge current is set by connecting a resistor R_{ISET} from this pin to GND. When in pre-charge mode, the ISET pin's voltage is regulated to 0.12V. When in constant current charge mode, the ISET pin's voltage is regulated to 1.205V. When maintenance mode, the ISET pin's voltage is regulated to 0.72V.</p> <p>The constant current is determined by:</p> $I_{CH} = 1218V / R_{ISET} \quad (A)$ <p>In the pre-charge mode, the charge current is 10% of the constant current.</p> <p>In the maintenance mode, the charge current is 60% of the constant current.</p>
3	GND	Ground Terminal.
4	VIN	<p>Positive Input Supply Voltage.</p> <p>VIN is the power supply to the internal circuit. When VIN drops to within 10mv of the BAT pin voltage, FH53085 enters low-power sleep mode, dropping BAT pin's current to less than 3.0uA.</p>
5	BAT	<p>Battery Connection Pin.</p> <p>Connect the positive terminal of the battery to BAT pin. BAT pin provides charge current to the battery, and draws less than 3.0uA current in sleep mode.</p>
6	RC	<p>Maintenance Charge Timer Setting Pin.</p> <p>Once the FH53085 enters into the maintenance charge mode, the charge timer is started, when the time out occurs, the whole charge cycle is terminated.</p> <p>The time limit is determined by the following equation:</p> $T = 2654 \times R5 \times C1 + 4980 \times C1 \times 10^3$ <p>Where,</p> <ul style="list-style-type: none"> ➤ T is the time limit in second ➤ R5 is the resistor from RC pin to VIN pin, the unit is ohm, R5 should range from 20kΩ to 1.0MΩ, otherwise the timer's accuracy may be affected. ➤ C1 is the capacitor from RC pin to GND, the unit is Farad, C1 should be greater than 1.0nF ,otherwise the timer's accuracy may be affected.
7	$\overline{\text{CHRG}}$	<p>Open Drain Charge Status Output.</p> <p>When the FH53085 is in the pre-charge, constant current and maintenance charge mode, $\overline{\text{CHRG}}$ pin is pulled low by an internal switch, otherwise $\overline{\text{CHRG}}$ pin is in high impedance state.</p>
8	FB	<p>Battery voltage feedback input.</p> <p>Battery voltage is fed back to the FH53085 through this pin. The FH53085 determines the charge mode based on the FB pin voltage.</p> <p>As shown in Figure 1, the battery terminal voltage at BAT pin:</p> $V_{BAT} = V_{FB} \times (1 + R3/R4)$

■ Typical Application Circuit

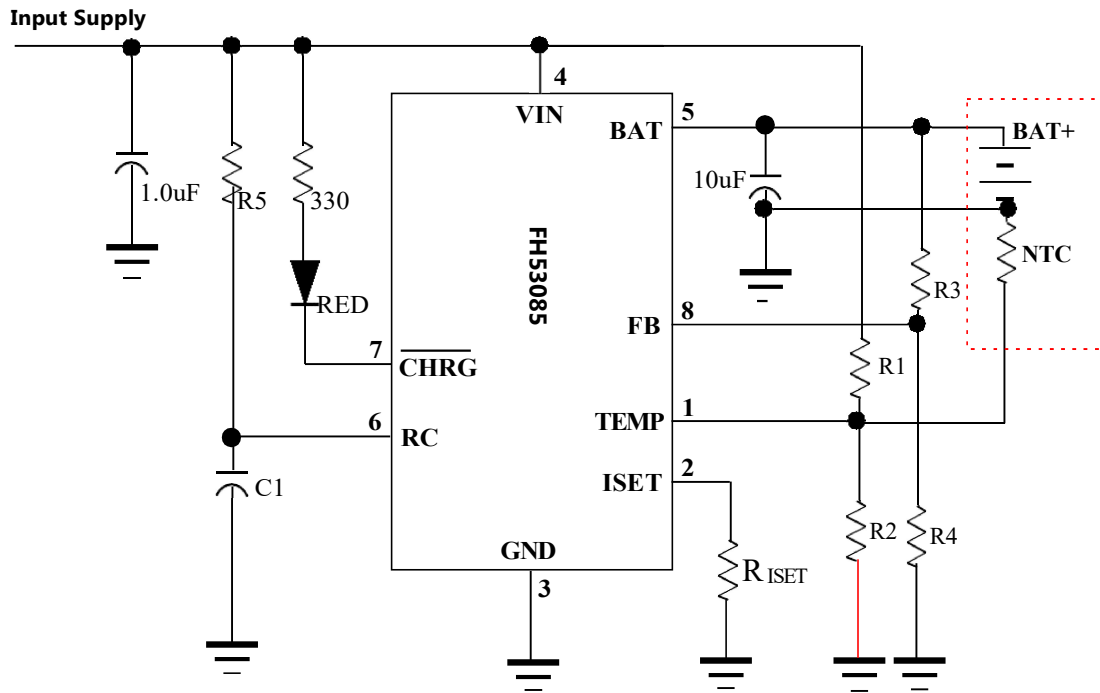


Figure.1 Typical Application Circuit

■ Block Diagram

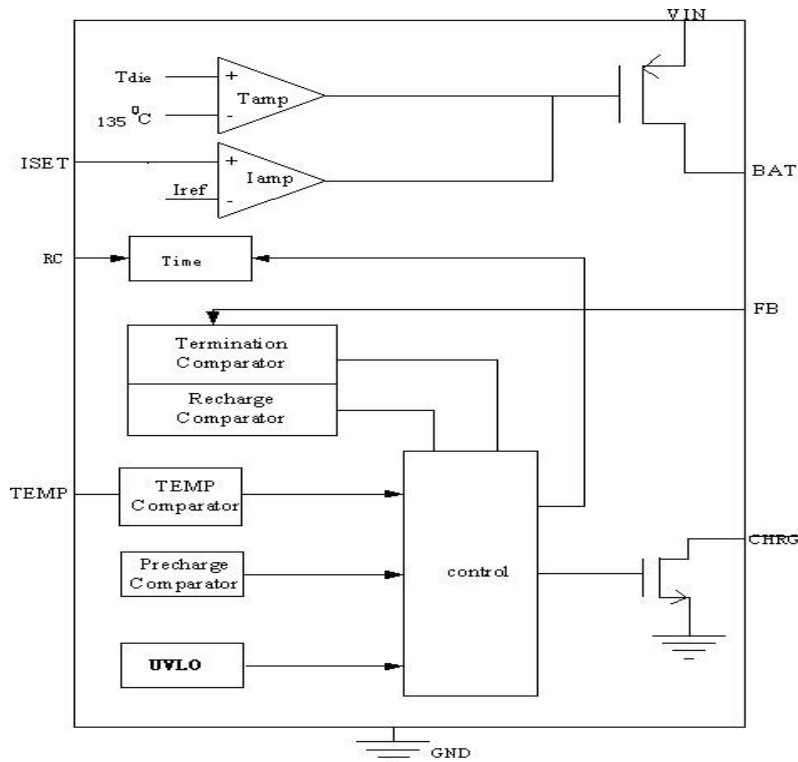
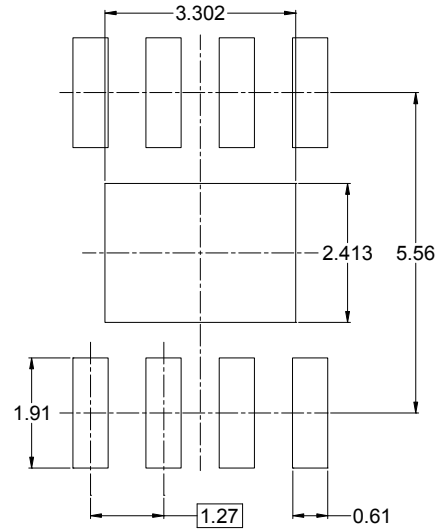
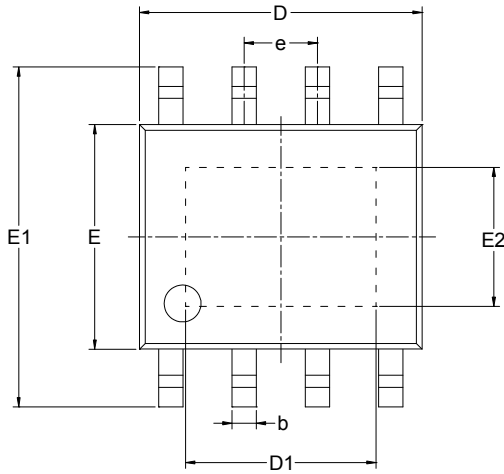


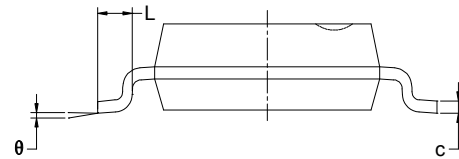
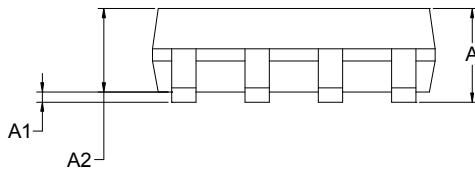
Figure.2 Block Diagram

■ Package Information

- Type: **ESOP-8L**



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.700		0.067
A1	0.000	0.100	0.000	0.004
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
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	Operating Ambient Temperature	Packaged	Top Mark	SPQ
FH53085S08	- 40°C to 85°C	ESOP-8L	53085 FH ** **	4000PCS / Reel

- FH53085 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.



ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.



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➢ Update by Apr.2018