

Lithium-ion Battery Charger for Solar-Powered Systems

Description

The FH4063D is a complete constant-current /constant voltage linear charger for single cell Li-ion and Li-Polymer batteries. The device contains an on-chip power MOSFET and eliminates the need for the external sense resistor and blocking diode. An on-chip adaptive cell can adjust charger current automatically based on the output capability of input power supply, so FH4063D is ideally suited for solar power system.

Thermal feedback regulates the charge current to limit the die temperature during high power operation or high ambient temperature.

The regulation voltage is internally fixed at 4.20V with 1% accuracy, it can also be adjusted upwards with an external resistor. The charge current can be set externally with a single resistor. When the input supply is removed, the FH4063D 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, battery temperature sensing and charging/ termination indicator.

The FH4063D is available in 8-Pin DFN package.

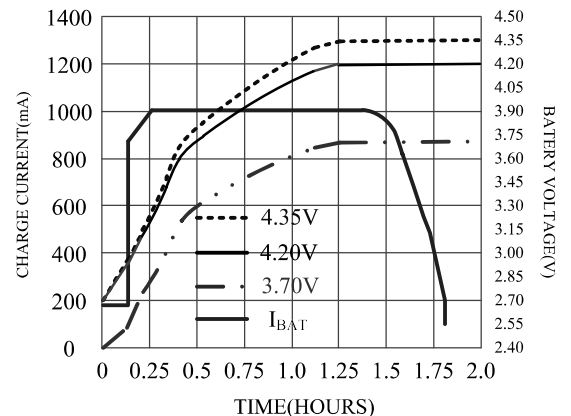
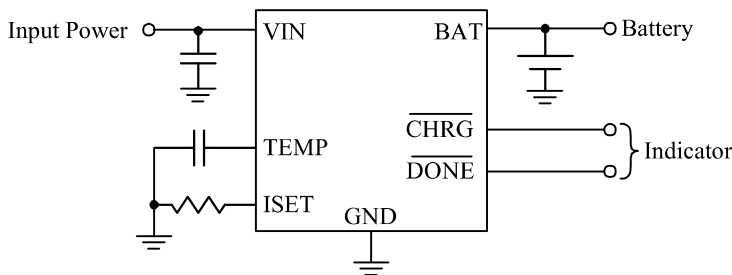
Applications

- Solar Powered System
- Portable Devices
- Digital Still Cameras
- Chargers
- Bluetooth Applications

Features

- Automatic charge current adjustment based on the output capability of input power supply
- Suitable for Solar-Powered System
- On-chip Power MOSFET
- No external Blocking Diode or Current Sense Resistors Required
- Preset 4.2V regulation voltage with 1% accuracy, upwards adjustable with a resistor
- Precharge Conditioning for Reviving Deeply Discharged Cells and Minimizing Heat Dissipation During Initial Stage of Charge
- Continuous Charge Current Up to 1.0A
- Constant-Current/Constant-Voltage Operation with Thermal Regulation to Maximize Charge Rate Without Risk of Overheating
- Automatic Low-Power Sleep Mode When Input Supply Voltage is Removed
- Status Indication for LEDs or uP Interface
- C/10 Charge Termination
- Automatic Recharge
- Battery Temperature Sensing
- Available in DFN3*3-8L Package
- Pb-free, RoHs-Compliant and Halogen Free

Simplified Application Circuit



Typical Application Circuit

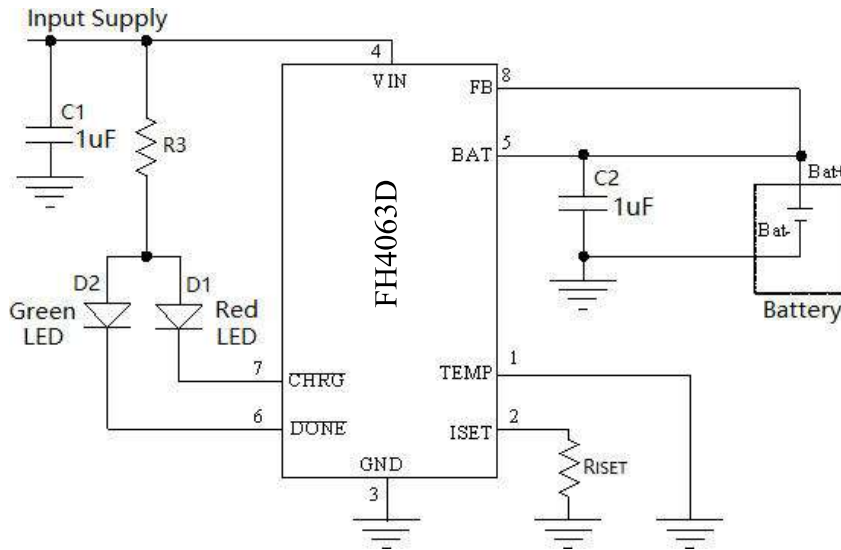


Figure 1 Typical Application Circuit (Constant Voltage Level 4.2V)

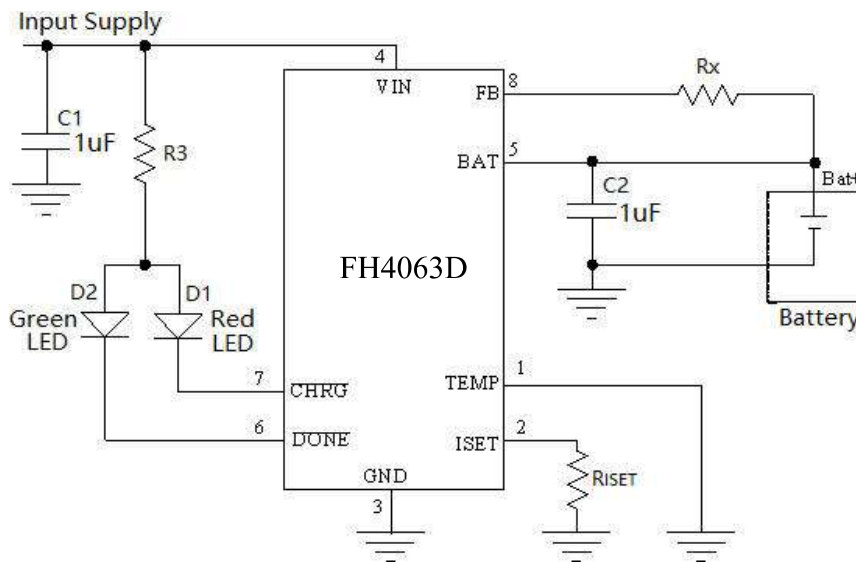


Figure 2 Application Circuit (Adjust Constant Voltage Level with Rx)

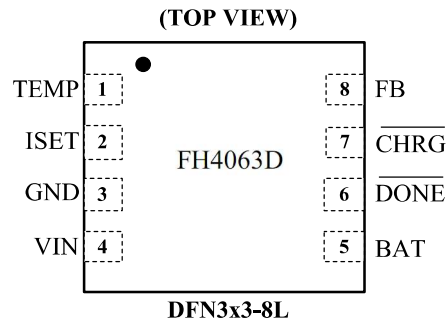
In Figure 2, the BAT pin's voltage in constant voltage mode is given by the following equation:

$$V_{REG} = 4.2 + 3.707 \times 10^{-6} \times R_x$$

Where, V_{REG} is in volt

R_x is in ohm

Pin Assignment



Pin Description

Pin No.	Name	Function Description
1	TEMP	<p>Temperature Sense Input. Connecting TEMP pin to NTC thermistor's output in Lithium ion battery pack. If TEMP pin's voltage is below 45% or above 80% of supply voltage V_{IN}, 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>Constant Charge Current Setting and Charge Current Monitor Pin. The charge current is set by connecting a resistor R_{ISET} from this pin to GND. When in precharge mode, the ISET pin's voltage is regulated to 0.12V. When in constant charge current mode, the ISET pin's voltage is regulated to 1.205V. In all modes during charging, the voltage on ISET pin can be used to measure the charge current as follows:</p> $I_{CH} = (V_{ISET} / R_{ISET}) \times 986$
3	GND	Ground Terminal (Ground).
4	VIN	Positive Input Supply Voltage. V_{IN} is the power supply to the internal circuit. When V_{IN} drops to within 10mv of the BAT pin voltage, FH4063D enters low power sleep mode, dropping BAT pin's current to less than 3.0uA.
5	BAT	Battery Connection Pin. Connect the positive terminal of the battery to BAT pin. BAT pin draws less than 3.0uA current in sleep mode. BAT pin provides charge current to the battery and provides regulation voltage.
6	\overline{DONE}	Open-Drain Charge termination Status Output. In charge termination status, \overline{DONE} is pulled low by an internal switch; Otherwise \overline{DONE} pin is in high impedance state.
7	\overline{CHRG}	Open Drain Charge Status Output. When the battery is being charged, the \overline{CHRG} pin is pulled low by an internal switch, otherwise \overline{CHRG} pin is in high impedance state.
8	FB	Battery Voltage Sense Input This Pin can sense the battery voltage; Also the regulation voltage in constant voltage mode can be adjusted by connecting an external resistor between FB pin and BAT pin.

可用太阳能板供电的锂电池充电管理芯片

器件概述

FH4063D是可以利用太阳能板供电的单节锂电池充电管理芯片。该器件内部包括功率晶体管，应用时不需要外部的电流检测电阻和阻流二极管。内部的充电电流自适应模块能够根据输入电源的电流输出能力自动调整充电电流，用户不需要考虑最坏情况，可最大限度地利用输入电源的电流输出能力，非常适合利用太阳能板等电流输出能力有限的电源供电的锂电池充电应用。FH4063D只需要极少的外围元器件，非常适合于便携式应用的领域。热调制电路可以在器件的功耗比较大或者环境温度比较高的时候将芯片温度控制在安全范围内。内部固定的恒压充电电压为4.2V，也可以通过一个外部的电阻向上调节。充电电流通过一个外部电阻设置。当输入电压掉电时，

FH4063D自动进入低功耗的睡眠模式，此时电池的电流消耗小于3微安。其它功能包括输入电压过低锁存，自动再充电，电池温度监控以及充电状态/充电结束状态指示等功能。

FH4063D采用散热增强型的8管脚DFN封装。

电气特点

- 内部集成有充电电流自适应模块，能根据输入电压源的电流输出能力自动调整充电电流
- 可利用太阳能板等输出电流能力有限的电压源供电的锂电池充电应用
- 输入电压范围：4.4V 到 6.0V
- 片内功率晶体管
- 不需要外部阻流二极管和电流检测电阻
- 恒压充电电压 4.2V，也可通过一个外部电阻向上调节
- 可作为电压源使用
- 内部软启动电路
- 为了激活深度放电的电池和减小功耗，在电池电压较低时采用涓流充电模式
- 可设置的持续恒流充电电流可达 1.0A
- 采用恒流/恒压/恒温模式充电，既可以使充电电流最大化，又可以防止芯片过热
- 电源电压掉电时自动进入低功耗的睡眠模式
- 充电状态和充电结束状态双指示输出
- C/10 充电结束检测
- 自动再充电
- 电池温度监测功能
- 封装形式DFN3*3-8L
- 产品无铅，满足RoHS，不含卤素

极限参数

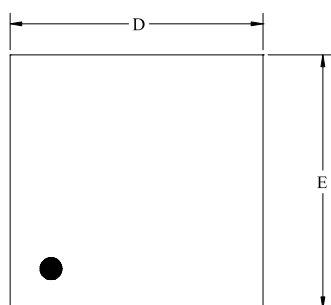
管脚电压	-0.3V to 6.5V
BAT 管脚短路持续时间	连续
存储温度	-65°C to 150°C
焊接温度（10 秒）	260°C
最高结温	150 °C
工作温度	-40°C to 85°C
热阻 (DFN3x3-8L)	TBD

说明：超出以上所列的极限参数可能造成器件的永久损坏。

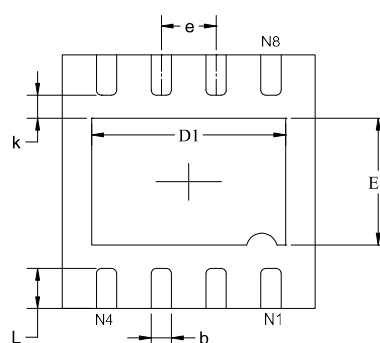
以上给出的仅仅是极限范围，在这样的极限条件下工作，器件的技术指标将得不到保证，长期在这种条件下还会影响器件的可靠性。

Package Information

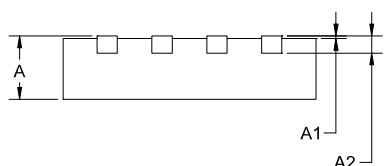
Type: DFN3*3-8L



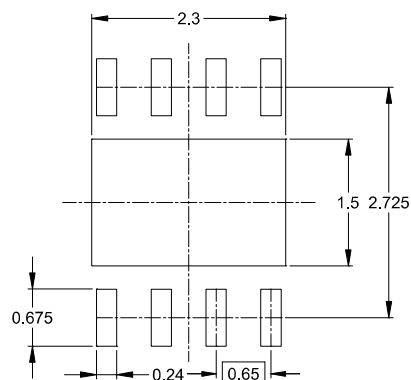
TOP VIEW



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	2.200	2.400	0.087	0.094
E	2.900	3.100	0.114	0.122
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.375	0.575	0.015	0.023

Ordering Information

Part Number	Voltage Range	Features	Operating Temperature	Package Type	Top Mark	SPQ
FH4063DN8	4.40V ~ 6.0V	<ul style="list-style-type: none"> • Suitable for Solar-Powered • Preset 4.2V voltage (1%) • Linear charger C/10 Charge • Charge Current Up to 1.0A 	-40°C to 85°C	DFN3*3-8L	<u>THY</u>	5000PCS/Reel

Note:

- **FH4063D** 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.



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 Jul.2019