

高精度低功耗线性充电，单节磷酸铁锂电池充电管理芯片

简要数据手册

PRELIMINARY DATASHEET

器件概述

FH4055/4054L 是一款完整的单节锂离子电池充电器，可对磷酸铁锂电池充电，兼容 10mA~500mA 的充电电流，充电器具有电池正负极反接保护，采用恒定电流/恒定电压线性控制。可以使用 USB 电源和适配器电源工作。

其中 SOT 封装与较少的外部元件数目使得 FH4055/4054L 成为便携式应用的理想选择，而且 FH4055/4054L 是专为在 USB 电源规范内工作而设计的。

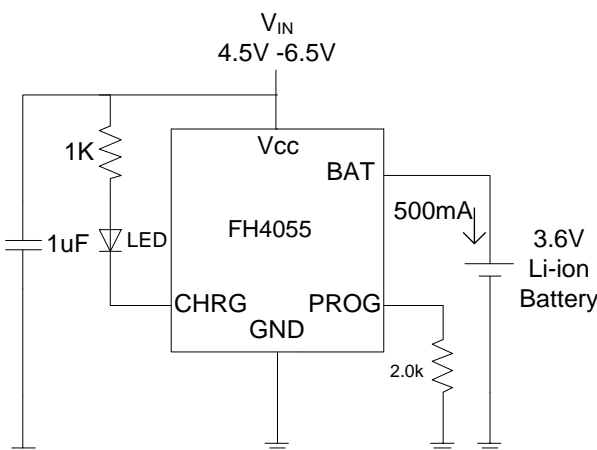
由于采用了内部 MOSFET 架构，加上防倒充电路，所以不需要外部检测电阻器和隔离二极管。热反馈可对充电电流进行自动调节，以便在大功率操作或高环境温度条件下对芯片温度加以限制。充满电压会因不同的锂电池而不同，而充电电流可通过一个电阻器进行外部设置。当电池达到充满电压后，充电电流降至设定值 1/10，FH4055/4054L 将自动终止充电。当输入电压（交流适配器或 USB 电源）被拿掉时，FH4055/4054L 自动进入一个低电流状态，本身功耗会小于 1.0uA。CHRG 引脚会提示是否处于充电状态。

FH4055/4054L 的其他特点包括充电电流监控器、欠压闭锁、自动再充电和一个用于指示充电结束和输入电压接入的状态引脚。

应用领域

- TWS 无线耳机和蓝牙耳机
- 其他穿戴和手持便携产品
- 智能手表，智能手环
- 单节锂电池产品

典型应用图



图一、FH4055/4054L 简化应用电路图

电气特性

- 最高输入可达 7.0V
- 超低功耗：输入断开或低压 TYP 0.2uA
- 充电终止电压：3.2V (FH4055)、3.675V (FH4054L)
- 充电终止电压精度：±1% (FH4055)、±1.5% (FH4054L)
- 10mA~500mA 可调充电电流
- 恒流充电电流精度：10%
- 涓流充电阈值：2.5V
- 软启动功能限制浪涌电流
- 自动再充电功能
- PROG 引脚接受低温信号恒流充电电流减半
- 热调节功能实现充电速率最大化
- 短路保护功能保护后限流 10mA
- 无需 MOSFET、检测电阻器或隔离二极管；
- 恒定电流/恒定电压操作，并具有可在无过热危险的情况下实现充电速率最大化的热调节功能
- 1 个充电状态开漏输出引脚
- C/10 充电终止
- 欠压时涓流充电
- 软启动限制了浪涌电流

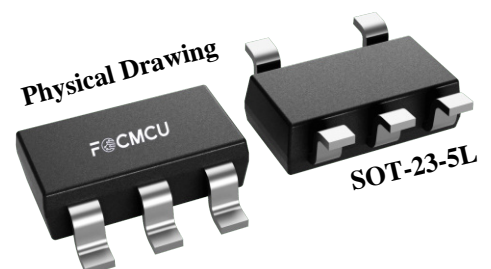
封装形式

- 5-pin SOT-23-5L

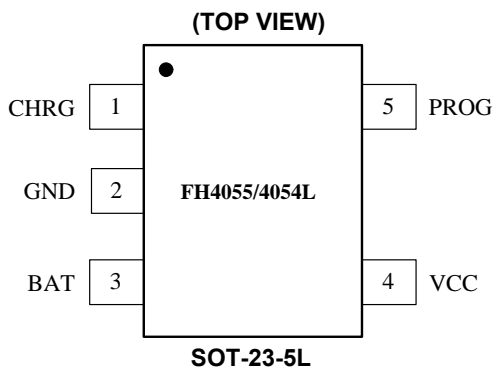
Device Information ⁽¹⁾

Part Number	Package	Body Size (NOM)
FH4055M5	SOT23(5L)	1.60mm * 2.92mm
FH4054LM5	SOT23(5L)	1.60mm * 2.92mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.



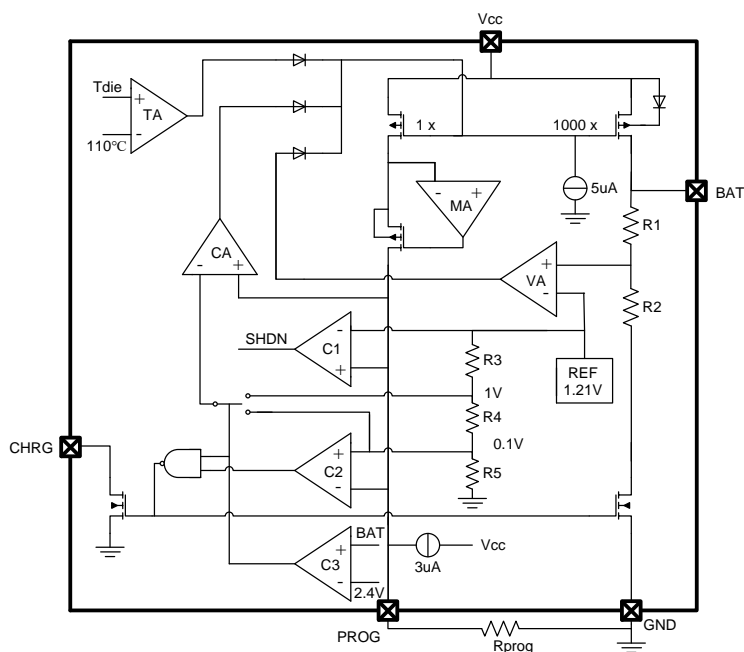
引脚分布



引脚描述

引脚序号	符号	I/O	功能简述
SOT-23-5L			
1	CHRG	O	漏极开路充电输出，充电状态指示，使用 LED 指示功能时必须串联 LED+限流电阻；如果不需要 LED 指示功能，可以将 CHRG 接地。
2	GND	I	接地
3	BAT	O	将电池的正端连接到此管脚。 在充满时，如果 VIN 没有移除，BAT 消耗电流大约为 2uA。如果移除 VIN，则 BAT 管脚的消耗电流小于 0.1uA。
4	VCC(VIN)	I	电源输入 VIN 管脚必须有至少 1.0μF 的旁路电容。当 VIN 降到 BAT 端电压 30mV 以内时，芯片停止充电，此时 BAT 端口的消耗电流小于 0.1uA。
5	PROG	I	充电电流编程，充电电流监控和关闭端。充电电流由一个精度为 1% 的接到地的电阻控制。在恒定充电电流状态时，此端口提供 1.2V 的电压。 在所有状态下，此端口电压都可以用下面的公式测算充电电流： $I_{BAT} = (V_{PROG} / R_{PROG}) * 1000$

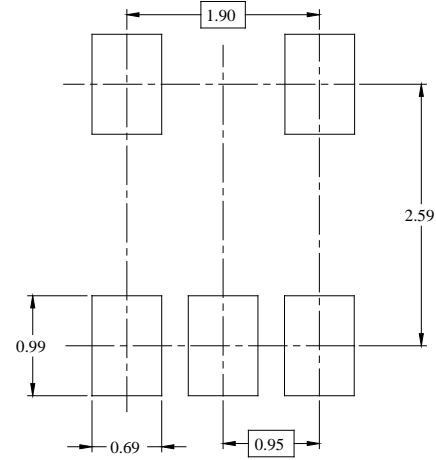
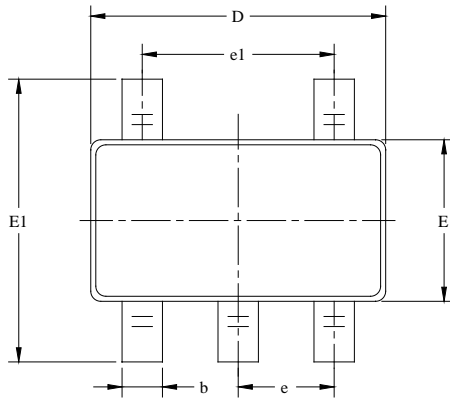
功能框图



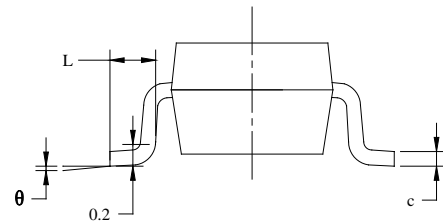
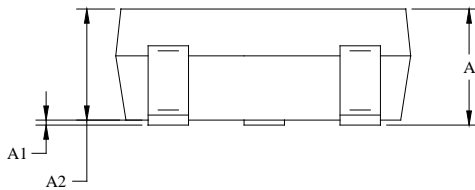
图二、模块功能示意图

Package Information

- Type: SOT-23-5L



RECOMMENDED LAND PATTERN(Unit: mm)



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	1.900BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

ORDERING INFORMATION

Part Number	Input Voltage	Output Function	Operating Temperature	Package Type	Top Mark	SPQ
FH4055M5	4.0 ~ 7.0V	• V _{FLOAT} : 3.70V (typ.)	-40°C to +85°C	SOT-23-5L	*** L	3000EA/Reel
FH4054LM5	2.0 ~ 55.0V	• V _{FLOAT} : 3.675V (typ.)	-40°C to +85°C	SOT-23-5L	*** L	3000EA/Reel

Note:

- **FH4055M5 | FH4054LM5** 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.
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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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