



产品概述

HTP4054是一个完善的单片锂离子电池恒流/恒压线性电源管理芯片。它薄的尺寸和小的外包装使它适用于便携式产品的应用。更值得一提的是,HTP4054专门设计适用于USB 的供电规格。得益于内部的 MOSFET 结构,在应用上不需要外部电阻和阻塞二极管。在高能量运行和高外围温度时,热反馈可以控制充电电流以降低芯片温度。

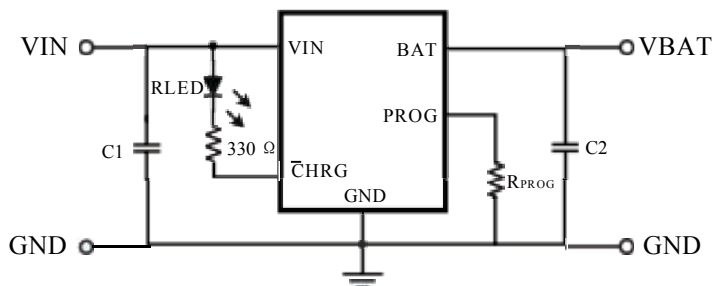
充电电压被限定在4.24V, 充电电流通过外部电阻调节。在达到目标充电电压后, 当充电电流降低到设定值的1/10时, 4054 就会自动结束充电过程。当输入端(插头或 USB 提供电源)拔掉后, 4054 自动进入低电流状态, 电池漏电流将降到 2 μ A 以下。4054 还可被设置于停止工作状态, 使电源供电电流降到 25 μ A。

其余特性包括: 充电电流监测, 输入低电压闭锁, 自动重新充电和充电已满及开始充电的标志。

用途

手机, PDA, MP3
蓝牙应用

典型应用电路



注: C1=4.7 μ F, C2=10 μ F, IBAT = (VPROG/RPROG)*1000

产品特点

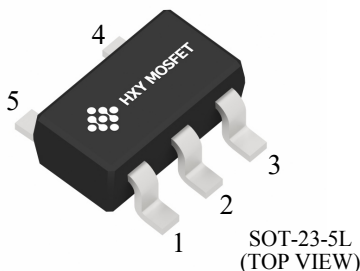
- 可编程使充电电流可达 500mA.
- 不需要 MOSFET, 传感电阻和阻塞二极管
- 小尺寸实现对锂离子电池的完全线性充电管理
- 恒流/恒压运行和温度调节使得电池管理效力最高, 没有温度过高的危险
- 从 USB 接口管理单片锂离子电池
- 预设充电电压为 4.24V $\pm$ 1%
- 充电电流输出监测
- 充电状态指示标志
- 1/10 充电电流终止
- 停止工作时提供 25 μ A 电流
- 2.9V 涓流充电阈值电压
- 软启动限制浪涌电流
- ESD(HBM)>7KV

封装

SOT-23-5L



引脚配置



引脚分配

引脚号	引脚名称
SOT-23-5L	
1	CHRG
2	GND
3	BAT
4	VIN
5	PROG

引脚功能

CHRG (引脚 1): 漏极开路充电状态输出。当充电时，CHRG 端口被一个内置的 N 沟道 MOSFET 置于低电位。当充电完成时，CHRG 呈现高阻态。当 HTP4054 检测到低电锁定条件时，CHRG 呈现高阻态。当在 BAT 引脚和地之间接一 $1\mu\text{F}$ 的电容，就可以完成电池是否接好的指示，当没有电池时，LED 灯会快速闪烁。

GND (引脚 2): 接地端

BAT (引脚 3): 充电电流输出端。给电池提供充电电流并控制浮动电压最终达到 4.2V 。一个内部精密电阻把这个引脚同停工时自动断电的浮动电压分开。

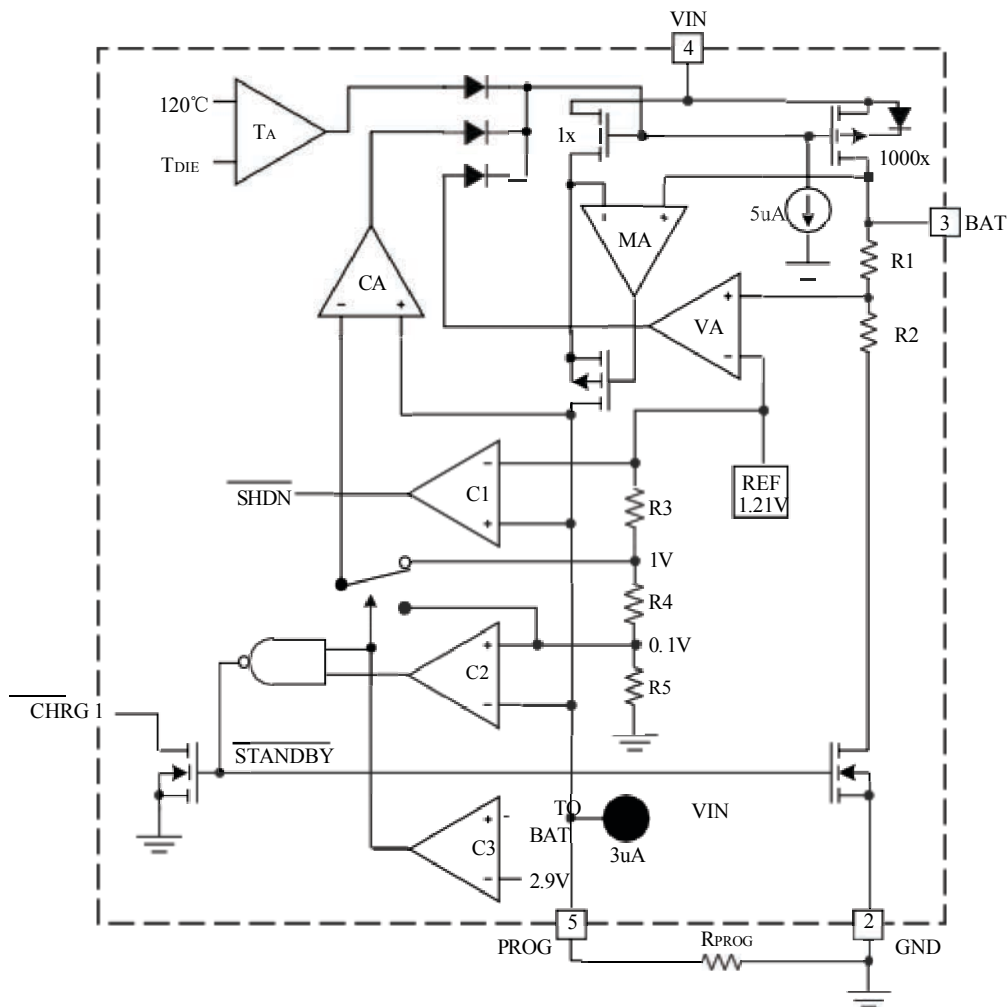
VCC (引脚 4): 提供正电压输入。为充电器供电。VCC 可以为 4.25V 到 6.5V 并且必须有至少 $1\mu\text{F}$ 的旁路电容。如果 BAT 引脚端电压的 VCC 降到 30mV 以内时，HTP4054 进入停工状态，并使 BAT 电流降到 $2\mu\text{A}$ 以下。

PROG (引脚 5): 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 1V 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： $IBAT = (V_{PROG}/R_{PROG}) \times 1000$ 。

PROG 端口也可用来关闭充电器。把编程电阻同地端分离可以通过上拉的 $3\mu\text{A}$ 电流源拉高 PROG 端口电压。当达到 1.21V 的极限停工电压值时，充电器进入停止工作状态，充电结束，输入电流降至 $25\mu\text{A}$ 。此端口夹断电压大约 2.4V 。给此端口提供超过夹断电压的电压，将获得 1.5mA 的高电流。再使 PROG 和地端结合将使充电器回到正常状态。



功能框图



绝对最大额定值

参数	标号	最大额定值		单位
输入电压	V _{cc}	V _{SS} -0.3~V _{SS} +8		V
PROG 端电压	V _{prog}	V _{SS} -0.3~V _{cc} +0.3		
BAT 端电压	V _{bat}	V _{ss} -0.3~8		
CHRG 端电压	V _{chrg}	V _{SS} -0.3~V _{SS} + 10		
容许功耗	P _D	SOT-23-5L	250	mW
		SOT-89-5L	500	
BAT 端电流	I _{bat}	500		mA
PROG 端电流	I _{prog}	800		uA
人体模式 ESD 能力	V _{ESD}	7000		V
工作外围温度	T _{opa}	-40~+85		°C
存储温度	T _{str}	-65~+125		

注意：绝对最大额定值是指在任何条件下都不能超过的额定值。万一超过此额定值，有可能造成产品劣化等物理性损伤。



电学特性参数

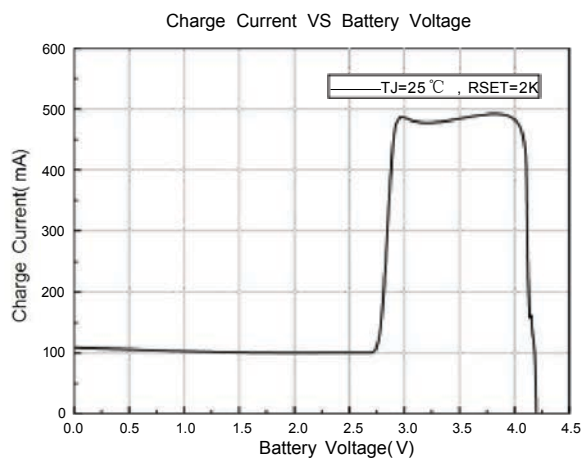
(TA=25℃ unless otherwise noted)

参数	标号	条件	最低	典型	最高	UNIT
输入电压	Vcc	-	4.25	-	6.5	V
输入电流	Icc	Charge mode, Rprog=10K	-	300	2000	μA
		Standby mode	-	200	500	μA
		Shutdown mode(Rprog not connected, Vcc<Vbat or Vcc<Vuv)	-	25	50	μA
输出控制电压	Vfloat	0℃<TA<85℃, IBAT = 40mA	4.17	4.24	4.32	V
BAT端电流	Ibat	Rprog=10k, Current mode	93	100	107	mA
		Rprog=2k, Current mode	465	500	535	mA
		Standby mode, Vbat=4.2V	0	-2.5	-6	μA
		Shutdown mode	-	1	2	μA
		Battery reverse mode, VBAT=-4V	-	0.7		mA
		Sleep mode, Vcc=0V	-	1	2	μA
涓流充电电流	Itrikl	Vbat<Vtrikl, Rprog=2k	93	100	107	mA
涓流充电极限电压	Vtrikl	Rprog=10K, Vbat Rising	2.8	2.9	3.0	V
涓流充电迟滞电压	Vtrhys	Rprog=10k	60	80	110	mV
电源低电闭锁阈值电压	Vuv	From Vcc low to high	3.7	3.8	3.93	V
电源低电阈值电压迟滞电压	Vuvhys	-	150	200	300	mV
手动关闭阈值电压	Vmsd	PROG pin rising	1.15	1.21	1.30	V
		PROG pin falling	0.9	1.0	1.1	V
Vcc-Vbat停止工作阈值电压	Vasd	Vcc from low to high	70	100	140	mV
		Vcc from high to low	5	30	50	mV
C/ 10 终端阈值电流	Iterm	Rprog=10k	0.085	0.10	0.115	mA/mA
		Rprog=2k	0.085	0.10	0.115	mA/mA
PROG端电压	Vprog	Rprog=10k, Current mode	0.93	1.0	1.07	V
CHRG端弱下拉电流	Ichrg	Vchrg=5V	8	20	35	μA
CHRG端最小输出电压	Vchrg	Ichrg=5mA	-	0.35	0.6	V
电池再充电迟滞电压	Δ Vrecg	VFLOAT - VRECHRG	-	100	200	mV

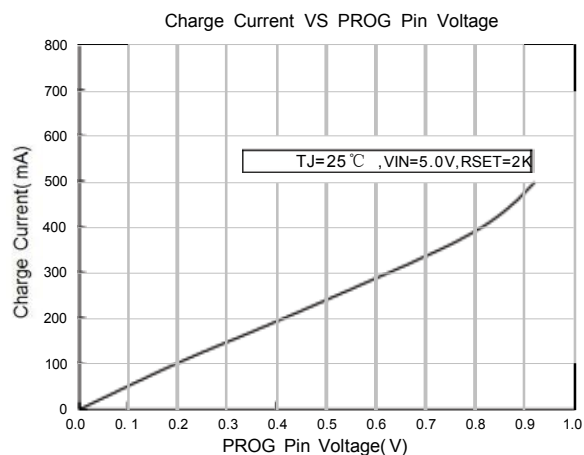


特性曲线

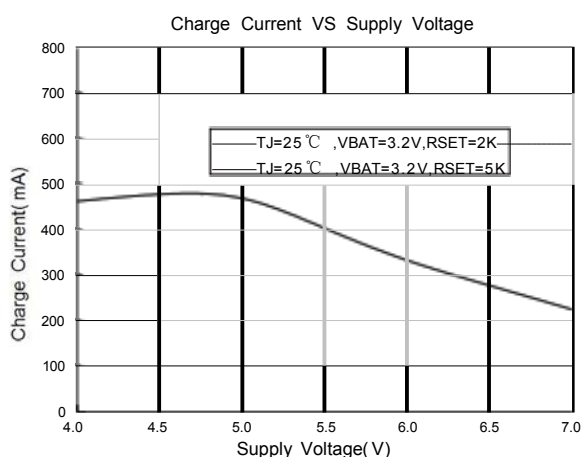
1. 充电电流 VS BAT 端电压



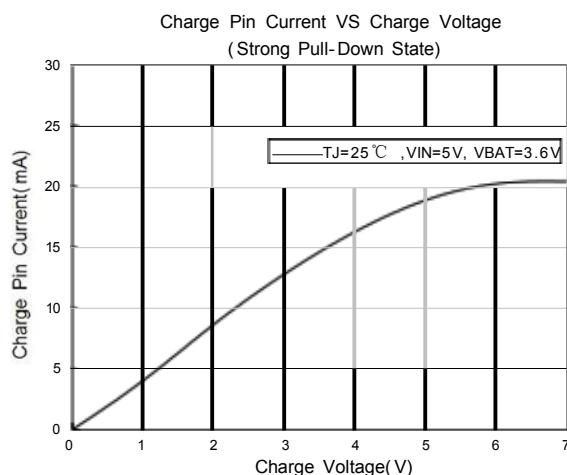
2. 充电电流 VS PROG 端电压



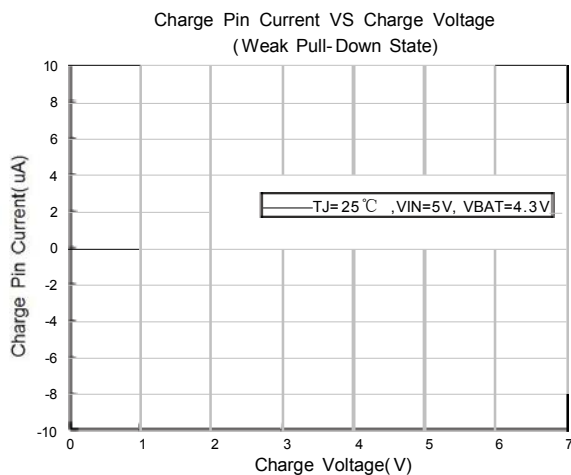
3. 充电电流 VS 输入电压



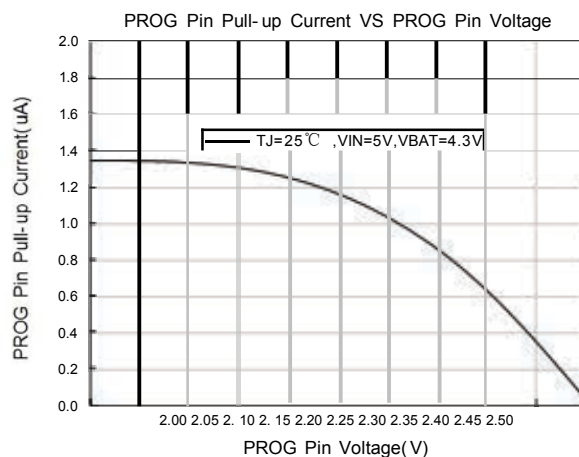
4. CHARGE 端电流 VS CHARGE 端电压 (充电时)



5. CHARGE 端电流 VS CHARGE 端电压 (充满电)

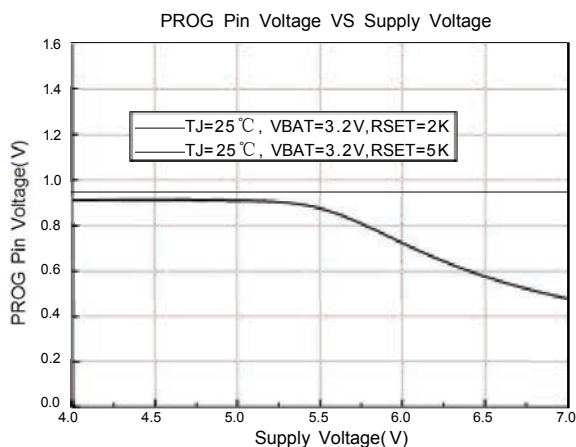


6. PROG 端电流 VS PROG 端上拉电压

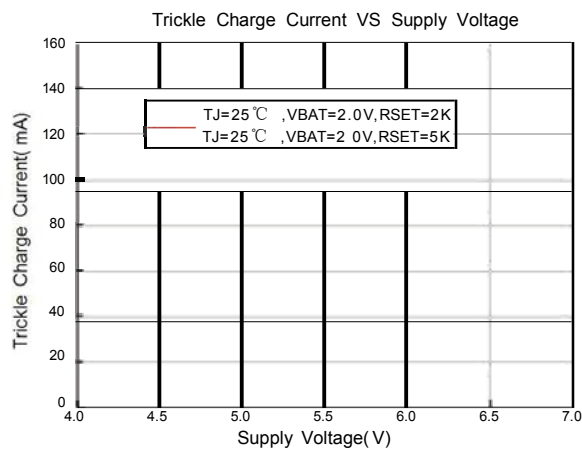




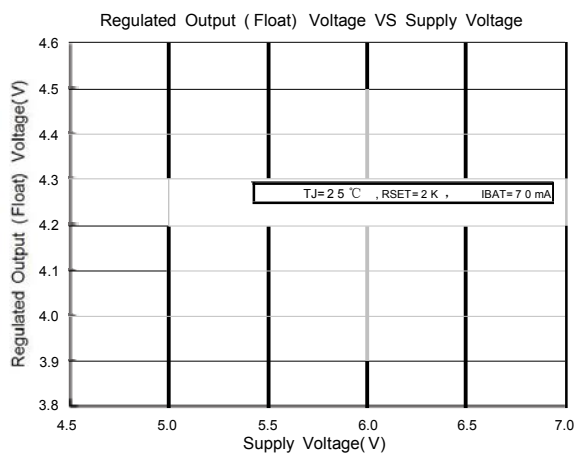
7. PROG 端电压 VS 输入电压



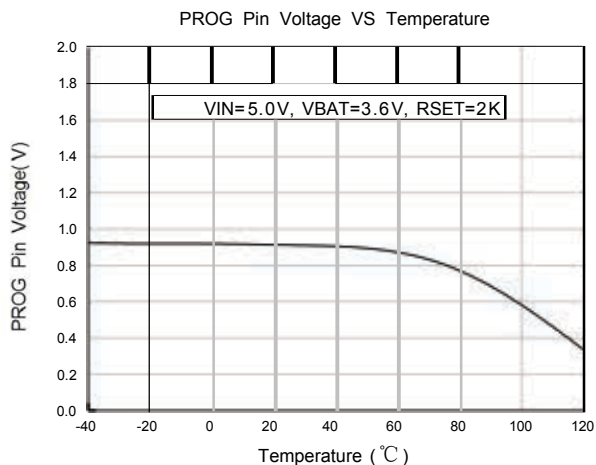
8. 涓流充电电流 VS 输入电压



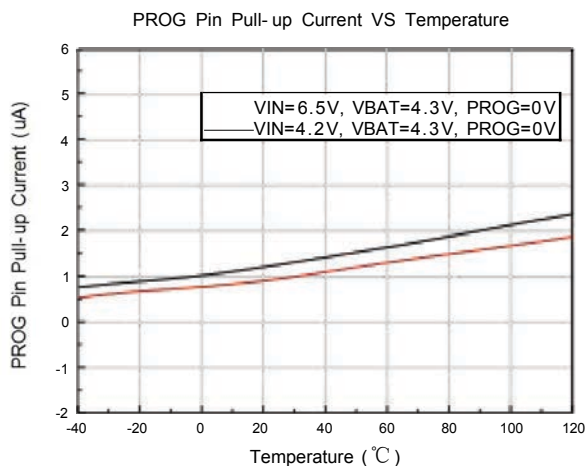
9. VBAT VS 输入电压



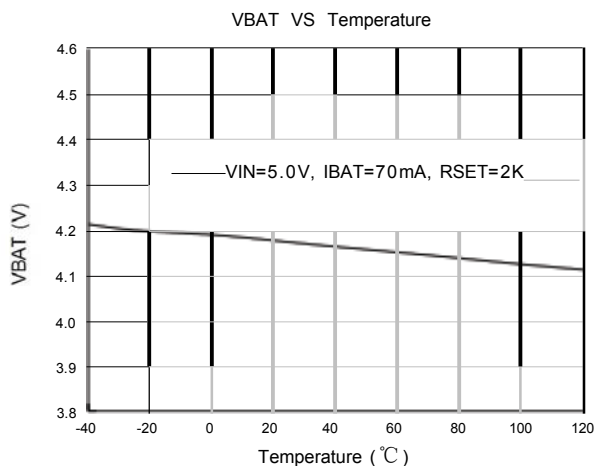
10. PROG 端电压 VS 温度



11. PROG 端上拉电流 VS 温度

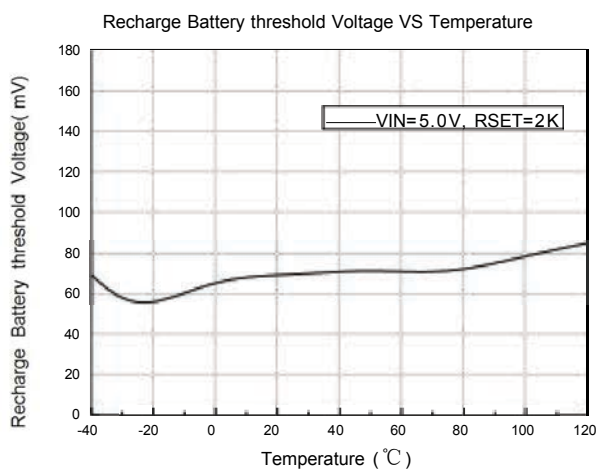


12. BAT 端温度曲线

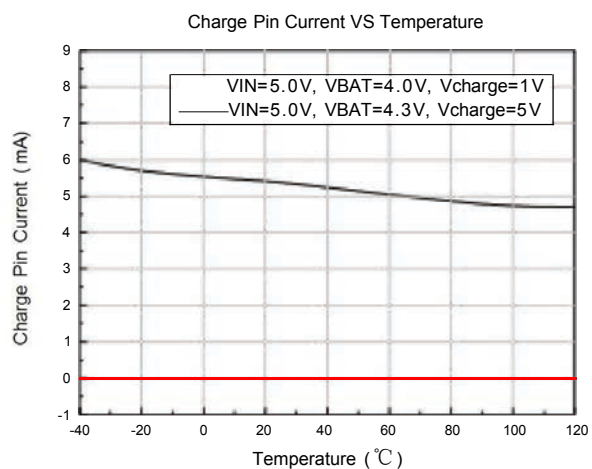




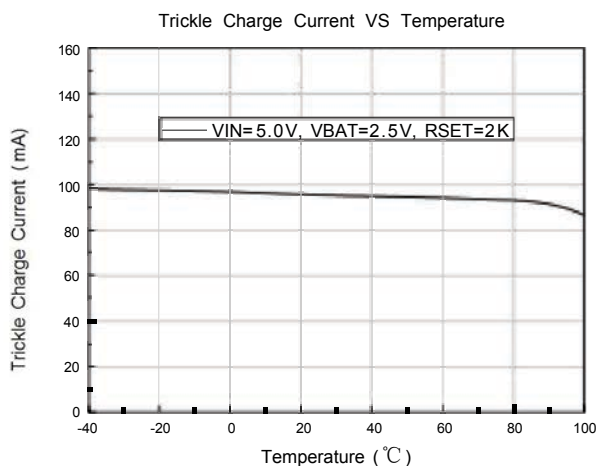
13. 再充电迟滞电压 VS 温度



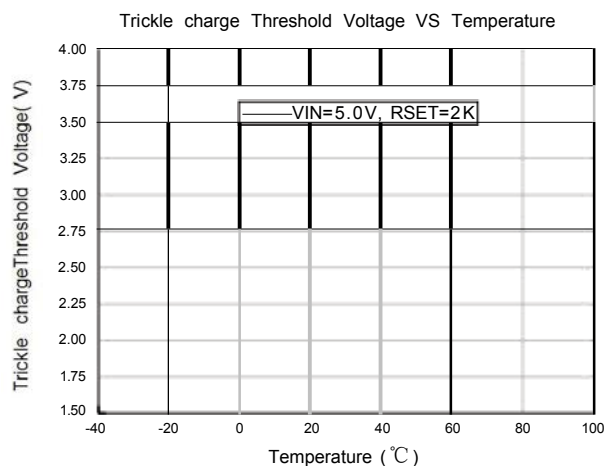
14. CHRG 端电流 VS 温度



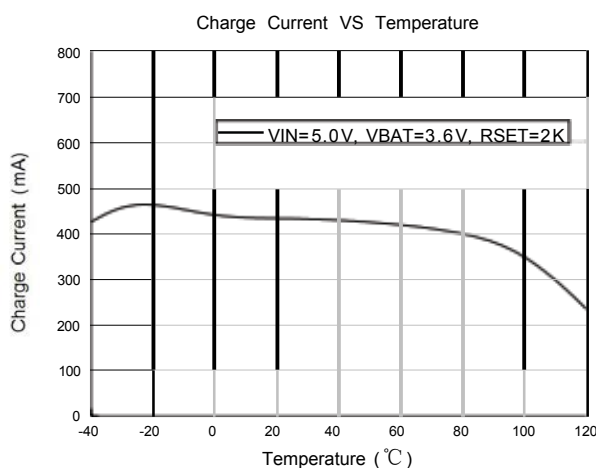
15. 涓流充电电流 VS 温度



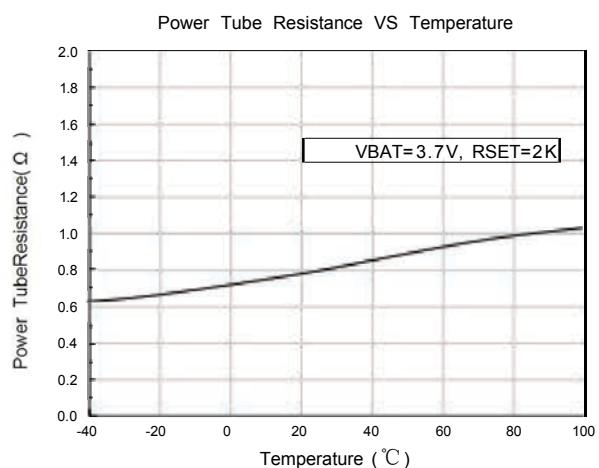
16. 涓流充电极限电压 VS 温度



17. 充电电流温度曲线

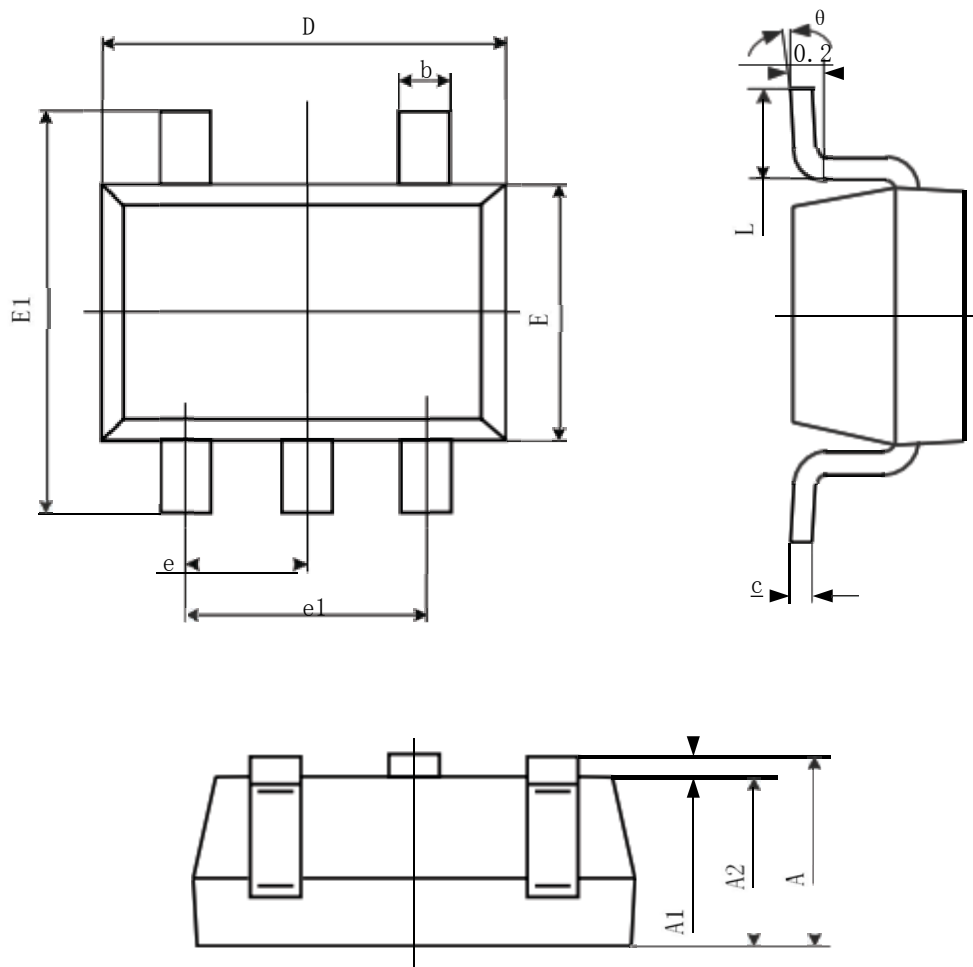


18. 功率管内阻 VS 温度





● SOT-23-5L



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	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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