

Charge charging management IC

1 Overview

FC4054 It is a constant current/constant voltage seat charging and charger chip, mainly used in a single lithium battery charging.No external detection resistance, with internal MOSFET structure, hence no external reverse diode.

FC4054 Charging current can be automatically adjusted at high power and high ambient temperature to limit the chip temperature.Its charging voltage fixed at 4.2V, charging current can be adjusted by an external resistor.When the floating charge voltage is reached and the charging current drops to 1/10 of the setting circuit, the FC4054 Automatic terminate the charging process.When the input voltage is removed, the FC4054 Automatically goes into low current mode, drawing less than 2uA of current from the battery.When the FC4054 is the power supply current is less than 70uA. when entering the standby mode.

FC4054 The charging current may also be monitored, having the characteristics of voltage detection, automatic circulating charging, and having an indicator pin indicating the charging termination state and an input voltage state.

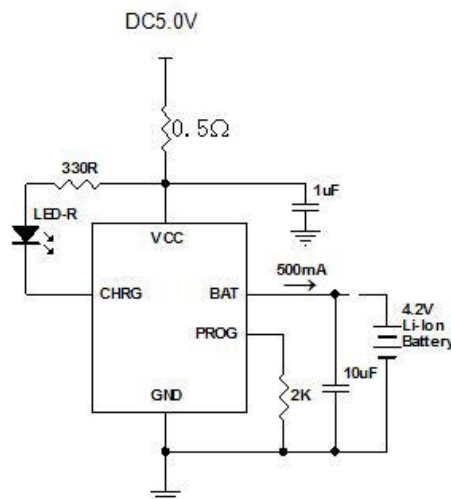
2 Characteristics

- Programmable charging current of up to 500mA
- No external MOSFET, no external resistance, no external reverse diode
- Constant current / constant voltage mode operation, with thermal protection function
- The lithium battery can be charged via the USB port
- Preset charging voltage with 1% accuracy
- The standby mode is 70uA in current
- 2.9V trickle-down charging voltage
- Soft start limits the surge current
- SOT23-5 package

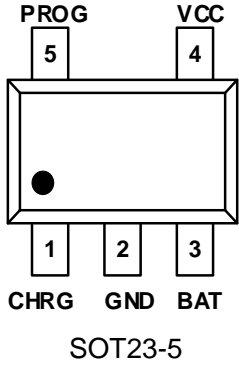
3 Product application

- Mobile phone, handheld computer, MP3 player
- Bluetooth headset

4 Typical application circuit



5 Pin diagram and function description

 <p>SOT23-5</p>	Symbol	name	Function description
	1	CHRG	Charging indicating terminal
	2	GND	Ground
	3	BAT	Charging current output
	4	VCC	Power
	5	PROG	External programming charging current terminal

6 Absolute maximum rating

parameter	Symbol	rating value	unit
Input power voltage	V_{CC}	7	V
PROG voltage	V_{PROG}	$V_{CC}+0.3$	V
BAT voltage	V_{BAT}	7	V
CHRG voltage	V_{CHRG}	7	V
Thermal resistance	θ_{JA}	250	$^{\circ}C/W$
BAT current	I_{BAT}	500	mA
PROG current	I_{PROG}	800	μA
Maximum junction temperature	T_J	110	$^{\circ}C$
Storage temperature	T_S	-65 to +125	$^{\circ}C$
Welding temperature (less than 10 seconds)		260	$^{\circ}C$

- Charging current external programming: PROG(pin 5): constant current charging current setting and charging current monitoring terminal. Connecting from the PROG pin to an external resistance to the ground end can program the charging current. In the precharging stage, the voltage of the pin is modulated at 0.1V; in the constant current charge stage, and the voltage of the pin is fixed at 1V. In all modes of the charging state, measuring the voltage of the pin can estimate the charging current according to the following formula:

R_{prog}	I_{bat}
$I_{bat}=1000/R_{prog}$	
10K	100mA
5K	200mA
3.3K	300mA
2.5K	400mA
2K	500mA

Table of R_{prog} resistance and charging current I_{bat}



FC4054

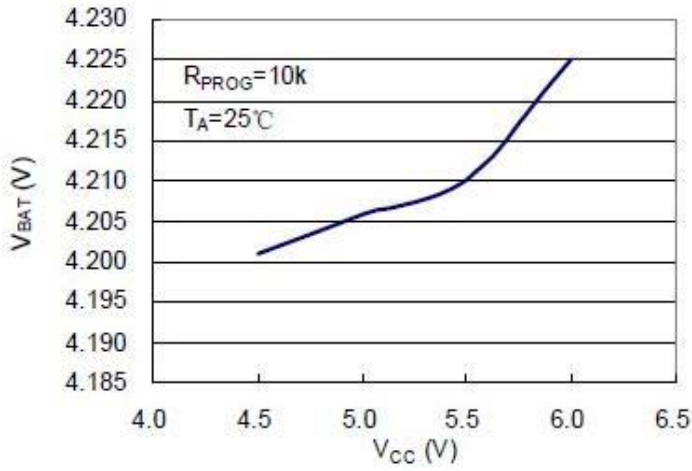
7 Electrical characteristics (V_{IN}=5V; T_J=25°C, unless otherwise specified)

Symbol	parameter	condition	min	typ	max	unit
V _{CC}	Input power voltage		4.5	5.0	5.5	V
I _{CC}	Input power current	Charging mode ⁽³⁾ , R _{PROG} =10K		50	300	μA
		Standby mode (charging termination)		70		μA
		Shut off the mode (R _{PROG} not connected V _{CC} < V _{BAT} , V _{CC} < V _{UV})		38	100	μA
V _{FLOAT}	Adjustable output (floating charge) voltage	I _{BAT} =30 mA, I _{CHRG} =5 mA	4.185	4.2	4.245	V
I _{BAT}	BAT terminal current	R _{PROG} = 10k, current mode	90	110	130	mA
		R _{PROG} = 2k, current mode	465	500	535	mA
		V _{BAT} =4.2V, Standby mode	0	+/-1	+/-5	μA
		Shut off the mode (R _{PROG} not connected)		+/-0.5	+/-5	μA
		Sleep mode, V _{CC} =0V		+/-1		μA
I _{TRIKL}	trickle charge current	V _{BAT} < V _{TRIKL} , R _{PROG} = 10k		15		mA
V _{TRIKL}	Trickle charging threshold voltage	R _{PROG} = 10k, V _{BAT} Rising	2.8	2.9	3.0	V
V _{UV}	VCC undervoltage locking threshold	VCC from low to high		3.8		V
V _{UVHYS}	VCC under voltage locking hysteresis	VCC from high to low		200		mV
V _{ASD}	Vcc-Vbat threshold voltage	VCC from low to high		100		mV
		VCC from high to low		30		mV
I _{TERM}	C/10z termination current threshold	R _{PROG} = 10k ⁽⁴⁾		0.1		mA/mA
		R _{PROG} = 2k		0.1		mA/mA
V _{PROG}	PROG terminal voltage	R _{PROG} = 10k, current mode	0.9	1.03	1.1	V
ΔV _{RECHRG}	Threshold voltage of rechargeable battery	V _{FLOAT} - V _{RECHRG}		150		mV
T _{LIM}	Thermal protection temperature			130		°C

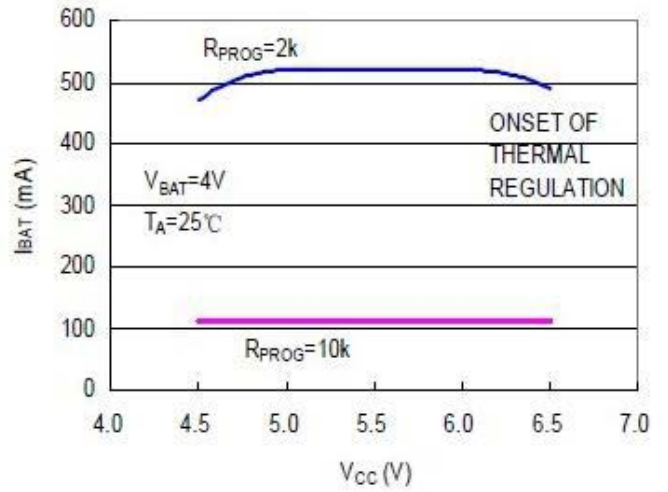
- Note:
- 1 Out of the maximum working range may damage the chip.
 - 2 Beyond the operating parameter limit of the device, its normal function is not guaranteed.
 - 3 The power current comprises a PROG end current (about 100uA), excluding other current transmitted to the battery via the BAT terminal.
 - 4 The charging termination current is generally 0.1 times the set charging current.

8 Typical performance characteristics

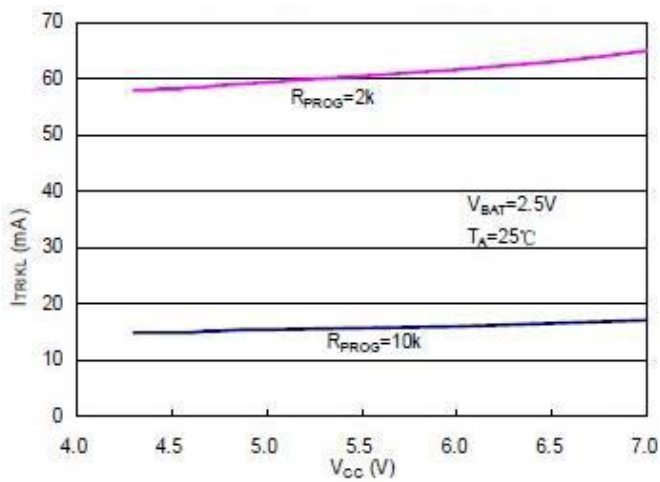
Floating charge voltage VS power supply voltage



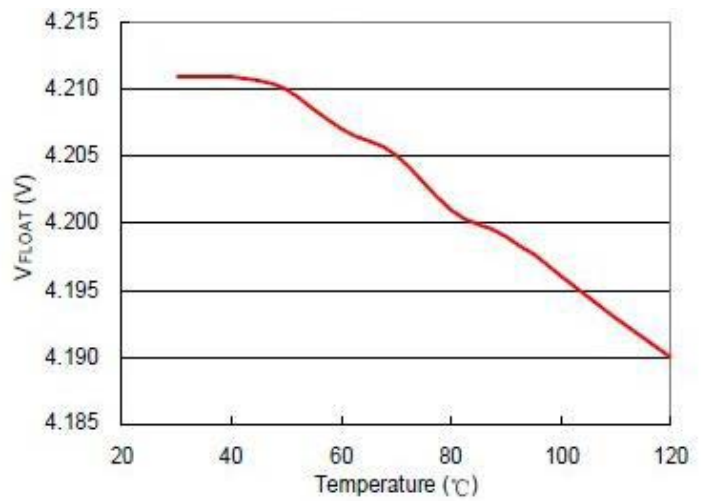
Charge current VS power supply voltage



Trickle charging current VS power supply voltage

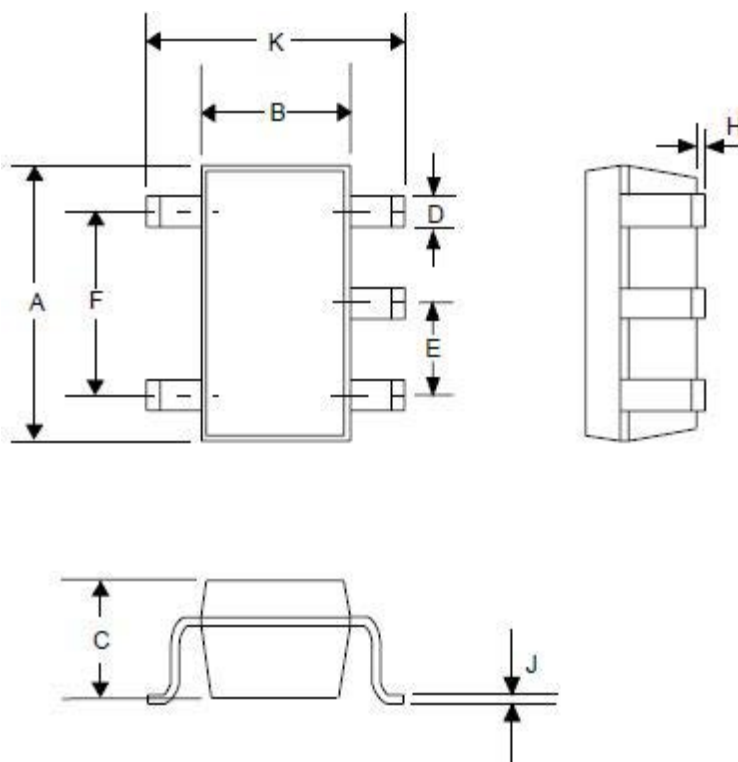


Floating charge voltage VS temperature



9 Package dimension drawing

SOT23-5



specifications				
SYMBOL	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.05
B	0.059	0.070	1.50	1.75
C	0.036	0.051	0.90	1.30
D	0.014	0.020	0.35	0.50
E	—	0.037	—	0.95
F	—	0.075	—	1.90
H	—	0.006	—	0.15
J	0.0035	0.008	0.090	0.20
K	0.102	0.118	2.60	3.00