



Description

PJ4054 is a complete single lithium ion battery with constant current/constant voltage linear charger. Its SOT package and small number of external components make the PJ4054 ideal for portable applications. PJ4054 can be suitable for USB power and adapter power supply work.

Due to the internal PMOSFET architecture, plus the anti-inverted charging circuit, there is no need for external detection resistor and isolation diode. Thermal feedback adjusts the charging current to limit chip temperature at high power operation or ambient temperature conditions. The charging voltage is fixed at 4.2V, and the charging current can be set externally through a resistor. When the charging current reaches the final floating charging voltage and drops to the set value of 1/10, PJ4054 will automatically terminate the charging cycle.

When the input voltage (ac adapter or USB power supply) is removed, PJ4054 automatically enters a low current state, reducing the battery leakage current below 2uA. PJ4054 can also be placed in stop mode to reduce the power supply current to 45uA. Other features of the PJ4054 include a charging current monitor, undervoltage latching, automatic recharging, and a status pin to indicate the end of charging and input voltage access.

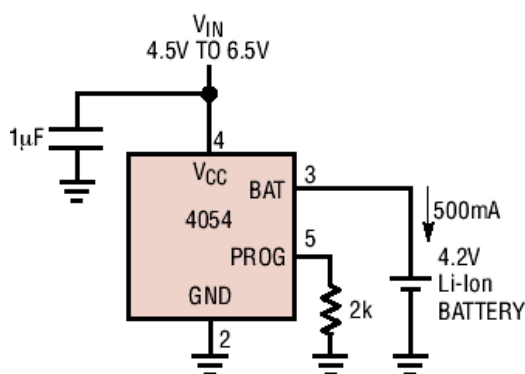
Features

- 800mA programmable charging current
- No MOSFET, test resistor or isolation diode required
- A complete linear charger with SOT-23-5 package for single lithium ion battery
- Constant current/voltage operation, with thermal regulation function
- Charge single lithium ion battery directly from USB port
- 4.2V charging voltage is preset
- Output of charging current monitor for battery quantity detection
- C/10 Charge termination, automatic recharging
- Power supply current in standby mode is 45uA
- Soft boot limits the surge current
- 2.9V trickle charge device version

Applications

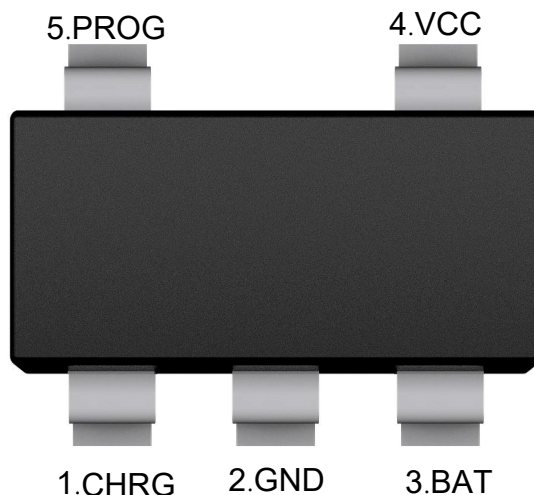
Rprog resistance and charging current
Ibat corresponding table

| Rprog | Ibat |
|---------------------------|-------|
| $I_{bat} = 1000/R_{prog}$ | |
| 10K | 100mA |
| 5K | 200mA |
| 3.3K | 300mA |
| 2.5K | 400mA |
| 2K | 500mA |
| 1.65K | 600mA |



Pin Distribution

SOT-23-5



Pin Function

| Pin No. | Symbol | Pin Function |
|---------|--------|--|
| 1 | CHRG | Output of open drain charging state. The CHRG pin is pulled to low level by an internal N-channel MOSFET during battery charging. When the charging cycle ends, CHRG pin is off and all lights are off. When PJ4054 detects an under voltage blocking condition, the CHRG pin is forced to a high impedance state. |
| 2 | GND | Ground pin |
| 3 | BAT | Charging current output. The pin provides charging current to the battery and adjusts the final floating charging voltage to 4.2V. A precise internal resistance voltage divider of the pin sets the floating charging voltage. In the shutdown mode, the internal resistance voltage divider is disconnected. |
| 4 | VCC | Positive input power voltage. This pin supplies power to the charger. VCC shall vary from 4.25V to 6.5V and shall be bypassed by at least one 1uF capacitor. When the VCC drops to less than 30mV of BAT pin voltage, PJ4054 enters the stop mode, and the Ibat falls below 2uA. |
| 5 | PROG | Charging current setting, charging current monitoring and stop pin. The charging current can be set by connecting a 1% precision resistor Pprog between the pin and the ground. When charging in constant current mode, the voltage of this pin is maintained at 1V. In all modes, the voltage on this pin can be used to calculate the charging current. The formula is $I_{bat} = (V_{prog}/R_{prog}) * 1000$. Short connect the set resistor to the ground, and an internal 2.5ua current pulls the PROG pin to a high level. When the voltage of this pin reaches the stop threshold voltage of 1.22v, the charger enters the stop mode, the charging stops and the input power current drops to 45uA. Reconnecting the Rprog to the ground will restore the charger to normal operation. |

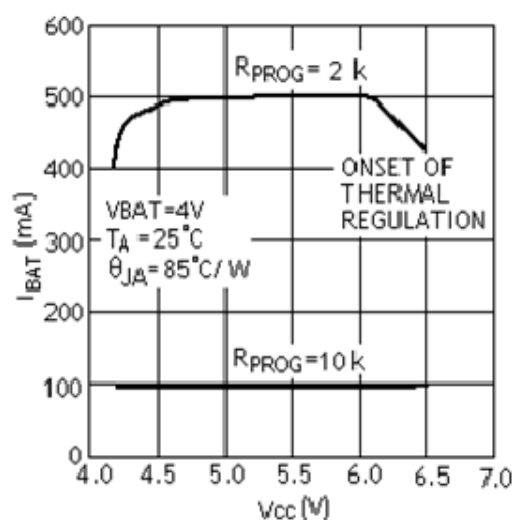
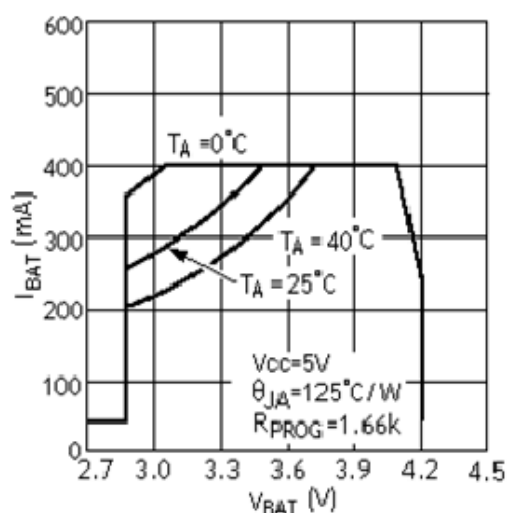
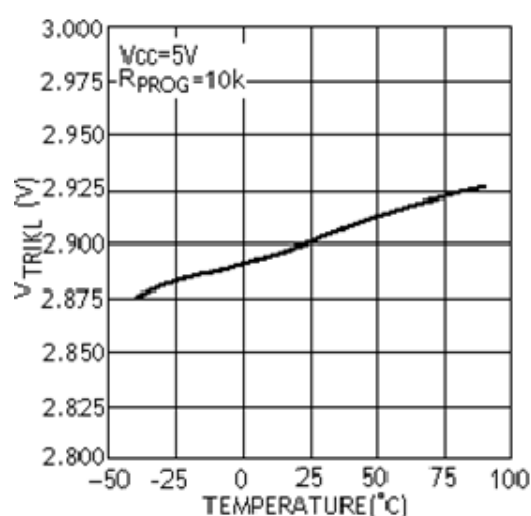
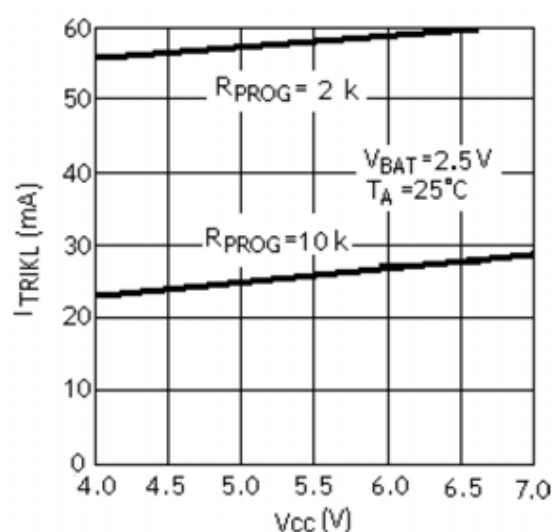
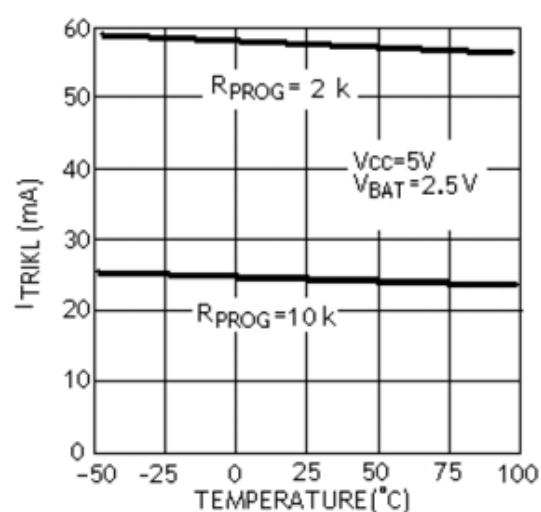
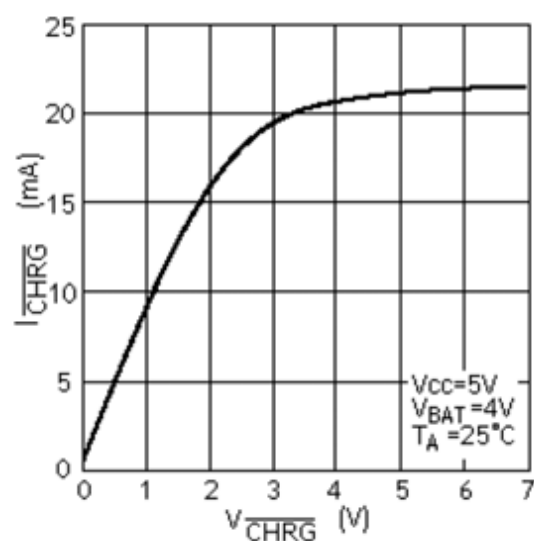


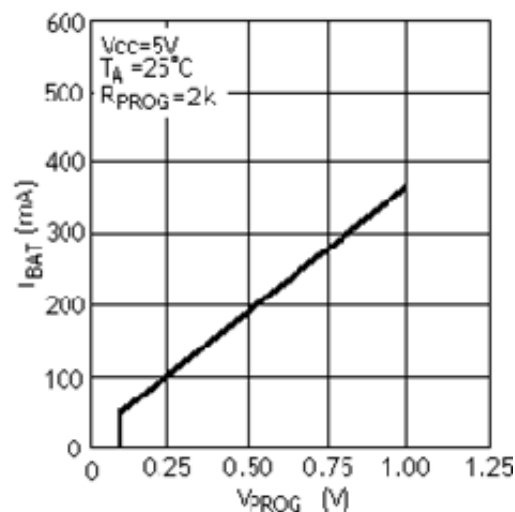
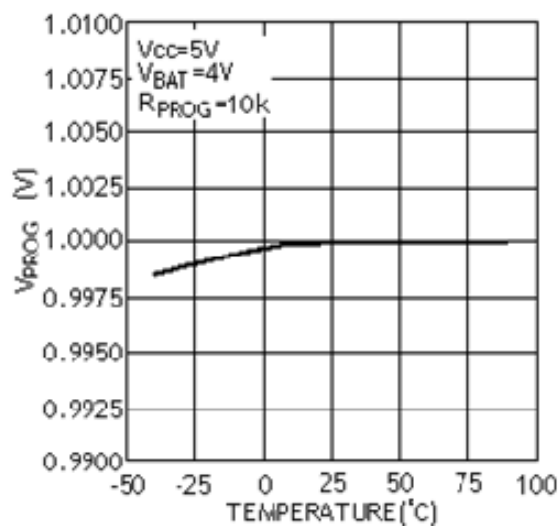
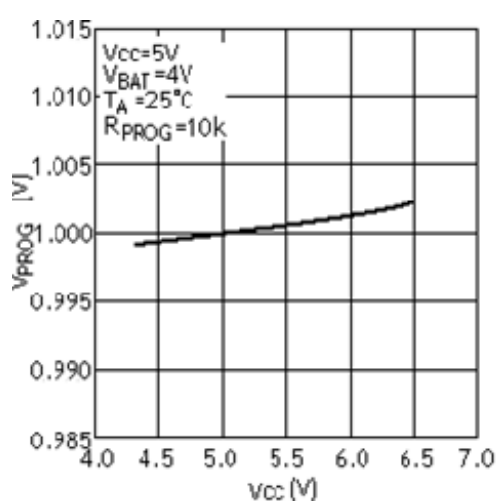
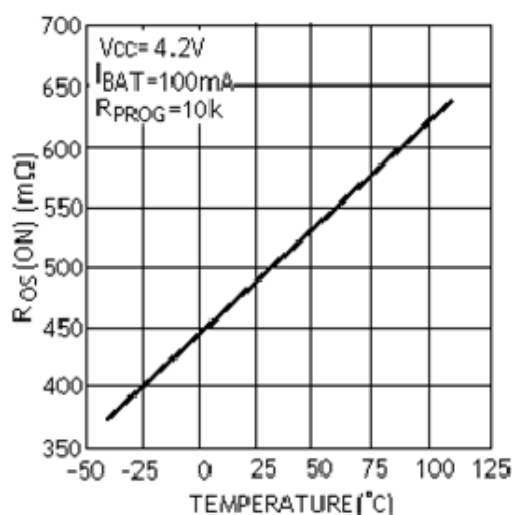
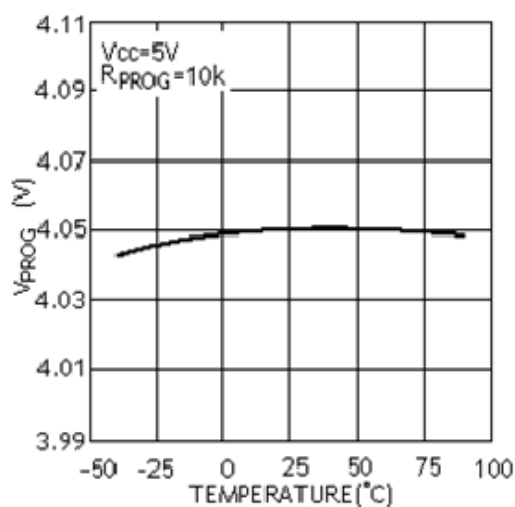
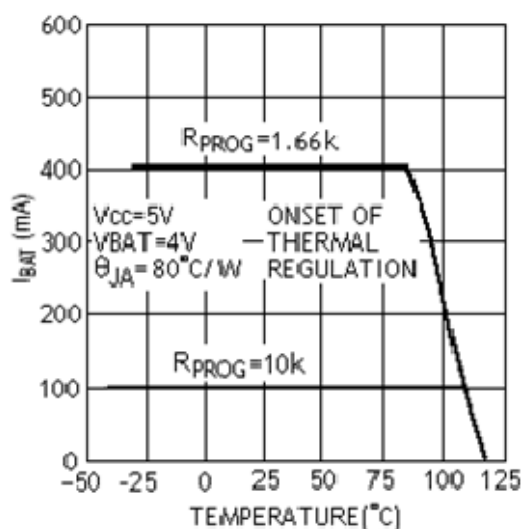
Electrical Characteristics

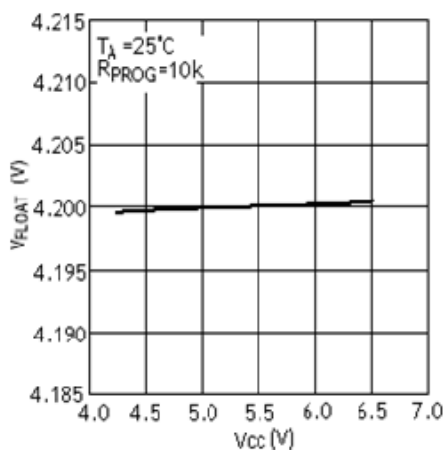
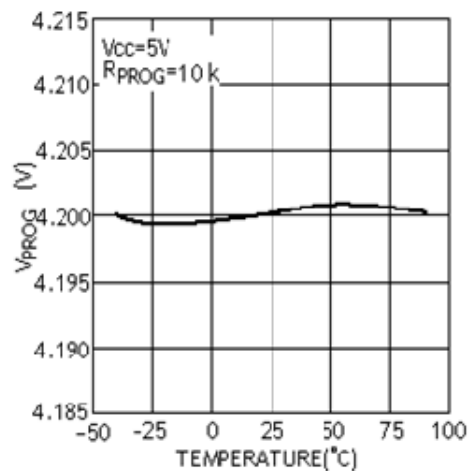
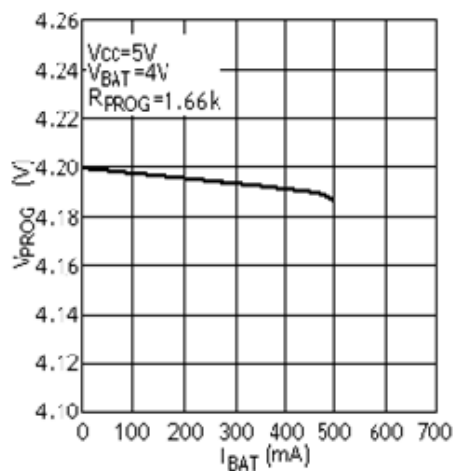
(V_{CC}=5V, T_A=25°C , unless otherwise noted.)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|-----------------------|--------------------------------------|-------|------|-------|------|
| Input Voltage | VCC | | 4.5 | 5 | 6 | V |
| Input Current | ICC | charging mode, Rprog=10K | -- | 150 | 500 | μA |
| | | Standby mode (Charge termination) | -- | 45 | 150 | |
| | | stop mode(RPROG uninit) | -- | 45 | 150 | |
| | | VCC<Bbat or VCC<Vuv | -- | 45 | 150 | |
| Stable Output Voltage | VFLOAT | 0°C≤T _A ≤85°C, Ibat=40mA | 4.13 | 4.2 | 4.255 | V |
| BAT Pin Current | IBAT | RPROG=10K, current mode | 93 | 100 | 107 | mA |
| | | RPROG=2K, current mode | 465 | 500 | 535 | |
| | | standby mode, Vbat=4.2V | 0 | -2.5 | -6 | μA |
| | | stop mode(RPROG uninit) | -- | ±1 | ±2 | |
| | | sleep mode, VCC=0 | -- | -1 | -2 | |
| Trickle Charging Current | ITRIKL | VBAT<VTRIKL, Rprog=2K | 30 | 50 | 70 | mA |
| Trickle Charging Threshold Voltage | VTRIKL | RPROG=10K, Vbat up | 2.8 | 2.9 | 3 | V |
| Trickle Charging Hysteresis Voltage | VTRHYS | RPROG=10K | 60 | 150 | 200 | mV |
| VCC Undervoltage Locking Threshold | VUV | VCC from low to high | 3.7 | 3.9 | 3.99 | V |
| VCC Undervoltage Atesia Hysteresis | VUVHYS | | 150 | 250 | 300 | mV |
| Manual Shutdown Threshold Voltage | VMSD | PROG pin level up | 1.15 | 1.21 | 1.3 | V |
| | | PROG pin level down | 0.9 | 1 | 1.1 | |
| Blocking Threshold Voltage | VASD | VCC from low to high | 70 | 100 | 140 | mV |
| | | VCC from high to low | 5 | 30 | 50 | |
| C/10 Termination Current Threshold | ITERM | RPROG=10K | 0.085 | 0.1 | 0.115 | mA |
| | | RPROG=2K | 0.085 | 0.1 | 0.115 | |
| PROG Pin Voltage | VPROG | RPROG=10K, current mode | 0.93 | 1 | 1.07 | V |
| Pin Output Low Voltage | VCHRG | ICHRG=5mA | 0.1 | 0.35 | 0.6 | V |
| Recharging Battery Threshold Voltage | ΔV _{RECHRG} | VFLOAT-VRECHRG | 100 | 150 | 200 | mV |
| Junction temperature in a finite temperature mode | T _{LIM} | | -- | 120 | -- | °C |
| Power FET On Resistance | R _{ON} | | -- | 660 | -- | mΩ |
| Soft Start Time | T _{SS} | IBAT=0 to Ibat=1000/Rprog | -- | 100 | -- | μS |
| Recharging Comparator Filter Time | t _{RECHARGE} | VBAT from high to low | 0.75 | 2 | 4 | mS |
| Stop Comparator Filter Time | t _{TERM} | IBAT below Ichg/10 | 0.8 | 1.8 | 4 | mS |
| PROG Pin Pull Current | I _{PROG} | | -- | 3 | -- | μA |

Typical Characteristics Curves

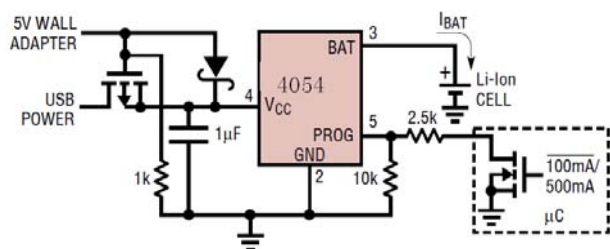




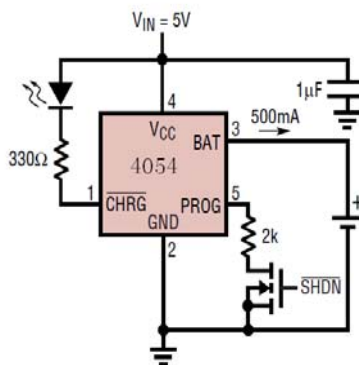


Typical Applications

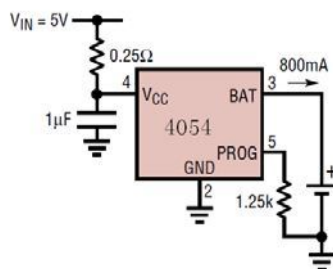
USB/交流适配器电源锂电池充电器



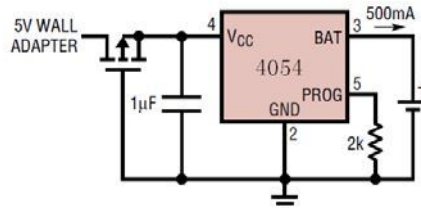
全功能单节锂电池充电器



采用外部功率耗散的800mA锂电池充电器



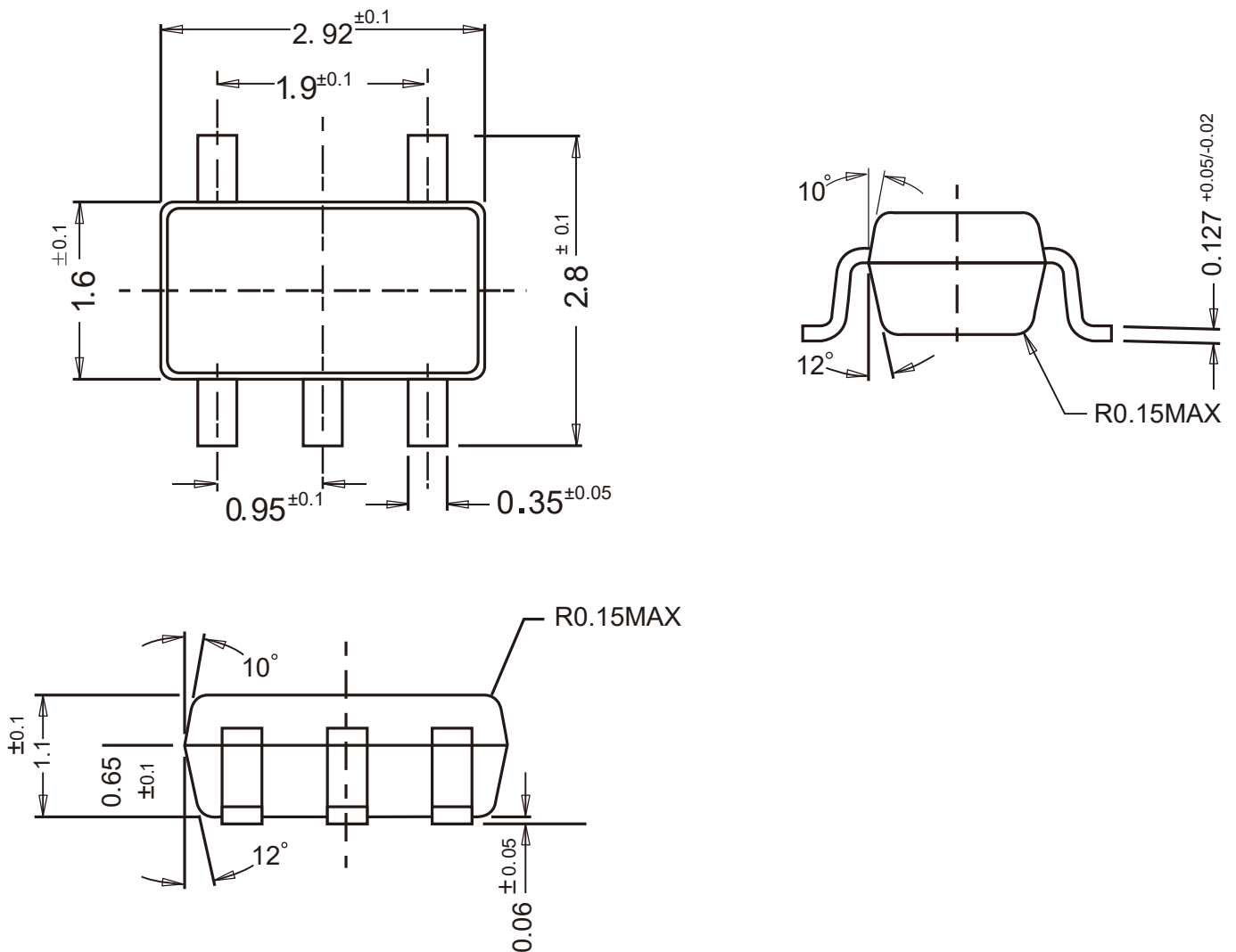
具有反向极性输入保护功能的基本锂电池充电器



Package Outline

SOT-23-5

Dimensions in mm



Ordering Information

| Device | Package | Shipping |
|--------|----------|-----------------------|
| PJ4054 | SOT-23-5 | 3,000PCS/Reel&7inches |