## 1. Overview

LTH7R. is a constant current/constant voltage charger chip, mainly used for charging single-cell lithium batteries. No external detection resistor is required, and its internal structure is MOSFET, so no external reverse diode is required.

LTH7R. can automatically adjust the charging current to limit the chip temperature under high power and high ambient temperature. Its charging voltage is fixed at 4.2V, and the 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, LTH7R. automatically terminates the charging process. When the input voltage is removed, LTH7R. automatically enters low current mode and draws less than 2uA of current from the battery . When LTH7R. enters standby mode, the supply current is less than 25uA.

The LTH7R. can also monitor the charging current, has voltage detection, automatic cycle charging features, and has an indication pin to indicate the charging termination status and input voltage status.

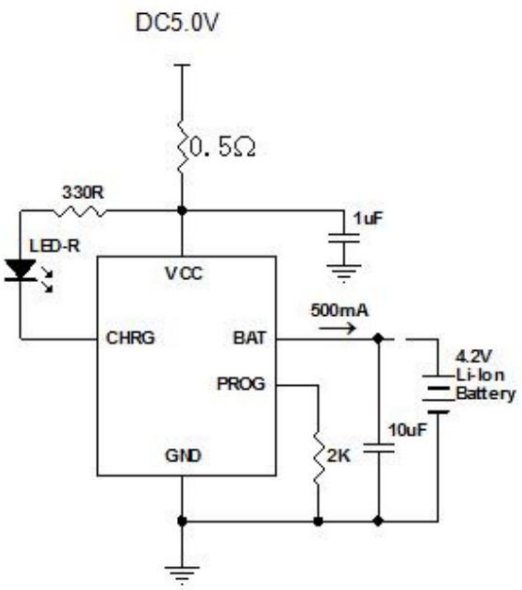
Second, characteristics

ÿ Programmable charge current up to 500mAÿ No external
MOSFET, sense resistor, or reverse diode requiredÿ Constant current/constant
voltage mode operation with thermal protectionÿ Charges lithium
batteries via USB portÿ 1% accurate preset charge
voltageÿ 20uA current in standby modeÿ 2.9V trickle
charge voltageÿ Soft start limits inrush currentÿ
Available in SOT23-5 package

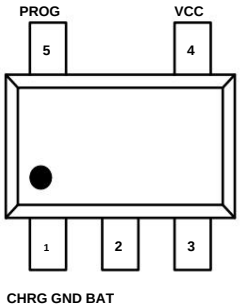
## 3. Product Application

ÿ Mobile phone, PDA, MP3 player ÿ Bluetooth headset

## 4. Application Circuit



## 5. Pin diagram and function description




SOT23-5

| Symbolic Name | | Functional Description |
|---|---|---|
| 1 | CHRG | charging indicator terminal |
| 2 | GND | Ground |
| 3 | BAT | charging current output terminal |
| 4 | VCC | power input terminal |
| 5 | PROG | External programming charging current terminal |

## 6. Absolute Maximum Ratings

| parameter | symbol | Rating | unit |
|---|---|---|---|
| Input power voltage | VCC | 7 | V |
| PROG Voltage | VPROG | VCC+0.3 | V |
| BAT voltage | VBAT | 7 | V |
| CHRG Voltage | VCHRG | 7 | V |
| BAT short circuit | | Continuous | |
| Thermal resistance | ÿJA | 250 | ÿ/W |
| BAT Current | DIFFERENT | 500 | mA |
| PROG Current | IPROG | 800 | µA |
| Maximum junction temperature | TJ | 110 | ÿ |
| Storage temperature | TS | -65 to +125 | ÿ |
| Soldering temperature (no more than 10 seconds) | | 260 | ÿ |

ÿ External charging current programming: PROG (pin 5): constant current charging current setting and charging current monitoring terminal. Connect an external

The charging current can be programmed by connecting a resistor to the ground terminal. In the pre-charging stage, the voltage of this pin is modulated at 0.1V; in the constant current charging stage, this pin

The voltage of the pin is fixed at 1V. In all modes of charging, the voltage of this pin can be measured to estimate the charging current according to the following formula:

Rprog电阻和充电电流Ibat对应表

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

VII. Electrical Characteristics (VIN=5V; TJ=25ÿ, unless otherwise specified)

| symbol | | condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| VCC | Parameter Input power voltage | | 4.5 | 5.0 | 5.5 | V |
| ICC | Input power current | Charging Mode (3), RPROG = 10K | | 170 | 500 | µA |
| | | Standby Mode (Charging | | 70 | | µA |
| | | Termination) Shutdown Mode (RPROG Not Connected, VCCÿVBATÿVCCÿVUVÿ | | 38 | 50 | µA |
| VFLOAT | Adjustable output (float charge) voltage | IBAT=30 mAÿICHRG=5 mA Aÿ4.2-4.28Vÿ Bÿ4.17-4.205V | 4.16 | 4.20 | 4.28 | V |
| DIFFERENT | BAT terminal current | RPROG = 10k, current mode | 90 | 110 | 130 mA | |
| | | RPROG = 2k, current mode | 465 | 500 | 535 mA | |
| | | VBAT = 4.2V, standby mode | 0 | +/-1 | +/-5 | µA |
| | | shutdown mode, RPROG not | | +/-0.5 | +/-5 | µA |
| | | connected sleep mode, VCC | | +/-1 | | µA |
| ITRICL | = 0V trickle charge current VBAT ÿ VTRIKL, RPROG = 10k VTRIKL | | | 15 | | mA |
| trickle charge threshold voltage RPROG = 10k, VBAT Rising VCC Undervoltage lockout | | | 2.8 | 2.9 | 3.0 | V |
| VUV | threshold | | | 3.4 | | V |
| VUVHYS | VCC Under Voltage Lockout Hysteresis From VCC Low to High From | | | 100 | | mV |
| VASD | VCC-VBAT threshold voltage | VCC Low to High | | 100 | | mV |
| | | From VCC High to | | 30 | | mV |
| ITERM | C/10Z Termination Current Threshold | Low RPROG = 10k (4) | | 0.1 | | mA/mA |
| | | RPROG = 2k | | 0.1 | | mA/mA |
| VPROG | PROG terminal voltage RPROG = 10k, current mode battery | | 0.9 | 1.03 | 1.1 | V |
| ÿVRECHRG | threshold voltage VFLOAT - VRECHRG thermal | | | 100 | | mV |
| TLIM | protection temperature | | | 130 | | ÿ |

| | | | | | | |
|---|---|---|---|---|---|---|
| tSS | Soft start time | IBAT = 0 to 1000V/RPROG | | 100 | | μs |
| tRECHRGE Recharge comparator filter time VBAT High to Low | | | | 1 | | ms |
| tTERM Termination comparator filter time IBAT Falling Below ICHG/10 | | | | 1000 | | μs |

Note:

1. Exceeding the maximum operating range may damage the chip.

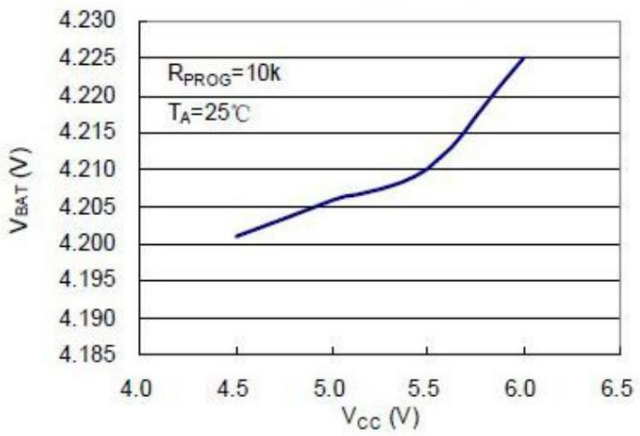
2. If the device is beyond the operating parameter limit, its normal function is not guaranteed.

3. The power supply current includes the PROG terminal current (about 100uA), but does not include other currents transmitted to the battery through the BAT terminal.

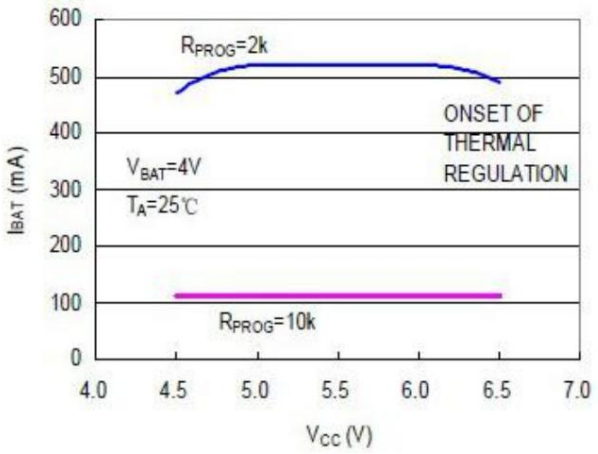
4. The charge termination current is generally 0.1 times the set charge current.

## 8. Waveform

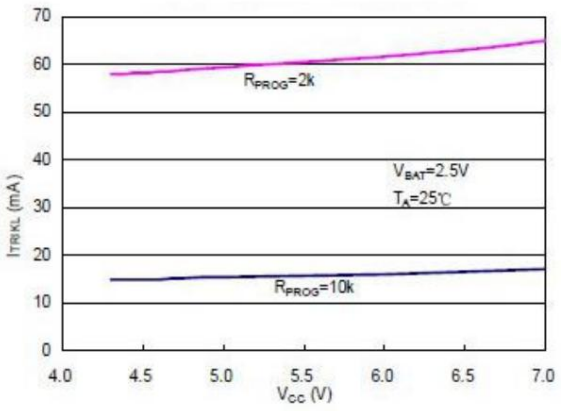
Floating Voltage vs Supply Voltage



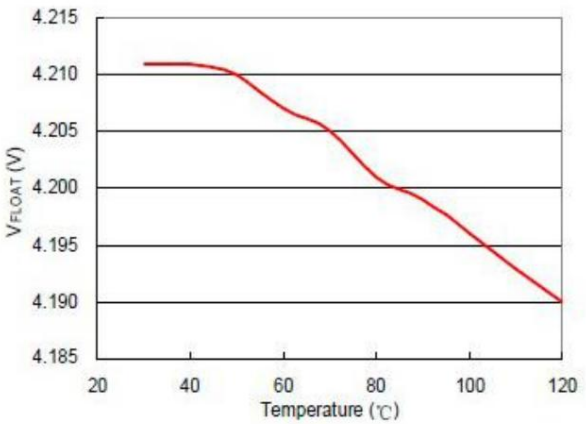

Charging Current VS Supply Voltage




Trickle Charge Current VS Supply Voltage

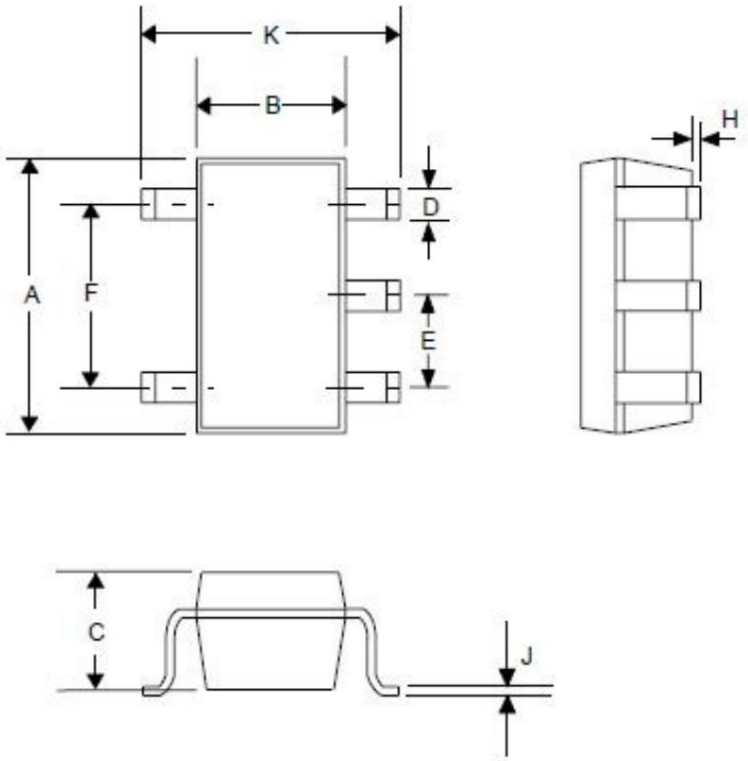



Floating Voltage vs. Temperature



IX. Package Dimensions

SOT23-5




| Specification | | | | |
|---|---|---|---|---|
| size | inch | | Millimeters | |
| | Minimum | Maximum | Minimum | Maximum |
| 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 |
| AND | - | 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 |