WARNING: This is a translation done with Google Translate with NO editing cleanup. If you are familiar with how charger ICs or switching power ICs work, the translation should be adequate. If not, PLEASE SEEK HELP.

DATASHEET

TP5000

(2A switching 4.2V lithium battery / 3.6V lithium iron Battery charger)

Summary

TP5000 is a single switch buck-type lithium manganese battery / lithium iron phosphate battery charge management chip. Its ultra-compact QFN16 closure Fitted with a simple peripheral circuit, making it ideal for portable devices TP5000 large current charging management applications. Meanwhile, TP5000 built-in input overcurrent, undervoltage protection, over temperature protection, short circuit protection, battery temperature monitoring, reverse battery protection.

TP5000 has a wide input voltage, trickle charge the battery into the pre-charge, constant current, constant voltage three phase trickle precharge Current, constant charging current can be adjusted by an external resistor, the maximum charging current up to 2A. TP5000 frequency of 800kHz using open Off mode makes it possible to use a smaller peripheral devices, and high-current charging remains a small amount of heat. TP5000 Built-in power PMOSFET, anti-intrusion circuit, so no anti-intrusion protection and other external Schottky diode. TP5000 constant current Function, but also can be used in two series lithium batteries or four strings input, constant current white LED driver 0.5-7W.

Features

- ■ single 4.2V or 3.6V lithium manganese rechargeable lithium iron phosphate
- ■ Built-in power MOSFET, switching mode, Devices less heat, peripheral simple
- ■ Programmable charge current, 0.1A—2A
- ■ programmable pre-charge current, 10% - 100%
- ■ No external Schottky diode anti-intrusion
- ■ Wide operating voltage, maximum reach 9V
- ■ Two LED charge status indicator
- ■ chip temperature protection, overcurrent protection, undervoltage protection
- ■ Battery temperature protection, reverse battery shutdown, short circuit protection
- ■ Switching frequency 800KHz, available inductor 2.2uH-10uH
- ■ automatic recharge function
- ■ Charging voltage accuracy of less than 1% of control
- ■ trickle, constant current, constant voltage charging three sections, to protect the battery
- ■ using QFN16 4mm * 4mm ultra-small package

Absolute Maximum Ratings

- ■ input supply voltage (VIN): 10V
- ■ BAT:-4.2V ~ 9V
- ■ BAT Short Duration: Continuous
- ■ The maximum junction temperature: 145 ℃
- ■ Operating ambient temperature range: -40 ℃ ~ 85 ℃
- ■ Storage temperature range: -65 ℃ ~ 125 ℃
- ■ Lead Temperature (Soldering, 10 sec): 260 ℃

Applications

- ■ portable devices, various chargers
- ■ smart phone, PDA, mobile cellular telephone
- ■ MP4, MP5 player, Tablet PC
- ■ miner
- ■ Power Tools
- ■ White LED Driver

Typical Application

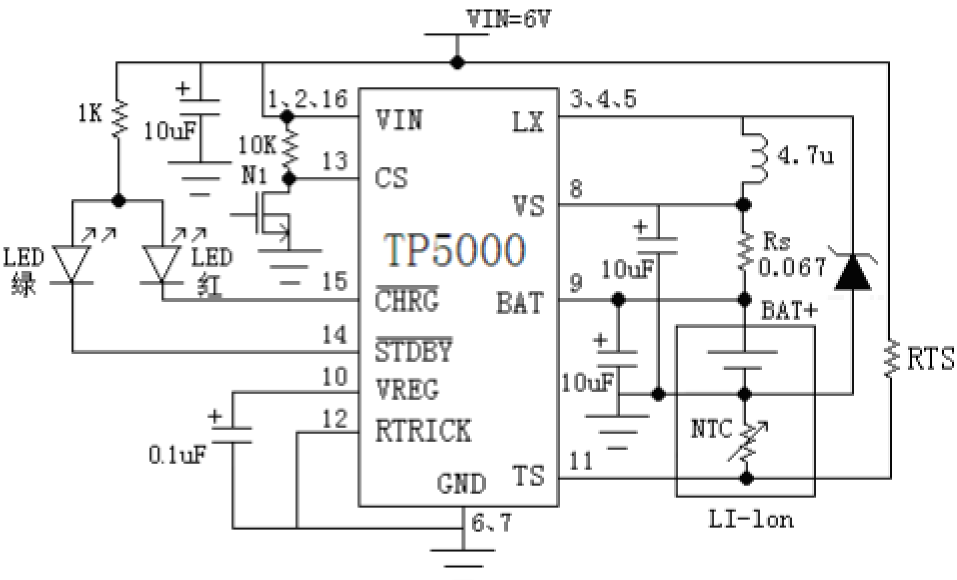


Figure 1 TP5000 is 1.5A 4.2V rechargeable lithium-ion battery (150MA prefilled) Application Diagram

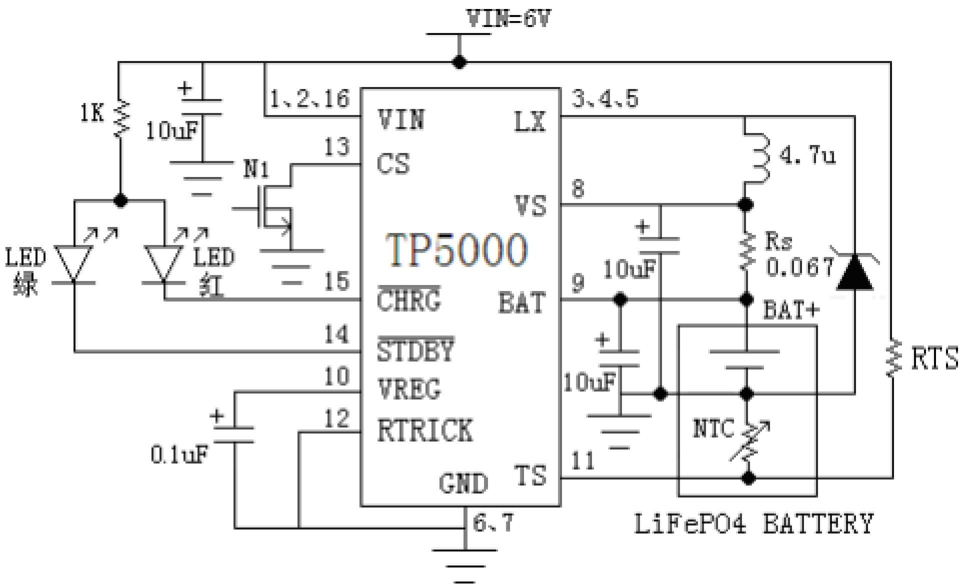
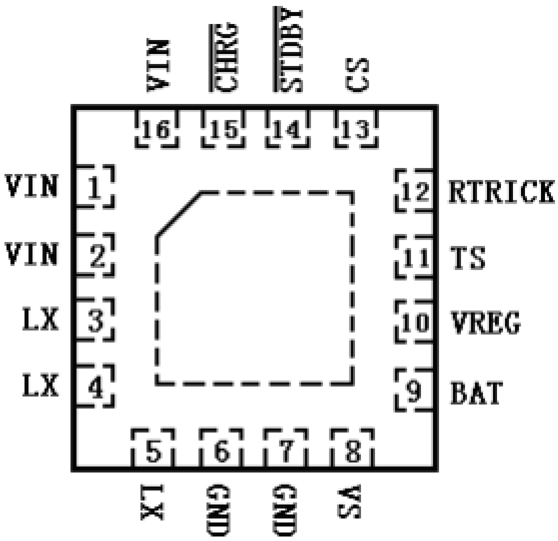


Figure 2 TP5000 is 3.6V 1.5A rechargeable lithium iron phosphate battery (150MA prefilled) Application Diagram

Package / Ordering Information



16-pin 4mm * 4mmQFN16 Package Top View (Heat sink grounding unacceptable other potential)

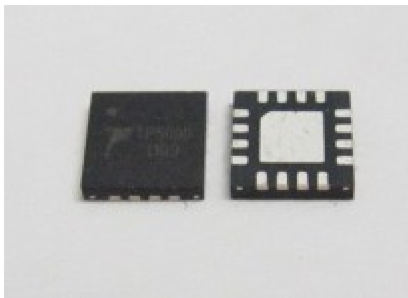
Order Type

TP5000-QFN16

Device Marking

TP5000

Physical picture



TP5000 functional block diagram

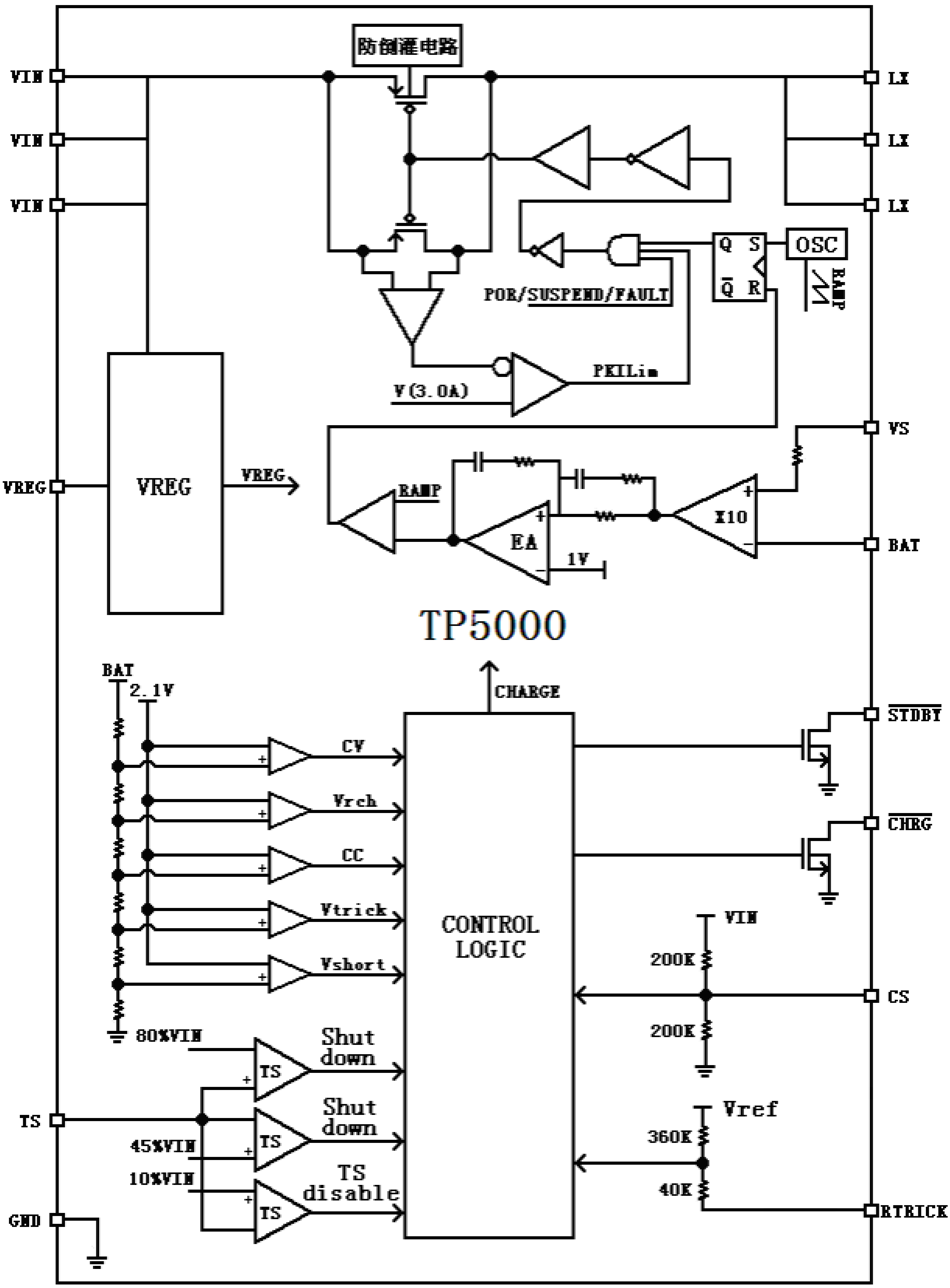


Figure 3 TP5000 Functional Block Diagram

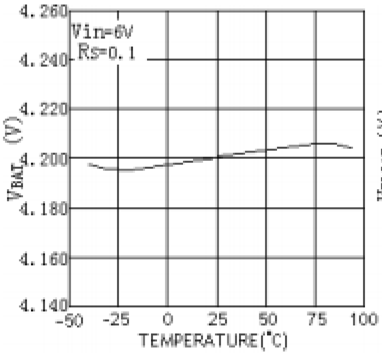
Electrical characteristics

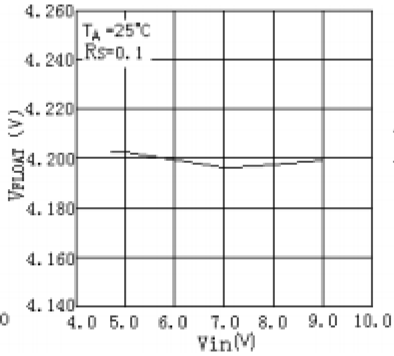
Table 1 TP5000 electrical characteristics of energy parameters

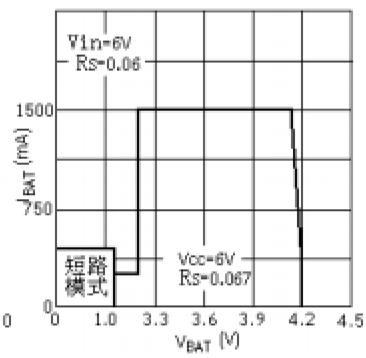
The ● denotes specifications which apply over the full operating temperature range, otherwise specifications T_A = 25 ℃, VIN = 6V, unless otherwise noted.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
VIN	Input supply voltage		●	4.0	5	9.0	V
I_{CC}	Input supply current	Charge mode, RRSR = 0.1Ω Standby mode (charge termination) Shutdown mode (CS = GND, V_{in} <V_{BAT}, or V_{in} <V_{UV})	● ● ●		250 180 180	500 250 250	µA µA µA
V_{FLOAL}	Charging cut-off voltage	4.2V lithium-ion battery 3.6V lithium iron phosphate battery		4.158 3.564	4.2 3.6	4.242 3.636	V V
I_{BAT}	BAT Pin Current: (Current Mode test conditions CS = VIN, battery = 3.8V)	R_S = 0.1Ω, constant current mode R_S = 0.067Ω, constant current mode Standby mode, V_{BAT} = 4.2V VIN = 0V, V_{BAT} = 4.2V	● ● ● ●	950 1450 0 0	1000 1500 -4 -4	1100 1600 -6 -6	mA mA µA µA
I_{TRIKL}	Trickle pre-charge current RTRICK pin to ground	1.2V <V_{BAT} <V_{TRIKL}, R_S = 0.067	●	150	170	190	mA
F	Oscillation frequency			650	800	950	KHz
D_{MAX}	Maximum Duty Cycle				100%		
D_{MIN}	Minimum duty cycle			0%			
V_{TRIKL}	Trickle charge threshold voltage (4.2V) (3.6V)	R_S = 0.067Ω, V_{BAT} rise		 2.8 2.4	 2.9 2.5	 3.0 2.6	 V V
V_{THRYS}	Hysteresis voltage trickle charging	R_S=0.067Ω		60	80	100	mV
V_{UV}	V_{IN} undervoltage lockout threshold	From V_{IN} Low to High	●	3.5	3.7	3.9	V
V_{UVHYS}	V_{IN} undervoltage lockout hysteresis		●	150	200	300	mV
V_{ASD}	V_{IN}- V_{BAT} lockout threshold voltage	V_{IN} from low to high V_{IN} low		60 5	100 30	140 50	mV mV
I_{TERM}	C/10 termination current threshold	R_S=0.067Ω	●	130	150	170	mA
V_{CHRG}	CHRG pin output low voltage	I_{CHRG}=5mA			0.3	0.6	V
V_{STDBY}	STDBY pin output low	I_{STDBY}=5mA			0.3	0.6	V
V_{TEMP-H}	TEMP pin high voltage shutdown				>80	82	%*VIN
V_{TEMP-L}	TEMP pin voltage low-end shutdown			43	<45		%*VIN
ΔV_{RECHRG}	The rechargeable battery threshold voltage	V_{FLOAT}-V_{RECHRG}		100	150	200	mV
T_{LIM}	Chip temperature protection				145		℃
R_{ON}	Power FET "on" resistance				260		mΩ
t_{SS}	Soft start time	I_{BAT}=0 to I_{BAT}=0.1V/R_S			20		µS
$t_{RECHARGE}$	Comparator Filter Time to recharge	V_{BAT} High to Low		0.8	1.8	4	mS
t_{TERM}	Termination Comparator Filter Time	I_{BAT} drops C/10 less		0.8	1.8	4	mS

Typical performance indicators (CS mode is set to 4.2V rechargeable lithium battery)







Cut-off voltage vs ambient temperature   Cut-off voltage vs supply voltage   Charging current vs battery voltage

Pin Function

VIN (pin 1, 2, 16): Input voltage positive input. Voltage of this pin is the power supply of the internal circuit, VIN range varies between 4.5V to 9V, and through a 10μF tantalum capacitor bypass. When the VIN and V_{BAT} pressure when the difference is less than 30mv, TP5000 into shutdown mode, from leaving I_{BAT} fell 4μA.

LX (pin 3, 4, 5): Built-in power management PMOSFET Drain connection. LX is the current output and TP5000 external inductor is connected to an input terminal of the battery charging current.

GND (pin 6, 7): Power Ground.

VS (pin 8): the positive input of the output current detection.

BAT (pin 9): Battery voltage detection terminal. The battery The positive terminal is connected to this pin.

VREG (pin 10): internal power supply. VREG is a Internal power supply, it is an external 0.1uF bypass capacitor to ground.

TS (pin 11): The battery temperature detection input. Will to the TS pin of the battery NTC (negative temperature coefficient thermistor Resistance) output of the sensor. If the TS pin power pressure is less than 45% greater than the input voltage or the input voltage 80%, which means the battery temperature is too low or too high, then the charge power is suspended. If TS directly connected to GND, battery temperature detection function is canceled, the other charging function properly.

RTRICK (pin 12): Trickle pre-charge current setting end. The RTRICK pin to ground the pre-charge current is 10% Set constant, can be set by an external resistor precharge Stream. If RTRICK floating the pre-charge current is equal to a constant Stream currents.

CS (pin 13): Lithium-ion or lithium iron phosphate status Chip Select Input. CS-side high input will TP5000 is 4.2V rechargeable lithium-ion battery voltage shutdown state. CS end TP5000 is vacant so that the lithium iron phosphate-off voltage 3.6V State. Low input level so that the TP5000 is shutdown. CS side can be TTL or CMOS level driver.

STDBY (pin 14): Battery Charge complete indication end. When the battery is fully charged internal switch is pulled STDBY Low, indicating that charging is complete. In addition, STDBY pin will be in a high impedance state.

CHRG (pin 15): Charging Status Indication end. When When the battery is being charged, CHRG pin is internally Switch is pulled low, which means that charging is in progress; otherwise CHRG pin is in a high impedance state.

Works

TP5000 is designed for single-cell lithium-ion 4.2V / 3.6V Lithium iron phosphate designed switching high current charging Chip, using a power transistor chip on the battery Trickle, constant current and constant voltage charging. The charging current can Programmed with an external resistor, the maximum charging current can be sustained Up to 2A, does not require additional anti-intrusion diodes. TP5000 Contains two open-drain output status outputs, Charge status indicator and the battery is fully end CHRG status indicator Shows the output of STDBY. Electrical power management chip Road in the chip junction temperature exceeds 145℃ automatically reduces the charging time Current, this feature allows users to maximize the use of Chip power handling capability, do not worry about overheating chips Damage to the chip or external components.

When the input voltage is greater than the threshold voltage and chip startup The chip enable input connected to high or left floating, TP5000 start charging the battery, CHRG pin output Low, which means that charging is in progress. If the lithium-ion battery Battery voltage is lower than 2.9V (lithium iron phosphate battery voltage is lower than 2.5V), with a small current to the battery charger trickle pre-Charge (pre-charge current is adjustable through an external resistor). Permanent Charging current flows from the VS pin and the pin between VBAT Resistance OK. When the lithium-ion battery voltage is close to 4.2V (P Acid lithium iron close to 3.6V), the distance charging cut-off power Pressure of about 50mV (depending on the connection resistance and electrical circuits Pool resistance voltage), the charging current gradually decreases, TP5000 into constant voltage charging mode. When the charge current decreases Off current when charging cycle is complete, CHRG end Output impedance state, STDBY ended output low.

When the battery voltage falls below the recharge threshold (lithium-ion battery Pool 4.05V, lithium iron phosphate battery 3.45V), the automatic Start a new charge cycle. The on-chip electrical Voltage reference, error amplifier and the resistor divider network to ensure The battery terminal voltage cutoff accuracy within ±1%, to meet the Lithium-ion batteries and lithium iron phosphate battery charging requirements. When Input voltage brownout or when the battery voltage is lower than the input voltage, Charger enters a low-power shutdown mode, no external anti-Intrusion diodes, batteries close 4μA potential leakage from the chip.

Charging cut-off voltage selection

TP5000 has a single-cell lithium ion / lithium iron phosphate battery Two charging cut-off voltage of choice. When connected to the high potential side CS VIN, 4.2V lithium-ion battery as standard, Cut-off voltage 4.2V. When the CS side vacant, lithium iron phosphate Battery charging standard cut-off voltage 3.6V. When the CS side Then low GND, the charger stops charging.

CS composite design TP5000's end, you can External control decision TP5000 in charge mode and shut down Switching mode.

4.2V lithium-ion battery state of charge and shutdown mode Switching. Shown in Figure 4, through an open-drain output port Connection with CS side, if the NMOS gate input low, N1 off, then CS high termination, charging cut-off Voltage of 4.2V, TP5000 is a lithium ion battery. When the NMOS transistor gate input high, N1 turns on, then CS terminal is pulled down to GND, TP5000 is in shutdown mode.

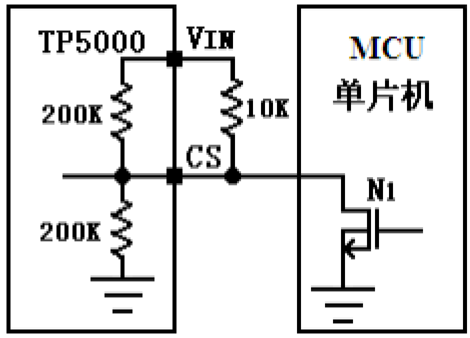


Figure 4 controlled by external 4.2V lithium-ion battery state Switching state and stop state

3.6V lithium iron phosphate battery charge status and stop status Switch. As shown, if the gate of NMOS output 5 Into low, N1 off, then CS end vacant, filled Power cut-off voltage of 3.6V, TP5000 lithium iron phosphate Battery. When the NMOS transistor gate input high, N1 guide Tong, CS terminal is pulled down to GND, TP5000 is in shutdown mode.

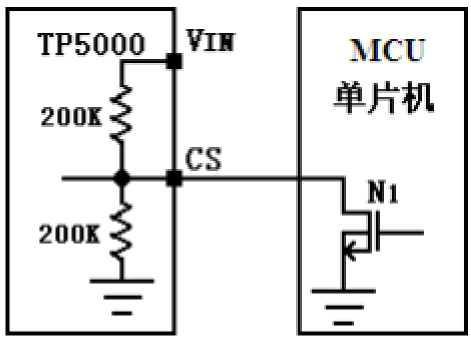


Figure 5 lithium iron phosphate battery charge status by external control Switching and stopping state

Charge current setting

Battery charging current I_{BAT}, detected by the external current Resistance R_S determined by adjusting the threshold across the resistor R_S The ratio of the voltage V_S and the constant current charging is determined, constant The state of the voltage across R_S is 100mV.

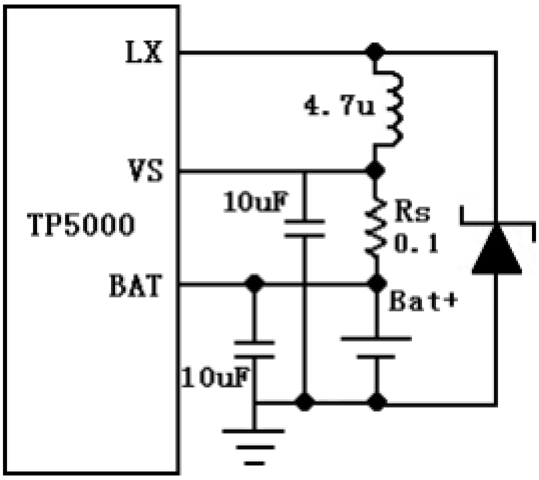


Figure 6 battery charging current setting

Setting resistor and the charge current using the following formula to calculate the

$$R_S = \frac{0.1\,V}{I_{BAT}}$$ (Current Unit A, resistance units Ω)

Example:
Need to set the charging current is 1A, was brought into the equation
$R_S = 0.1\ \Omega$
Table 2 shows some different settings corresponding to the current power-R_S Resistance, needed to facilitate rapid design circuit.

Table 2: R_S its corresponding constant charging current

R_S (Ω)	I_{BAT} (mA)
1	100
0.2	500
0.1	1000
0.067	1500
0.05	2000

Trickle pre-charge current setting

If the battery voltage is below the precharge threshold voltage, TP5000 will launch a pre-charging the battery charge Electrical, TP5000 precharge current can TRICK Port settings. Precharge current is the use of a connection TRICK resistor between pin and ground to set the device.

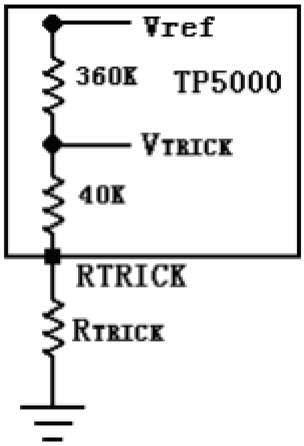


Figure 7 TRICK side view of the internal circuit diagram

From Figure 7 it can be seen that if R_{TRICK} port Voltage is directly proportional to the ground, resulting resistor divider is pre-Trickle charging with constant charge current ratio. So prefilled Electrical current is constant current charging current of 1/10. This pin is only more Changes trickle current, shutdown current is not affected by this, still 10% constant current.

Setting resistors and pre-charge current using the following formula to calculate the

$$R_{TRICK} = \frac{400k\, I_{TRICK} - 40k\, I_{BAT}}{I_{BAT} - I_{TRICK}}$$

In order to facilitate customers to quickly design, Table 3 shows the relationship R_{TRICK} and set precharge current and the constant trickle of current IBAT

Table 3: R_{TRICK} and set trickle current relationship with constant current I_{BAT}

R_{TRICK} (k)	I_{TRICK} (mA)
0	10% I_{BAT}
50k	20% I_{BAT}
114k	30% I_{BAT}
320k	50% I_{BAT}
Pin floating	100% I_{BAT}

Charge Termination

Constant phase, when 1/10 of the maximum charge current drops constant value, the charge cycle is terminated. This condition is achieved by using an internal filter of the comparator to monitor the voltage drop across R_S detection. When the voltage across R_S time difference to less than 10mV t_{TERM} (typically 1.8ms), charging is terminated. Charging current is switched off, TP5000 into standby mode, when the input supply current drops to 170μA, the battery drain current outflow of approximately 4uA.

In standby mode, TP5000 on the BAT pin voltage is continuously monitored. If lithium-ion battery that pin voltage falls below the following 4.05V (lithium iron phosphate battery voltage drops to 3.45V) recharge limit switches V_{RECHRG}, the new The charge cycle begins and the supply current to the battery again.

Charging status indicator

TP5000 has two open-drain status outputs, CHRG and STDBY. When the charger is charging, CHRG is pulled low, in other states, CHRG is high impedance. When the battery temperature is outside the normal temperature range, CHRG and STDBY output pins are high impedance. When not status indicator, you can not pin is connected to ground

Table 4: indicates the state of charge

Green light STDBY	Red light CHRG	State of charge
Off	On	Charging status
On	Off	Fully charged
Off	Off	Voltage, battery temperature is too high, too low, or no battery access fault state (TS end use)
Green light, red light flashes F = 0.5-2S		BAT termination 10u capacitor, battery standby state (TS Ground)

Battery over-temperature protection

To prevent overheating damage caused by low batteries or, TP5000 integrated internal battery temperature detection circuit. Battery temperature is detected by measuring the voltage achieved pin TS, TS pin voltage is within the cell by the NTC thermistor and a resistor divider network implementation, shown in Figure 8. TP5000 with the TS pin voltage inside the chip and two thresholds V_{LOW} and V_{HIGH} compared to confirm whether the battery temperature exceeds the normal range. In TP5000 inside, V_{LOW} is fixed at 45% × V_{CC}, V_{HIGH} is fixed at 80% × V_{CC}. If the voltage $V_{TS} < V_{LOW}$ or $V_{TS} > V_{HIGH}$ TS pin, the battery temperature is too high or too low, the charging process will be suspended; If the TS pin voltage V_{TS} in V_{LOW} and V_{HIGH} Between the charge cycle continues. If the pin is connected to ground TS, battery temperature detection function will be disabled.

Example: room temperature 25℃ RNTC = 10k, set protection temperature 60℃, under 60℃ RNTC = 3k, then the calculated R = 3.6k when, NTC resistor divider ratio of 45% supply voltage, which stops at 60℃ TP5000 charging.

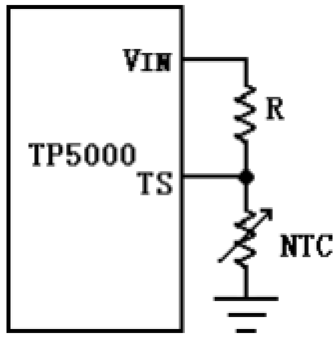


Figure 8 NTC connection diagram

Chip thermal limiting

If the die temperature attempts to rise to about 145℃ defaults above, then an internal thermal feedback loop will reduce the charge current setting. This feature prevents overheating TP5000, and allows users to raise the ceiling for a given circuit board without the power handling capability of the risk of damage TP5000. In ensuring the charger will automatically reduce the current under worst-case conditions premise according to a typical (but not the worst case) the ambient temperature to set the charge current.

Limiting and output short circuit

TP5000 integrates a variety of protection, the chip inputs limiting the maximum peak current 3.5A, to prevent chip damage due to excessive current. When the output terminal voltage drops below approximately 1.2V, the chip enters short circuit protection mode, the chip input current limit is 10% of the maximum peak current of about 350mA. With the current size of the different input voltage differences.

Undervoltage lockout

An internal undervoltage lockout circuit monitors the input voltage and under-voltage lockout rose before Vin limit above the door keeps the charger in shutdown mode. UVLO circuitry will keep the charger in shutdown mode, the battery is no discharge current. If the UVLO comparator transitions, then rose before VIN voltage 50mV higher than the battery charger will not exit shutdown mode. So that customers do not have to worry about the power situation in the input battery power is insufficient relief.

Automatic restart

Once the charge cycle is terminated, TP5000 taken immediately

With a 1.8ms filter time ($t_{RECHARGE}$) has a comparator to BAT pin voltage continuous monitoring. When the battery voltage drops below 90% of the battery capacity, the charging cycle begins again. This ensures that the battery is maintained at (or near) a full charge. In the process of recharging cycle, CHRG pin output re-enter a strong pull-down state

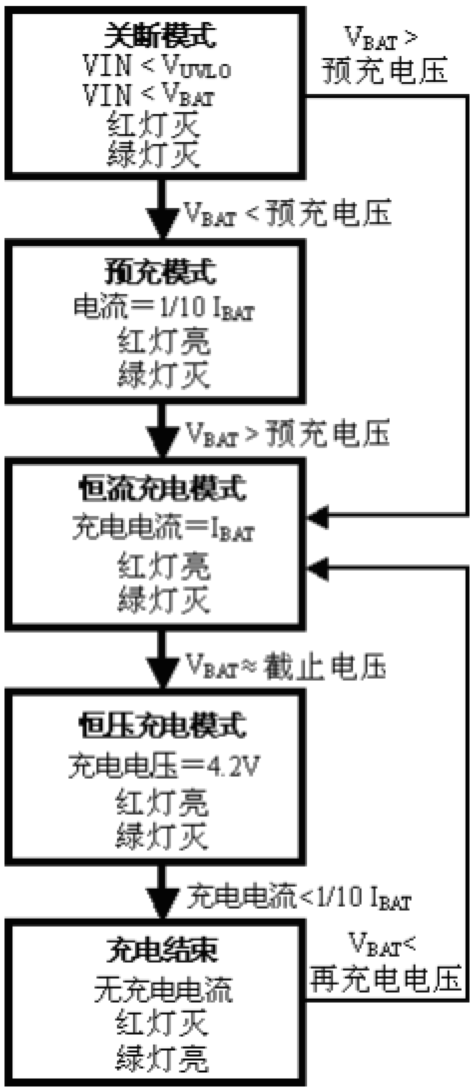


Figure 9 A typical lithium-ion battery charging cycle state diagram

White LED Driver

TP5000 can be designed to operate at 4.2V lithium battery charge mode, using two input strings lithium battery (8.4v) batteries, or 4 strings as input (6v), output directly drives WLED, because the white LED is turned around 3.6V operating voltage, this when in constant current stage. TP5000 can provide single or multiple pieces of parallel white LED white LED efficient, stable drive current, and a 4.2V output voltage limiting protection. Adjust the drive current in accordance Rs settings, you can drive 0.5W-7W white LED.

Input, output, VS terminal capacitance

You can use various types of capacitors, but requires high-quality power capacitors. In particular, when the multilayer ceramic capacitor must be used with caution, some types of ceramic capacitors have the characteristics of high EMI value, therefore, under certain conditions (such as the charger input is connected to a working power source) are likely to generate a high voltage transient state signal damage to the chip, recommended 10uF tantalum or ceramic capacitors with X5R or X7R level, if you want to use electrolytic capacitors, you need plus a 0.1uF ceramic bypass capacitor, and be sure to link location close to the chip pin.

Thermal Considerations

Although small QFN16 package dimensions, but its good thermal characteristics, however, need PCB version of the design with the best thermal design using a sophisticated PCB board layout to the most significant increase in the charging current can be used. Thermal path for dissipating heat generated from the IC chip to the lead frame and heat sink to reach the bottom of the chip through the PCB copper surface. Copper area connected to the pin should be as wide and extends out to larger copper areas to spread the heat to the surroundings. Recommend to the internal copper circuit layer or back pay more through holes, improve the overall thermal performance of the charger. When making the PCB layout design, other heat sources on the board has nothing to do with the charger also must be considered, because they will affect overall temperature rise and the maximum charge current has been affected.

Inductor Selection

To ensure system stability, the pre-charge and constant current charging phase, the system needs to ensure that work in continuous mode (CCM). According to the inductor current formula:

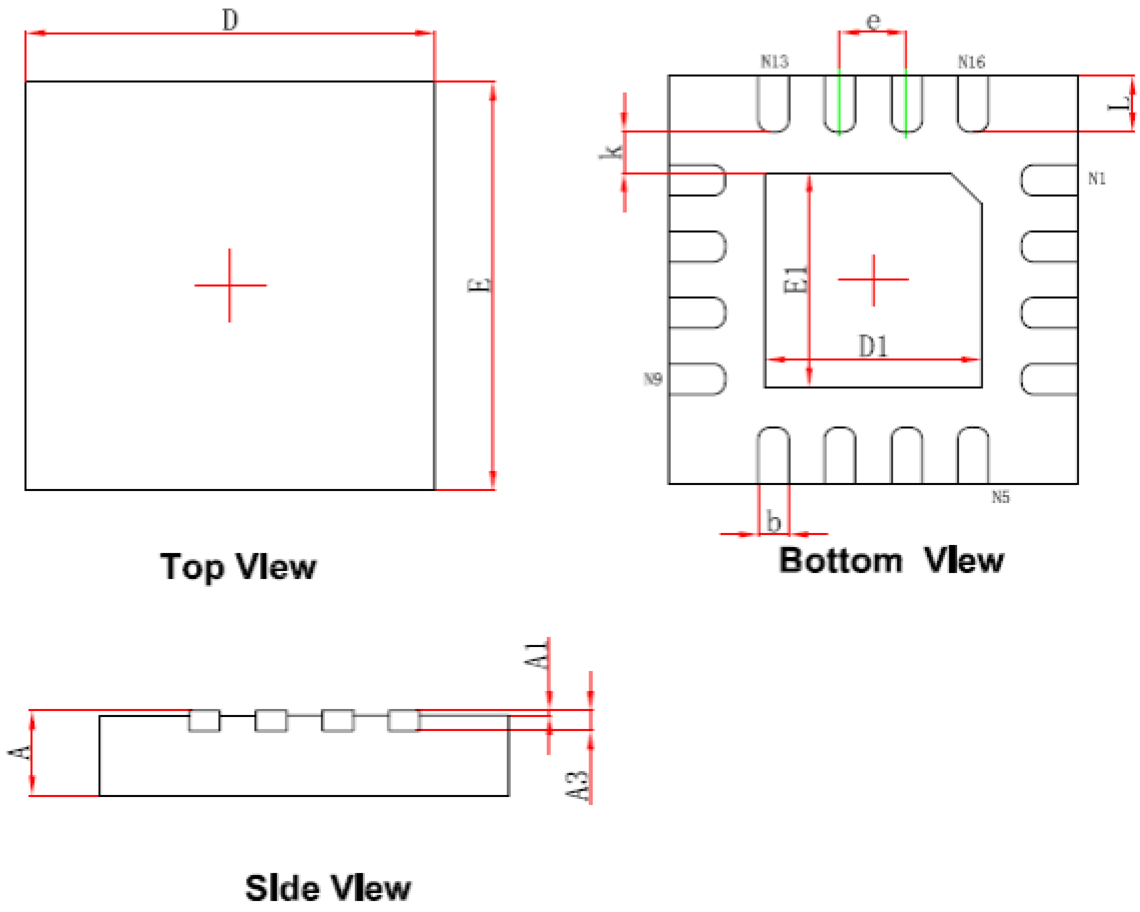
$$\Delta I = \frac{1}{L \times FS}\left(\frac{VIN - V_{BAT}}{VIN}\right) \times V_{BAT}$$

Wherein Δ I is the inductor ripple, FS is the switching frequency, in order to ensure both a precharge and a constant current charging mode is CCM, Δ I take the precharge current value is a constant current charge 1/5, based on the input voltage requirements the inductor value is calculated.

Inductance values 2.2uH-10uH, recommended recommended 4.7uH.

Inductive charging current is greater than the rated current selection, the resistance of smaller power inductors.

Package Description 4mm * 4mm 16-pin QFN package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	3.900	4.100	0.154	0.161
E	3.900	4.100	0.154	0.161
D1	2.000	2.200	0.079	0.087
E1	2.000	2.200	0.079	0.087
k	0.200MIN.		0.008MIN.	
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
L	0.450	0.650	0.018	0.026

封装	卷盘	只/盘	盘/盒	盒/箱	只/箱
QFN4*4	13 寸	5000	1	8	40000

TP5000 other application circuit

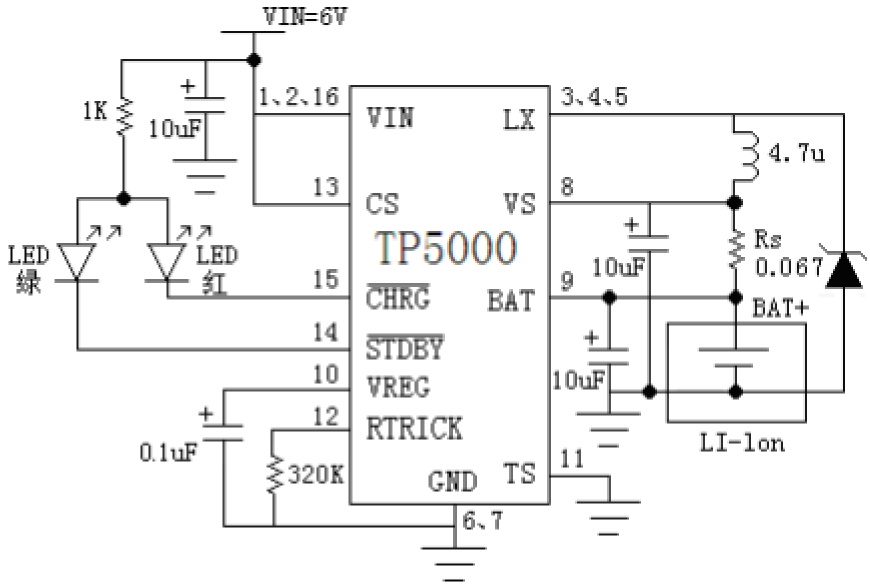


Figure 10 TP5000 is 4.2V lithium-ion battery temperature protection without battery trickle 0.75A 1.5A constant current charging application diagram (CS pin is tied high)

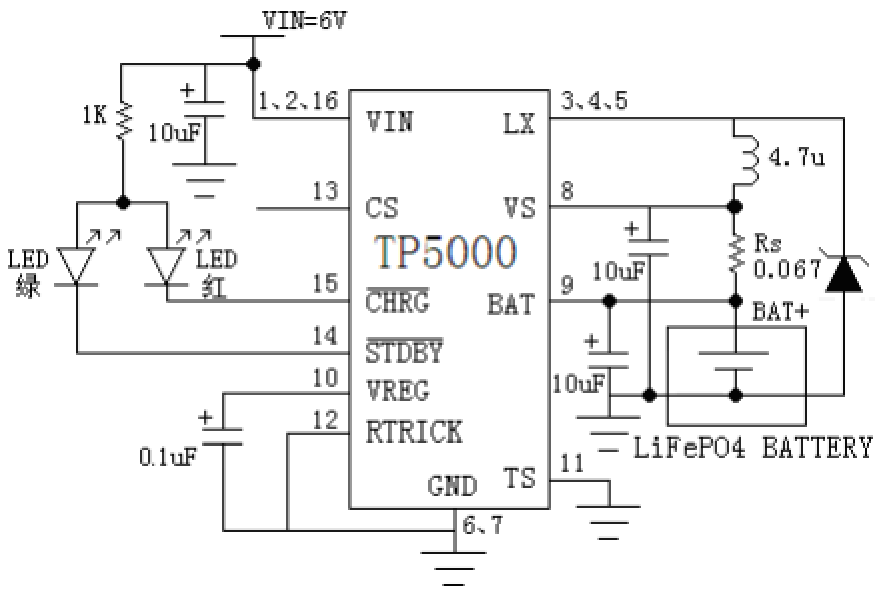


Figure 11 TP5000 lithium iron phosphate battery temperature protection 1.5A charge no application diagram (CS pin floating)

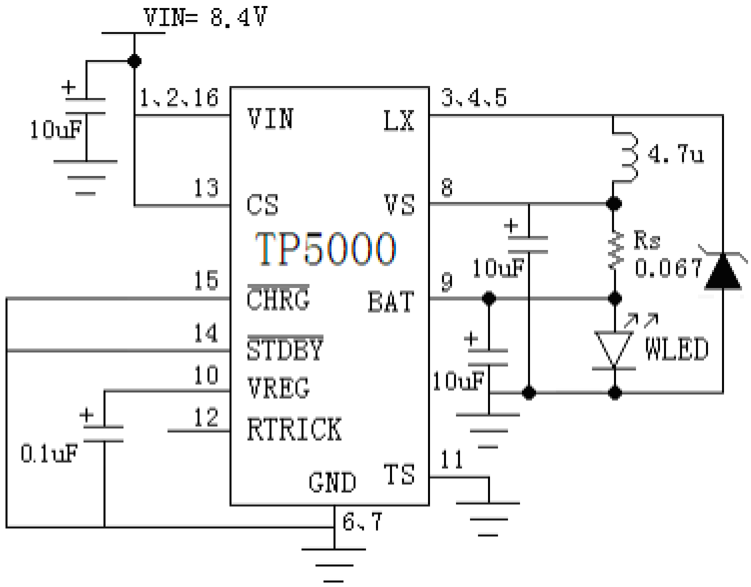


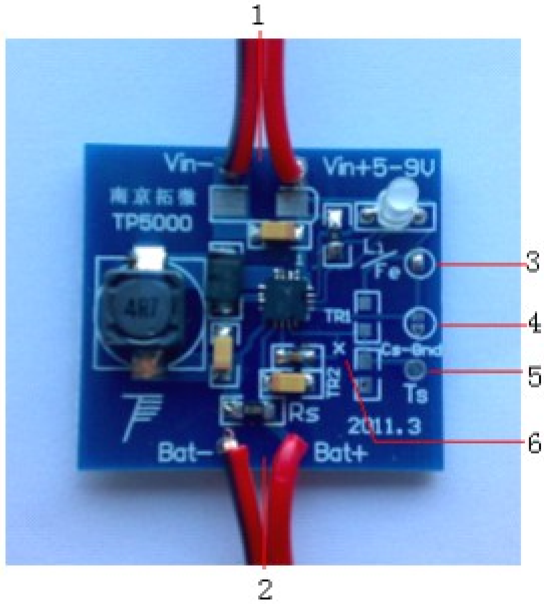
Figure 12 TP5000 pick two lithium drive 5W WLED application diagram (RTRICK pin floating)

TP5000 Precautions

1 circuit capacitance should be as close to the chip.
2. VS VIN end end end use tantalum capacitors with BAT, X5R or X7R ceramic capacitors or electrolytic capacitors level plus 0.1uF ceramic capacitor.
3 Inductance please use enough power inductor current capability.
4 optional conduction voltage drop Schottky diode small current capacity greater than or equal to 2A Schottky diode.
5 For the VIN and LX via current loop should be wider than normal traces the signal line.
6 Note that the location of each node capacitance grounding wire, grounding point should be focused on making good ground.
7 Using the chip work at a large current, the chip at the bottom of the heat sink should be considered a good connection with the PCB to ensure good heat dissipation.

TP5000 demonstration board circuits and instructions

Component	Model	Package	Quantity
Chip	TP5000	QFN16	1
Inductance	4.7uH		1
Tantalum	10uF	1206	3
Ceramic capacitor	0.1uF	0603	1
Schottky diode	S495		1
RS resistance	0.067 ohms or 0.1 and 0.2Ω	1206	1
LED current limiting resistor	1k	0805	1
Red and green common anode LED		3mm	1



TP5000 demo version pin and Port Description:

Input: Vin + Vin-(No. 1)
Output: Bat + Bat-(No. 2)
CS: 4.2V rechargeable lithium manganese default mode, CS pick Vin. Use (number 3) solder adhesion;
For 3.6V rechargeable lithium iron mode, CS vacant, you need to change (No. 3) to prohibit adhesions;
CS = GND shutdown mode, you need to (No. 3) prohibits blocking the (No. 4) adhesion to the pad.
Prohibited (No. 3) (No. 4) while blocking.
TS: The default is not used to detect temperature, TS = GND, for the use of the (No. 6) crossed wires cut at the customer RNTC resistance according to the size of the design divider resistors reserved TR1, TR2 two 0805 pads. TR1 is TS to Vin resistance, TR2 to TS to GND resistor.
RS: The default charge current 1.5A, chart resistance RS 1206 resistors. Customers can design their own changes as needed.
RTRICK: Grounding, the default precharge current is constant current of 10%.

Use Test Description:

Connect the power and the battery can be charged, charging the red light, green light charging is completed.

In the constant current charging phase ammeter in series can be positive terminal of the battery, the charging current is detected, ammeter large range file. Considering the ammeter resistance is not recommended in the final test battery is fully charged voltage mode ammeter in series. Resistance may cause the actual shut off the battery voltage is lower than the chip itself off voltage.

For driving white LED, simply adjust the appropriate current output (No. 2) Bat + Bat-white LED were connected to the positive and negative.

Attention to the selection of the Schottky diode reverse leakage current is less than 1uA, at the end of charge or standby batteries can leak through the Schottky diode reverse.

Reverse chip will not damage the battery, but the battery through the Schottky diode, inductor, RS shorted loop itself.

To replace the chip, we recommend using a heat gun, such as welding equipment.