circuit Product Overview

HT4936S monolithic frame is a new mobile power management chip, the use of advanced technology common charging and discharging port, and synchronous rectification, fewer external components, excellent performance, can form a good 1A-in / 1A-out 4LEDs mobile power .

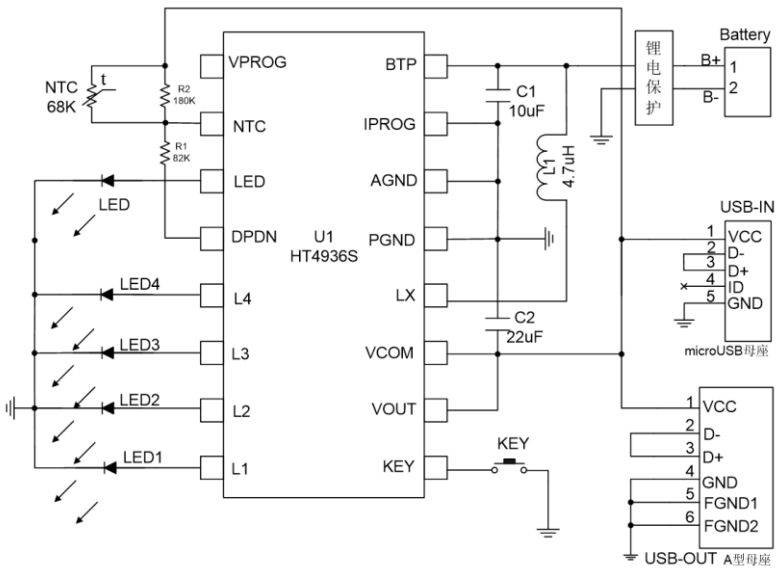
main feature

- 1A Built maximum linear charging mode, charging current is externally Transfer;
- trickle / constant-current / constant-voltage three-charge, 4.20V / 4.35V may Election, support 0V battery;
- built-in rechargeable automatically reduce the charging current according to temperature, 130 Degrees began to decline, the minimum can be reduced to 0;
- boost synchronous rectification circuit using a maximum efficiency of more than 90%, low heat generation, a fixed 5.1V output, no external resistor;
- boost output current 1A (BTP = 3.6V);
- have constant power output, a complete over-current, short circuit Protection, over-temperature thermal shutdown automatically stops the boosting;
- load inserted automatically start boost, remove the load off automatically sleep;
- four light indication manner, a more accurate indication of battery charge, while Includes a low battery alert function;
- apple provided having a D +, D- dividing resistors disposed port DPDN, comprising a port disposed NTC, safe temperature control system can be driven directly
- hand LED lamp drive current 50mA
- 1MHZ fixed switching frequency;
- battery overcharge, over-discharge protection;
- 4KV ESD;
- SOP16 package;

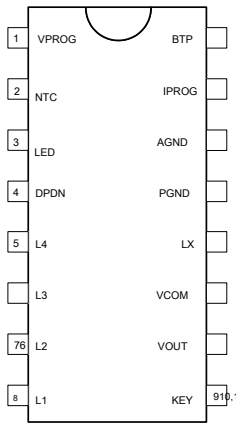
typical application

- various mobile power backup power lithium battery charger and battery indicator

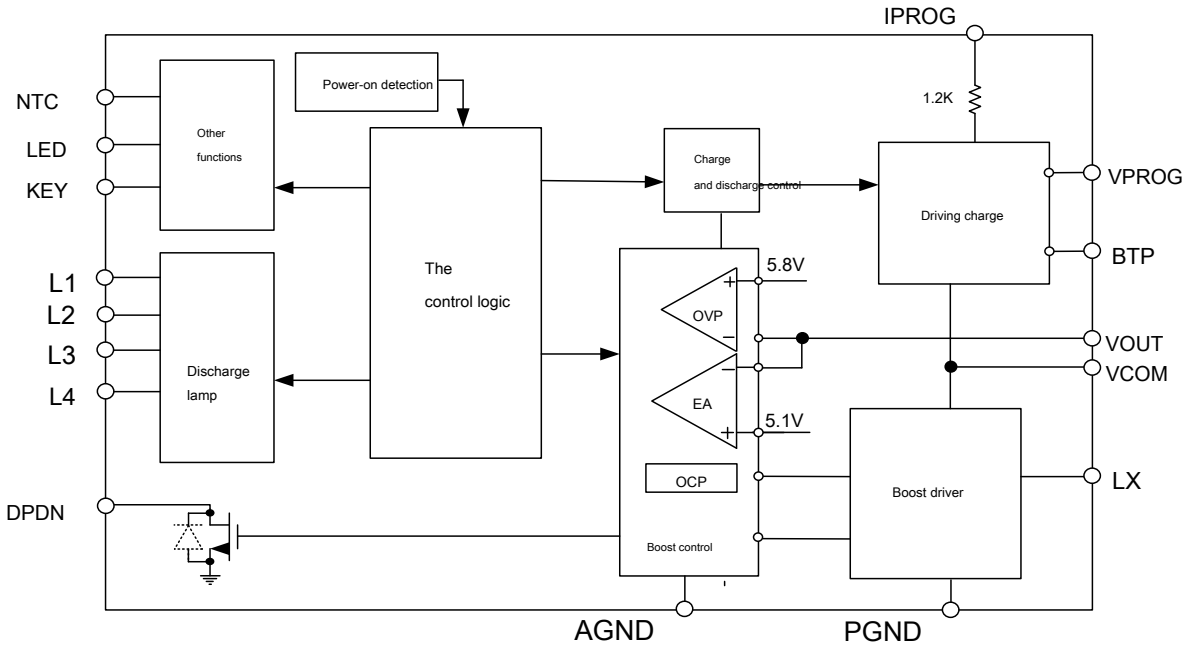
A typical application



Pin definitions

SOP16	Pin name Pin Number		Function Description
	VPROG	1	Select lithium (float 4.2V, 4.35V is shorted to ground)
	NTC	2	NTC resistor (this feature is not required when the pin receiving DPDN)
	led	3	Hand lamps
	DPDN	4	Pull-down side (can be driven DP, DN setting resistor)
	L4	5	Power indicator 4
	L3	6	Battery indicator 3
	L2	7	Power indicator 2
	L1	8	Battery indicator 1
	KEY	9	Function switch
	VOUT	10	Boost output sampling
	VCOM	11	Input / output terminal
	LX	12	Boost inductor end
	PGND	13	Power to
	AGND	14	Analog ground
	IPROG	15	Adjusting a charging current terminal (short to ground when the charging current 1A)
	BTP	16	Battery terminal

A circuit block diagram showing an internal configuration



Typical parameters

(Unless otherwise specified, all parameters are measured at room temperature to give, to the GND potential and the potential 0)

symbol	characteristic	Test Conditions	unit	Min	Typ	Max	
System parameters							
VIN	Input voltage range		V	4.5	5		6
Vbat	battery voltage		V	2.8			4.35
Charging parameters							
VIN Down prison Measurement	VIN From low to high	Vin> BAT	mV			100	
	VIN High to Low	Vin> BAT	mV			30	
Vfloat1	Float threshold voltage	(4.2 / 4.35 Pin floating)	V	4.158	4.20	4.242	
Vfloat2	Float threshold voltage	(4.2 / 4.35 Pin to ground)	V	4.30	4.35	4.40	
Ibat	BAT Current intrusion	Vcc = 3.5V , Vbat = 4.2V	uA			± 0.5	± 5
VTRKL	Juan constant flow	VBAT From low to high	V			2.8	
VTRHYS	Trickle charge voltage hysteresis		mV			100	
VUV	Vcc Undervoltage lockout threshold	Vcc From low to high	V			3.7	
VUVHYS	Vcc Undervoltage lockout hysteresis		mV			200	
VRECHG	Re-charge threshold voltage		V			4.1	
Vprog1	When trickle PROG Voltage		V			0.1	
Vprog2	Large current PROG Voltage		V			1	
FLED	Charging time led Flashing frequency		Hz			1	
Discharge parameters							
Vo	System output voltage boost		V	4.95	5.10	5.25	
VOVP	Output overvoltage protection		V			5.8	
VOVP_DIS			V			5.4	
VUVLO	Boost undervoltage protection	BAT High to low	V			2.8	
VUVLO_R	Boost voltage recovery	BAT From low to high	V			3.2	
IBAT1		Vout = 5.5V , No switching	mA			0.2	
IBAT2		Vout = 4.5V , switching mA				1	
FOSC	working frequency		MHz			1	
Iout	Output current	BAT = 3.6V, Vout> 4.8V	V			1.0	

Iauto_off	Automatic shutdown of the load current	BAT = 3.6V Cout = 22uF mA			50	
Ibtp	Quiescent Current	BTP = 3.6V	uA		15	40
OTP	Over-temperature protection		degC		150	
OTP_HYS	Sluggish		degC		30	

Charging

management module functions and parameters

1. The internal reference, when 4.20 / 4.35V pin floating, fully charged voltage of 4.20 V, when the ground, fully charged voltage of 4.35V

2. maximum charging current up to 1A (PROG when shorted to ground), requires less than the charge current of 1A, the PROG pin to the resistor Rch, Ich = 1200 / (Rch + 1200) (A)

3. The battery voltage is below 2.8V having a precharge function (current = Ich * 10%)

4. Support for 0V battery charge

The three-step charge: trickle, a large current, constant voltage charging, the battery may be filled to ensure

6. When the charging current decreases with increasing temperature, 130 ℃ begins to decrease when the temperature reaches 150 degrees, the charging current may be reduced to 0

Boost module

1. Synchronous rectification step, the maximum conversion efficiency of over 90%, the output voltage is fixed 5.1V

2.Vbat> 3.6V, the output voltage is not less than 4.8V with a carrier to provide an output capacity of more than 1A.

3. After the output current begins to drop the maximum voltage, over-current point decreases with the decrease of the battery voltage, high current equipment more compatible

4. After the output voltage of the overvoltage protection greater than 5.8V, when the output voltage drops to 5.4V, automatic recovery

The over-current protection and short circuit protection, by Plug load is automatically released, may be released by a switch

6. The switching frequency of 1MHZ, use of smaller inductance

7. Start the boost automatically detected load is greater than 10uA standby current, when the output load current is less than 50mA delay 8 seconds automatically enter standby mode may be started by the boost switch

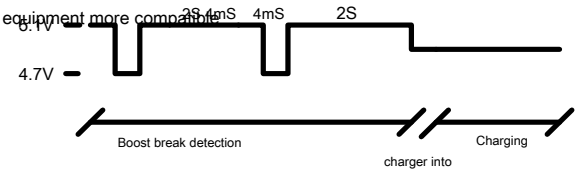
8. If the discharge process when the temperature reaches 150 degrees, the thermal protection turns off the output automatically goes to standby.

Put through charging

1. Support put through charging process, i.e., an external charger while charging the mobile phone, but also mobile power charging. If the mobile phone and then plug the charger plug the power supply first, the priority phone is fully charged; if the first mobile power plug adapter and then plug the phone, the mobile power full priority

2. Mobile power step process, resulting in the output of a cycle 2 seconds, the charge detection signal of the pulse width 4mS; when there is no charger is inserted in 4mS pulse, the output voltage is reduced to 4.7V, the outside is not inserted is determined charger. When the charger is inserted in 4mS pulse, the output voltage is greater than 4.7V, the charger determines inserted, the system automatically enters charge while discharge state.

3. If you remove the charger, then automatically start boost



Discharge lamp

1. The charging indicator lamp current charge Happy form a four, to define the indicator values into constant light amount;

2. The discharge lamp lit four-way indicates the current charge, the indicator is higher than the defined capacity value is extinguished;

3. If the battery voltage is below 3.2V discharge, the flicker L1, the voltage drops below 2.8V off; the battery voltage reaches a low to high 3.2V before, inserted or push switch load L1 flashes eight seconds, but will not start the boost.

Hand lamp control function

1. Double-click function can turn on flashlight constant light, hand lamp can be turned off again to double-click;

2. driven white light, no current limiting resistor, the maximum output current of 50mA;

NTC

1.NTC the battery may be controlled apparatus capable of operating temperature range;

2. due to the battery temperature by a thermistor, the NTC pin voltage is higher than 80% Vcom, that temperature over the operating range, to stop charging or boosting, when the pin is re NTC when less than 77% Vcom recovery ;

NTC pin 3. When the voltage is less than 45% Vcom, that temperature over the operating range, to stop charging or boosting, than when the NTC pin again return to work only 48% Vcom;

4. Take Suitable NTC element can be controlled to give the desired temperature range. When the NTC function is not required, please contact DPDN NTC pin, otherwise the system can not work stable

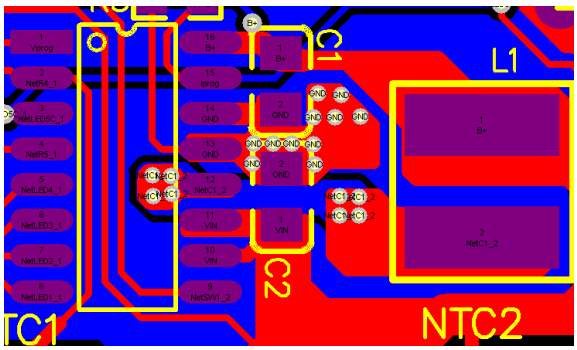
Discharge lamp status table

jobs mode	Built-in battery status (4.2V)	L1	L2	L3	L4
	BAT<3.2V 闪烁	提示 灭	灭 灭		
放电模式	3.2≤BAT<3.45V 亮	灭	灭		
	3.45≤BAT<3.65V 亮	亮	灭		
	3.65≤BAT<3.80V 亮	亮	灭		
	3.80≤BAT	亮	亮	亮	亮
充电模式	3.65≤BAT 浪涌	浪涌	浪涌	浪涌	
	3.65≤BAT<3.80V 亮	浪涌	浪涌	浪涌	
	3.80≤BAT<4.00V 亮	亮	浪涌	浪涌	
	4.00≤BAT<4.22V 亮	亮	亮	浪涌	
	4.22≤BAT	亮	亮	亮	亮
待机模式	-	灭	灭	灭	灭

工作模式	内置电池状态（4.35V）	L1	L2	L3	L4
	BAT<3.2V 闪烁	提示 灭	灭 灭		
放电模式	3.2≤BAT<3.60V 亮	灭	灭		
	3.60≤BAT<3.80V 亮	亮	灭		
	3.80≤BAT<3.95V 亮	亮	灭		
	3.95≤BAT	亮	亮	亮	亮
充电模式	3.80≤BAT 浪涌	浪涌	浪涌	浪涌	
	3.80≤BAT<3.95V 亮	浪涌	浪涌	浪涌	
	3.95≤BAT<4.15V 亮	亮	浪涌	浪涌	
	4.15≤BAT<4.35V 亮	亮	亮	浪涌	
	4.35≤BAT	亮	亮	亮	亮
待机模式	-	灭	灭	灭	灭

(注意上表中电压值，指的是充电或者放电过程中，芯片 BTP和AGND的电压)

PCB LAYOUT 参考



C1,C2 要紧靠芯片 2mm以内，并且到芯片管脚的

连线尽量短；为防止 L1 的热量影响芯片，L1 可稍 远点在 5-10mm左右，用粗线连接.

静电防护措施

CMOS 电路为静电敏感器件，在生产、运输过 程中需采取下面的预防措施，可以有效防止 CMOS 电路由于受静电放电影响而引起的损 坏：

1.操作人员要通过放静电腕带接地；

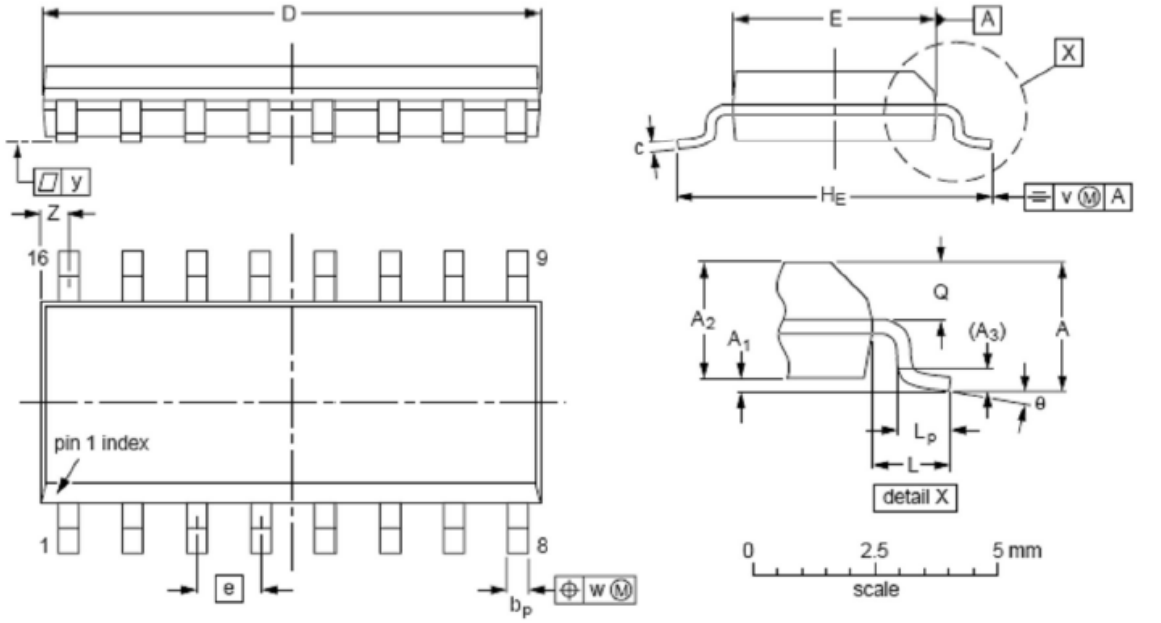
2.生产设备外壳必须接地；

3.装配过程中使用的工具必须接地；

4.必须采用半导体包装或抗静电材料包装或运 输。

封装信息

SOP16 封装外观图

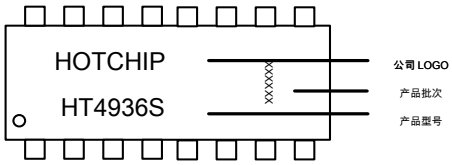


DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D(1)	E(1)	e	H_E	L	L_p	Q	v	w	y	Z(1)	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

器件标识与订购信息

器件标识与订购信息



封装形式 芯片	表面标识	采购器件名 称	包装形式	最小包装 数量
SOP-16 Pb-free	HT4936S HT4936S-C0	Panel mounting	3000PCS	

Important Notice

- China Chipsbrand reserved the right to change the specification, please describe the information to the core of China official website states prevail, without notice.
- The company does not issue related to industrial standards, the patent rights of third parties or caused by a circuit or a graph depicting responsible. The application circuit Examples of typical applications, its usefulness does not guarantee specific mass production.
- When the discrepancies and derivative products and the Wassenaar Arrangement or other international agreements, it may need to authorize the export of relevant government departments.
- Without any of the information described herein for other purposes copy or copies of the Company's license are published strictly prohibited.
- Information herein described in the Company's written permission is not obtained, the human body can not be used with related equipment, such as mechanical movement, with medical Equipment, security systems, gas equipment, or any apparatus installed in airplanes or other means of transport.
- Although the company tried to improve product quality and reliability, but the product of the failure or malfunction inevitable. Therefore, the use of the product the customer must be Careful safety design, including redundancy, fire protection design, fail-safe to prevent any accidents, fires, or damage.
- Silan, I will be dedicated to provide customers with better products.