Description

HT3310 is a fully integrated motor driver control IC that integrates a lithium battery charging management module, motor driver module, motor freewheeling diodes, key gear control and multi-protection modules. Its standby current is only 5μA.

The chip delivers a maximum output current of 1.6A. For applications requiring higher current beyond 1.6A, an external PMOS transistor can be added to expand the driving capability.

HT3310 supports output control via single key click. Each click cycles the output : 50%→75%→100%→OFF.

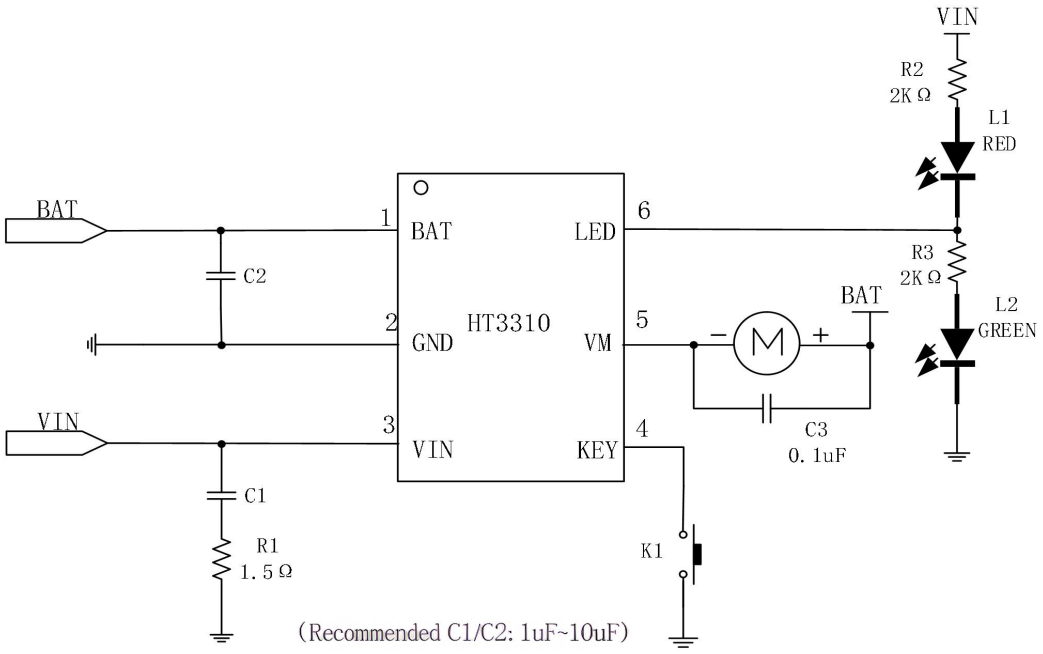
Applications

- **Electric shavers, hair clippers, facial cleansing devices, portable water pumps**
- **Electric toothbrushes, flashlights, desk lamps**

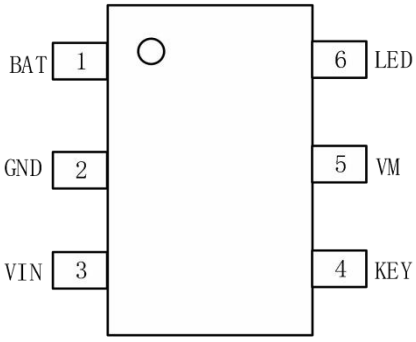
Features

- Built-in motor freewheeling diodes
- Continuous motor driving current: 1.6A
- Max peak current: 2.6A
- Supports external PMOS for higher drive current
- Charging current up to 0.5A
- Red LED on during charging; green LED on when fully charged
- Green LED on during discharge; green LED flashes under low battery
- 2.9V battery over-discharge protection
- Output over-current protection
- Thermal protection
- Single-click key control for power on/off
- Package: SOT23-6

Typical Application Circuit



Pin Configuration



SOT23-6

Pin Description

Pin No	SOT23-6	Description
BAT	1	Lithium battery connection terminal
GND	2	Ground pin
VIN	3	5V USB charging power input
KEY	4	Single-click control pin for output power switch
VM	5	Motor negative terminal
LED	6	Indicator pin for charging, discharging and low battery alert

Absolute Maximum Ratings (1)

Input Supply Voltage ..... -0.3V~6.0V

Voltage on Other Pins .....-0.3V~6.0V VM

Peak Current 2.6AVM

Continuous Current 1.6A

Operating Junction Temperature (TJ) ..... -25 ℃ ~ +125 ℃

Storage Temperature (TSTG) ..... -50 ℃ ~ +150 ℃

Operating Range

Power Dissipation 600mW

ESD (HBM) 2KV

(1) The device may be damaged if the IC operates beyond the absolute maximum ratings. Operation at absolute maximum ratings or any conditions exceeding the recommended operating conditions is not recommended. Continuous operation under absolute maximum rating conditions may degrade device reliability. Absolute maximum ratings are merely stress rating limits.

Electrical Characteristics

(Unless otherwise specified, VIN=5V, TA=25℃)

Parameter	Test Condition	Min.	Typ.	Max.	Unit
Input voltage range		4.5	5	6	V
Float charging voltage output		-	4.2	-	V
Constant charging current		-	0.5	-	A
Trickle charging current		-	0.2CC	-	mA
Trickle charging threshold voltage	VBAT Raising	-	2.8	-	V
Trickle charge hysteresis voltage		-	150	-	mV
Charging temperature limit		-	120	-	℃
Recharge threshold	Input 5V, VBAT Falling	-	4.05	-	V
Discharge Low Voltage Warning Threshold	BAT From high to low	-	3.2	-	V
Overvoltage protection voltage	BAT From high to low	-	2.9	-	V
Over-discharge release voltage	BAT From low to high	-	3.2	-	V
Output overcurrent protection current	HT3310	-	2.6	-	A
BAT standby current		-	5	-	uA
Output switch transistor internal resistance	BAT=4V, I=0.5A	-	200	-	mΩ
Discharge Overtemperature Protection Temperature	Limited to chip internal temperature	-	150	-	℃
Discharge Overtemperature Protection Hysteresis	Limited to chip internal temperature	-	30	-	℃

Functional Description

VIN Input Bypass Capacitor

When selecting a ceramic capacitor for the VIN input bypass circuit, special attention must be paid: due to their high Q-factor, ceramic capacitors may generate a high transient voltage signal during certain power-up conditions (e.g.), when VCC is connected to an active power supply), which could pose a risk of damaging the chip; therefore, it is recommended to connect a 2Ω resistor in series with the input ceramic capacitor to eliminate the startup transient voltage signal.

Charging process

HT3310 supports trickle charging, constant current charging, and constant voltage charging, as well as 0V battery charging. When the battery voltage falls below 2.8V, the chip operates in trickle charging mode, with the trickle charging current set at 0.2 times the constant current charging current; when the battery voltage exceeds 2.8V, the chip switches to constant current charging mode; when the battery voltage approaches 4.2V, the charging current gradually decreases; and when the charging current reduces to 0.1 times the constant current charging current, the charging process is completed.

Smart Recharging

When the battery is fully charged but the 5V input remains connected, the HT3310 will monitor the voltage at the BAT pin; when the BAT pin voltage falls below the recharging threshold voltage of 4.05V, the system will initiate a new battery charge cycle. This approach prevents unnecessary repeated charging of the battery and effectively extends its service life.

Over-temperature Protection (Chip Internal Temperature Only)

HT3310 integrates an internal thermal protection function. During charging, the IC will automatically reduce the charging current to stabilize the chip temperature when the internal temperature exceeds 120 ℃. When the motor is running, the output will be shut off once the internal chip temperature reaches 150 ℃; the output will be re-enabled after the temperature drops back to 120 ℃.

Over-Current Protection

The IC continuously monitors the continuous current at the VM pin. If the VM current rises to the over-current protection threshold IOD, the output will be turned off. After protection triggers, the user needs to press the key again to restart the output. The typical over-current protection threshold of HT3310 is 2.6A.

Application Information

Status Indicator LED

The red LED lights up during charging; the red LED turns off and the green LED stays solid on when the battery is fully charged.

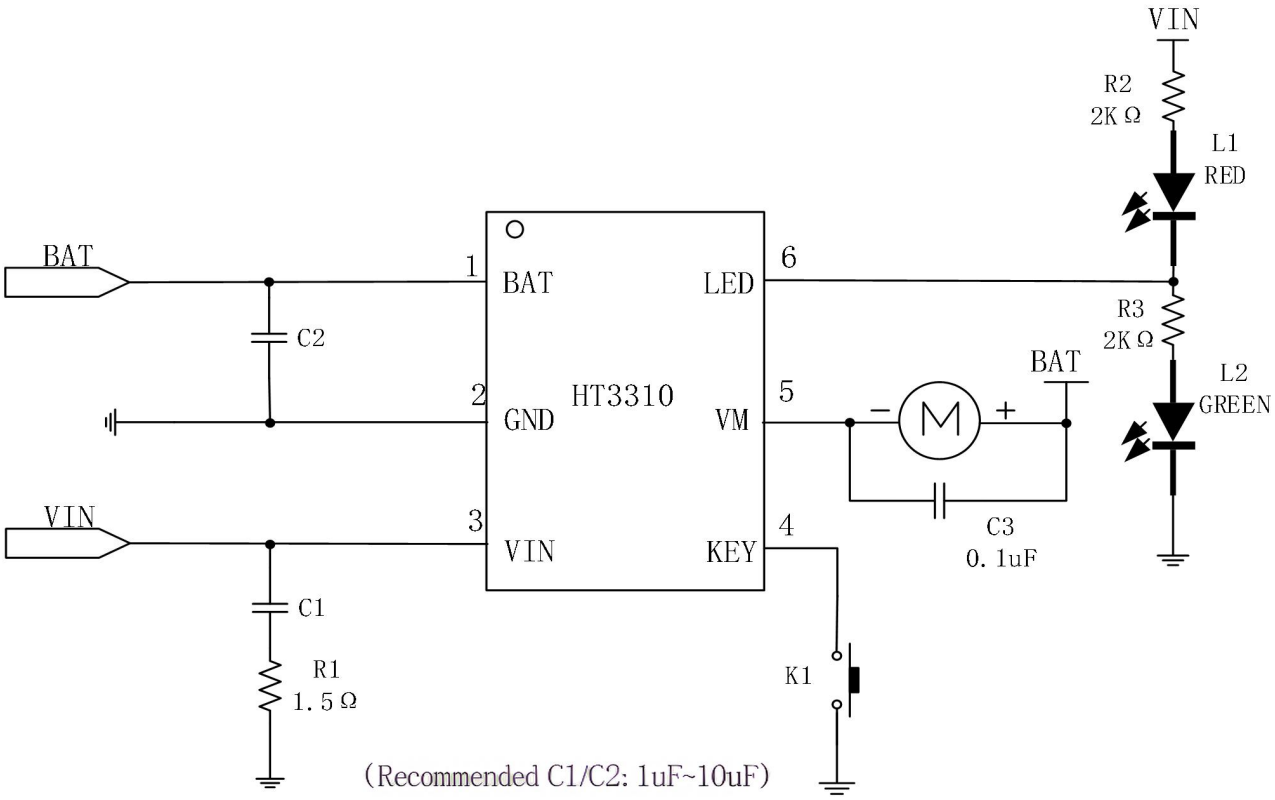
The green LED remains on during discharge. When the battery voltage drops below 3.2 V, the green LED flashes as a low-battery reminder until the output is shut down.

PCB Layout Recommendations

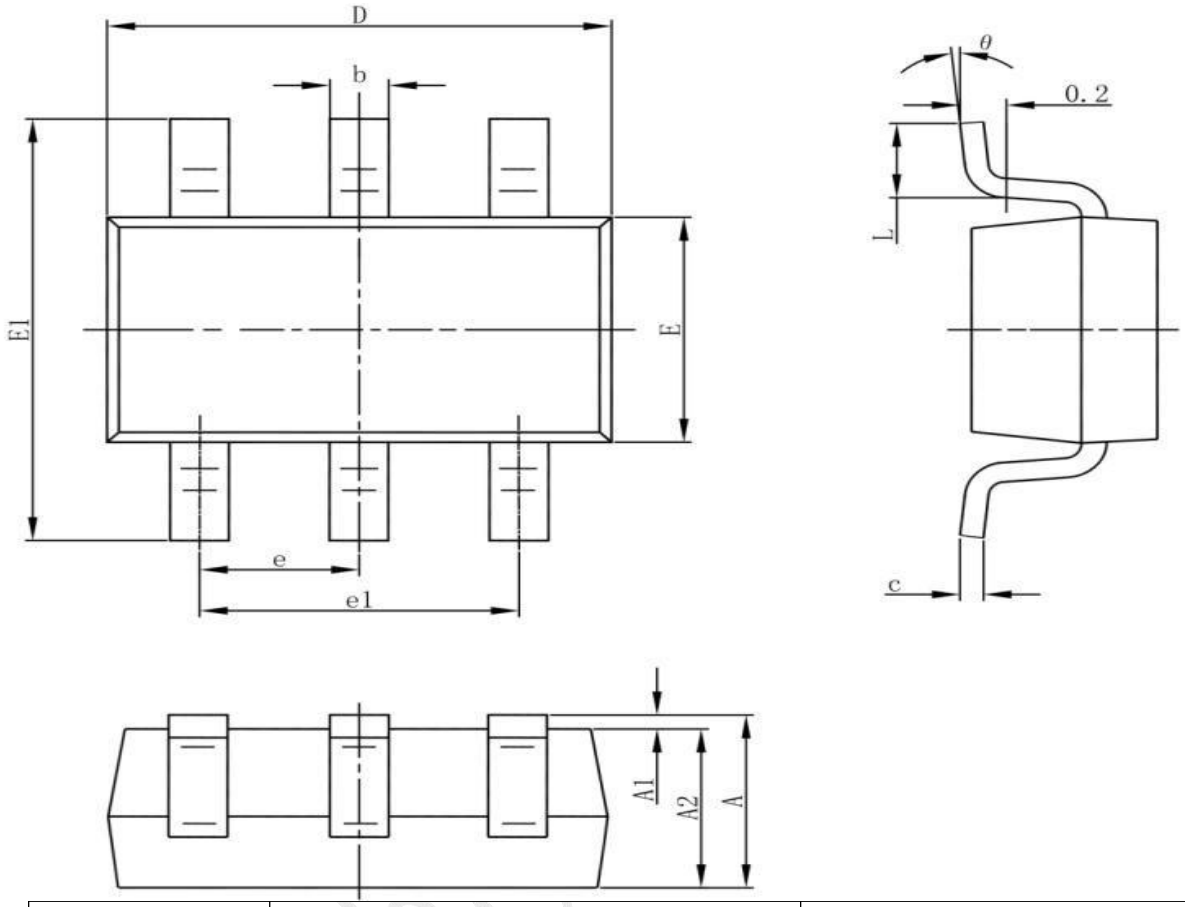
1. Place the BAT capacitor as close to the IC as possible, and keep the traces from the IC to both terminals of the capacitor short and wide.
2. Route the motor negative terminal as close to the VM pin of the chip as possible.
3. Use short and wide copper traces between the battery and the BAT pin.

Typical Applications

External MOS application (applications with drive current greater than 1.6A)



Package Size: SOT23-6



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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