Description

HCP5001 is a constant-current & constant-voltage charger IC with a built-in LDO. It offers battery charge & discharge protection mode is similar to the DW01. The input voltage can operate from 2.8V to 7V. Its package is DFN2*3 _8L. VIN can withstand ESD (HMB) pressure up to 6kV.

Features

- 7V voltage technology
- Battery reversely-connected protection
- Maximum input voltage : 7V
- Constant current charging :Small charge current is 30mA when Vbat<2.8V, otherwise,charge current is 300mA.
- Constant voltage charging :Charging in constant voltage mode when Vbat nearly approach 4.2V.
- Over temperature protection :charge IC and LDO be shutdown when IC's temperature over 150℃， hysteresis 30℃.
- Built-in LDO :controlled by SD signal, it will disable Vout if SD is pulled down for 3 seconds. Another pull-down for 3 seconds can enable Vout.
- Small Package : DFN2*3-8L

Ordering information

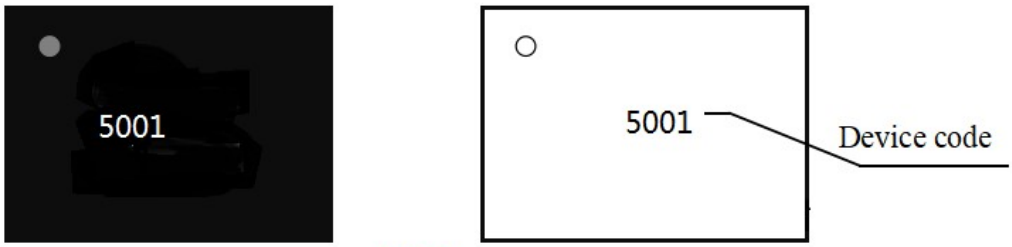

Fig.1

Device	package	MOQ
HCP 5001	DFN8L(02*03-0.75)	3000pcs/reel

Typical Application

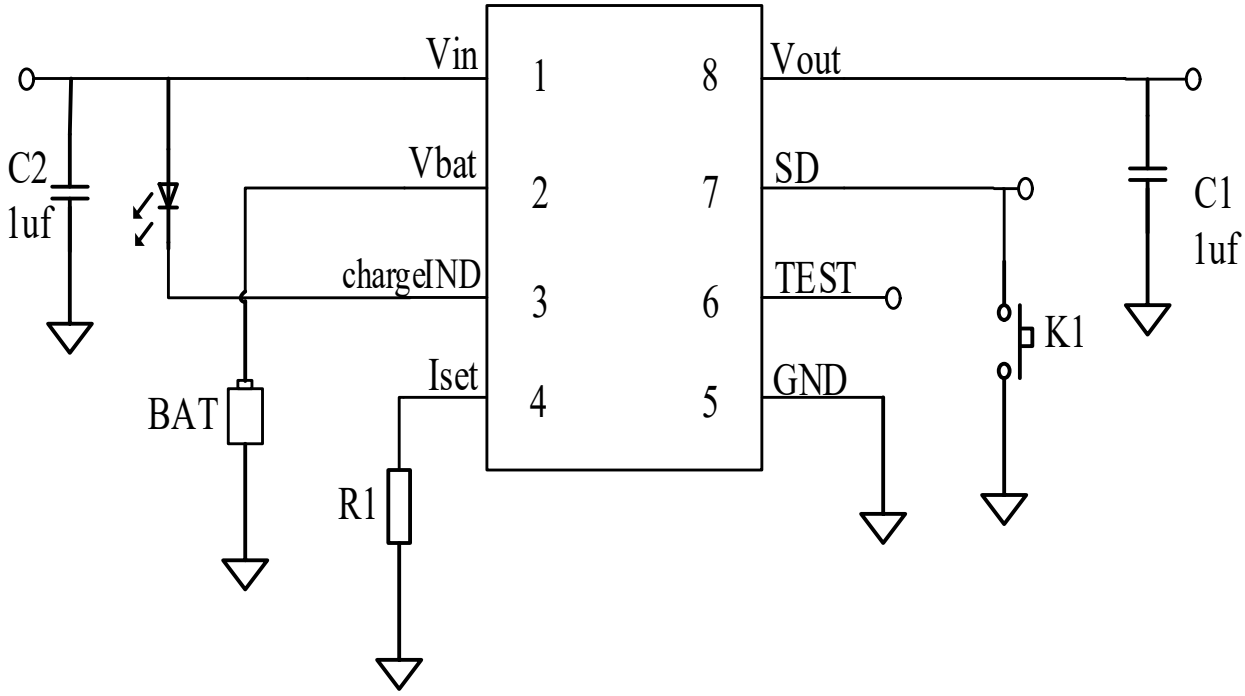

Fig.2 Typical application circuit

Pin Configuration and Function

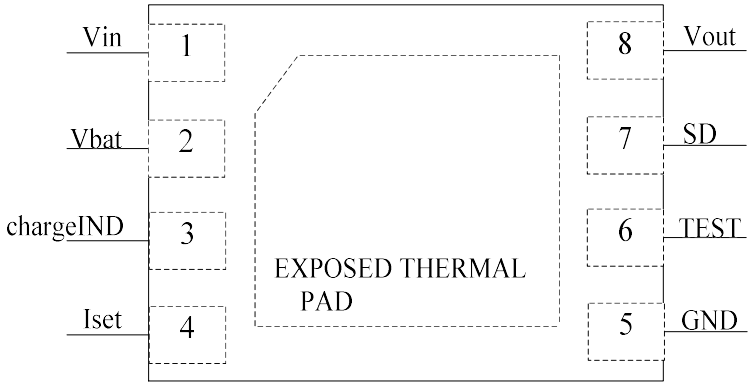

Fig.3 Pin configuration (Top view)

Table 1

NO.	Name	Symbol	Description
1	Input voltage	Vin	Power input pin (2.8~7V)
2	Battery	Vbat	Connect with Battery anode.
3	Charging indication	chargeIND	Open-drain output pin. In normal charging model, it can sink the current of 1mA.
4	Charging current set	Iset	Connect resistor to ground to setting charging current.
5	Ground	GND	Ground, the lowest voltage input pin.
6	Test acceleration	TEST	TEST pin connect to the GND，SD will select 50ms； normal work with the TEST pin is suspension（SD select 3 seconds）。
7	Shutdown	SD	SD is pulled up with 100K resistor. It will disable Vout if it is pulled down for 3 seconds. Another pull-down for 3 seconds can enable Vout.
8	Output of LDO	Vout	Vout=3.3V at Iload<300mA. The LDO can be powered by charger or battery.

Functional Block Diagram

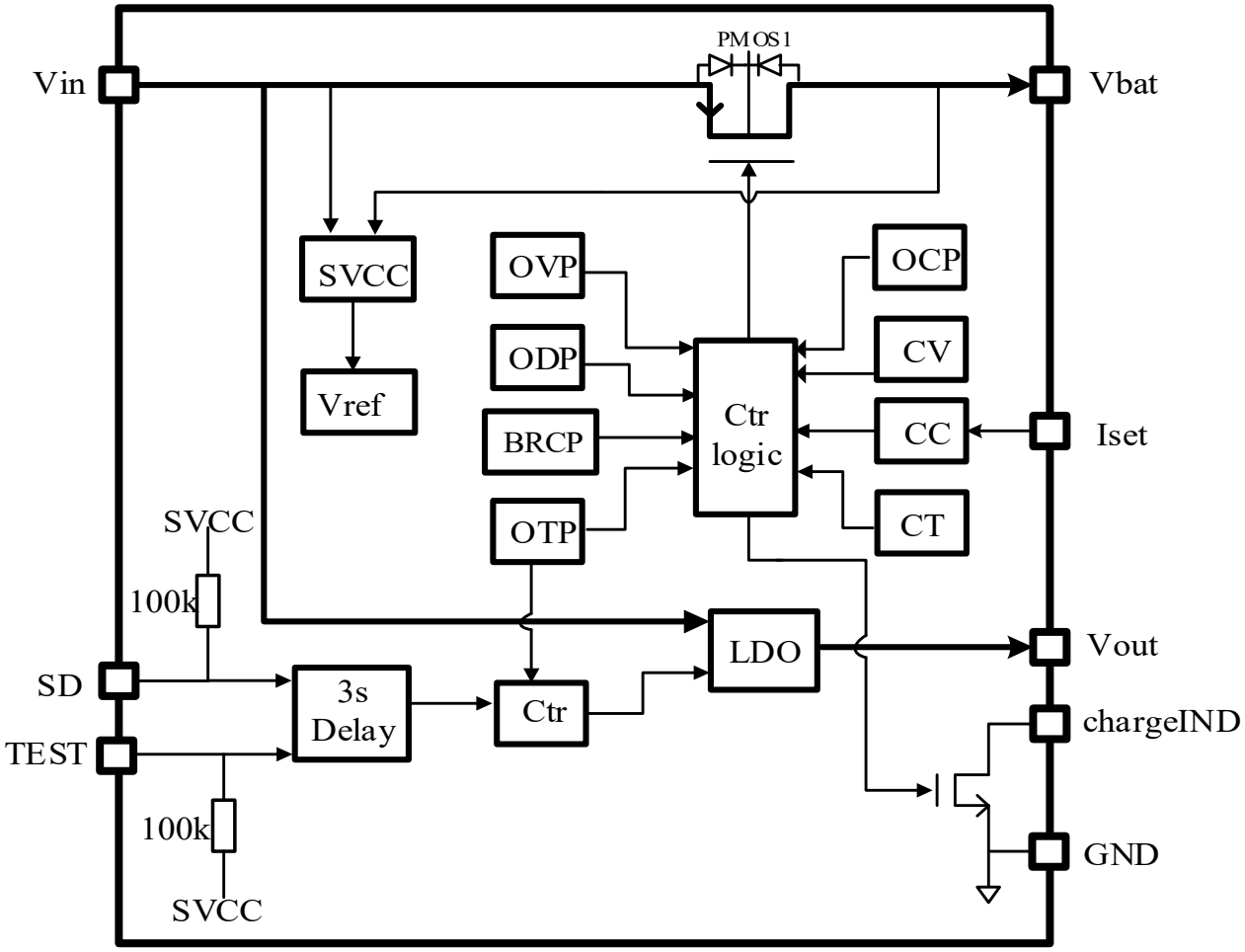

Fig.4

Absolute Maximum Ratings

Table 2

Parameter	Symbol	Value	Unit
Input voltage (IN pin)	Vin	2.8~7	V
Output voltage (OUT pin)	Vbat	4.2	V
Junction temperature	T_J	150	℃
Storage temperature	Tstg	-55 ~ 150	℃
ESD Ratings	HBM	±6000	V
	MM	±200	V

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute

Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Recommend Operating Conditions

Table 3(Ta=25℃, unless otherwise noted)

Parameter	Symbol	Value	Unit
Input voltage	Vin	2.8 ~ 7	V
Output current（Vbat pin）	Iout,bat	0.3	A
Output current（Vo pin）	Iout,ldo	0.3	A
Output voltage (Vbat pin)	Vout,bat	4.2	V
Output voltage (Vo pin)	Vout,ldo	3.3	V
Ambient operating temperature	Topr	-40 ~ 85	℃

Electrical Characteristics

Table4

Parameter	Symbo	Test conditions	Min	Typ	Max	Unit
Linear Charger						
Max Charger Current	$I_{charger\_max}$	V_{bat}>2.8V		300		mA
Trickle charger Current	$I_{Trickle\ charger}$	V_{bat}<2.8V		30		mA
Charger finish	V_{bat_full}		4.21	4.25	4.29	V
LDO(powered by Vin)						
Output voltage	Vout	Iout=50mA	3.26	3.3	3.34	V
Output current	I_{out}			500		mA
Dropout voltage	Vdrop	Iout=500mA		0.35		V
LDO(powered by Vbat)						
Output voltage	Vout	Iout=50mA	3.26	3.3	3.34	V
Output current	I_{out}			300		mA
Dropout voltage	Vdrop	Iout=300mA		0.42		V
SD key						
Power on time	Ton			3		s
Power off time	Toff			3		s
Power off current	Iss,off				3	uA
Over-Temperature-Protection (OTP)						
OTP threshold				150		℃
OTP hysteresis				30		℃

Function Description

1、 **Trickle-current(TC), Constant-current(CC) & Constant-voltage(CV) charging:** HCP5001 can work in TC mode, CC mode or CV mode when charging. When the battery voltage is less than 2.8V, the chip works in TC mode, the charging current is one-tenth the setting value. When the battery voltage is greater than 2.8V but less than 4.2V, it works in CC mode, the charging current is the value set by R1. When the battery voltage is near 4.2V, it works in CV mode, the charging current will decrease.

2、 **Charge current setting:** The charging current set by R1（refer to typical application circuit）is given with:

$$I_{charge} = \frac{3}{R1} \text{ X1000 (A)}$$

3、 **Constant-temperatre (CT):** If the temperature of the chip rises near 120℃, the charging current decreases automatically, so that he temperature of the chip can be kept about 120℃.

4、 **Over-charging Protection(OVP), Over-discharging Protection(ODP) & Over-current Protection(OCP):** If the battery voltage is greater than 4.25V and with a charger, the chip enters over-charging mode. The charging loop turns off. If battery voltage is less than 2.8V and without a charger, the chip enters over-discharging mode. The discharging loop circuit turns off. The over-current protection turns on when discharging. These functions can be regarded as a built-in DW01.

5、 **Battery reversely-connected protection(BRCP):** It is disaster if battery is reversely connected. Anyway, HCP5001 can not be destroyed. HCP5001 can recover to work while battery is correctly connected. The feature is effective only without charger when the battery is reversely connected.

6、 **Over-temperature Protection(OTP):** When the temperature of the chip is over 150℃, the charger and LDO will be shutdown. When the temperature of the chip is under 120℃, he charger and LDO will be on again.

7、 **LDO power supply:** The LDO can be powered by charger or battery. The power supply will switch between charger and battery automatically.

8、 **Power Disable Function:** SD is pulled-up with 100K resistor. If it is shorted to ground for 3 seconds, Vo is disabled and LDO is shut down. The leakage current through BAT is less than 3uA. It can be used for system deep shutdown. After it is re-shorted to ground for 3 seconds, Vo are recovered.

9、 **Power path:** A valid charger can provide power to battery and LDO; without a charger, the battery can provide power to LDO and VIN pin; with a charger and shutdown, LDO is disabled and charger is working; without a charger and shutdown, the LDO and VIN are disabled.

Package Outline

DFN8L（0203-0.75-0.50）

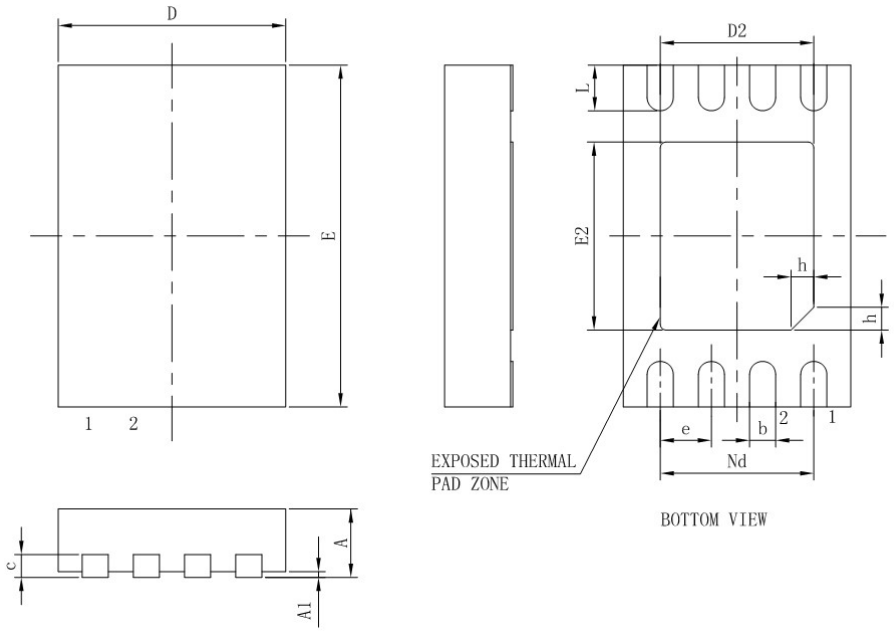

Fig. 5 Package outline

Table 6（Unit：mm）

Symbol	Min	Type	Max
A	0.70	0.75	0.80
A1	-	0.02	0.05
b	0.20	0.25	0.30
c	0.18	0.20	0.25
D	1.90	2.00	2.10
D2	1.40	1.50	1.60
E	2.90	3.00	3.10
E2	1.50	1.60	1.70
e	0.50BSC		
Nd	1.50BSC		
L	0.30	0.40	0.50
h	0.20	0.25	0.30