Low Power Temperature Switch IC

CN10 Series

General Description：

The CN10 devices are temperature switch IC, which monitors a temperature window formed by Lower Trip Point(T_L) and Upper Trip Point(T_H).
Two output pins offer a CMOS output (OUT1) and an open-drain output (OUT2). When the measured temperature is beyond the trip point window, the OUT1 and OUT2 become low after a delay time t_D.
There are five trip points available as shown in Section of Ordering Information. Trip points are set at the factory and can be set to any other desired temperature. For applications that require different trip points, contact your sales representative.
CN10 devices are available in 6-pin SOT-23 package.

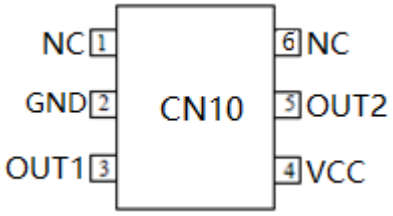
Applications:

- Battery Charging
- Battery Thermal Protection
- Consumer Electronic
- Electric Fans
- Telecom and Computers

Features：

- Input Voltage Range：1.8V to 6.5V
- Operating Current：4uA@VIN=3.7V
- 2 Outputs: CMOS Output and Open-Drain Output
- The Monitored Temperature Window Formed by Lower Trip Point(T_L) and Upper Trip Point(T_H)
- Fixed Trip Point Hysteresis
- Operating Temperature ：－40℃ to 125℃
- Available in 6-Pin SOT-23 Package
- Lead-free, rohs-Compliant and Halogen Free

Pin Assignment



Typical Application Circuit:

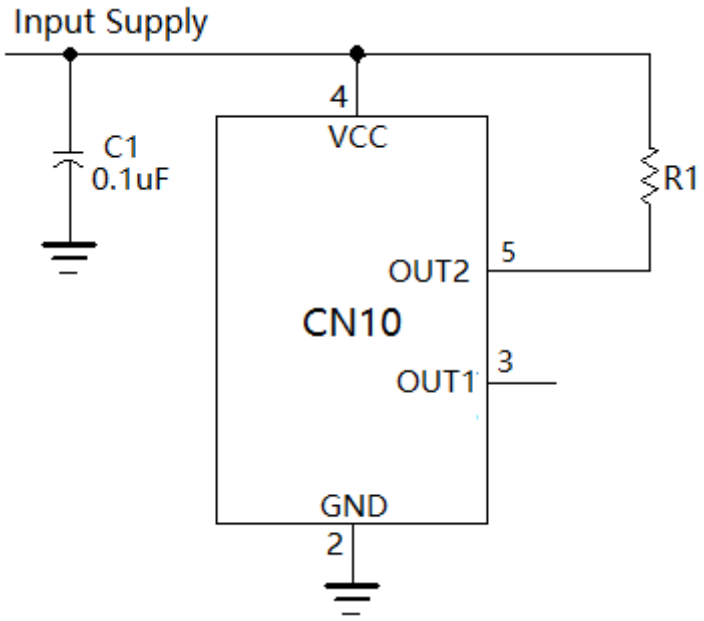


Figure 1 Typical Application Circuit

Ordering Information:

Part No.	Package	Shipping	Trip Points
CN10A	SOT-23-6	Tape and Reel, 3000/reel	T_L=0℃, T_H=45℃
CN10B	SOT-23-6	Tape and Reel, 3000/reel	T_L=0℃, T_H=55℃
CN10C	SOT-23-6	Tape and Reel, 3000/reel	T_L=0℃, T_H=60℃
CN10D	SOT-23-6	Tape and Reel, 3000/reel	T_L=－10℃, T_H=60℃
CN10E	SOT-23-6	Tape and Reel, 3000/reel	T_L=－15℃, T_H=125℃

Pin Description:

No.	Symbol	Description
1	NC	**No Connection.**
2	GND	**Ground.** The negative terminal of input supply.
3	OUT1	**CMOS Output.** When the chip's temperature is over the upper threshold T_H or below the lower threshold T_L after a delay time t_D, OUT1 becomes low. When the chip's temperature is between T_L and T_H after a delay time t_D, OUT1 outputs high.
4	VCC	**Positive Terminal of Input Supply.** CN10's internal circuit is powered by this pin.
5	OUT2	**Open-Drain Output.** A pull-up resistor is needed to pull OUT2 pin to a certain voltage level. When the chip's temperature is over the upper threshold T_H or below the lower threshold T_L after a delay time t_D, OUT1 becomes low. When the chip's temperature is between T_L and T_H after a delay time t_D, OUT1 pin is in high impedance state.
6	NC	**No Connection.**

ABSOLUTE MAXIMUM RATINGS

VCC Voltage……..…－0.3V to 7.0V
OUT1 Voltage…….....……－0.3V to VCC
OUT2 Voltage…….…….. －0.3V to VCC
Lead Temperature(Soldering, 10s).....…...260℃
Maximum Junction Temperature.....……...150℃
Operating Temperature Range.....－40℃ to 125℃
Storage Temperature…….....－65℃ to 150℃

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERICS：

(VIN = 3.7V, T_A＝－40°C to +125°C, Typical values are at T_A＝+25°C, unless otherwise noted)

Parameters	Symbol	Test Conditions	Min	Typ.	Max	Unit
Input Voltage Range	VCC		1.8		6.5	V
UVLO Threshold	V_{UVLO}				1.72	V
Operating Current	I_{VCC}		3	4	5	uA
Lower Trip Point	T_L	CN10A, Chip temperature falls	－3	0	3	℃
		CN10B, Chip temperature falls	－3	0	3	
		CN10C, Chip temperature falls	－3	0	3	
		CN10D, Chip temperature falls	－13	－10	－7	
		CN10E, Chip temperature falls	－18	－15	－12	
Hysteresis of Lower Trip Point	HYS_{TL}			5		℃
Upper Trip Point	T_H	CN10A,Chip temperature rises	42	45	48	℃
		CN10B,Chip temperature rises	52	55	58	
		CN10C,Chip temperature rises	57	60	63	
		CN10D,Chip temperature rises	57	60	63	
		CN10E,Chip temperature rises	121	125	129	
Hysteresis of Upper Trip Point	HYS_{TH}			6		℃
Delay Time	t_D		1.05	1.38	1.65	S
OUT1 Pin						
Output Logic Level	VOH	I_{SOURCE}=5mA			0.5	V
	VOL	I_{SINK}=5mA			0.3	
OUT2 Pin						
Output Logic Level	V_{OL}	I_{SINK}=5mA			0.3	V

Detailed Description：

The CN10 devices are temperature switches used to signal a microprocessor or microcontroller or other functional block in the event of an over or under temperature condition.in battery-powered applications that require accurate monitoring of a very specific temperature window from 0°C to 45°C (CN10A), 0°C to 55°C (CN10B), 0°C to 60°C (CN10C), –10°C to 60°C (CN10D), –15°C to 125°C (CN10E). This functionality is accomplished through the preset trip window.

The CN10 devices offer 2 outputs, one is CMOS output (OUT1 pin), the other one is open-drain output (OUT2 pin). When the chip's temperature is over the upper threshold T_H or below the lower threshold T_L after a delay time t_D, OUT1 and OUT2 become low. When the chip's temperature is between T_L and T_H after a delay time t_D, OUT1 outputs high, OUT2 is in high impedance state.

The preset trip points of temperature window are configured at the factory; for other trip points, contact a sales representative.

Application Information:

Input Voltage Range

The CN10 devices function well when the input voltage is between 1.8V to 6.5V. On-chip UVLO circuit will shut down the CN10 if input voltage falls below UVLO threshold (1.72V Max.).

Input Capacitor

A bypass capacitor is strongly recommended at VCC. An at least 0.1uF ceramic capacitor, placed in close proximity to VCC and GND pins, works well. In some applications depending on the power supply characteristics, cable length and loading type, it may be necessary to increase the capacitor's value. The capacitor's breakdown voltage should be higher than the maximum input voltage.

If large voltage spikes are present at input supply due to sudden loading change, etc., the circuit shown in Figure 2 is strongly recommended, in which resistor R2 and capacitor C1 forms a low-pass filter.

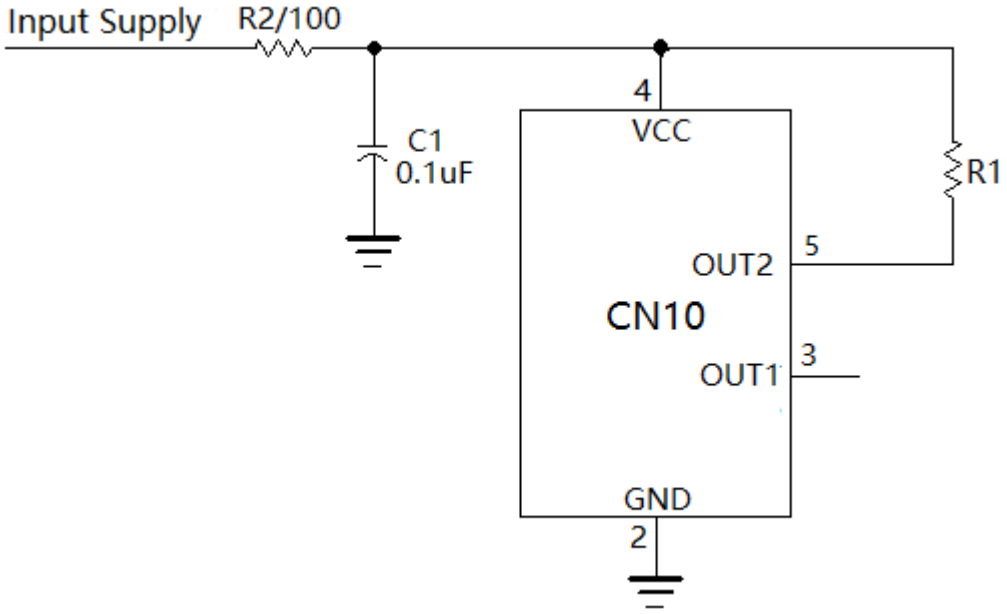


Figure 2 Application Circuit to Filter-out Input Supply Voltage Spikes

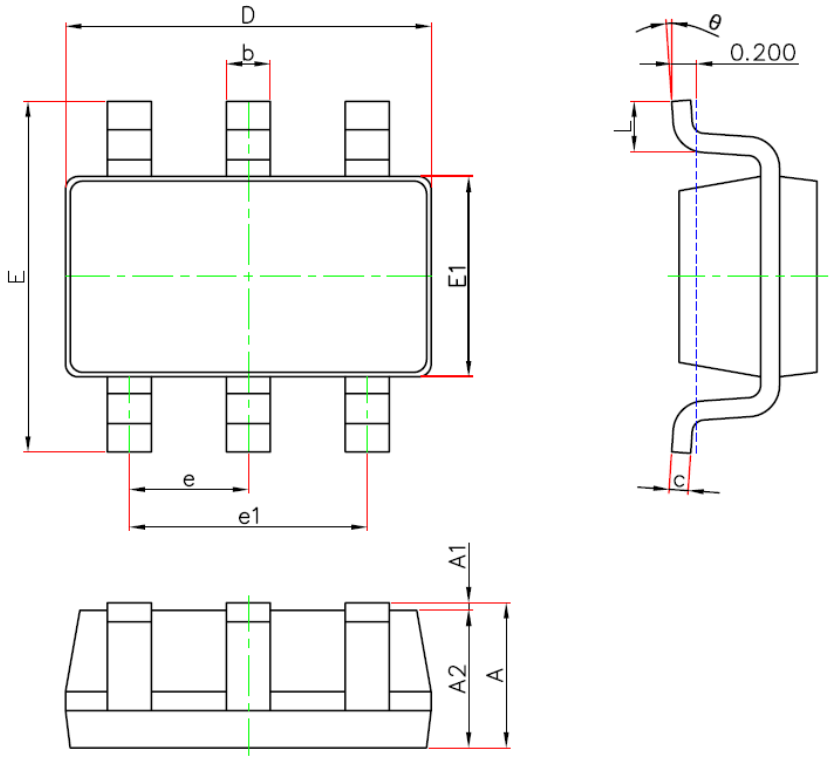
PCB Considerations

A good PCB design is very important to monitor the temperature window. When laying out the printed circuit board, the following considerations should be taken to ensure proper operation of the IC.

- The CN10 device should be placed in such a manner that it can sense the temperature correctly
- Measures should be taken so that CN10 device will not be affected by the other heat source.

Package Information

SOT-23-6L(12R) PACKAGE OUTLINE DIMENSIONS



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
E1	1.500	1.700	0.059	0.067
E	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°