

# Current Constant Regulator CN40 Series

## General Description

The CN40series are constant current regulator and a Linear LED driver offering excellent output handling capability. The CN40 series are simple, economical and robust device designed to provide a cost-effective solution for regulating current in LEDs.

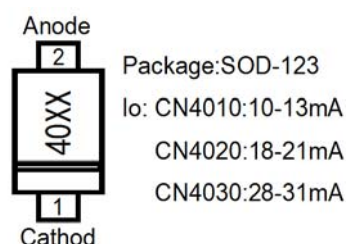
The CN40series regulates current over a wide voltage range. It is designed with a negative temperature coefficient to protect LEDs from thermal runaway at extreme voltages and currents.

CN40 series are available in space saving SOD123 package.

## Features

- High-voltage CMOS technology;
- Wide operation range: 1.35V~40V;
- No need any components;
- Constant current: 10mA, 15mA, 20mA, 25mA, 30mA
- None EMI、None EMC
- The Parallel will increase the current
- Package: SOD-123

## Package/Marking



## Application

- Automobile: Chevron side mirror markers, Cluster, Display & Instrument Backlighting,
- AC lighting LED Panels, Display Signage, Decorative Lighting, Channel lettering;
- DC lighting, LED strip, LED module, LED back plate;

## Ordering information

| Parts  | Constant Current | Package | Min. Qty |
|--------|------------------|---------|----------|
| CN4010 | 10-12mA          | SOD-123 | 3000pcs  |
| CN4015 | 14-16mA          | SOD-123 | 3000pcs  |
| CN4020 | 18-21mA          | SOD-123 | 3000pcs  |
| CN4025 | 24-26mA          | SOD-123 | 3000pcs  |
| CN4030 | 28-31mA          | SOD-123 | 3000pcs  |

## Electrical Characteristics and Recommended operating conditions

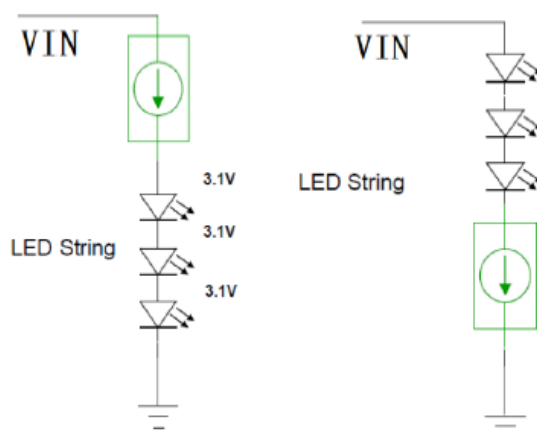
The operating temperature at 25°C unless otherwise noted,

| Characteristic       | Symbo<br>l | Condition          | Min. | Typ. | Max. | Unit |
|----------------------|------------|--------------------|------|------|------|------|
| Operating Voltage    | Vak        | Va-b<br>= 1.35-40V | 1.35 |      | 40   | V    |
| Constant Current     | Icon       |                    | 10   | 11   | 12   | mA   |
|                      |            |                    | 14   | 15   | 16   |      |
|                      |            |                    | 18   | 20   | 21   |      |
|                      |            |                    | 24   | 25   | 26   |      |
|                      |            |                    | 28   | 30   | 31   |      |
| Junction Temperature | TJ         |                    | -40  |      | 85   | °C   |

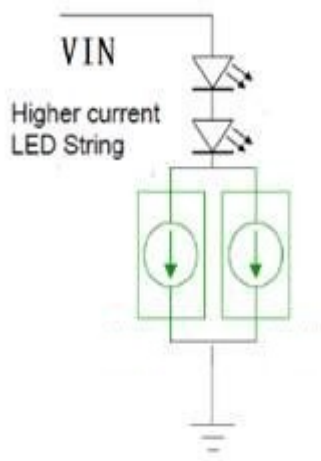
## Maxing Ratings

| Rating                | Symbol        | Value               | Unit |
|-----------------------|---------------|---------------------|------|
| Operating voltage     | Vak Max       | 45                  | V    |
| Power consumption     | PD            | 300                 | mW   |
| Thermal Resistance    | $\Theta_{JA}$ | 165                 | °C/W |
|                       | $\Theta_{JC}$ | 75                  |      |
| Operating Temperature | TJ            | -40 to +150         | °C   |
| Storage Temperature   | Tstg          | -55 to +150         | °C   |
| Static electricity    | ESD           | Class 1C<br>Class B |      |

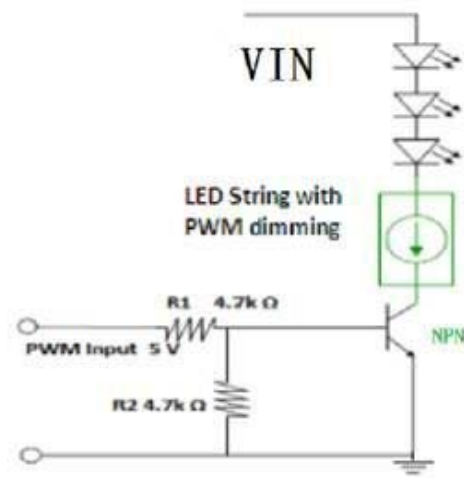
## Application information



## Higher current LED strings



## Dimming using PWM



The operating voltage is 1.35V to 45V of CN40 series, CN40 is full entry constant state above 1.35V. So Suggest about 3V.

## Performance and characteristics

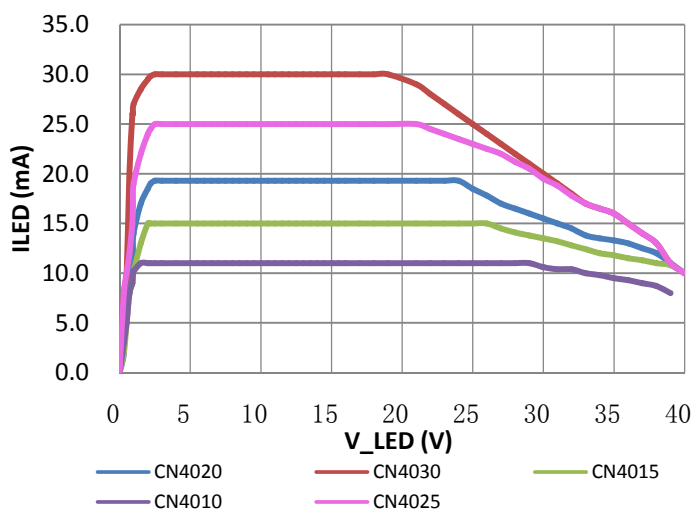


Figure1. General Performance Curve

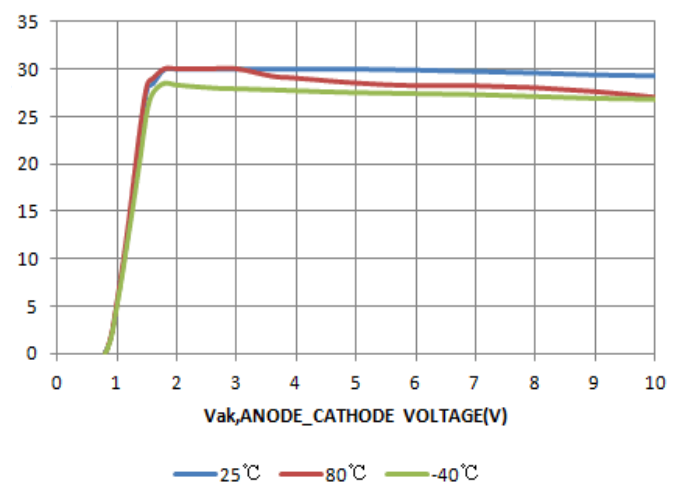


Figure 2.  $I_{LED}$  vs. temperature ( $V_{AK}$ ) for CN4030

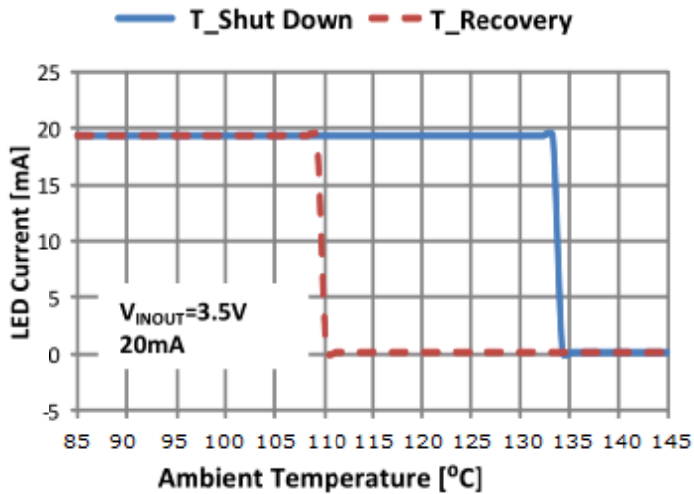


Figure3. THSD of 20mA Current Option

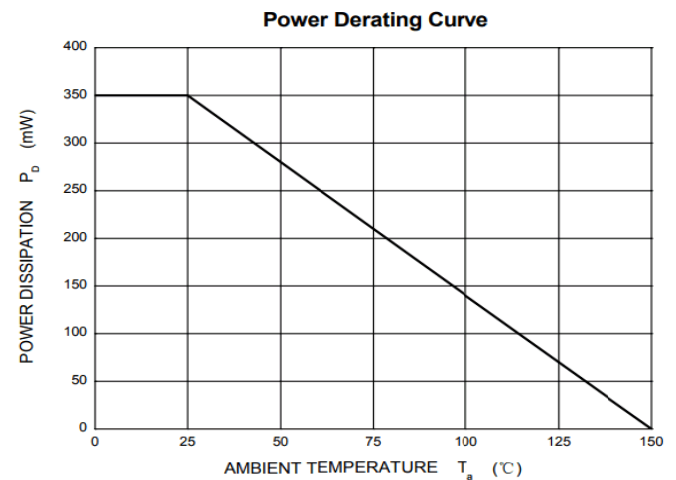


Figure4. Power Dissipation vs. Temperature

## Thermal consideration

To pursue a small package, the SOD123 has limited heat dissipation capability. But the device is linear system and could generate a high power defined by:

$$PD=(V_{IN}-V_{ac}) \times I_{LED}$$

Given the case of LED-driver application, V<sub>IN</sub> is 12V and 3 LEDs is series, the power consumed in the IC could be as high as

$$PD=(12V-9.3V) \times 0.03A = 0.081W$$

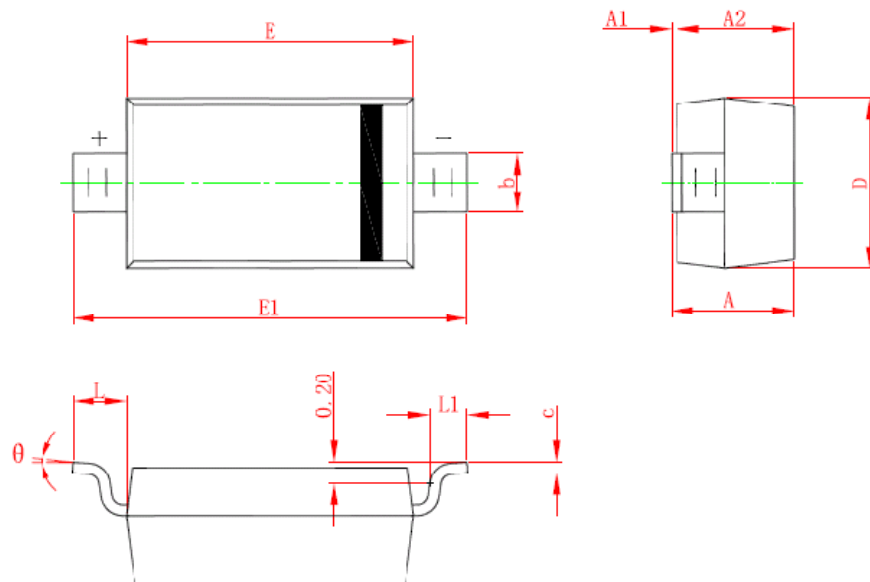
The SOD123 package can only withstand a power as high as 0.3W. So LED current set is very Important to decrease the power and lower the temperature of the IC.

## Thermal balance, Negative temperature characteristics

To avoid the lifetime decrease under high temperature, CN40 employ a thermal balance control module. When the IC's temperature is higher than 100°C, the CN40 will regulate the drive current to be lower and lower until the chip reach the thermal balance. And thus, CN40 is well protected from extremely high temperature which could cause reliability issue.

## Package

### SOD-123 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        | 0.450                     | 0.650 | 0.018                | 0.026 |
| c        | 0.080                     | 0.150 | 0.003                | 0.006 |
| D        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E        | 2.600                     | 2.800 | 0.102                | 0.110 |
| E1       | 3.550                     | 3.850 | 0.140                | 0.152 |
| L        | 0.500 REF.                |       | 0.020 REF.           |       |
| L1       | 0.250                     | 0.450 | 0.010                | 0.018 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |