



## 4-Channel Constant Current LED Driver

### ● General Description

The CDT2504 is a 4-channel constant current LED driver. It's designed to operate as a constant sink to drive the LEDs with external resistance in low power environment.

The CDT2504 is based on a current-mirror architecture that transfers a reference current produced at the SET pin to each of four open drain current sinking outputs.

### ● Features

- Operating voltage 2.5V~5.5V
- Programmable Sink Current to ground
- Excellent  $\pm 2\%$  LED-to-LED Current Match
- Up to 60mA/LED bias current
- Standby Current  $< 1\mu\text{A}$
- Package type : SOP8 with heat sink pad

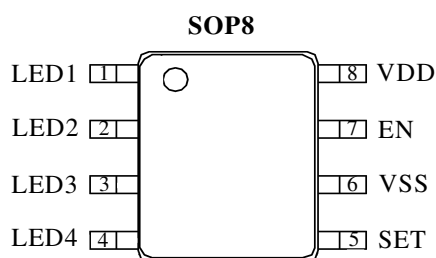
### ● Applications

- Cell Phone Display
- PDA White LED Display
- Automotive Display
- Digital Still Camera

### ● Ordering Information

Part Number	Function	Package
CDT2504	4-Channel Constant Current LED Driver	SOP8

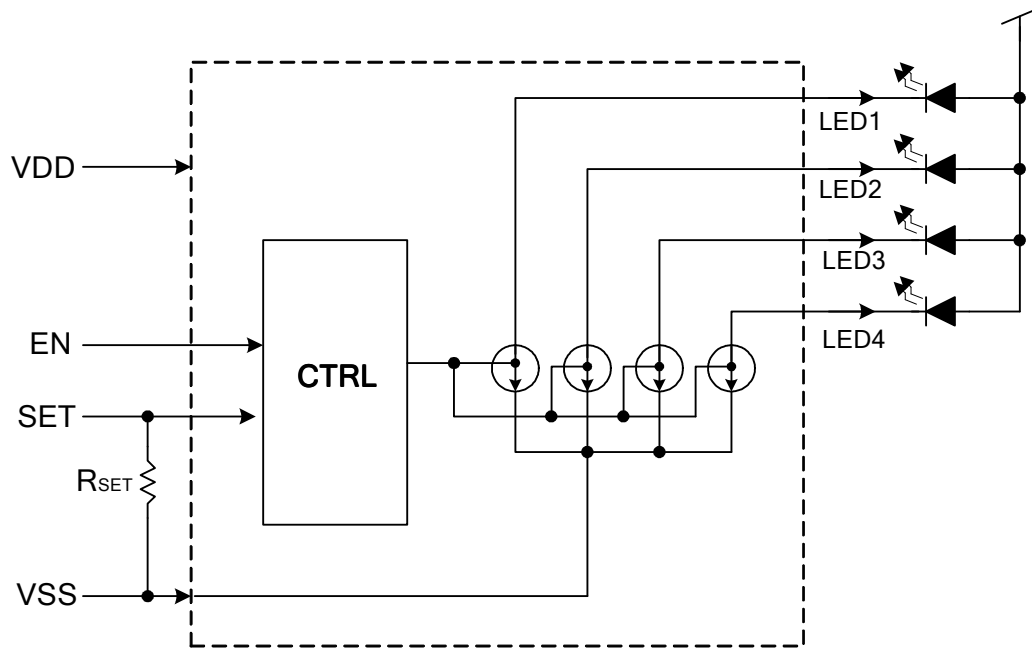
### ● Pin Assignment



## ● Pin Description

PIN NO.	NAME	FUNCTION
1	LED1	LED1 Current Sink
2	LED2	LED2 Current Sink
3	LED3	LED3 Current Sink
4	LED4	LED4 Current Sink
5	SET	LED Bias Current Set input
6	VSS	Power (-)
7	EN	Enable Chip
8	VDD	Power (+)

## ● Block Diagram



## ● Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Units
V <sub>DD</sub>	DC Supply Voltage	-0.3	6.5	V
V <sub>IN</sub>	Voltage to Input Terminal	-0.3	V <sub>DD</sub> +0.3	V
T <sub>J</sub>	Junction Temperature		150	°C
T <sub>A</sub>	Operating Temperature	-40	85	°C
T <sub>S</sub>	Storage Temperature	-55	150	°C
P <sub>D</sub>	Power Dissipation		1.25	W

\*Note : Stresses above those listed may cause permanent damage to the devices.

## ● Electrical Characteristics

(Unless otherwise specified: V<sub>DD</sub>=3.3V, V<sub>LED1</sub>= V<sub>LED2</sub>= V<sub>LED3</sub>= V<sub>LED4</sub>=1V, T<sub>a</sub>=25°C)

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
V <sub>DD</sub>	Operating Voltage		2.5		5.5	V
I <sub>SET</sub>	SET Current Range		10		230	uA
	ISET to LED Current Ratio	ISET=100uA	220	240	260	A/A
V <sub>SET</sub>	SET Bias Voltage	ISET=100uA	1.08	1.2	1.3	V
	LEDX to LEDX Current Matching	I <sub>LED</sub> =24mA	-2	0	2	%
I <sub>SINK</sub>	Maximum LED Sink Current				60	mA
	Dropout Voltage	I <sub>LED</sub> =24mA (Note 1)			400	mV
I <sub>STB</sub>	Standby Current			0.1	1	uA
I <sub>OP</sub>	Operating Current	ISET=100uA, No Loading			500	uA

Note 1: Dropout Voltage is defined as the LEDX to GND voltage at which current sink into LEDX drops 10%

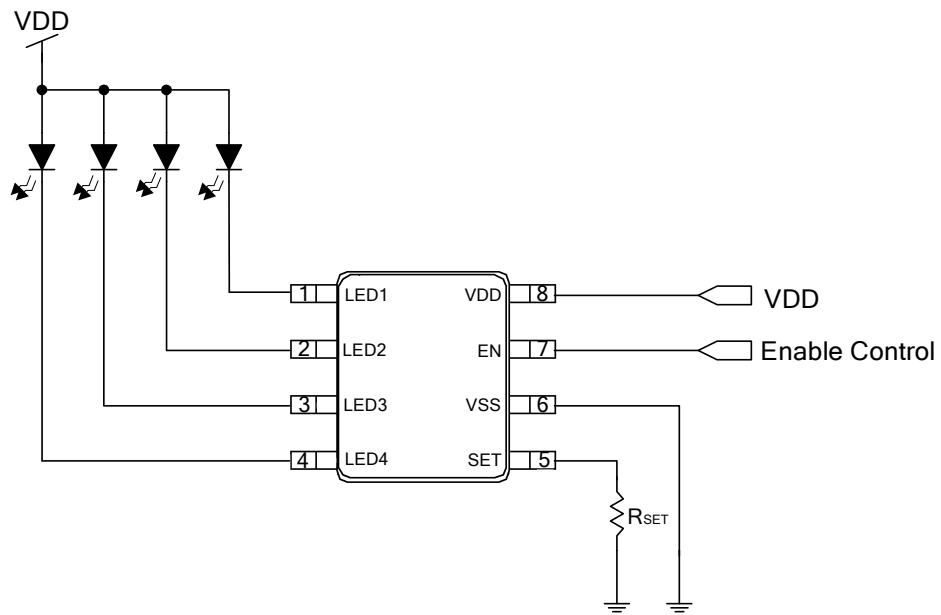
from the value at V<sub>LED</sub> = 1V.

## ● Function Description

The CDT2504 provides constant-current bias supply for white LED designs. The CDT2504 uses a single resistor to the bias current for up to four LEDs. LEDX bias currents are matched  $\pm 2\%$ .

### • Output Current Setting

The LED output current is setting by the SET pin. The typical application circuit Figure1.



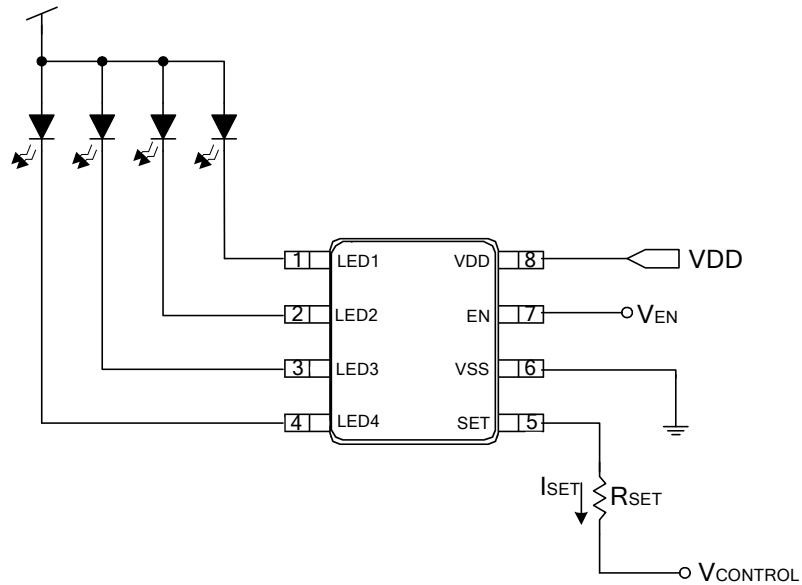
Connecting a resistor  $R_{SET}$  between SET at 1.2V and ground generates a current that is mirrored into each of the output with a gain of about 240.

$$I_{LED\ 1\sim 4} = 240 \times \frac{V_{SET}}{R_{SET}}$$

For example,  $R_{SET}=12k\ \Omega$  and  $V_{SET}=1.2V$ , the current of  $I_{LED1\sim 4}$  is equal to 24mA.

• **LED Brightness Control**

The CDT2504 LED drivers feature analog and PWM controls to give designers flexible brightness control. These control methods can be applied to circuit in two different ways to provide more flexibility than other solutions.



\* **Analog Control**

Set  $V_{control}$  and  $R_{set}$  for LED1~4 current :

$$I_{LED\ 1-4} = 240 \times \frac{V_{SET} - V_{CONTROL}}{R_{SET}}$$

\* **PWM Control - 1**

$V_{EN} = PWM$

- Amplitude has no effect on current.
- Pulse width controls between 0 and maximum.

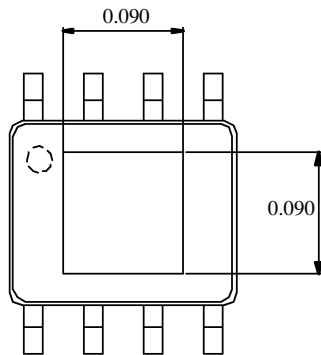
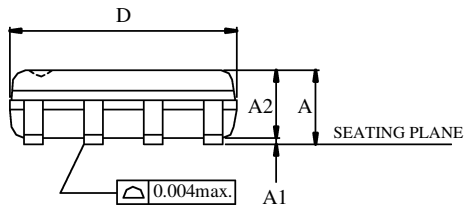
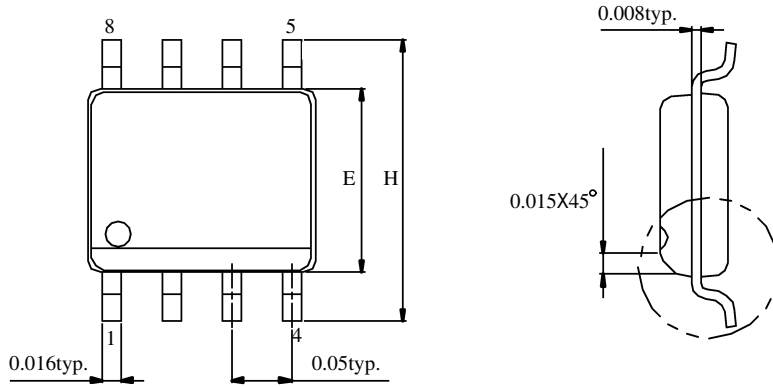
\* **PWM Control - 2**

$V_{CONTROL} = PWM$

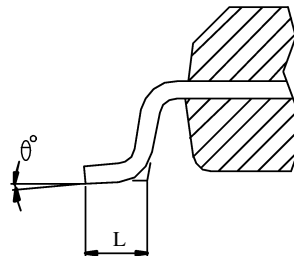
- Amplitude sets maximum LED current .
- Pulse width controls between 0 and maximum.

## ● Package Information

### • SOP-8Pin



E.P. VERSION ONLY



Symbols	MIN.	MAX.
A	0.053	0.069
A1	0.004	0.010
A2	—	0.059
D	0.189	0.196
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
$\theta^{\circ}$	0	8

UNIT : INCH

#### NOTES.

1. JEDEC OUTLINE : MS-012 AA / E.P. VERSION : N/A
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.15mm (0.006in) PER SIDE.
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.25mm (0.010in) PER SIDE.

\* CDT assumes no responsibility for the use of the specification described. CDT reserves the right to modify the product specification without notice.  
( 以上規格僅供參考，本公司得逕行修正，不另通知 )