

## Linear, 100mA, Constant Current LED Driver with Enable

### Features

- ▶ 100mA  $\pm$ 5% constant current drive
- ▶ Built-in reverse polarity protection
- ▶ Logic level enable
- ▶ Dimmable via  $\overline{\text{EN}}$  pin
- ▶ Overtemperature protection
- ▶ 90V max rating for transient immunity

### Applications

- ▶ Flashlights
- ▶ Specialty lighting
- ▶ Low voltage signage
- ▶ Low voltage lighting
- ▶ ***This device is not rated for automotive applications!***

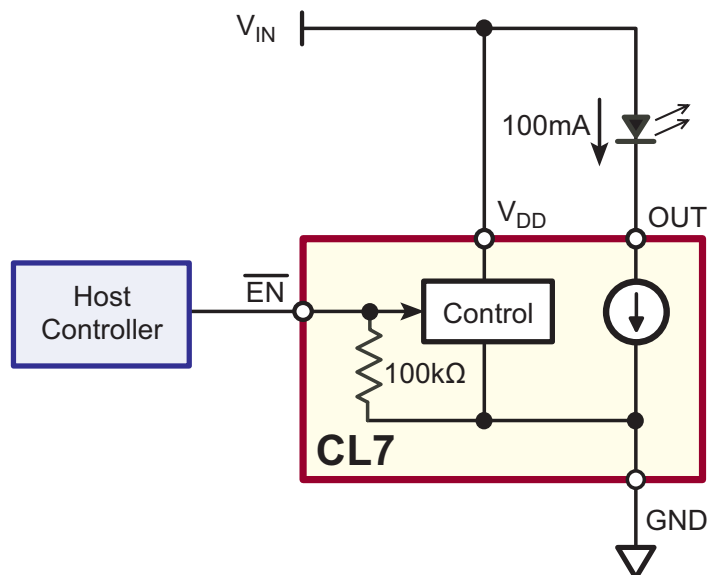
### General Description

The CL7 is a linear fixed current regulator designed for driving high brightness LEDs at 100mA from nominal 12V, 24V, and 48V power supplies. With a maximum rating of 90V, it is able to withstand transients without the need for additional transient protection circuitry. The CL7 is offered in the Power SO-8 package.

An active low enable input ( $\overline{\text{EN}}$ ) allows logic level control of the LED for on/off control or PWM dimming. The enable input has 100k $\Omega$  pull-down resistance. For applications not needing an enable input, refer to the CL6 data sheet.

Overtemperature protection shuts off the LED current when the die temperature rises above 135°C (nominal). Full LED current resumes when the die temperature falls below 105°C (nominal).

### Typical Application Circuit



## Ordering Information

Device	8-Lead Power SOIC
CL7	CL7SG-G

-G indicates package is RoHS compliant ('Green')



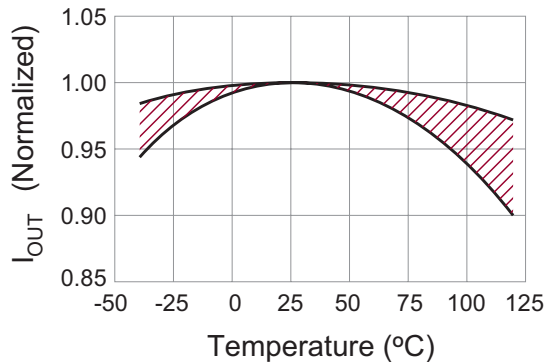
## Absolute Maximum Ratings

Supply voltage, $V_{DD}$	-25V to +100V
Output voltage, $V_{OUT}$	-25V to +100V
Enable voltage, $V_{EN}$	-0.5V to +6.5V
Operating junction temperature	-40°C <sup>1</sup>
Storage temperature	-65°C to +150°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

1. Maximum junction temperature internally limited.

## $I_{OUT}$ vs Temperature



## Thermal Characteristics (Guaranteed by design – not production tested)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$\theta_{j-a}$	Thermal resistance, junction to ambient		67		°C/W	Power SO-8 Soldered to 2cm <sup>2</sup> exposed copper area
$T_{LIM}$	Overtemperature limit	120	135	150	°C	---
$T_{HYS}$	Overtemperature hysteresis	-	30	-	°C	---

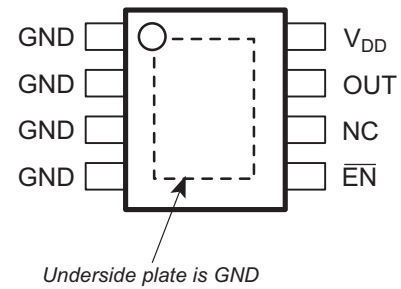
## Recommended Operating Conditions (all voltages with respect to GND pin)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$V_{DD}$	Supply voltage	6.5	-	28	V	Normal Extended ---
$V_{OUT}$	Voltage at OUT pin <sup>1</sup>	4.0	-	28	V	Normal Extended ---
$T_j$	Junction temperature <sup>2</sup>	-40	-	119	°C	---

1. Continuous operation at high  $V_{OUT}$  voltages may result in activation of overtemperature protection. Use appropriate heatsinking.  
 2. Maximum junction temperature internally limited.

## Pin Configurations

### Power SO-8



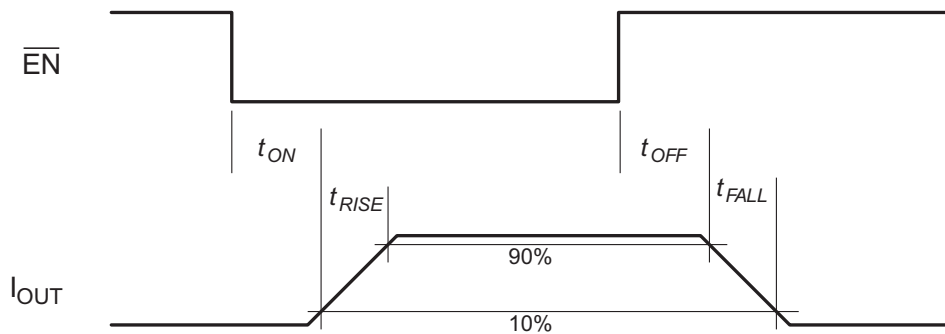
## Pin Designation

Pin	Name	Description
$V_{DD}$	$V_{DD}$	Supply voltage for the CL7
OUT	Output	Connect the LED between this pin and the supply voltage
GND	Ground	Circuit common
$\overline{EN}$	Enable	Active low enable input - this input has an internal 100kΩ pull-down resistance

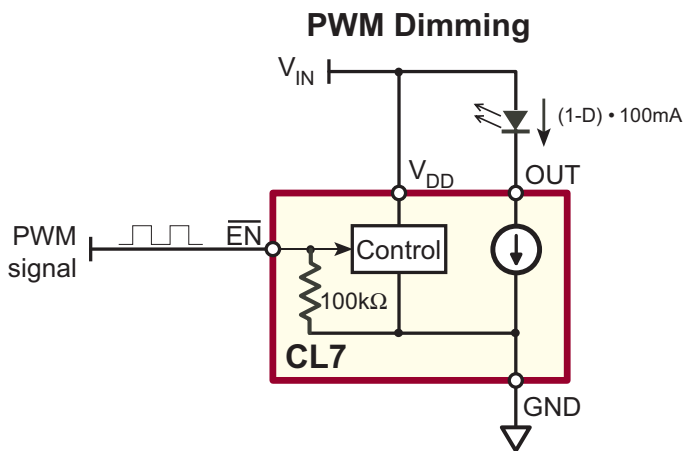
**Electrical Characteristics** (Over normal recommended operating conditions unless otherwise specified. All voltages with respect to GND pin. Production tested @ 25°C.)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$I_{DD}$	Current into $V_{DD}$ pin	3.0	5.0	10	mA	---
$I_{OUT}$	Current into OUT pin <sup>1</sup>	95 90 50	100 100 -	105 110 120	mA	Normal conditions, 25°C Normal conditions, full temp <sup>2</sup> Extended conditions
$I_{OUT(OFF)}$	Current into OUT pin with $V_{DD}$ pin open or $\overline{EN}=1$	-	-	10	$\mu$ A	$V_{DD}$ = open
$V_{EN(ON)}$	Enable voltage, on	-	-	0.8	V	---
$V_{EN(OFF)}$	Enable voltage, off	2.4	-	-	V	---
$R_{EN}$	Enable pull-down resistance	-	100	-	k $\Omega$	---
$V_{OFF}$	Voltage at $V_{DD}$ to shut off LED current	-	-	1	V	$I_{OUT} < 10\mu$ A
$t_{ON}$	On delay, $\overline{EN}$ to OUT	-	3.0	-	$\mu$ s	$\overline{EN} = 0V$
$t_{OFF}$	Off delay, $\overline{EN}$ to OUT	-	0.1	-	$\mu$ s	$\overline{EN} = 5V$
$t_{RISE}$	Current rise time, $\overline{EN}$ to OUT	-	4.0	-	$\mu$ s	$\overline{EN} = 0V$
$t_{FALL}$	Current fall time, $\overline{EN}$ to OUT	-	0.3	-	$\mu$ s	$\overline{EN} = 5V$

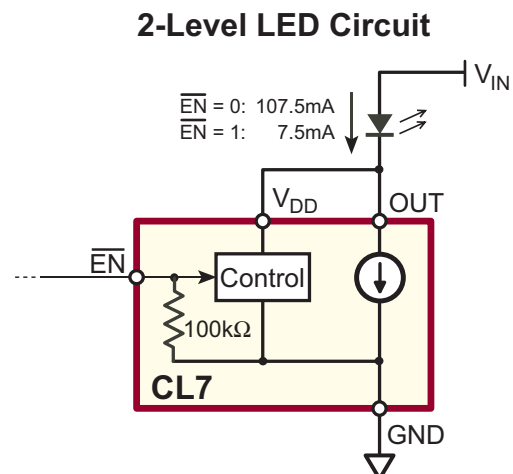
**Timing**



**Application Circuits**



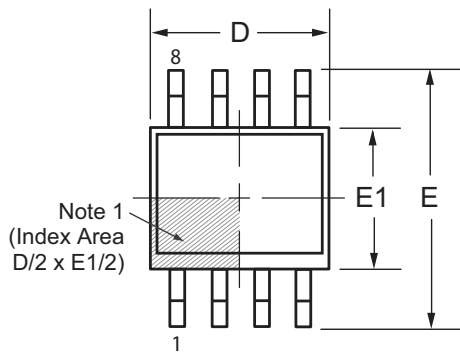
*D is the portion of time the PWM signal is high.*



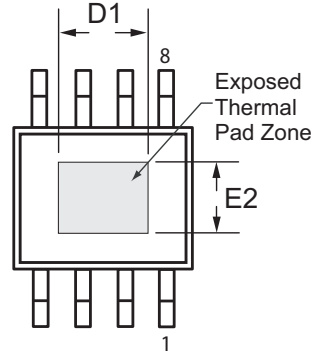
*Minimum  $V_{IN}$  is increased by LED drop.*

# 8-Lead SOIC (Narrow Body w/Heat Slug) Package Outline (SG)

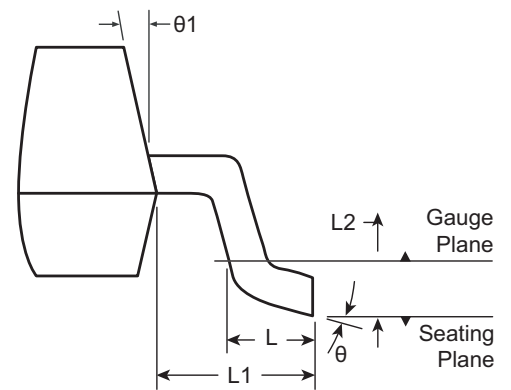
4.90x3.90mm body, 1.70mm height (max), 1.27mm pitch



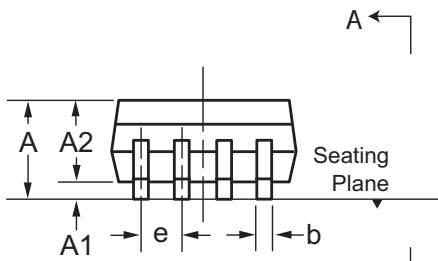
**Top View**



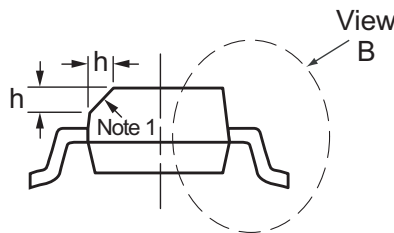
**Bottom View**



**View B**



**Side View**



**View A-A**

**Note 1:**

This chamfer feature is optional. If it is not present, then a Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier may be either a mold, or an embedded metal or marked feature.

Symbol	A	A1	A2	b	D	D1	E	E1	E2	e	h	L	L1	L2	θ	θ1				
Dimension (mm)	MIN	1.25	0.00	1.25	0.31	4.80	3.30*	5.80	3.80	2.29*	1.27 BSC	0.25	0.40	1.04 REF	0.25 BSC	0°	5°			
	NOM	-	-	-	-	4.90	-	6.00	3.90	-		-	-			-	-	-	-	-
	MAX	1.70	0.15	1.70	0.51	5.00	3.81*	6.20	4.00	2.79*		0.50	1.27			8°	15°			

JEDEC Registration MS-012, Variation BA, Issue E, Sept. 2005.

Dimensions marked with (\*) are non-JEDEC dimensions.

Drawings not to scale.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to <http://www.supertex.com/packaging.html>.)

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