

## Linear, Fixed Constant Current LED Driver

### Features

- ▶ 20mA  $\pm 10\%$  constant current drive
- ▶ 1.0V dropout
- ▶ 90V rating for transient immunity
- ▶ Temperature compensated
- ▶ 4.75 - 90V supply range

### Applications

- ▶ Specialty lighting
- ▶ Low voltage signage

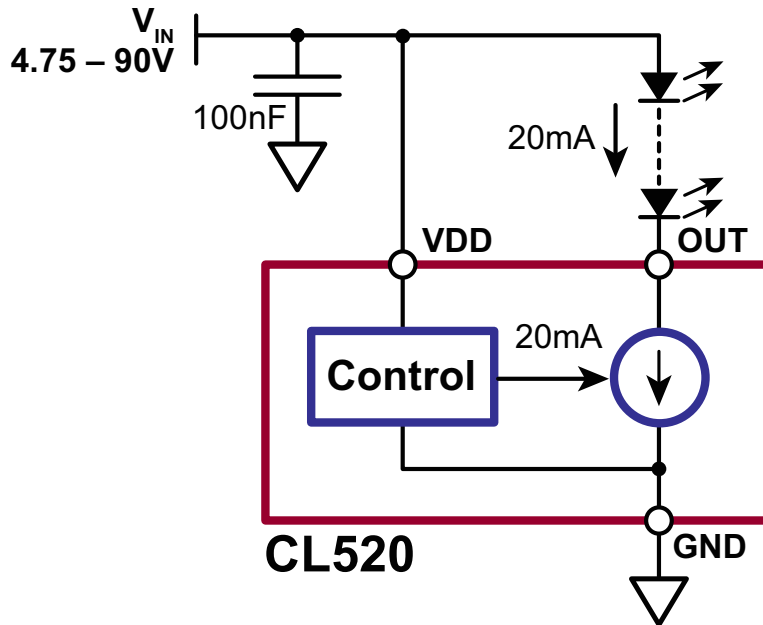
### General Description

The CL520 is a fixed, linear current regulator designed for driving LEDs at 20mA. With a maximum rating of 90V, it is able to withstand transients without the need for additional transient protection circuitry. It is ideally suited for applications employing single or multiple LEDs.

The minimum dropout voltage of 1.0V accommodates extra LEDs, permits lower supply voltages, and provides more efficient operation.

The CL520 is offered in TO-252(D-PAK) and TO-92 packages.

### Typical Application Circuit



## Ordering Information

| Part Number    | Package Options | Packing   |
|----------------|-----------------|-----------|
| CL520K4-G      | TO-252 (D-PAK)  | 2000/Reel |
| CL520N3-G      | TO-92           | 1000/Bag  |
| CL520N3-G P002 | TO-92           | 2000/Reel |
| CL520N3-G P003 | TO-92           | 2000/Reel |
| CL520N3-G P005 | TO-92           | 2000/Reel |
| CL520N3-G P013 | TO-92           | 2000/Reel |
| CL520N3-G P014 | TO-92           | 2000/Reel |

-G denotes a lead (Pb)-free / RoHS compliant package

Refer to 'P0xx' Tape & Reel Specs for P002, P003, P005, P013, and P014 TO-92 Taping Specifications and Winding Styles

## Absolute Maximum Ratings

| Parameter                      | Value           |
|--------------------------------|-----------------|
| Supply voltage, $V_{DD}$       | -0.5V to +100V  |
| Output voltage, $V_{OUT}$      | -0.5V to +100V  |
| Operating junction temperature | -40°C to +125°C |
| 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..

## Typical Thermal Resistance

| Package        | $\theta_{ja}$ |
|----------------|---------------|
| TO-252 (D-PAK) | 81°C/W*       |
| TO-92          | 132°C/W*      |

\* Mounted on JEDEC test PCB (2s 2p)

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

| Sym       | Parameter                       | Min  | Typ | Max | Units | Conditions |
|-----------|---------------------------------|------|-----|-----|-------|------------|
| $V_{DD}$  | Supply voltage                  | 4.75 | -   | 90  | V     | ---        |
| $V_{OUT}$ | Voltage at OUT pin <sup>1</sup> | 1.0  | -   | 90  | V     | ---        |
| $T_J$     | Junction temperature            | -40  | -   | 125 | °C    | ---        |
| $C_{DD}$  | $V_{DD}$ bypass capacitor       | 100  | -   | -   | nF    |            |

## Pin Configurations



TO-252 (D-PAK)



TO-92

## Product Marking

Si YYWW  
CL520K4  
LLLLLLL

YY = Year Sealed  
WW = Week Sealed  
L = Lot Number  
\_\_\_\_\_ = "Green" Packaging

Package may or may not include the following marks: Si or 

TO-252 (D-PAK)

SiCL  
5 2 0  
YYWW

YY = Year Sealed  
WW = Week Sealed  
\_\_\_\_\_ = "Green" Packaging

Package may or may not include the following marks: Si or 

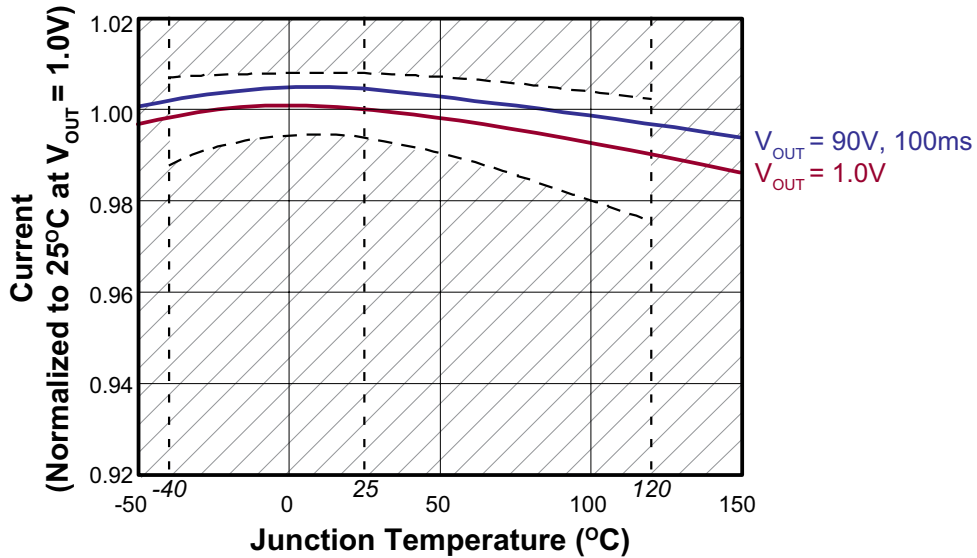
TO-92

## Electrical Characteristics

(Over recommended operating conditions.  $T_A = 25^\circ\text{C}$  unless otherwise specified. All voltages with respect to GND pin)

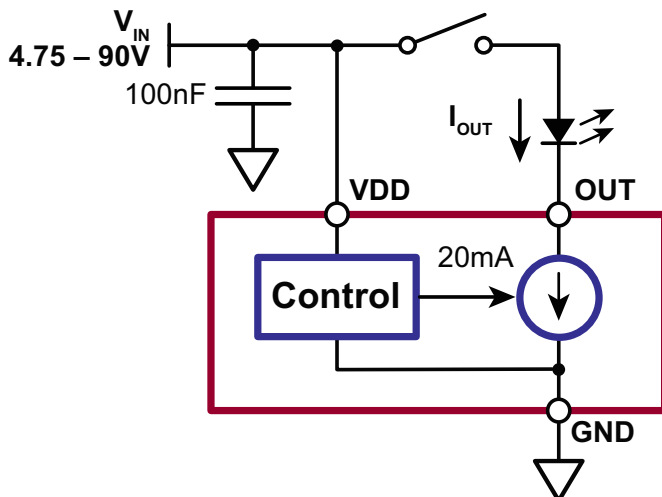
| Sym            | Parameter                              | Min | Typ | Max | Units         | Conditions                           |
|----------------|--|-----|-----|-----|---------------|--------------------------------------|
| $I_{DD}$       | Current into VDD pin                   | -   | -   | 1.0 | mA            | ---                                  |
| $I_{OUT}$      | Current into OUT pin                   | 18  | 20  | 22  | mA            | $1.0\text{V} < V_{OUT} < 90\text{V}$ |
|                |  | -   | -   | 22  |               | $V_{OUT} < 1.0\text{V}$              |
| $I_{OUT(OFF)}$ | Current into OUT pin with VDD pin open | -   | -   | 10  | $\mu\text{A}$ | $V_{DD} = \text{open}$               |
| $V_{DD(OFF)}$  | Voltage at VDD to shut off LED current | -   | -   | 1.0 | V             | $I_{OUT} < 10\mu\text{A}$            |
| $t_{ON}$       | VDD applied on time                    | -   | -   | 100 | $\mu\text{s}$ | ---                                  |
| $t_{OFF}$      | VDD removed off time                   | -   | -   | 100 | $\mu\text{s}$ | ---                                  |

## Temperature Effects



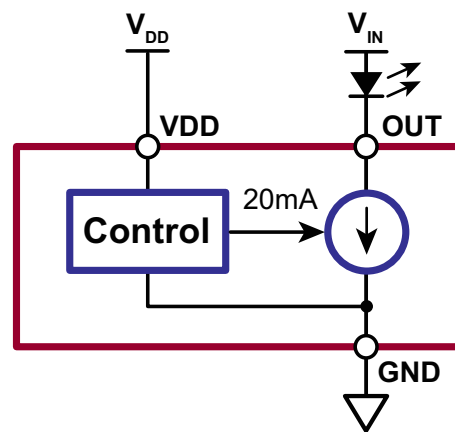
## Application Circuits

### Switched LED



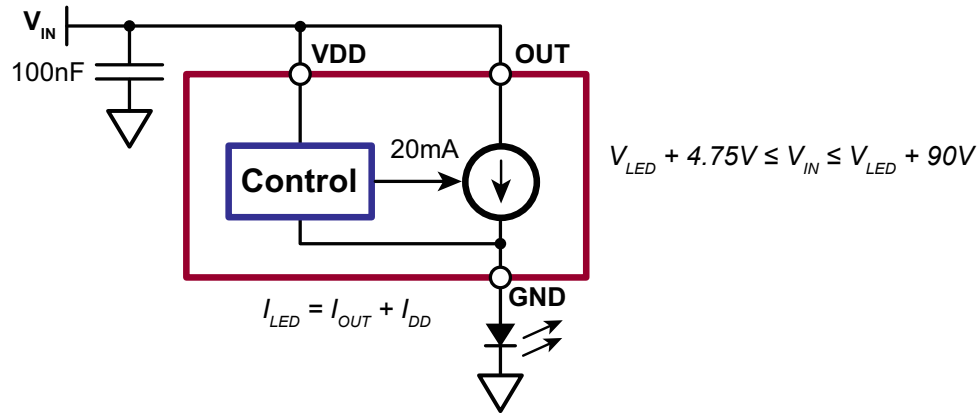
### Separate LED Supply

( $V_{OUT}$  may be higher or lower than  $V_{DD}$ )



## Application Circuits

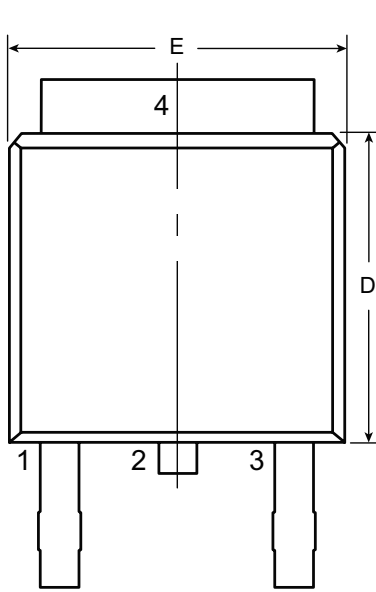
### Ground Referenced LEDs



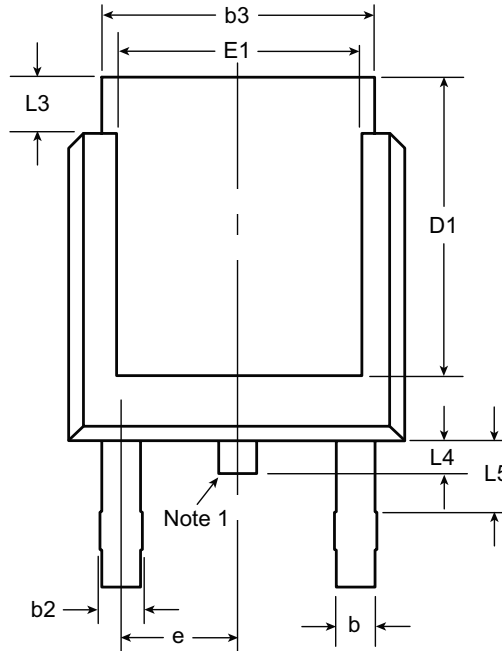
### Pin Description

| Pin #                   |               | Name | Description  |
|-------------------------|---------------|------|--|
| TO-252<br>D-PAK<br>(K4) | TO-92<br>(N3) |      |  |
| 1                       | 1             | VDD  | Supply voltage for the CL520. Bypass locally with a 100nF capacitor to ground. |
| 3                       | 2             | OUT  | Constant current output (sink).  |
| 4                       | 3             | GND  | Circuit common.  |

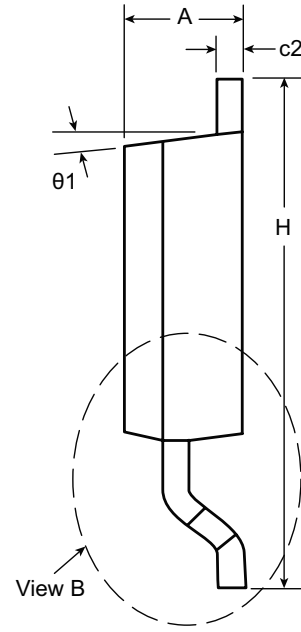
# 3-Lead TO-252 D-PAK Package Outline (K4)



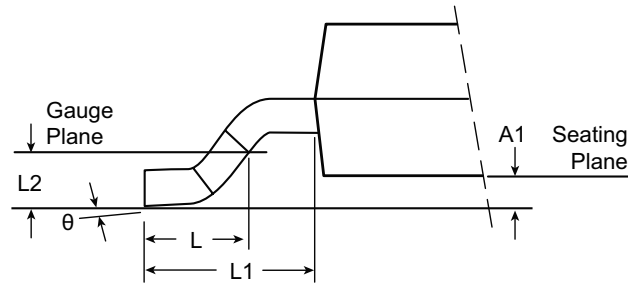
**Front View**



**Rear View**



**Side View**



**View B**

**Note:**

1. Although 4 terminal locations are shown, only 3 are functional. Lead number 2 was removed.

| Symbol             | A   | A1   | b     | b2   | b3   | c2   | D    | D1   | E     | E1   | e     | H    | L    | L1       | L2       | L3   | L4    | L5   | θ   | θ1  |   |   |
|--------------------|-----|------|-------|------|------|------|------|------|-------|------|-------|------|------|----------|----------|------|-------|------|-----|-----|---|---|
| Dimension (inches) | MIN | .086 | .000* | .025 | .030 | .195 | .018 | .235 | .205  | .250 | .170  | .370 | .055 | .108 REF | .020 BSC | .035 | .025* | .045 | 0°  | 0°  |   |   |
|                    | NOM | -    | -     | -    | -    | -    | -    | .240 | -     | -    | -     | -    | .060 |          |          | -    | -     | -    | -   | -   | - | - |
|                    | MAX | .094 | .005  | .035 | .045 | .215 | .035 | .245 | .217* | .265 | .182* | .410 | .070 |          |          | .050 | .040  | .060 | 10° | 15° |   |   |

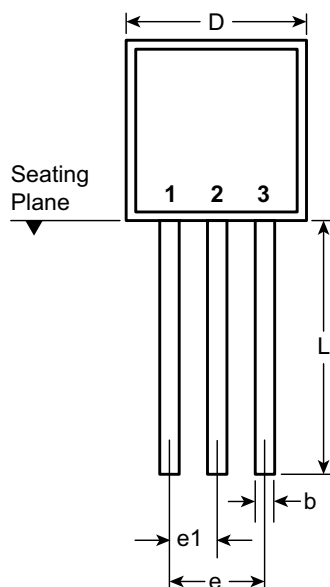
JEDEC Registration TO-252, Variation AA, Issue E, June 2004.

\* This dimension is not specified in the JEDEC drawing.

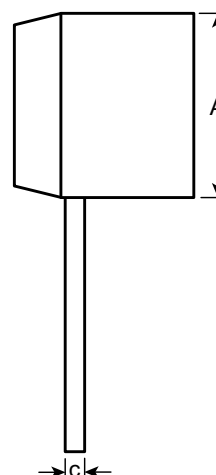
Drawings not to scale.

Supertex Doc. #: DSPD-3TO252K4, Version E041309.

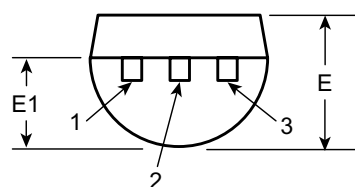
### 3-Lead TO-92 Package Outline (N3)



**Front View**



**Side View**



**Bottom View**

| Symbol                 |     | A    | b                 | c                 | D    | E    | E1   | e    | e1   | L     |
|------------------------|-----|------|-------------------|-------------------|------|------|------|------|------|-------|
| Dimensions<br>(inches) | MIN | .170 | .014 <sup>†</sup> | .014 <sup>†</sup> | .175 | .125 | .080 | .095 | .045 | .500  |
|                        | NOM | -    | -                 | -                 | -    | -    | -    | -    | -    | -     |
|                        | MAX | .210 | .022 <sup>†</sup> | .022 <sup>†</sup> | .205 | .165 | .105 | .105 | .055 | .610* |

JEDEC Registration TO-92.

\* This dimension is not specified in the JEDEC drawing.

† This dimension differs from the JEDEC drawing.

**Drawings not to scale.**

**Supertex Doc.#:** DSPD-3TO92N3, Version E041009.

(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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