

Linear, Fixed, 100mA, Constant Current LED Driver

Features

- ▶ 100mA \pm 5% constant current drive
- ▶ Built-in reverse polarity protection
- ▶ Dimmable via PWM supply
- ▶ Overtemperature protection
- ▶ Tab ground allows direct heatsinking to chassis
- ▶ 90V max rating for transient immunity

Applications

- ▶ Flashlights
- ▶ Specialty lighting
- ▶ Low voltage signage
- ▶ Low voltage lighting

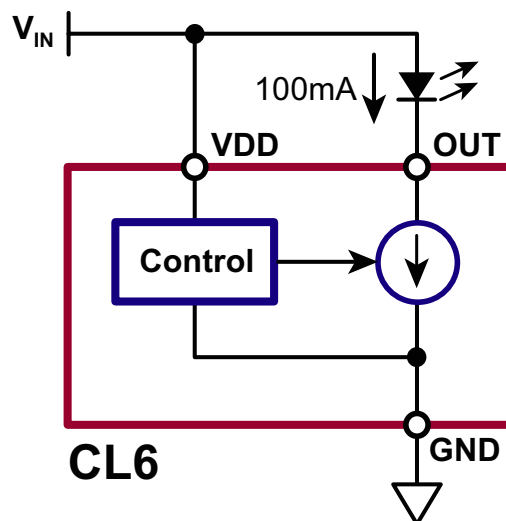
General Description

The CL6 is a fixed, linear current regulator designed for driving high brightness LEDs at 100mA from nominal 12V, 24V, or 48V supplies. With a maximum rating of 90V, it is able to withstand transients without the need for additional transient protection circuitry.

The CL6 is offered in both TO-252 (D-PAK) and TO-220 packages. The tab on the TO-220 is ground, allowing heatsinking directly to a chassis without the need for electrically insulating spacers.

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

| Part Number | Package Option | Packing |
|-------------|----------------|-----------|
| CL6K4-G | TO-252 (D-PAK) | 2000/Reel |
| CL6N5-G | 3-Lead TO-220 | 50/Tube |

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

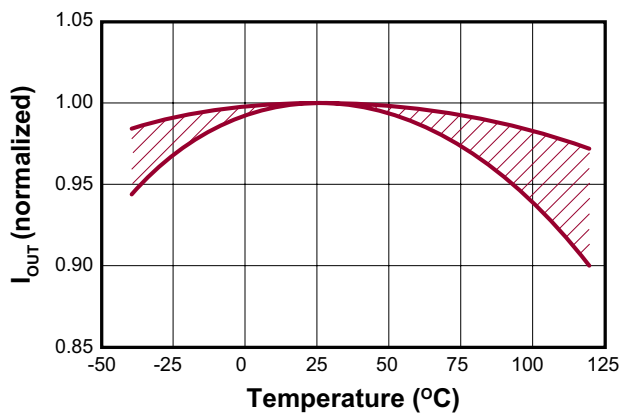
Absolute Maximum Ratings

| Parameter | Value |
|---------------------------------|-----------------|
| Supply voltage, V_{DD} | -25V to +100V |
| Output voltage, V_{OUT} | -25V to +100V |
| Operating junction temperature* | -40°C |
| Storage temperature | -65°C to +150°C |

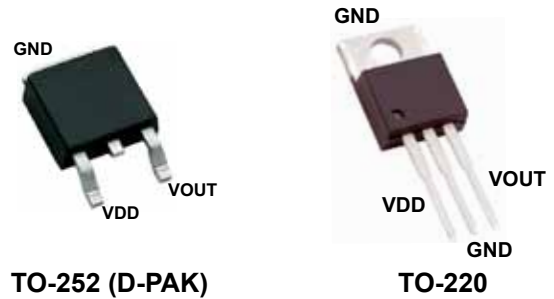
Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

* Maximum junction temperature internally limited.

I_{OUT} vs Temperature



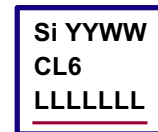
Pin Configurations



Pin Designation

| Pin | Name | Description |
|-----|--------|---|
| VDD | VDD | Supply voltage for the CL6 |
| OUT | Output | Connect the LED between this pin and the supply voltage |
| GND | Ground | Circuit common |

Product Marking



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

Package may or may not include the following marks: Si or **3-Lead TO-252 (D-PAK)**



L = Lot Number
 YY = Year Sealed
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Package may or may not include the following marks: Si or **3-Lead TO-220**

Thermal Characteristics

Guaranteed by design – not production tested

| Sym | Parameter | Min | Typ | Max | Units | Conditions |
|---------------|---|--------|-----|-----|-------|--|
| θ_{JA} | Thermal resistance, junction to ambient | D-PAK | - | 81 | - | °C/W Soldered to 2cm ² exposed copper area |
| | | TO-220 | - | 29 | - | |
| T_{LIM} | Overtemperature limit | 120 | 135 | 150 | °C | --- |
| T_{HYS} | Overtemperature hysteresis | - | 30 | - | °C | --- |

Recommended Operating Conditions

(all voltages with respect to GND pin)

| Sym | Parameter | | Min | Typ | Max | Units | Conditions |
|-----------|-----------------------------------|----------|-----|-----|-----|-------|------------|
| V_{DD} | Supply voltage | Normal | 6.5 | - | 28 | V | --- |
| | | Extended | 6.5 | - | 90 | | |
| V_{OUT} | Voltage at OUT pin ¹ | Normal | 4.0 | - | 28 | V | --- |
| | | Extended | 4.0 | - | 90 | | |
| T_j | Junction temperature ² | | -40 | - | 119 | °C | --- |

Note:

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

Electrical Characteristics

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

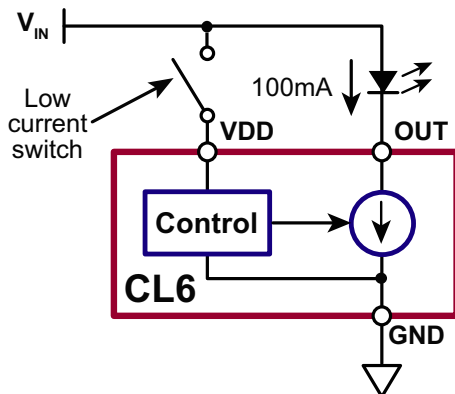
| Sym | Parameter | Min | Typ | Max | Units | Conditions |
|----------------|---|-----|-----|-----|-------|---|
| I_{DD} | Current into V_{DD} pin | 3.0 | 5.0 | 10 | mA | -- |
| I_{OUT} | Current into OUT pin ⁽³⁾ | 95 | 100 | 105 | mA | Normal conditions, 25°C |
| | | 90 | 100 | 110 | | Normal conditions, full temp ⁽⁴⁾ |
| | | 50 | - | 120 | | Extended conditions |
| $I_{OUT(OFF)}$ | Current into OUT pin with V_{DD} pin open | - | - | 10 | µA | $V_{DD} = \text{open}$ |
| V_{OFF} | Voltage at V_{DD} to shut off LED current | - | - | 1.0 | V | $I_{OUT} < 10\mu\text{A}$ |
| t_{ON} | V_{DD} applied on delay | - | - | 100 | µs | --- |
| t_{OFF} | V_{DD} removed off delay | - | - | 100 | µs | --- |

Note:

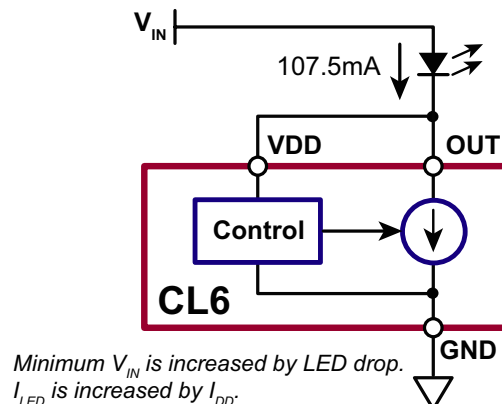
3. Thermal considerations may limit current to lower values. Use appropriate heat sinking.
4. Guaranteed by design – not production tested.

Application Circuits

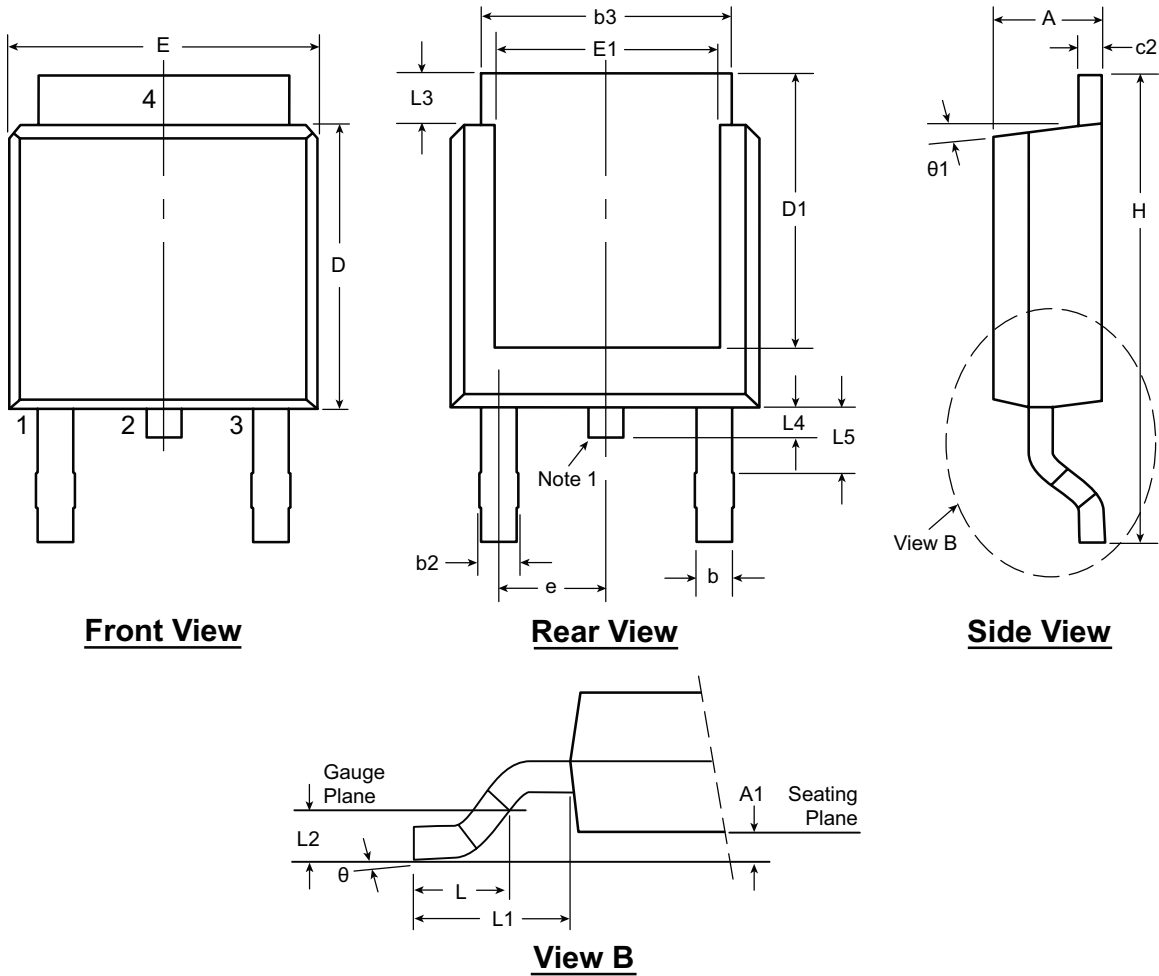
Low Current On/Off Control



2-Terminal Operation



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



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 | θ_1 | | |
|--------------------|-----|------|-------|------|------|------|------|------|-------|------|-------|------|------|----------|----------|------|-------|-------------------|----------|------------|---|---|
| Dimension (inches) | MIN | .086 | .000* | .025 | .030 | .195 | .018 | .235 | .205 | .250 | .170 | .370 | .055 | .108 REF | .020 BSC | .035 | .025* | .035 [†] | 0° | 0° | | |
| | NOM | - | - | - | - | - | - | .240 | - | - | - | - | .060 | | | - | - | - | - | - | - | - |
| | MAX | .094 | .005 | .035 | .045 | .215 | .035 | .245 | .217* | .265 | .200* | .410 | .070 | | | .050 | .040 | .060 | 10° | 15° | | |

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

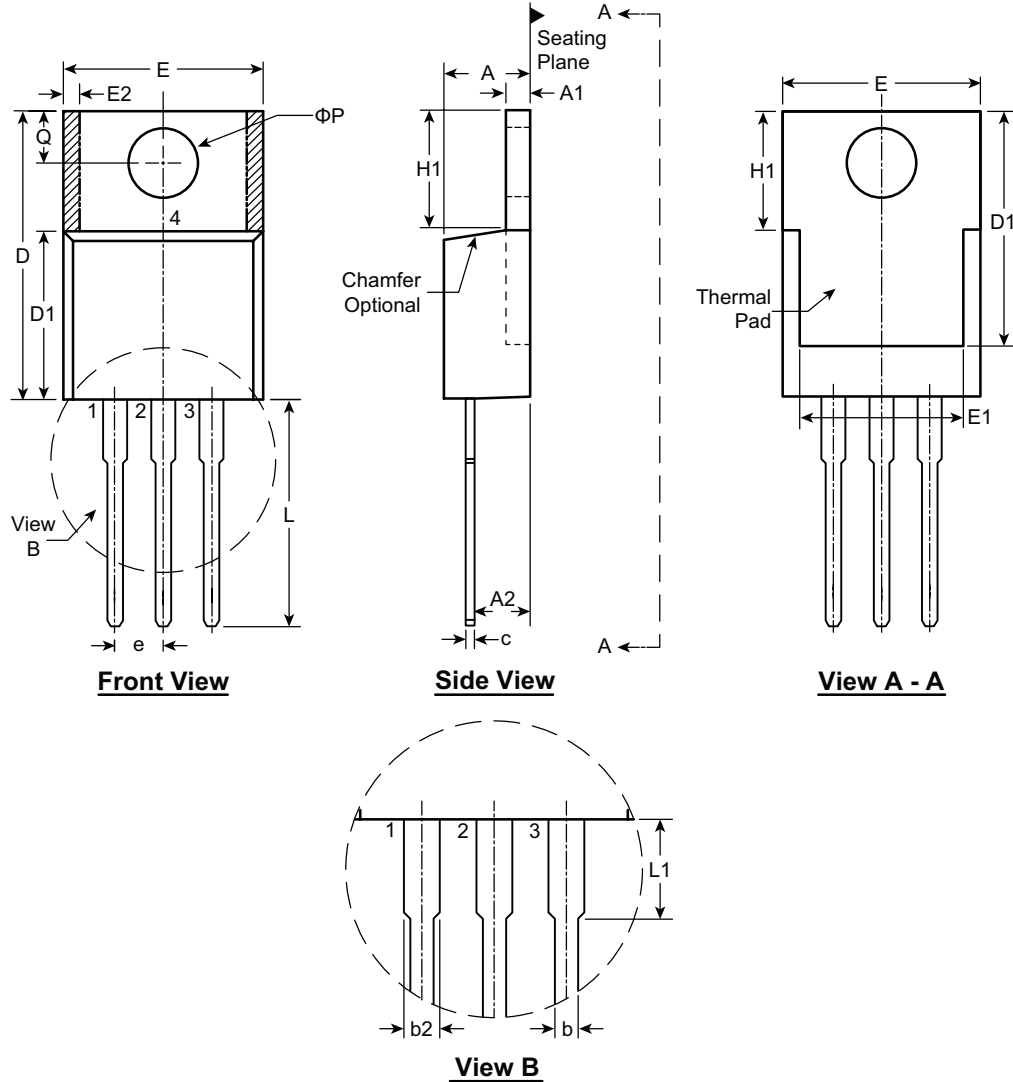
* This dimension is not specified in the JEDEC drawing.

† This dimension differs from the JEDEC drawing.

Drawings not to scale.

Supertex Doc. #: DSPD-3TO252K4, Version F040910.

3-Lead TO-220 Package Outline (N5)



| Symbol | A | A1 | A2 | b | b2 | c | D | D1 | D2 | E | E1 | E2 | e | H1 | L | L1 | Q | ΦP | |
|--------------------|-----|------|------|-------|------|------|------|-------|-------|------|------|-------|-------------|------|------|-------|------|----------|------|
| Dimension (inches) | MIN | .140 | .020 | .080 | .015 | .045 | .560 | .326† | .474† | .380 | .270 | 0.20* | .100 BSC | .230 | .500 | .200* | .100 | .139 | |
| | NOM | - | - | - | .027 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| | MAX | .190 | .055 | .120† | .040 | .070 | .024 | .650 | .361† | .507 | .420 | .350 | | .030 | .270 | .580 | .250 | .135 | .161 |

JEDEC Registration TO-220, Variation AB, Issue K, April 2002.

* This dimension is not specified in the JEDEC drawing.

† This dimension differs from the JEDEC drawing.

Drawings not to scale.

Supertex Doc. #: DSPD-3TO220N5, Version C041009.

(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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