

Simple 90V 20mA Temperature Compensated Constant Current LED Driver IC

Features

- ❑ 5.0V to 90V operating range (V_{a-b})
- ❑ 20mA $\pm 5\%$ at 45V V_{a-b}
- ❑ $-8.5\mu A / ^\circ C$ Typical Temperature Coefficient
- ❑ SOT-89, D-PAK & TO-92 packages
- ❑ No external components (two terminal device)
- ❑ Can be paralleled for higher current

General Description

The Supertex CL1 is a high voltage, temperature compensated, constant current source. The device is trimmed to provide a constant current of 20mA $\pm 5\%$ at an input voltage of 45V. No external components are required. The device can be used as a two terminal constant current source or constant current sink.

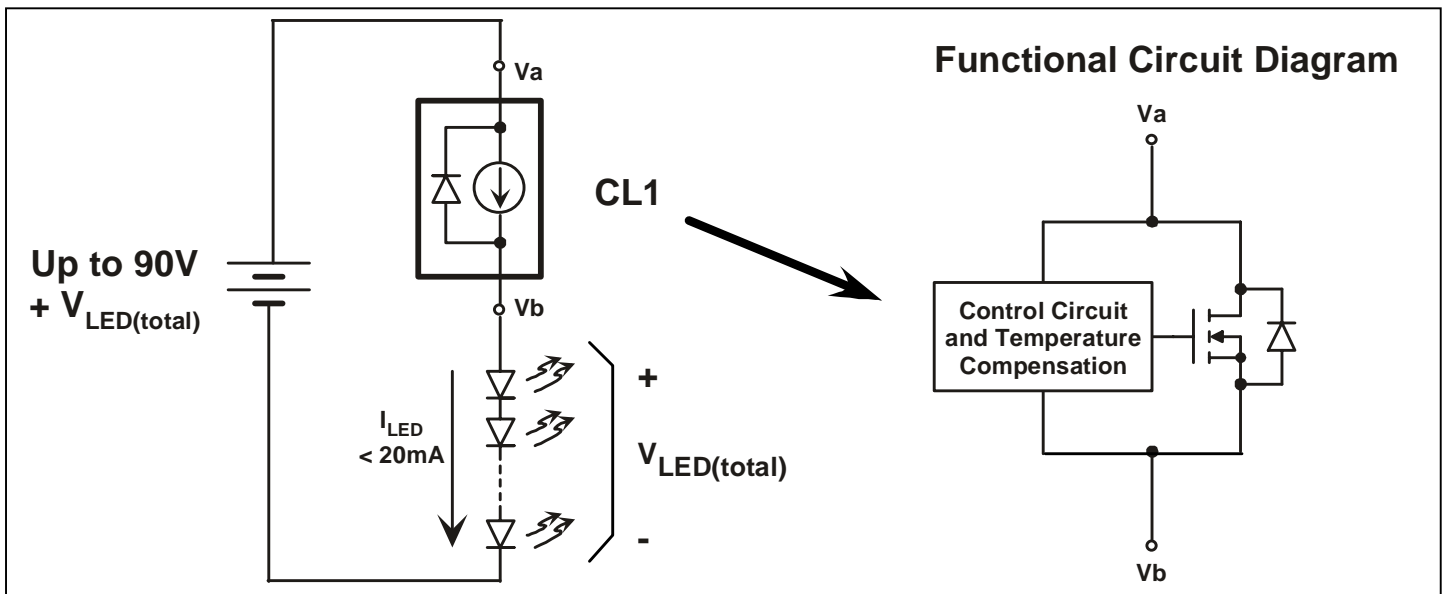
A typical application for the CL1 is to drive LEDs with a constant current of 20mA. They can also be used in parallel to provide higher currents such as 40mA, 60mA or 80mA. The device is available in SOT-89, D-PAK and TO-92 packages.

**Not Recommended
For New Designs!
See CL2 Datasheet
for more information.**

Applications

- ❑ LED driver
- ❑ Industrial lamp indicators
- ❑ Signage
- ❑ Accent lighting
- ❑ Automotive
- ❑ Constant current source
- ❑ Constant current sink

Typical Application Circuit



Ordering Information

| Order Number / Package | | |
|------------------------|---------|----------------|
| TO-92 | D-PAK | TO-243AA |
| CL1N3 /CL1N3-G | CL1K4-G | CL1N8 /CL1N8-G |

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



Thermal Characteristics

| Package | Power Dissipation @ $T_A=25^\circ\text{C}$ | θ_{JC} $^\circ\text{C/W}$ | θ_{JA} $^\circ\text{C/W}$ |
|-------------------|---|-------------------------------------|-------------------------------------|
| TO-92 | 0.73W | 125 | 170 |
| TO-243AA (SOT-89) | 1.3W* | 15 | 78* |
| TO-252 (D-PAK) | 2.0W* | 6.0 | 50* |

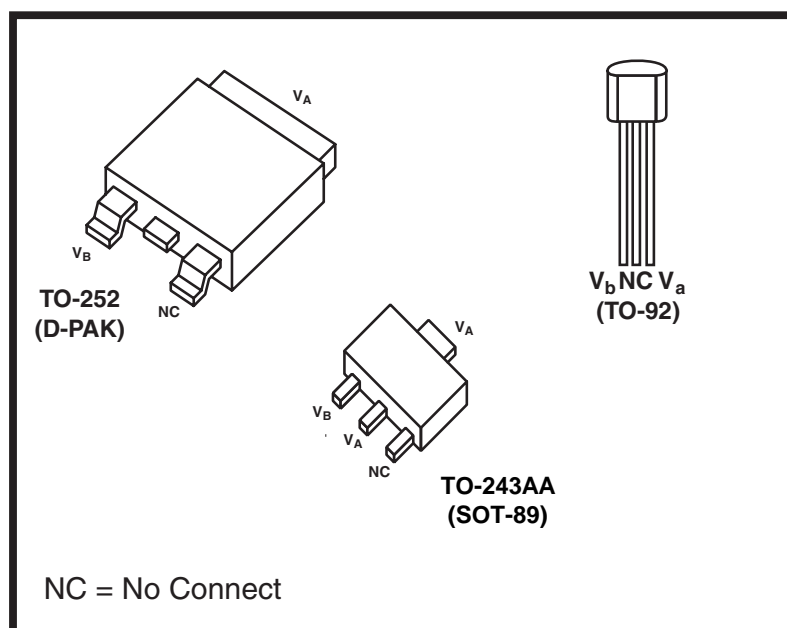
* Mounted on FR4 board; 25mm x 25mm x 1.57mm.

Absolute Maximum Ratings*

| | |
|--|---|
| V_{a-b} , Operating Voltage | 100V |
| T_J , Operating Junction Temperature | 0°C to $+125^\circ\text{C}$ |
| T_s , Storage Temperature | -55°C to $+150^\circ\text{C}$ |

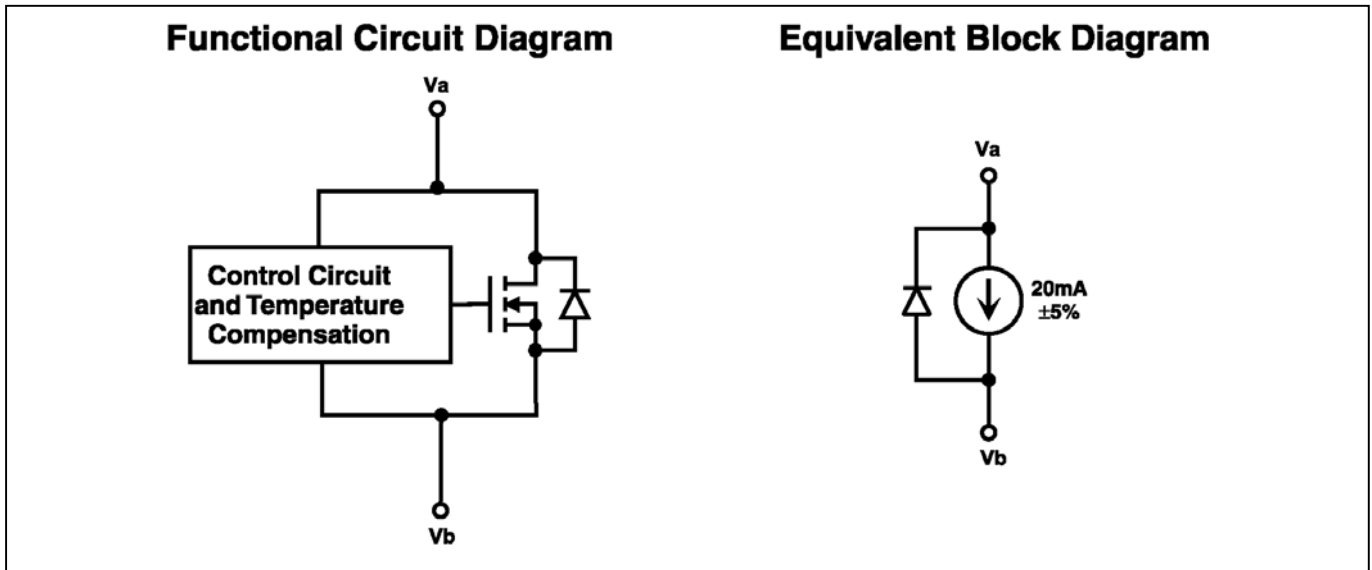
*Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability.

Package Options

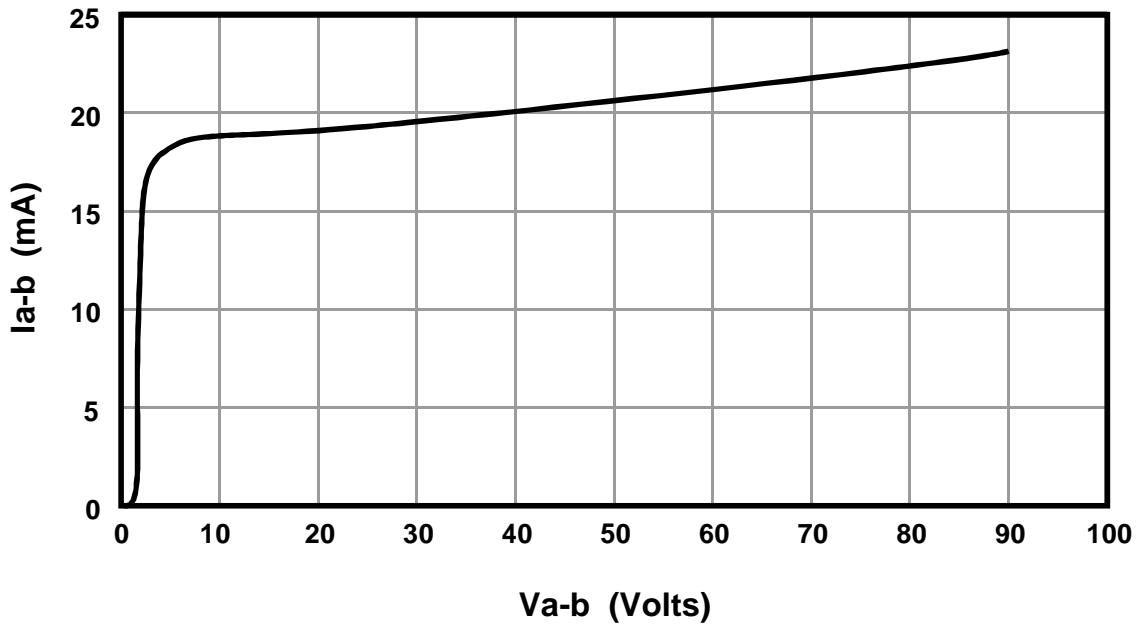


Electrical Characteristics (@ $T_j=25^{\circ}\text{C}$ unless otherwise specified)

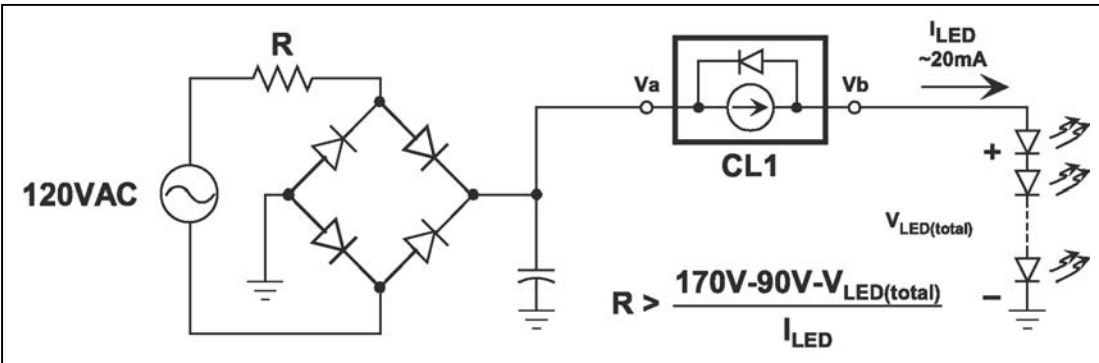
| Symbol | Parameter | Min | Typ | Max | Units | Conditions |
|---------------------------|--------------------------------|------|------|------|--------------------------------|---|
| Va-b | Maximum operating voltage | | | 90 | V | |
| Ia-b | Current regulation | 17.1 | 18.0 | 18.9 | mA | Va-b=5V |
| | | 19.0 | 20.0 | 21.0 | mA | Va-b=45V |
| | | 19.0 | 22.0 | 24.2 | mA | Va-b=90V |
| $\Delta I_{a-b}/\Delta T$ | Ia-b temperature coefficient | | -8.5 | | $\mu\text{A}/^{\circ}\text{C}$ | Va-b=45V, $T_j=0^{\circ}\text{C}$ to 100°C |
| Ra-b | AC resistance | | 17 | | K Ω | Va-b=5.0V to 90V |
| T_j | Operating junction temperature | 0 | | 125 | $^{\circ}\text{C}$ | |



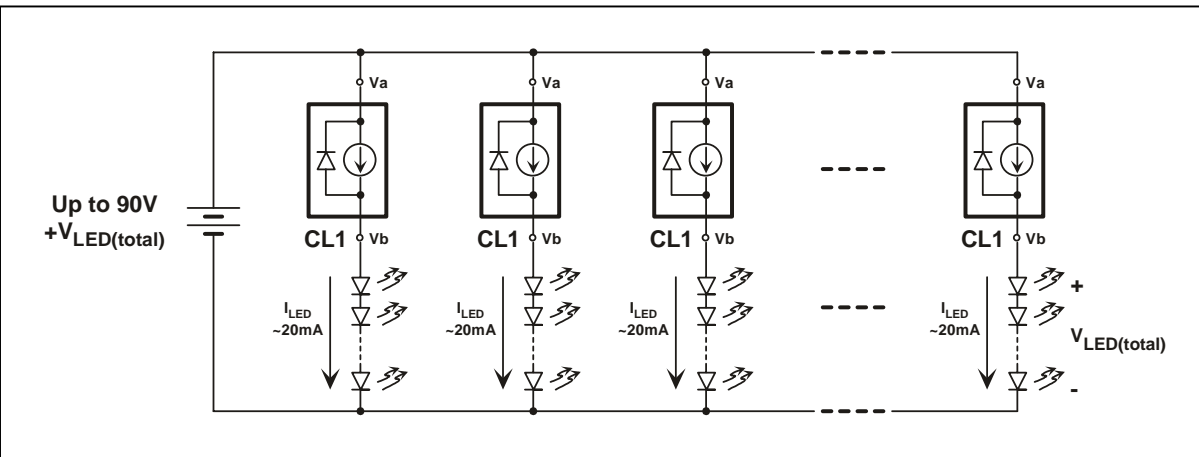
Output Current vs Voltage



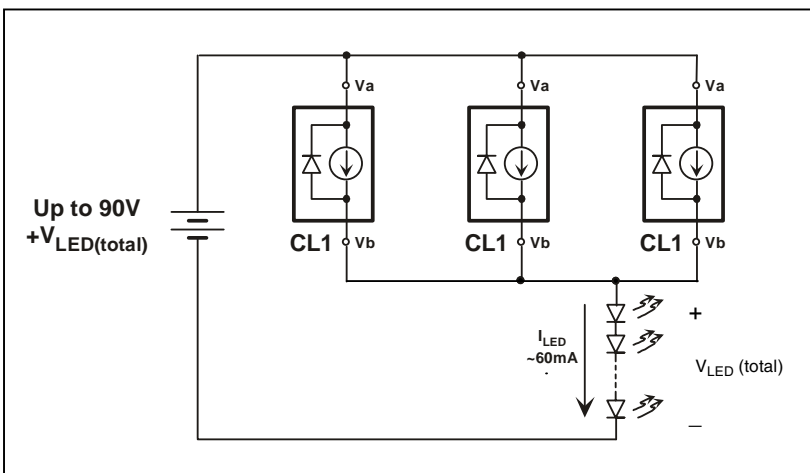
CL1 for 120V Off-Line LED Driver



CL1 for Multiple LED Strings

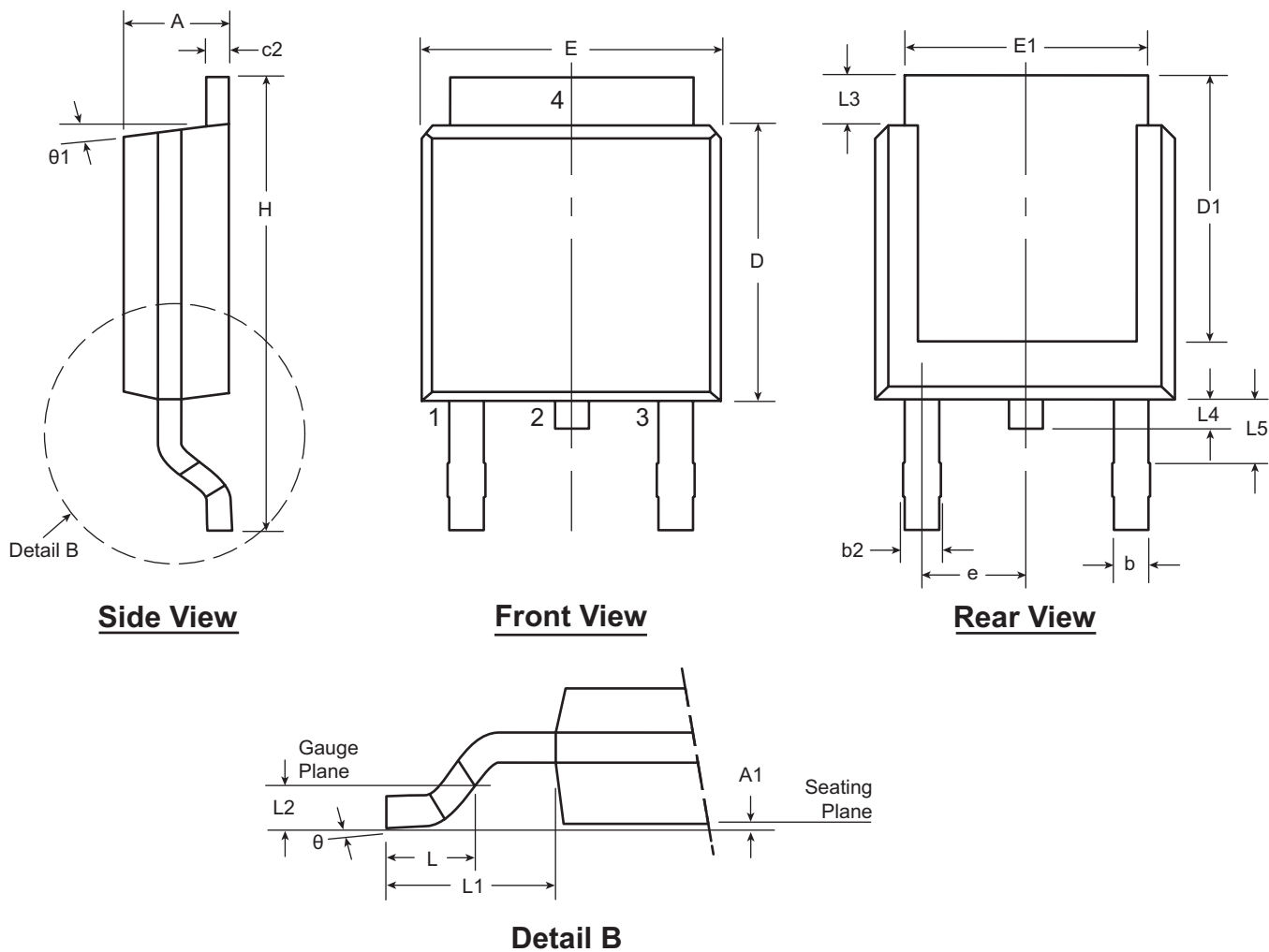


CL1 for 120V Off-Line LED Driver



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



Notes:

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

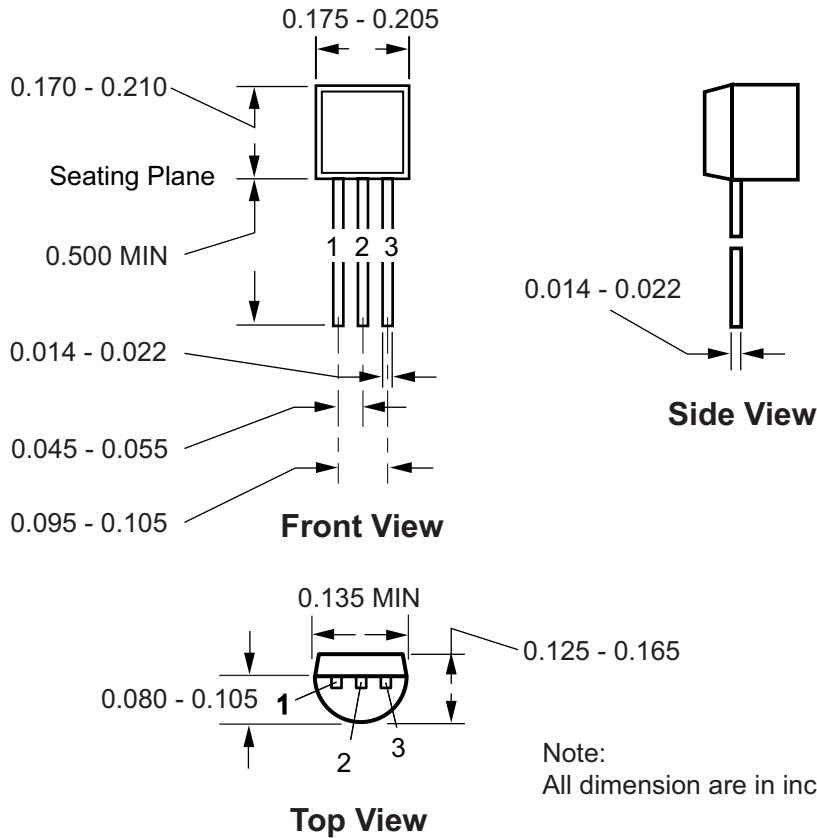
| Symbol | A | A1 | b | b2 | c2 | D | D1 | E | E1 | e | H | L | L1 | L2 | L3 | L4 | L5 | θ | θ1 | | | |
|--------------------|-----|------|------|------|------|------|------|------|------|------|-------------|------|------|-------------|-------------|------|----|------|------|------|-----|-----|
| Dimension (inches) | MIN | .086 | - | .025 | .030 | .018 | .235 | .205 | .250 | .170 | .090 BSC | .370 | .055 | .108 REF | .020 BSC | .035 | - | .045 | 0° | 0° | | |
| | NOM | - | - | - | - | .240 | - | - | - | - | | - | .060 | | | .108 | - | - | - | - | - | - |
| | MAX | .094 | .005 | .035 | .045 | .035 | .245 | - | .265 | - | | .410 | .070 | | | - | - | .050 | .040 | .060 | 10° | 15° |

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

Drawings not to scale.

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3-Lead TO-92 Package (N3)

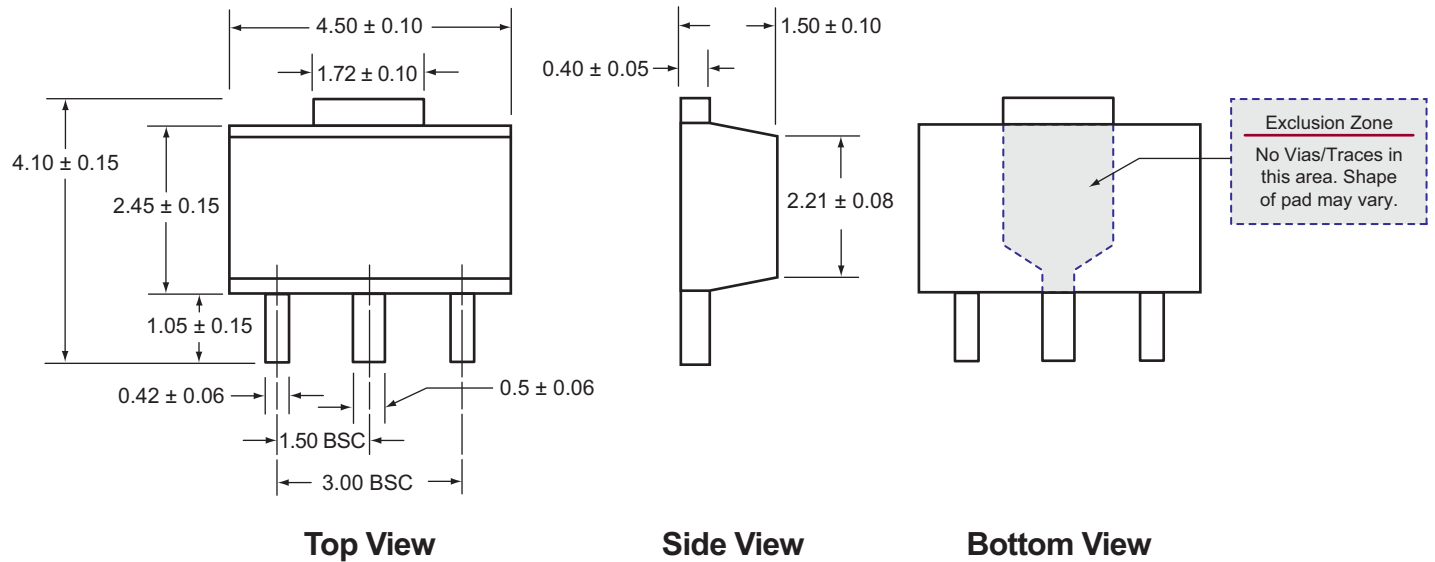


Note:
All dimension are in inches; angles are in degrees.

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3-Lead TO-243AA (SOT-89) Surface Mount Package (N8)



Notes:

1. All dimensions are in millimeters; all angles in degrees.

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