

**150V NPN LED DRIVING TRANSISTOR IN SOT89**
**Features**

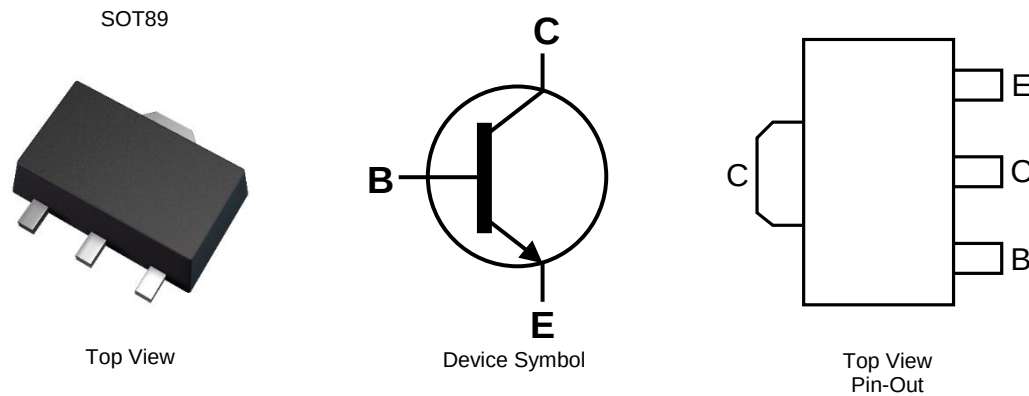
- $BV_{CEO} > 150V$
- $I_C = 1A$  High Continuous Current
- $h_{FE} > 100$  for  $I_C = 150mA$ ,  $V_{CE} = 0.25V$
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

**Mechanical Data**

- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.055 grams (Approximate)

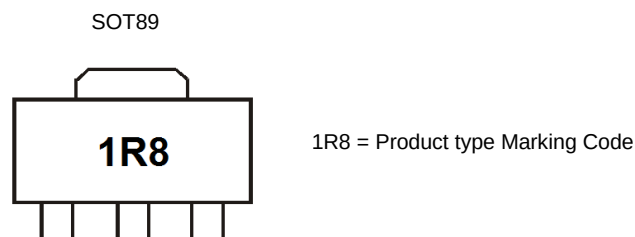
**Applications**

- LED TV Backlight


**Ordering Information** (Notes 4 & 5)

| Product      | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|------------|---------|--------------------|-----------------|-------------------|
| ZXTN4004ZTA  | AEC-Q101   | 1R8     | 7                  | 12              | 1,000 units       |
| ZXTN4004ZQTA | Automotive | 1R8     | 7                  | 12              | 1,000 units       |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
  3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C unless otherwise specified.)

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | 200   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 150   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | I <sub>C</sub>   | 1     | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | 3     | A    |
| Base Current                 | I <sub>B</sub>   | 500   | mA   |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

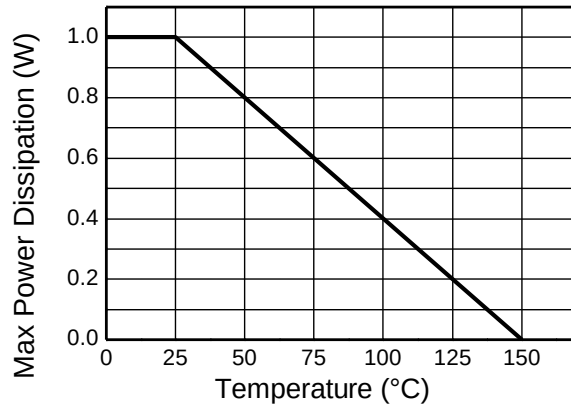
| Characteristic                              | Symbol                            | Value       | Unit |
|---------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation                           | P <sub>D</sub>                    | 1           | W    |
|                                             |                                   | 1.5         |      |
|                                             |                                   | 2.0         |      |
| Thermal Resistance, Junction to Ambient Air | R <sub>θJA</sub>                  | 125         | °C/W |
|                                             |                                   | 83          |      |
|                                             |                                   | 60          |      |
| Thermal Resistance, Junction to Lead        | R <sub>θJL</sub>                  | 13          | °C/W |
| Operating and Storage Temperature Range     | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**ESD Ratings** (Note 10)

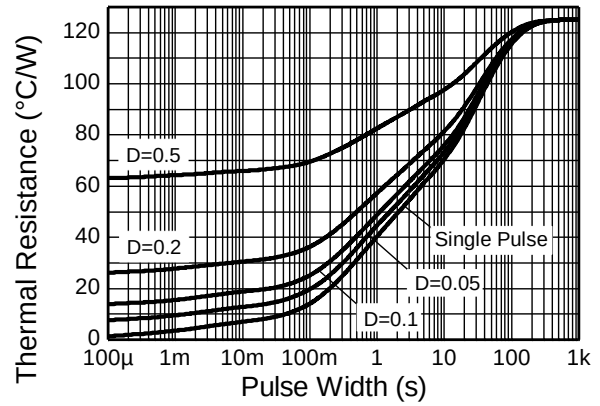
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--------------------------------------------|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
6. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Same as Note 6, except the device is mounted on 25mm x 25mm 1oz copper.
  8. Same as Note 6, except the device is mounted on 50mm x 50mm 1oz copper.
  9. Thermal resistance from junction to solder-point (on the exposed collector pad).
  10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

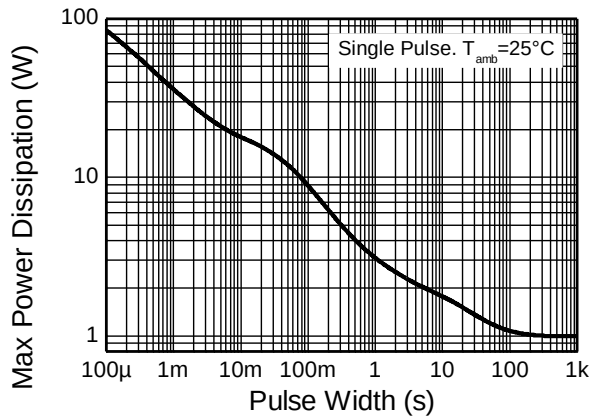
## Thermal Characteristics and Derating Information



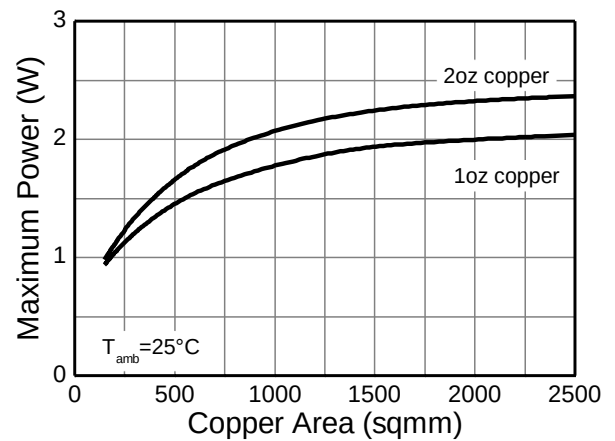
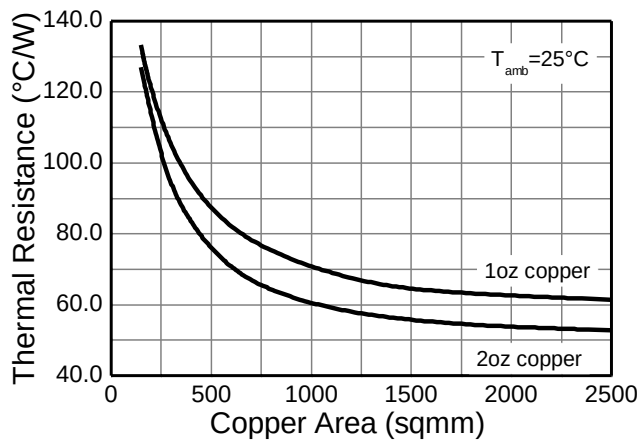
**Derating Curve**



**Transient Thermal Impedance**



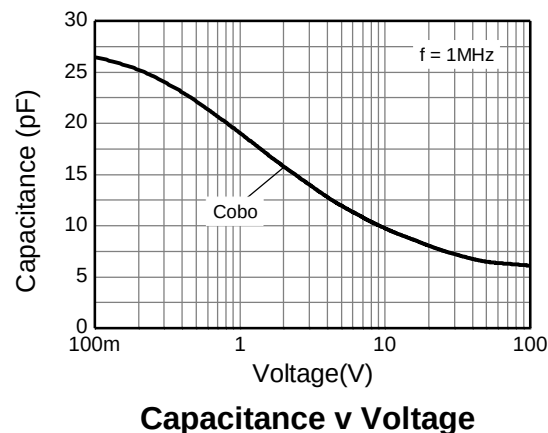
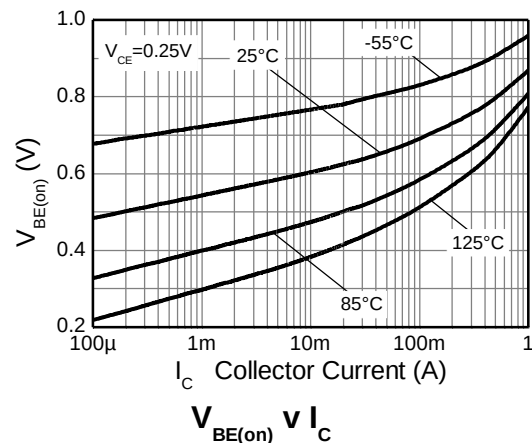
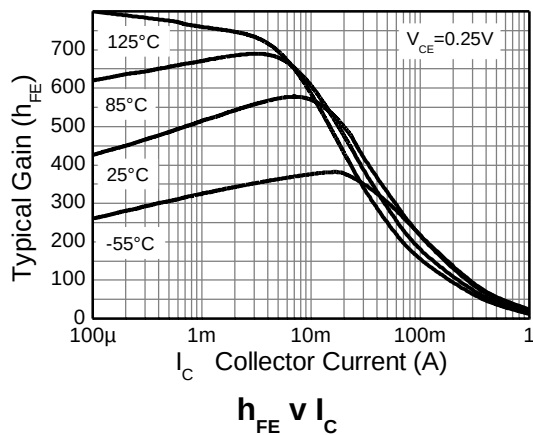
**Pulse Power Dissipation**



**Electrical Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)

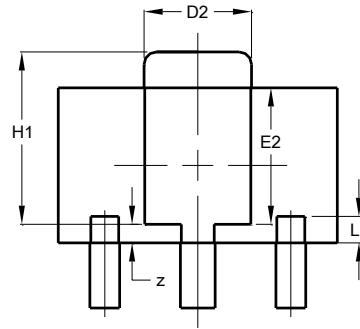
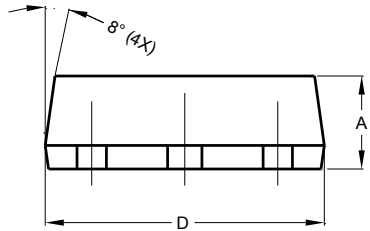
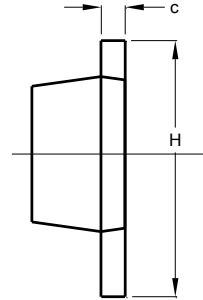
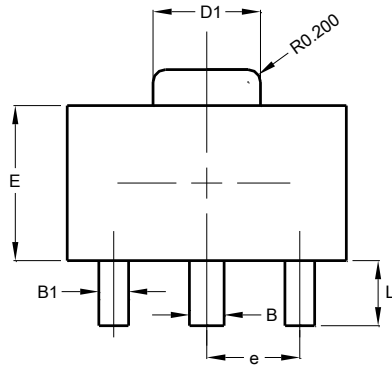
| Characteristic                                  | Symbol               | Min              | Typ         | Max         | Unit | Test Condition                                                                                                                                   |
|-------------------------------------------------|----------------------|------------------|-------------|-------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Collector-Emitter Breakdown Voltage (Note 11)   | BV <sub>CEO</sub>    | 150              | 175         | -           | V    | I <sub>C</sub> = 10mA                                                                                                                            |
| Collector-Base Breakdown Voltage                | BV <sub>CBO</sub>    | 200              | 310         | -           | V    | I <sub>C</sub> = 100μA                                                                                                                           |
| Collector Cut-Off Current                       | I <sub>CBO</sub>     | -                | <1          | 50          | nA   | V <sub>CB</sub> = 150V                                                                                                                           |
| Collector Cut-Off Current                       | I <sub>CES</sub>     | -                | <1          | 50          | nA   | V <sub>CE</sub> = 150V                                                                                                                           |
| Emitter Cut-Off Current                         | I <sub>EBO</sub>     | -                | <1          | 50          | nA   | V <sub>EB</sub> = 7V                                                                                                                             |
| Static Forward Current Transfer Ratio (Note 11) | h <sub>FE</sub>      | 200<br>60<br>100 | -<br>-<br>- | -<br>-<br>- | -    | I <sub>C</sub> = 30mA, V <sub>CE</sub> = 5V<br>I <sub>C</sub> = 85mA, V <sub>CE</sub> = 0.20V<br>I <sub>C</sub> = 150mA, V <sub>CE</sub> = 0.25V |
| Base-Emitter Turn-On Voltage (Note 11)          | V <sub>BE(on)</sub>  | -                | 0.71        | 0.95        | V    | I <sub>C</sub> = 150mA, V <sub>CE</sub> = 0.25V                                                                                                  |
| Collector-Emitter Saturation Voltage (Note 11)  | V <sub>CE(sat)</sub> | -                | -           | 0.25        | V    | I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA                                                                                                     |
| Delay Time                                      | t <sub>d</sub>       | -                | 512         | -           | ns   | V <sub>CC</sub> = 120V, I <sub>C</sub> = 150mA,<br>-I <sub>B2</sub> = 1.5mA, V <sub>CE(ON)</sub> = 0.25V                                         |
| Rise Time                                       | t <sub>r</sub>       | -                | 426         | -           | ns   |                                                                                                                                                  |
| Storage Time                                    | t <sub>s</sub>       | -                | 3413        | -           | ns   |                                                                                                                                                  |
| Fall Time                                       | t <sub>f</sub>       | -                | 321         | -           | ns   | V <sub>CC</sub> = 120V, I <sub>C</sub> = 150mA,<br>-I <sub>B2</sub> = 1.5mA, V <sub>CE(ON)</sub> = 4V                                            |
| Storage Time                                    | t <sub>s</sub>       | -                | 65          | -           | ns   |                                                                                                                                                  |
| Fall Time                                       | t <sub>f</sub>       | -                | 294         | -           | ns   |                                                                                                                                                  |

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Electrical Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)


## Package Outline Dimensions

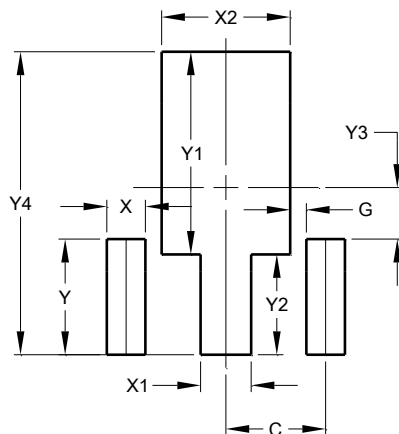
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT89                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 1.40  | 1.60  | 1.50  |
| B                    | 0.50  | 0.62  | 0.56  |
| B1                   | 0.42  | 0.54  | 0.48  |
| c                    | 0.35  | 0.43  | 0.38  |
| D                    | 4.40  | 4.60  | 4.50  |
| D1                   | 1.62  | 1.83  | 1.733 |
| D2                   | 1.61  | 1.81  | 1.71  |
| E                    | 2.40  | 2.60  | 2.50  |
| E2                   | 2.05  | 2.35  | 2.20  |
| e                    | -     | -     | 1.50  |
| H                    | 3.95  | 4.25  | 4.10  |
| H1                   | 2.63  | 2.93  | 2.78  |
| L                    | 0.90  | 1.20  | 1.05  |
| L1                   | 0.327 | 0.527 | 0.427 |
| z                    | 0.20  | 0.40  | 0.30  |
| All Dimensions in mm |       |       |       |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.500         |
| G          | 0.244         |
| X          | 0.580         |
| X1         | 0.760         |
| X2         | 1.933         |
| Y          | 1.730         |
| Y1         | 3.030         |
| Y2         | 1.500         |
| Y3         | 0.770         |
| Y4         | 4.530         |

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.