

## Features

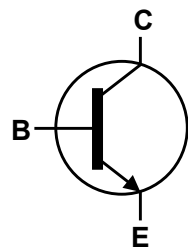
- $BV_{CEO} > 20V$
- $I_C = 6.0A$  Continuous Current
- Low Saturation Voltage  $V_{CE(sat)} < 48mV @ 1A$
- $R_{sat} = 30m\Omega$  for a Low Equivalent On-Resistance
- $P_D = 2.4W$  Power Dissipation
- Complementary part number: ZXTP25020DZ
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Mechanical Data

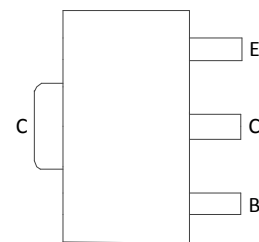
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.05 grams (Approximate)

## Application

- Emergency lighting circuits
- Motor driving
- Camera strobe
- Boost converters
- Backlight inverters
- MOSFET gate drivers
- LED Driving



Device Symbol



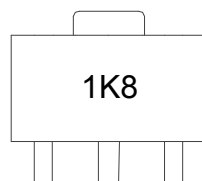
Top View  
Pin Out

## Ordering Information (Note 4)

| Part Number   | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|---------------|------------|---------|--------------------|-----------------|-------------------|
| ZXTN25020DZTA | Standard   | 1K8     | 7                  | 12              | 1,000             |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



1K8 = Product Type Marking Code

**Absolute Maximum Ratings** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

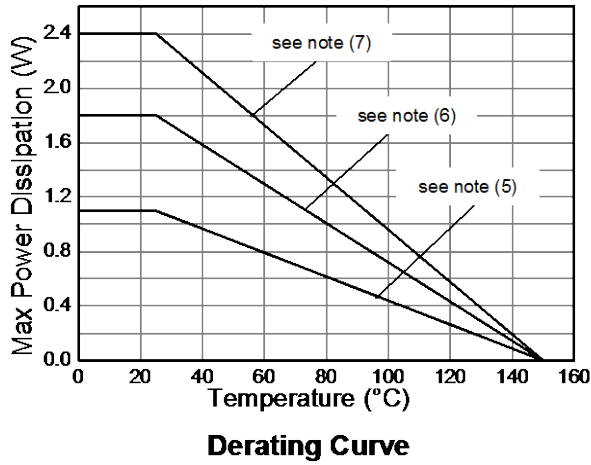
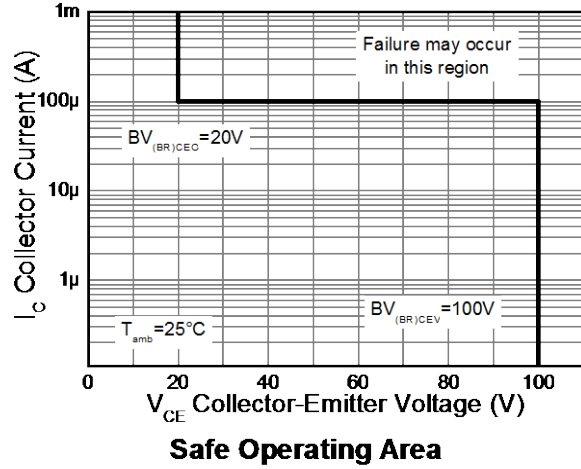
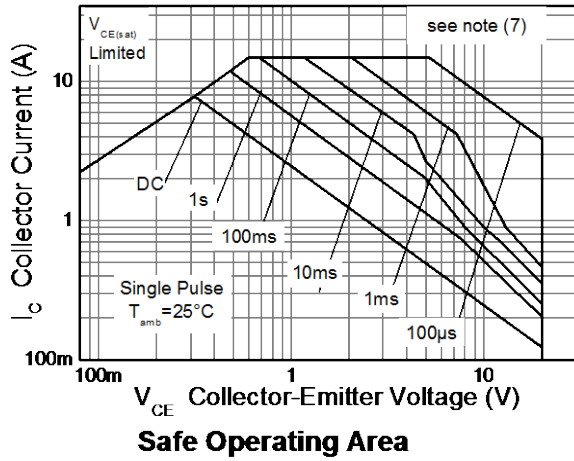
| Characteristic                               | Symbol    | Value | Unit |
|--|-----------|-------|------|
| Collector-Base Voltage                       | $V_{CBO}$ | 100   | V    |
| Collector-Emitter Voltage (forward blocking) | $V_{CEX}$ | 100   | V    |
| Collector-Emitter Voltage                    | $V_{CEO}$ | 20    | V    |
| Emitter-collector voltage (reverse blocking) | $V_{ECO}$ | 6     | V    |
| Emitter-Base Voltage                         | $V_{EBO}$ | 7     | V    |
| Continuous Collector Current                 | $I_C$     | 6     | A    |
| Peak Pulse Collector Current (single pulse)  | $I_{CM}$  | 15    | A    |
| Base current                                 | $I_B$     | 1     | A    |

**Thermal Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

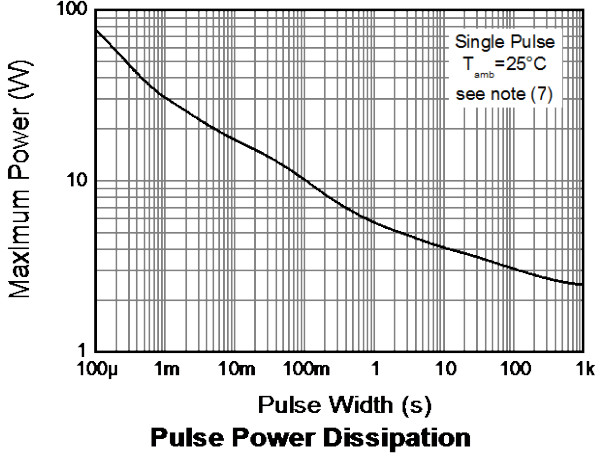
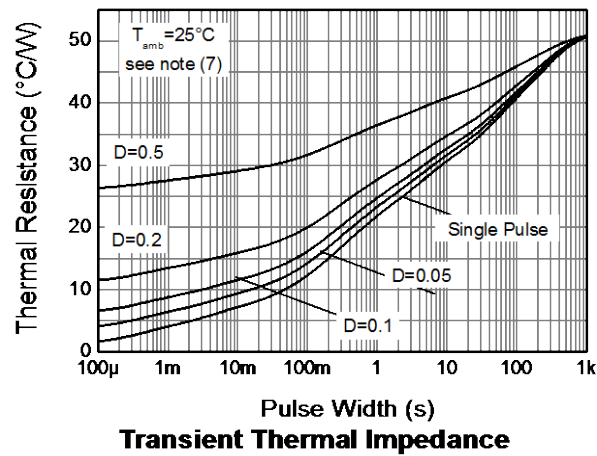
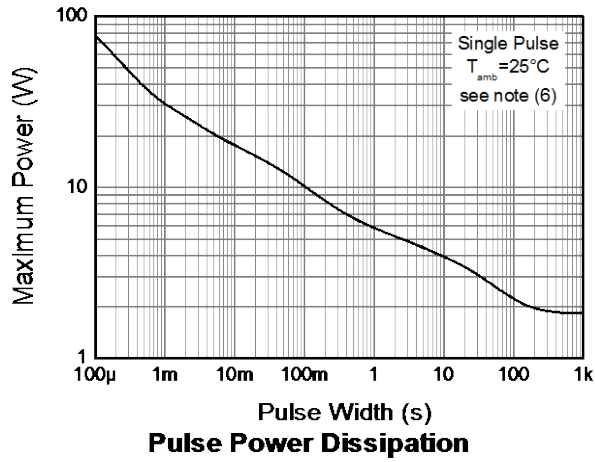
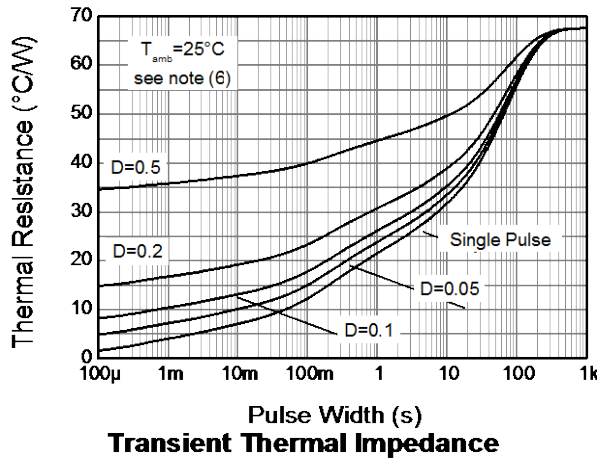
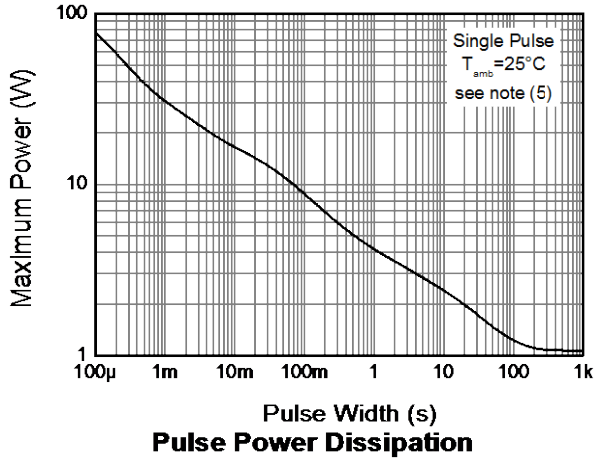
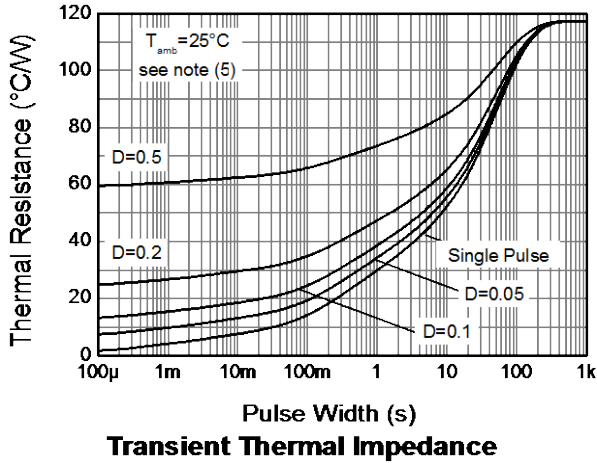
| Characteristic                                   | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 5)                       | $P_D$           | 1.1         | W<br>mW/ $^\circ\text{C}$ |
| Linear Derating Factor                           |                 | 8.8         |                           |
| Power Dissipation (Note 6)                       |                 | 1.8         |                           |
| Linear Derating Factor                           |                 | 14.4        |                           |
| Power Dissipation (Note 7)                       |                 | 2.4         |                           |
| Linear Derating Factor                           |                 | 19.2        |                           |
| Power Dissipation (Note 8)                       |                 | 4.46        |                           |
| Linear Derating Factor                           |                 | 35.7        |                           |
| Power Dissipation (Note 9)                       |                 | 19.2        |                           |
| Linear Derating Factor                           |                 | 153         |                           |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 117         | $^\circ\text{C/W}$        |
| Thermal Resistance, Junction to Ambient (Note 6) |                 | 68          |                           |
| Thermal Resistance, Junction to Ambient (Note 7) |                 | 51          |                           |
| Thermal Resistance, Junction to Ambient (Note 8) |                 | 28          |                           |
| Junction to case (Note 9)                        | $R_{\theta JC}$ | 7.95        | $^\circ\text{C/W}$        |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$          |

- Notes:
5. For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; device measured when operating in steady state condition.
  6. Same as note (5), except the device is mounted on 25mm x 25mm x 1.6mm single sided 2oz weight copper.
  7. Same as note (5), except the device is mounted on 50mm x 50mm x 1.6mm single sided 2oz weight copper.
  8. Same as note (5), except the device is measured at  $t < 5$  seconds.
  9. Junction to case (collector tab). Typical.

**Thermal Characteristics and Derating Information**



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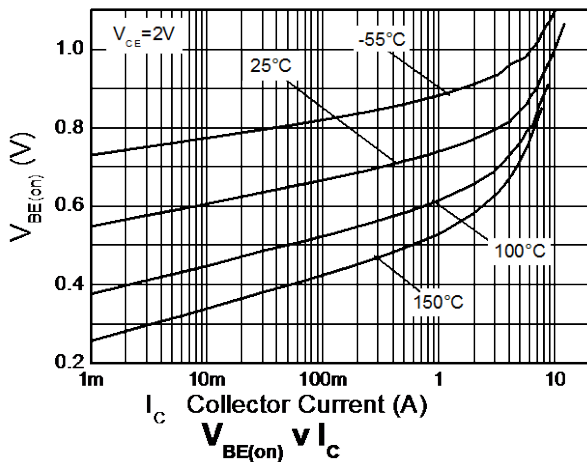
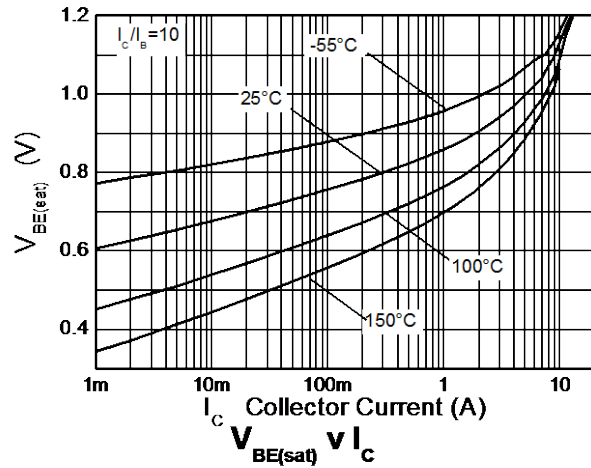
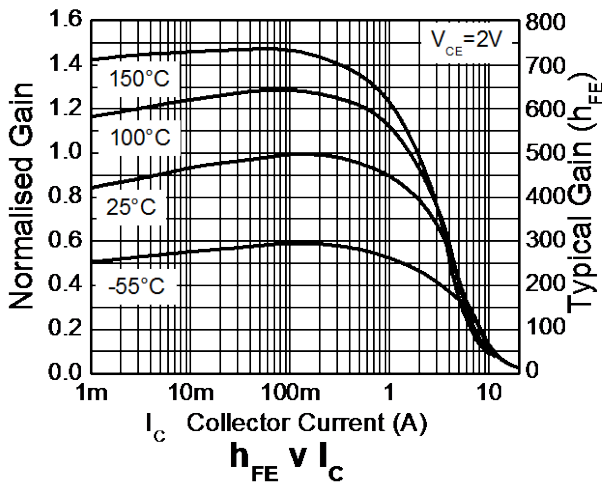
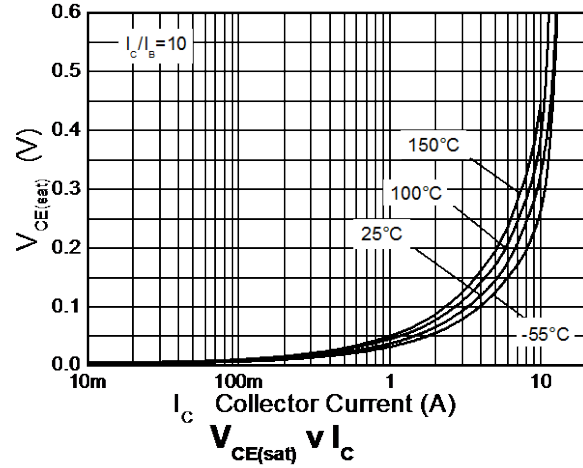
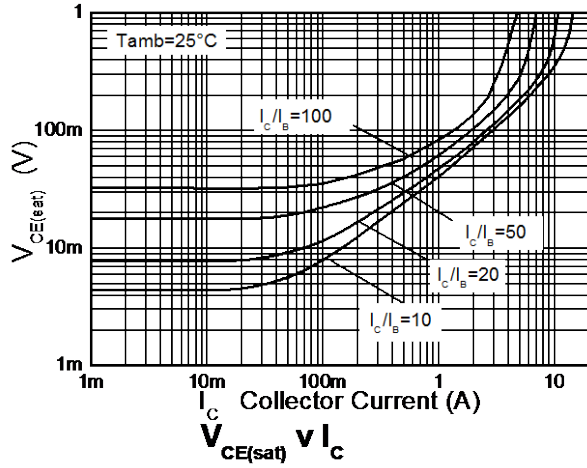


**Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic   | Symbol        | Min | Typ                                  | Max                                  | Unit                | Test Condition  |
|--|---------------|-----|--------------------------------------|--------------------------------------|---------------------|---|
| Collector-Base Breakdown Voltage                       | $BV_{CBO}$    | 100 | 125                                  | —                                    | V                   | $I_C = 100\mu\text{A}$  |
| Collector-Emitter Breakdown Voltage (forward blocking) | $BV_{CEX}$    | 100 | 120                                  | —                                    | V                   | $I_C = 100\mu\text{A}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$  |
| Collector- Emitter Breakdown Voltage (Note 10)         | $BV_{CEO}$    | 20  | 35                                   | —                                    | V                   | $I_C = 10\text{mA}$   |
| Emitter-Collector Breakdown Voltage (reverse blocking) | $BV_{ECX}$    | 6   | 8                                    | —                                    | V                   | $I_E = 100\mu\text{A}$ , $R_{BC} \leq 1\text{k}\Omega$ or $0.25\text{V} > V_{BC} > -0.25\text{V}$   |
| Emitter-Base Breakdown Voltage                         | $BV_{EBO}$    | 5.0 | 6.0                                  | —                                    | V                   | $I_E = 100\mu\text{A}$  |
| Emitter-Collector Breakdown Voltage                    | $BV_{ECO}$    | 7.0 | 8.3                                  | —                                    | V                   | $I_E = 100\mu\text{A}$  |
| Collector Base Cut-Off Current                         | $I_{CBO}$     | —   | 1                                    | 50                                   | nA<br>$\mu\text{A}$ | $V_{CB} = 100\text{V}$<br>$V_{CB} = 100\text{V}$ , $T_A = +100^\circ\text{C}$   |
| Collector Emitter Cut-Off Current                      | $I_{CEX}$     | —   | —                                    | 100                                  | nA                  | $V_{CE} = 100\text{V}$ ; $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$  |
| Emitter Cut-Off Current                                | $I_{EBO}$     | —   | 1                                    | 50                                   | nA                  | $V_{EB} = -5.6\text{V}$   |
| Collector-Emitter Saturation Voltage (Note 10)         | $V_{CE(sat)}$ | —   | 40<br>60<br>100<br>130<br>100<br>210 | 48<br>75<br>120<br>180<br>120<br>270 | mV                  | $I_C = 1\text{A}$ , $I_B = 100\text{mA}$<br>$I_C = 1\text{A}$ , $I_B = 20\text{mA}$<br>$I_C = 2\text{A}$ , $I_B = 40\text{mA}$<br>$I_C = 2\text{A}$ , $I_B = 20\text{mA}$<br>$I_C = 3\text{A}$ , $I_B = 300\text{mA}$<br>$I_C = 6\text{A}$ , $I_B = 300\text{mA}$ |
| Base-Emitter Saturation Voltage (Note 10)              | $V_{BE(sat)}$ | —   | 1000                                 | 1050                                 | mV                  | $I_C = 6\text{A}$ , $I_B = 300\text{mA}$  |
| Base-Emitter Turn-On Voltage (Note 10)                 | $V_{BE(on)}$  | —   | 875                                  | 950                                  | mV                  | $I_C = 6\text{A}$ , $V_{CE} = 2\text{V}$  |
| DC Current Gain (Note 10)                              | $h_{FE}$      | —   | 300<br>250<br>50<br>—                | 450<br>360<br>110<br>15              | —                   | $I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}$<br>$I_C = 2\text{A}$ , $V_{CE} = 2\text{V}$<br>$I_C = 6\text{A}$ , $V_{CE} = 2\text{V}$<br>$I_C = 15\text{A}$ , $V_{CE} = 2\text{V}$   |
| Transitional frequency                                 | $f_T$         | —   | 215                                  | —                                    | MHz                 | $I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ ,<br>$f = 100\text{MHz}$  |
| Output Capacitance                                     | $C_{ibo}$     | —   | 152                                  | —                                    | pF                  | $V_{EB} = 0.5\text{V}$ , $f = 1\text{MHz}$  |
| Output Capacitance                                     | $C_{obo}$     | —   | 16.5                                 | 25                                   | pF                  | $V_{CB} = 10\text{V}$ , $f = 1\text{MHz}$   |
| Delay time   | $t_d$         | —   | 67.7                                 | —                                    | ns                  | $V_{CC} = 10\text{V}$ , $I_C = 1\text{A}$ ,<br>$I_{B1} = -I_{B2} = 10\text{mA}$   |
| Rise time  | $t_r$         |     | 72.2                                 |                                      |                     |   |
| Storage time   | $t_s$         |     | 361                                  |                                      |                     |   |
| Fall time  | $t_f$         |     | 63.9                                 |                                      |                     |   |

 Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

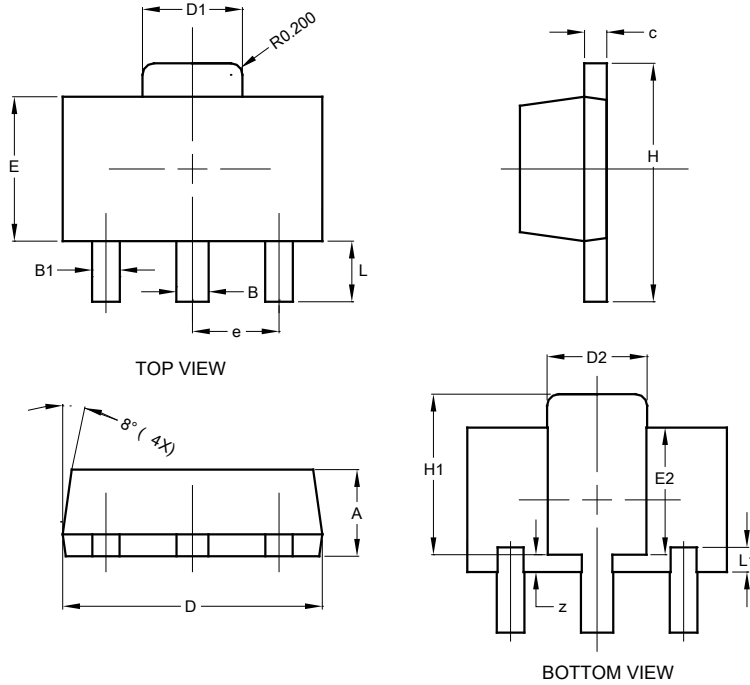
**Typical Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT89**

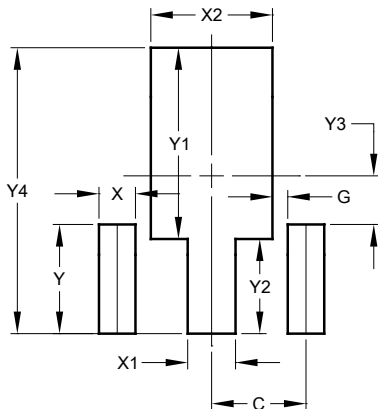


| SOT89                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 1.40  | 1.60  | 1.50  |
| B                    | 0.50  | 0.62  | 0.56  |
| B1                   | 0.42  | 0.54  | 0.48  |
| c                    | 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 <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT89**



| 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         |

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