

Features

- $BV_{CEO} > 60V$
- $I_C = 5A$ High Continuous Current
- $R_{SAT} = 30m\Omega$ for a Low Equivalent On-Resistance
- Low Saturation Voltage $V_{CE(SAT)} < 65mV @ I_C = 1A$
- h_{FE} Specified Up to 10A for High Current Gain Hold Up
- Complementary PNP Type: ZXTP2012Z
- **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-Q100/101/104/200, 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

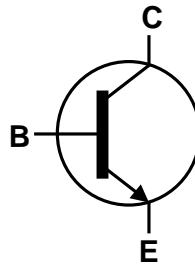
- Package: SOT89
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 Ⓔ③
- Weight: 0.05 grams (Approximate)

Application

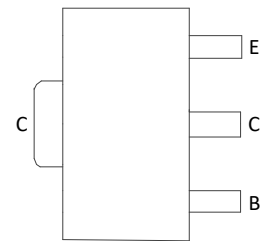
- Emergency lighting circuits
- Motor driving (including DC fans)
- Backlight inverters
- Power switches
- Gate-driving MOSFETs and IGBTs



Top View



Device Symbol

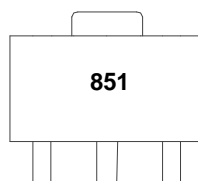

 Top View
Pin Out

Ordering Information (Note 4)

| Orderable Part Number | Package | Marking | Reel Size (inches) | Tape Width (mm) | Packing | |
|-----------------------|---------|---------|--------------------|-----------------|---------|---------|
| | | | | | Qty. | Carrier |
| ZXTN2010ZTA | SOT89 | 851 | 7 | 12 | 1,000 | Reel |
| ZXTN2010Z-13R | SOT89 | 851 | 13 | 12 | 4,000 | Reel |

- 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



851 = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 150 | V |
| Collector-Emitter Voltage | V _{CEO} | 60 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Base Current | I _B | 2 | A |
| Continuous Collector Current | I _C | 5 | A |
| Peak Pulse Current | I _{CM} | 20 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|-------|
| Power Dissipation (Note 5) | P _D | 1.5 | W |
| Linear Derating Factor | | 12 | mW/°C |
| Power Dissipation (Note 6) | P _D | 2.1 | W |
| Linear Derating Factor | | 16.8 | mW/°C |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 83 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 60 | °C/W |
| Thermal Resistance, Junction to Case (Note 5) | R _{θJC} | 5.3 | °C/W |
| Thermal Resistance, Junction to Leads (Note 7) | R _{θJL} | 3.23 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

ESD Ratings (Note 8)

| 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:
5. For a device mounted with the exposed collector pad on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as note (5), except the device is mounted on 50mm x 50mm 1oz copper.
 7. Thermal resistance from junction to solder-point (on the exposed collector pad).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

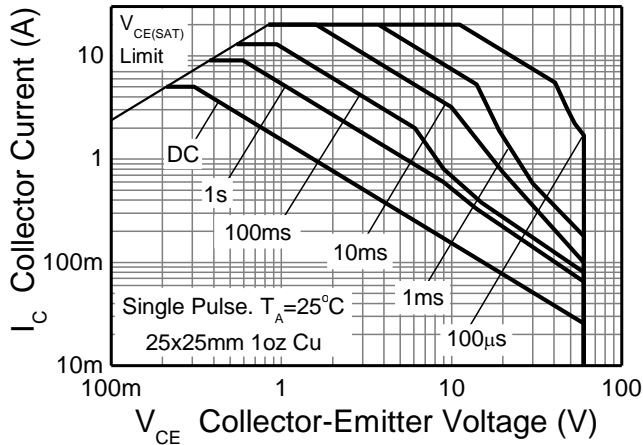


Fig 1. Safe Operating Area

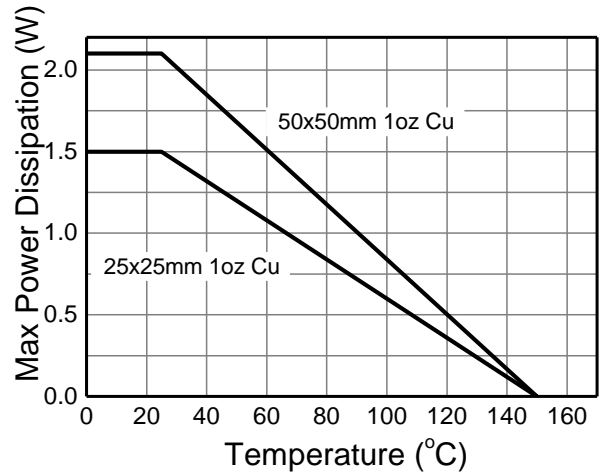


Fig 2. Derating Curve

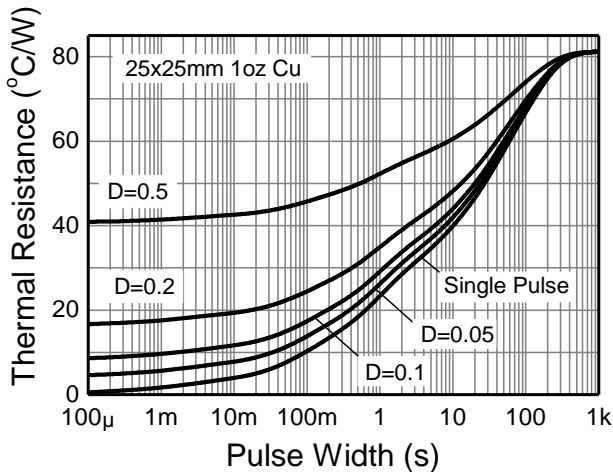


Fig 3. Transient Thermal Impedance

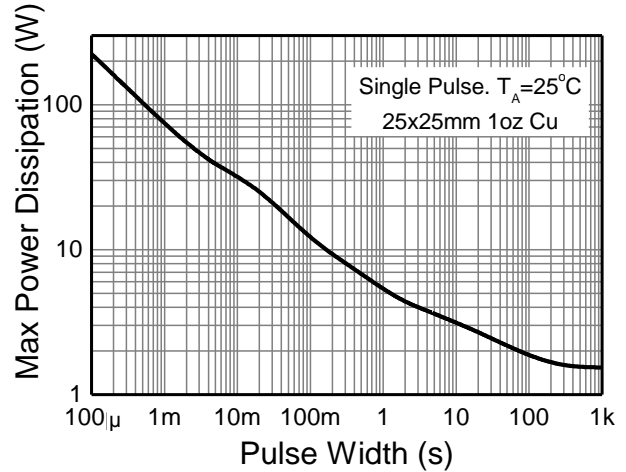


Fig 4. Pulse Power Dissipation

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|-----------------------------|-----|-----|------------|----------|--|
| Collector-Base Breakdown Voltage | BV _{CBO} | 150 | 190 | — | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage (Note 9) | BV _{CER} | 150 | 190 | — | V | I _C = 1μA, R _B ≤ 1kΩ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV _{CEO} | 60 | 80 | — | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 7 | 8.1 | — | V | I _E = 100μA |
| Collector Cutoff Current | I _{CBO} | — | < 1 | 50 500 | nA nA | V _{CB} = 120V V _{CB} = 120V, T _A = +100°C |
| Collector Cutoff Current | I _{CER} R ≤ 1kΩ | — | < 1 | 100 500 | nA nA | V _{CB} = 120V V _{CB} = 120V, T _A = +100°C |
| Emitter Cutoff Current | I _{EBO} | — | < 1 | 10 | nA | V _{EB} = 6V |
| DC Current Transfer Static Ratio (Note 9) | h _{FE} | 100 | 200 | — | — | I _C = 10mA, V _{CE} = 1V |
| | | 100 | 200 | 300 | | I _C = 2A, V _{CE} = 1V |
| | | 55 | 105 | — | | I _C = 5A, V _{CE} = 1V |
| | | 20 | 40 | — | | I _C = 10A, V _{CE} = 1V |
| Collector-Emitter Saturation Voltage (Note 9) | V _{CE(sat)} | — | 17 | 30 | mV | I _C = 100mA, I _B = 5mA |
| | | — | 35 | 55 | | I _C = 1A, I _B = 100mA |
| | | — | 40 | 65 | | I _C = 1A, I _B = 50mA |
| | | — | 90 | 125 | | I _C = 2A, I _B = 50mA |
| | | — | 170 | 230 | | I _C = 6A, I _B = 300mA |
| Base-Emitter Saturation Voltage (Note 9) | V _{BE(sat)} | — | 970 | 1100 | mV | I _C = 6A, I _B = 300mA |
| Base-Emitter Turn-on Voltage (Note 9) | V _{BE(on)} | — | 910 | 1050 | mV | I _C = 6A, V _{CE} = 1V |
| Transitional Frequency | f _T | — | 130 | — | MHz | I _C = 100mA, V _{CE} = 10V, f = 50MHz |
| Output Capacitance | C _{OBO} | — | 31 | — | pF | V _{CB} = 10V, f = 1MHz, |
| Switching Time | t _{on} | — | 42 | — | ns | V _{CC} = 10V, I _C = 1A I _{B1} = -I _{B2} = 100mA |
| | t _{off} | — | 760 | — | | |

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

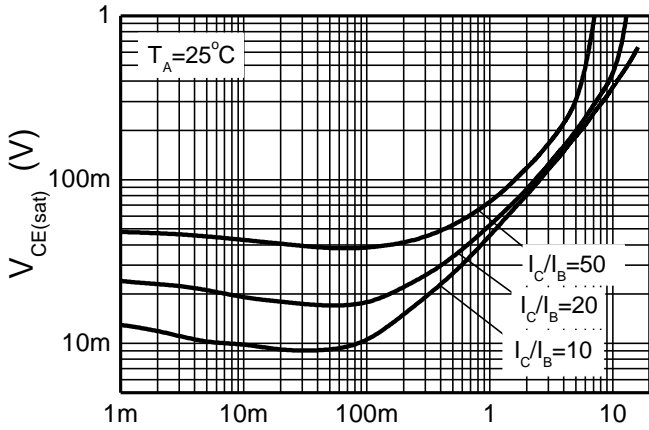


Fig 5. $V_{CE(sat)}$ v I_C

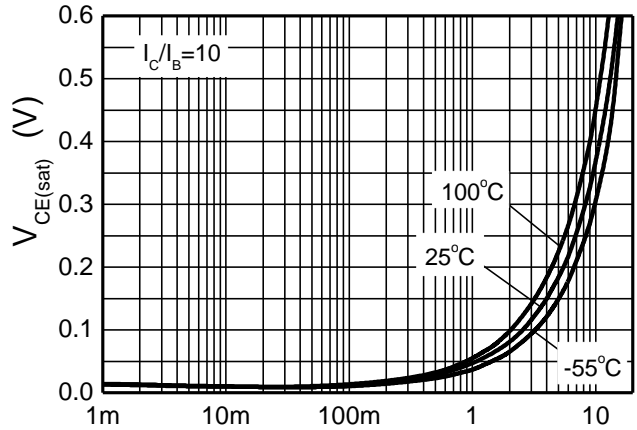


Fig 6. $V_{CE(sat)}$ v I_C

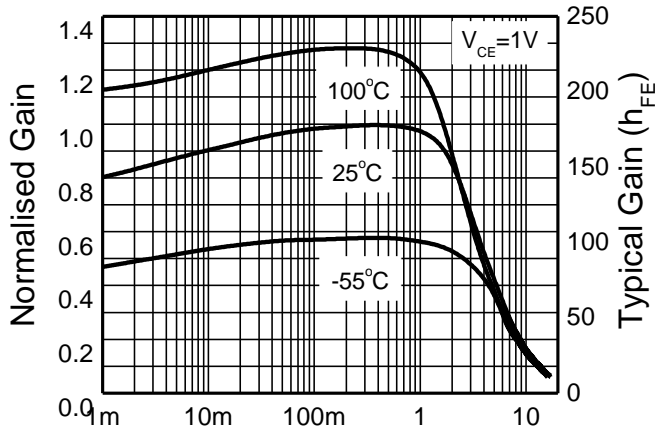


Fig 7. h_{FE} v I_C

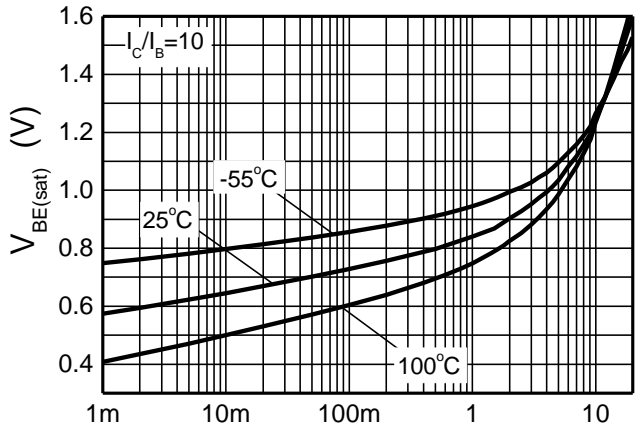


Fig 8. $V_{BE(sat)}$ v I_C

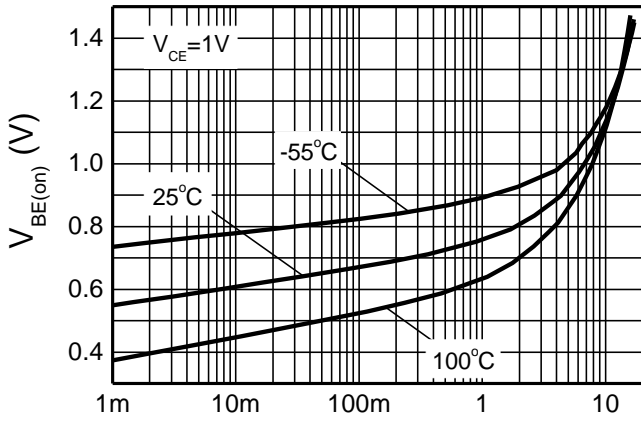
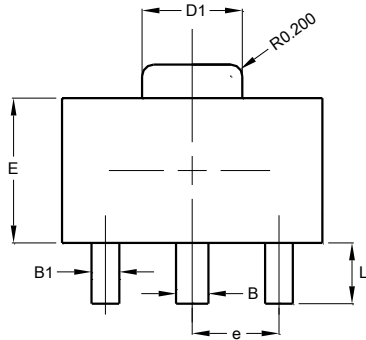


Fig 9. $V_{BE(on)}$ v I_C

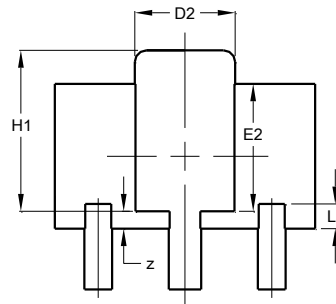
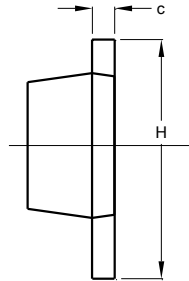
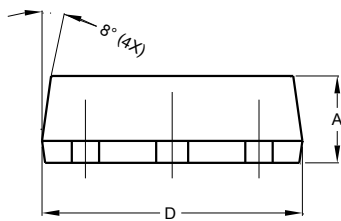
Package Outline Dimensions

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

SOT89



TOP VIEW



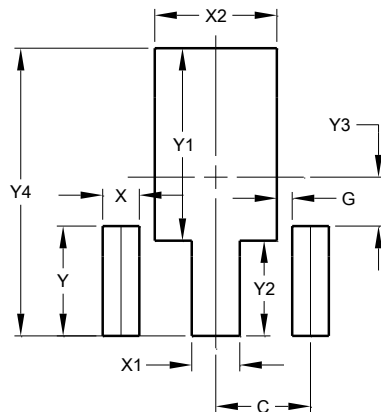
BOTTOM VIEW

| 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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