

25V NPN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89
Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirement of Automotive Applications.

Features

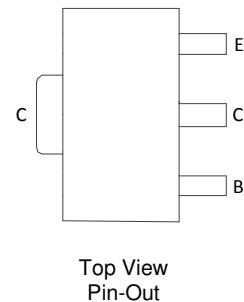
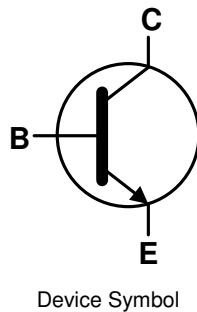
- $BV_{CEO} > 25V$
- $I_C = 5.5A$ High Continuous Current
- $I_{CM} = 20A$ Peak Pulse Current
- Very Low Saturation Voltages
- Extremely Low Equivalent On-Resistance; $R_{CE(SAT)} = 25m\Omega$ at 6.5A
- Excellent h_{FE} Characteristics up to 20A
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 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 208③
- Weight: 0.05 grams (Approximate)

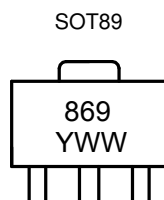
Applications

- Emergency Lighting Circuits
- Motor Driving (Including DC Fans)
- Solenoid, Relay and Actuator Drivers
- DC DC Modules
- Backlight Inverters


Ordering Information (Note 5)

| Part Number | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|--------------|---------|--------------------|-----------------|-------------------|
| ZXTN2005ZQTA | 869 | 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information


869 = Product Type Marking Code
 YWW = Date Code Marking
 Y = Last Digit of Year (ex: 8 = 2018)
 WW = Week Code (01 to 53)

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

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 60 | V |
| Collector-Emitter Voltage | V _{CEO} | 25 | V |
| Emitter-Base Voltage | V _{EBO} | 7 | V |
| Continuous Collector Current | I _C | 5.5 | A |
| Peak Pulse Current | I _{CM} | 20 | A |

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

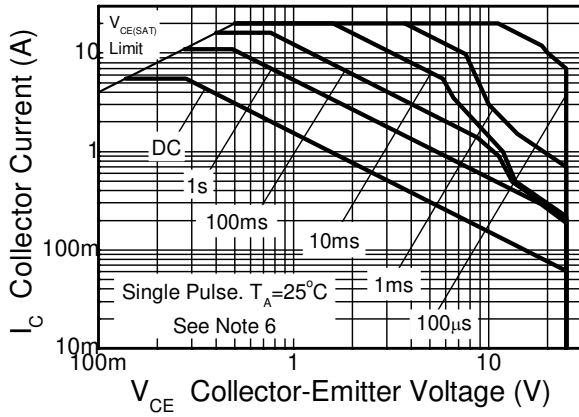
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|-------|
| Power Dissipation Linear Derating Factor | P _D | 1.5 | W |
| | | 12 | |
| Thermal Resistance, Junction to Ambient Air | R _{θJA} | 2.1 | mW/°C |
| | | 16.8 | |
| Operating and Storage Temperature Range | T _J , T _{STG} | 83 | °C/W |
| | | 60 | |
| | | -55 to +150 | °C |

ESD Ratings (Note 8)

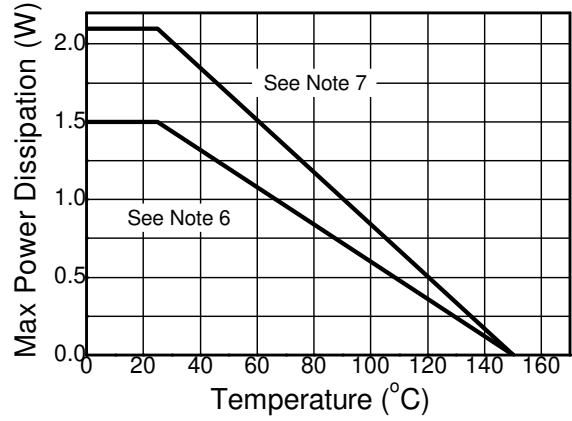
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
6. 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.
 7. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

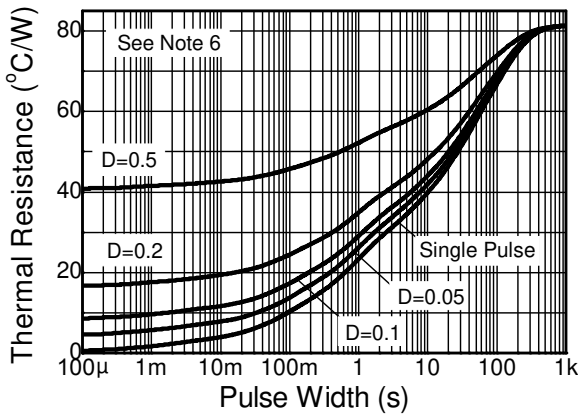
Thermal Characteristics and Derating Information



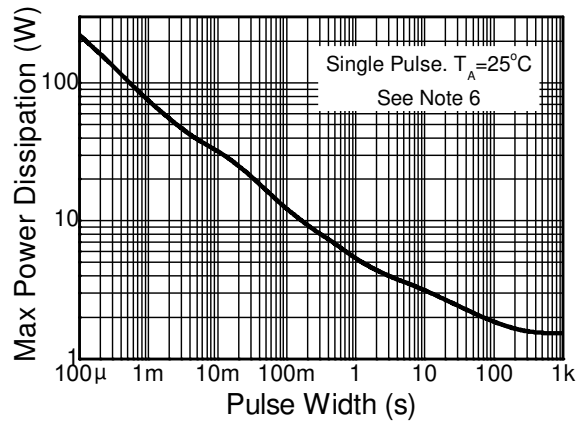
Safe Operating Area



Derating Curve



Transient Thermal Impedance



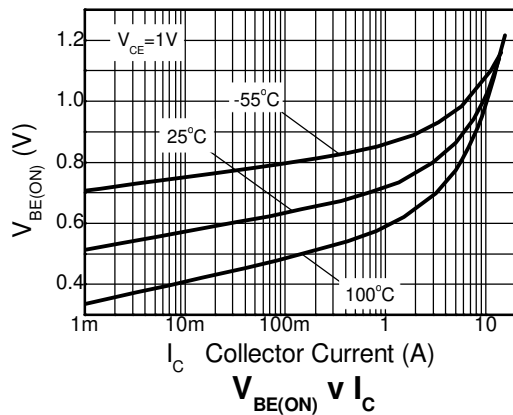
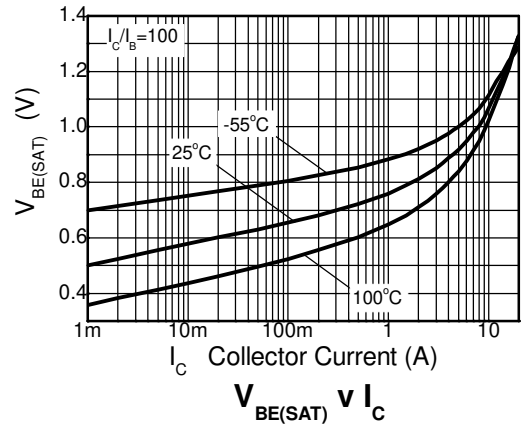
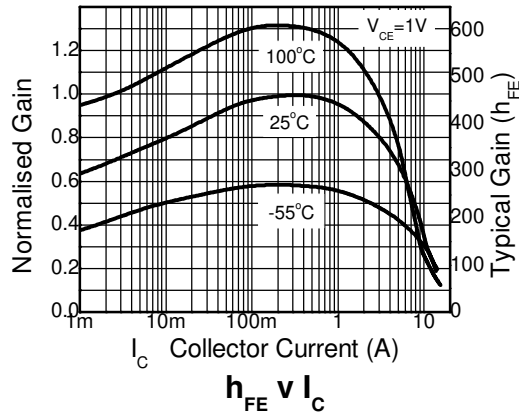
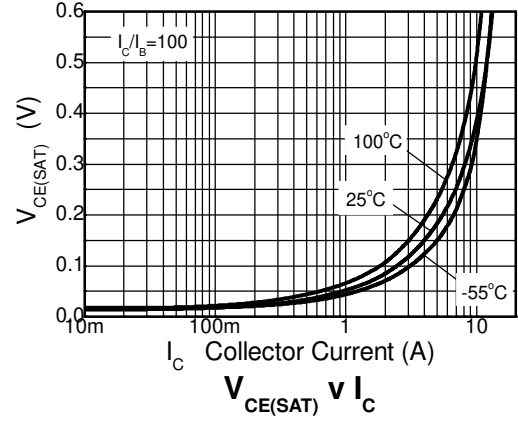
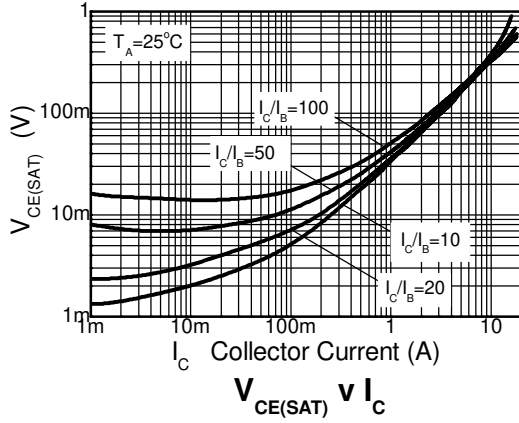
Pulse Power Dissipation

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|-----------------------------|-------------------------|------------------------------|------------------------------|----------|---|
| Collector-Base Breakdown Voltage | BV _{CBO} | 60 | 120 | — | V | I _C = 100μA |
| Collector-Emitter Breakdown Voltage | BV _{CER} | 60 | 120 | — | V | I _C = 1μA, R _B ≤ 1kΩ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV _{CEO} | 25 | 35 | — | V | I _C = 10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 7 | 8.1 | — | V | I _E = 100μA |
| Collector Cutoff Current | I _{CBO} | — | — | 20 0.5 | nA μA | V _{CB} = 50V V _{CB} = 50V, T _A = +100°C |
| Collector Cutoff Current | I _{CER} R ≤ 1kΩ | — | — | 20 0.5 | nA μA | V _{CB} = 50V V _{CB} = 50V, T _A = +100°C |
| Emitter Cutoff Current | I _{EBO} | — | — | 10 | nA | V _{EB} = 5.6V |
| DC Current Transfer Static Ratio (Note 9) | h _{FE} | 300 300 200 40 | 400 450 275 55 | — | — | I _C = 10mA, V _{CE} = 1V I _C = 1A, V _{CE} = 1V I _C = 7A, V _{CE} = 1V I _C = 20A, V _{CE} = 1V |
| Collector-Emitter Saturation Voltage (Note 9) | V _{CE(SAT)} | — | 25 30 45 105 160 | 35 45 70 130 200 | mV | I _C = 500mA, I _B = 10mA I _C = 1A, I _B = 100mA I _C = 1A, I _B = 10mA I _C = 2A, I _B = 10mA I _C = 6.5A, I _B = 150mA |
| Base-Emitter Saturation Voltage (Note 9) | V _{BE(SAT)} | — | 950 | 1050 | mV | I _C = 6.5A, I _B = 150mA |
| Base-Emitter Turn-on Voltage (Note 9) | V _{BE(ON)} | — | 860 | 960 | mV | I _C = 6.5A, V _{CE} = 1V |
| Transitional Frequency | f _T | — | 150 | — | MHz | I _C = 100mA, V _{CE} = 10V, f = 50MHz |
| Output Capacitance | C _{OBO} | — | 48 | — | pF | V _{CB} = 10V, f = 1MHz |
| Switching Time | t _{ON} | — | 33 | — | ns | V _{CC} = 10V, I _C = 1A, I _{B1} = -I _{B2} = 100mA |
| | t _{OFF} | — | 464 | — | | |

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

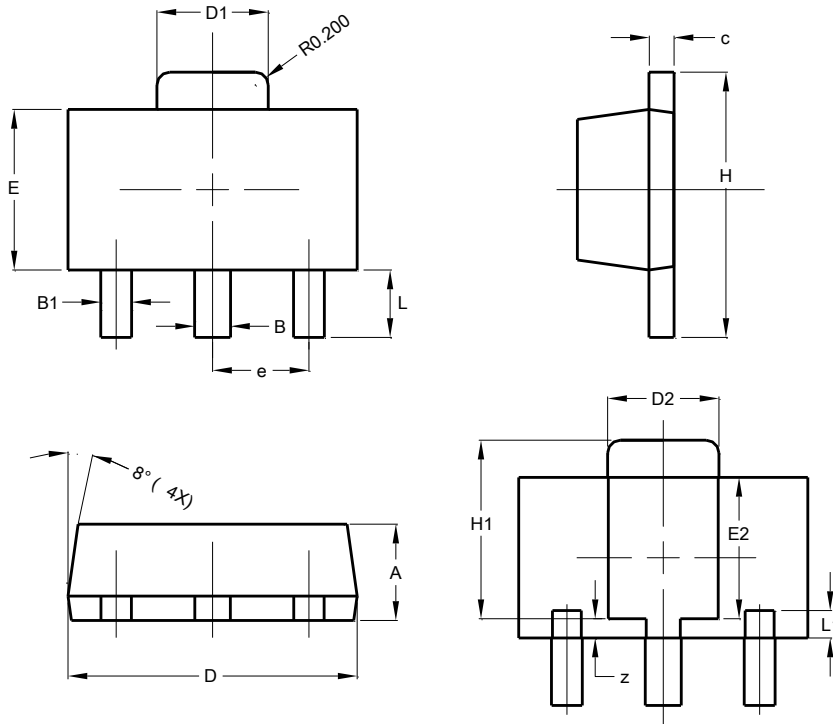
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

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

SOT89

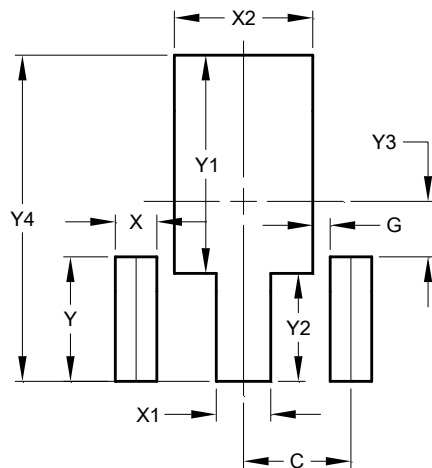


| SOT89 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 1.40 | 1.60 | 1.50 |
| B | 0.50 | 0.62 | 0.56 |
| B1 | 0.42 | 0.54 | 0.48 |
| c | 0.35 | 0.43 | 0.38 |
| D | 4.40 | 4.60 | 4.50 |
| D1 | 1.62 | 1.83 | 1.733 |
| D2 | 1.61 | 1.81 | 1.71 |
| E | 2.40 | 2.60 | 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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