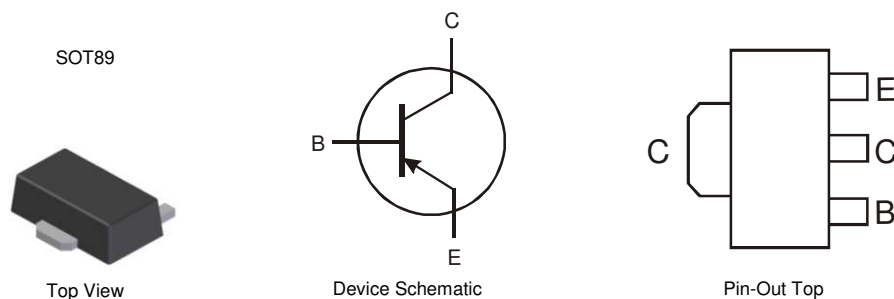


Features

- $BV_{CEO} > -40V$
- $I_C = -4A$ Continuous Collector Current
- Ultra-Low Collector-Emitter Saturation Voltage
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **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-Q101, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) 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 Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Plates Leads. Solderable per MIL-STD-202, Method 208 Ⓔ③
- Weight: 0.055 grams (Approximate)



Ordering Information (Note 4)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| DSS5540X-13 | ZPS54 | 13 | 12mm | 2500 |
| DSS5540XTC | ZPS54 | 13 | 12mm | 4000 |

- 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



ZPS54 = Product Type Marking Code
 JII = Manufacturer's Code Marking
 YWW = Date Code Marking
 Y = Last digit of year (ex: 2 = 2022)
 WW = Week code (01 – 53)

Absolute Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | -40 | V |
| Collector-Emitter Voltage | V_{CEO} | -40 | V |
| Emitter-Base Voltage | V_{EBO} | -6 | V |
| Peak Pulse Collector Current | I_{CM} | -10 | A |
| Repetitive Peak Pulse Collector Current (Note 5) | I_{CRP} | -5 | A |
| Continuous Collector Current | I_C | -4 | A |
| Peak Pulse Base Current | I_{BM} | -2 | A |
| Continuous Base Current | I_B | -1 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|--------------------|
| Power Dissipation (Note 6) @ $T_A = 25^\circ\text{C}$ | P_D | 0.9 | W |
| Thermal Resistance, Junction to Ambient Air (Note 6) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 139 | $^\circ\text{C/W}$ |
| Power Dissipation (Note 7) @ $T_A = 25^\circ\text{C}$ | P_D | 2 | W |
| Thermal Resistance, Junction to Ambient Air (Note 7) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case (Note 6) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JC}$ | 17 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Notes:
5. Pulse width $\leq 10\text{ms}$; Duty cycle ≤ 0.2
 6. For a device mounted on FR-4 PCB with minimum recommended pad layout.
 7. For a device mounted on FR-4 PCB with 1inch^2 copper pad layout.

Thermal Characteristics and Derating Information

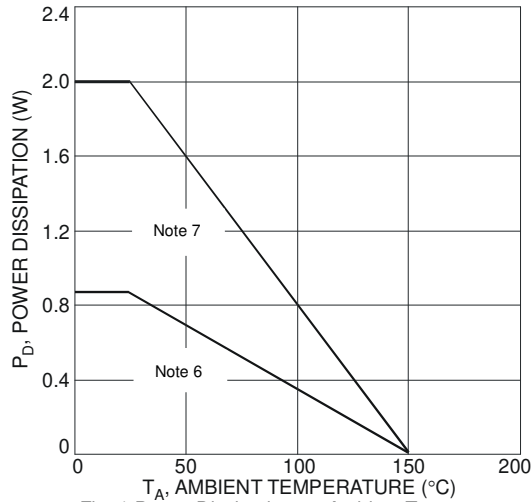


Fig. 1 Power Dissipation vs. Ambient Temperature

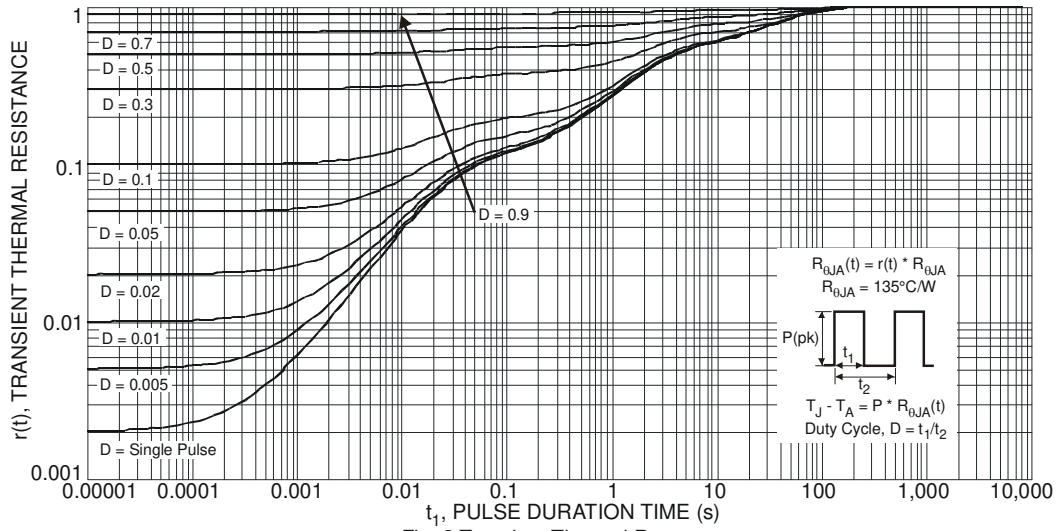


Fig. 2 Transient Thermal Response

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|----------------------|-----|------|------|------|--|
| Collector-Base Breakdown Voltage | BV _{CB0} | -40 | — | — | V | I _C = -100μA |
| Collector-Emitter Breakdown Voltage (Note 8) | BV _{CEO} | -40 | — | — | V | I _C = -10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | -6 | — | — | V | I _E = -100μA |
| Collector-Base Cutoff Current | I _{CB0} | — | — | -100 | nA | V _{CB} = -30V, I _E = 0 |
| | | — | — | -50 | μA | V _{CB} = -30V, I _E = 0, T _A = 150°C |
| Emitter-Base Cutoff Current | I _{EBO} | — | — | -100 | nA | V _{EB} = -5V, I _C = 0 |
| DC Current Gain (Note 8) | h _{FE} | 250 | — | — | — | V _{CE} = -2V, I _C = -0.5A |
| | | 200 | 350 | — | | V _{CE} = -2V, I _C = -1A |
| | | 150 | — | — | | V _{CE} = -2V, I _C = -2A |
| | | 50 | — | — | | V _{CE} = -2V, I _C = -5A |
| Collector-Emitter Saturation Voltage (Note 8) | V _{CE(sat)} | — | — | -120 | mV | I _C = -0.5A, I _B = -5mA |
| | | — | — | -170 | | I _C = -1A, I _B = -10mA |
| | | — | -70 | -160 | | I _C = -2A, I _B = -200mA |
| | | — | -165 | -340 | | I _C = -4A, I _B = -200mA |
| | | — | -150 | -375 | | I _C = -5A, I _B = -500mA |
| Equivalent On-Resistance | R _{CE(sat)} | — | -30 | -75 | mΩ | I _C = -5A, I _B = -500mA |
| Base-Emitter Saturation Voltage | V _{BE(sat)} | — | — | -1.1 | V | I _C = -4A, I _B = -200mA |
| | | — | — | -1.2 | | I _C = -5A, I _B = -500mA |
| Base-Emitter Turn-on Voltage | V _{BE(on)} | — | — | -1.0 | V | V _{CE} = -2V, I _C = -2A |
| Transition Frequency | f _T | 60 | — | — | MHz | V _{CE} = -10V, I _C = -0.1A, f = 100MHz |
| Collector Capacitance | C _C | — | — | 105 | pF | V _{CB} = -10V, I _E = 0A, f = 1MHz |
| Turn-On Time | t _{on} | — | 63 | — | ns | V _{CC} = -10V, I _C = -2A, I _{B1} = -I _{B2} = -200mA |
| Delay Time | t _d | — | 15 | — | ns | |
| Rise Time | t _r | — | 48 | — | ns | |
| Turn-Off Time | t _{off} | — | 280 | — | ns | |
| Storage Time | t _s | — | 232 | — | ns | |
| Fall Time | t _f | — | 48 | — | ns | |

Notes: 8. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.

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

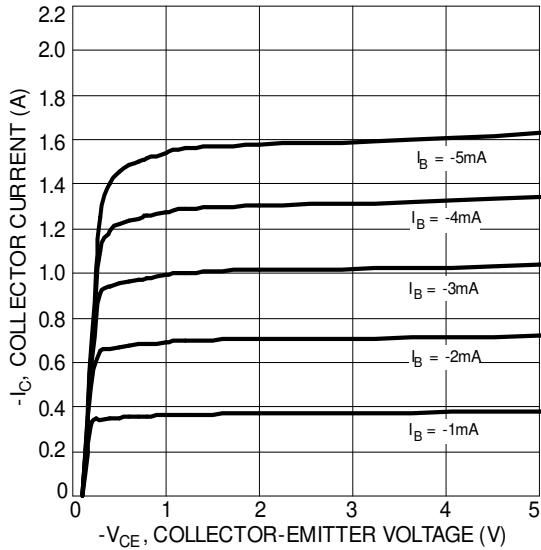


Fig. 3 Typical Collector Current vs. Collector-Emitter Voltage

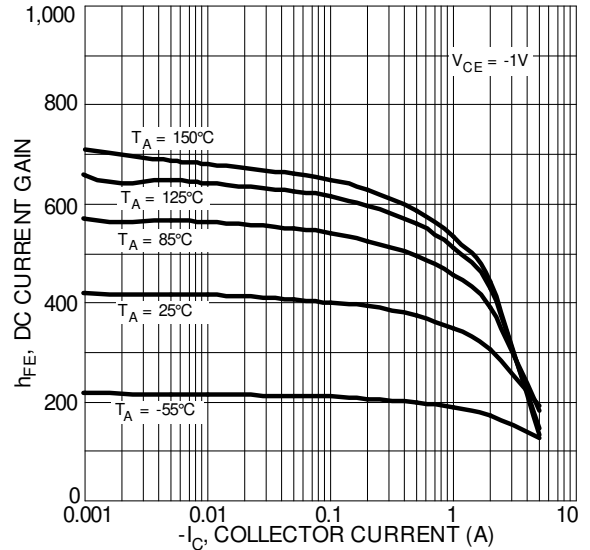


Fig. 4 Typical DC Current Gain vs. Collector Current

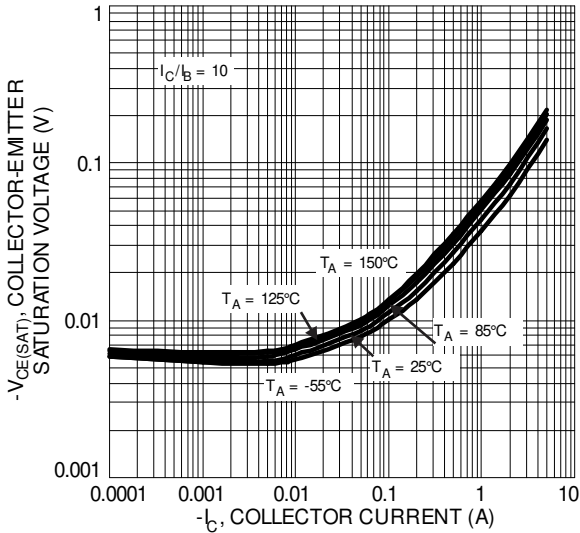


Fig. 5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

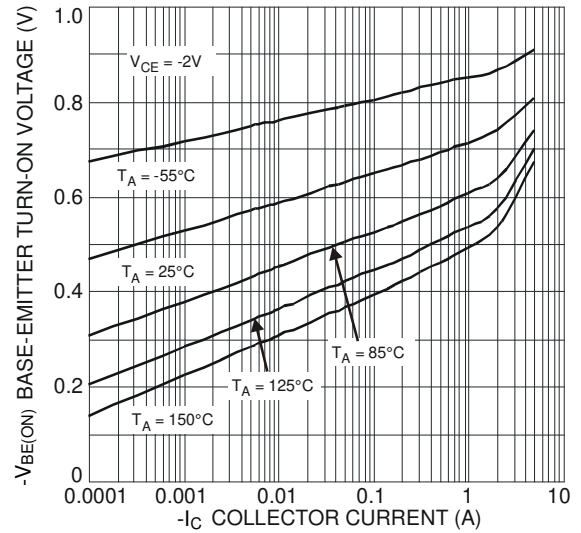


Fig. 6 Typical Base-Emitter Turn-On Voltage vs. Collector Current

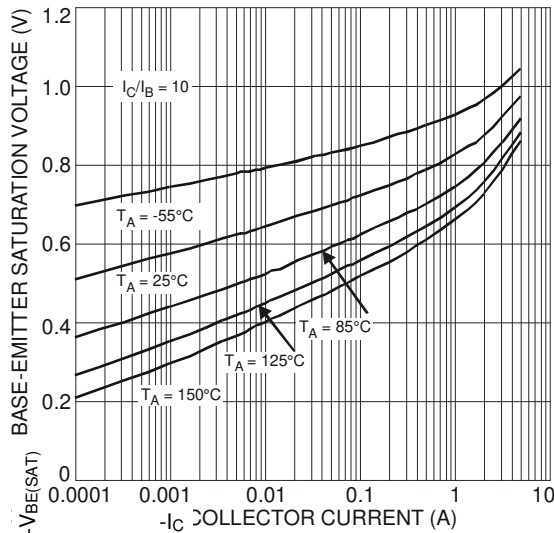


Fig. 7 Typical Base-Emitter Saturation Voltage vs. Collector Current

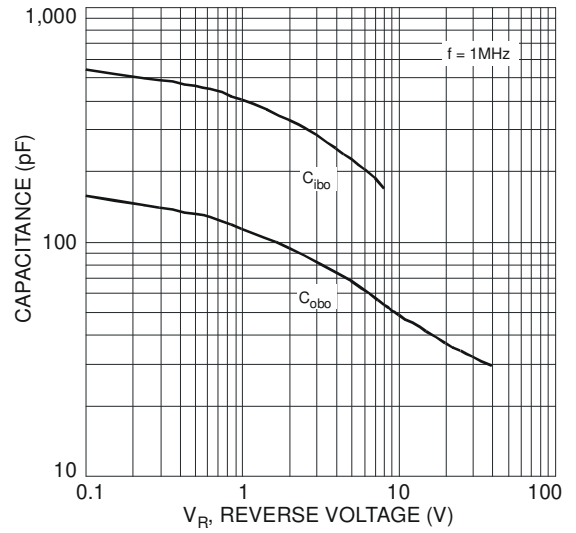
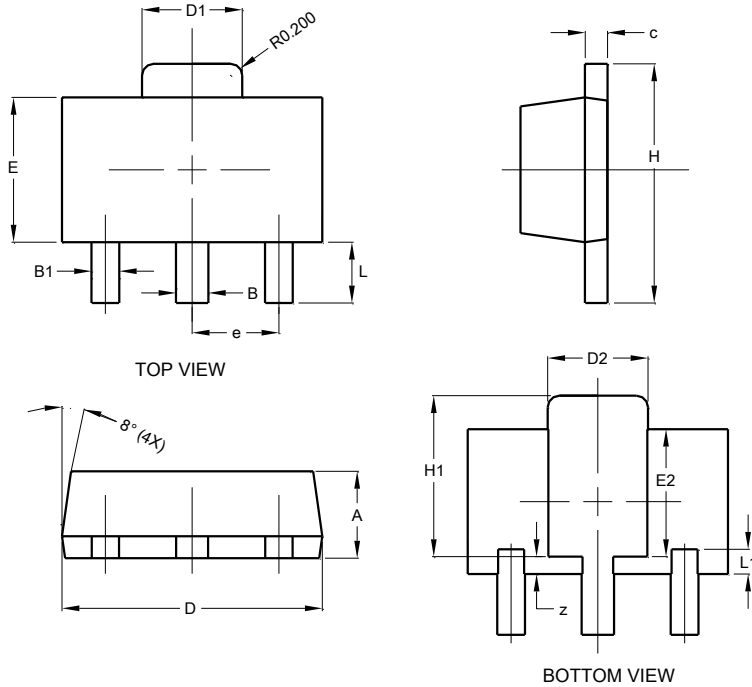


Fig. 8 Typical Capacitance Characteristics

Package Outline Dimensions

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

SOT89

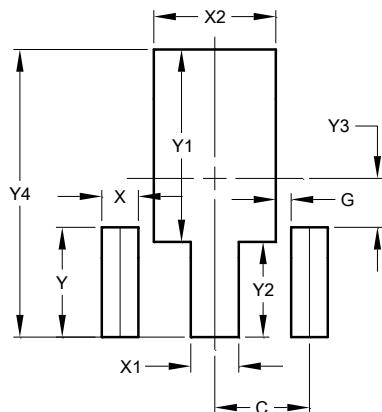


| SOT89 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 1.40 | 1.60 | 1.50 |
| B | 0.50 | 0.62 | 0.56 |
| B1 | 0.42 | 0.54 | 0.48 |
| c | 0.35 | 0.43 | 0.38 |
| D | 4.40 | 4.60 | 4.50 |
| D1 | 1.62 | 1.83 | 1.733 |
| D2 | 1.61 | 1.81 | 1.71 |
| E | 2.40 | 2.60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