# THE DATASHEET OF

# BAT54ST-7

## Features

- Ultra-Small Surface-Mount Package
- Low-Forward Voltage Drop
- Fast Switching
- PN Junction Guard Ring for Transient and ESD Protection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under separate datasheet (BAT54TQ/STQ)**

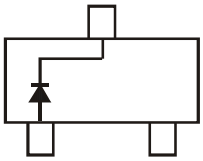
## Mechanical Data

- Package: SOT523
- 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 Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Lead-Free Plating
- Polarity: See Diagrams Below
- Weight: 0.002 grams (Approximate)

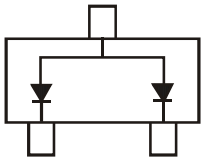
SOT523



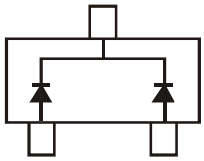
Top View



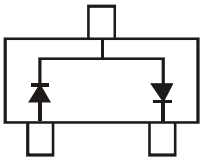
BAT54T



BAT54AT



BAT54CT



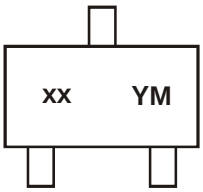
BAT54ST

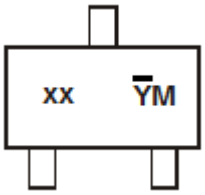
## Ordering Information (Note 4)

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| BAT54T-7-F | SOT523 | 3,000 | Tape & Reel |
| BAT54AT-7-F | SOT523 | 3,000 | Tape & Reel |
| BAT54CT-7-F | SOT523 | 3,000 | Tape & Reel |
| BAT54ST-7-F | SOT523 | 3,000 | Tape & 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




xx = Product Type Marking Code
L1 = BAT54T
L2 = BAT54AT
L3 = BAT54CT
L4 = BAT54ST
YM or $\overline{Y}$M = Date Code Marking
Y or $\overline{Y}$ = Year (ex: K = 2023)
M = Month (ex: 5 = May)

Date Code Key

| Year | 2003 | - | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | P | - | K | L | M | N | P | R | S | T | U | V |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 30 | V |
| Forward Continuous Current (Note 5) | $I_{FM}$ | 200 | mA |
| Repetitive Peak Forward Current | $I_{FRM}$ | 300 | mA |
| Non-Repetitive Peak Forward Surge Current<br>8.3ms Single Half Sine Wave Superimposed on Rated Load | $I_{FSM}$ | 600 | mA |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 5) | $P_D$ | 220 | mW |
| Typical Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 570 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -65 to +150 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Reverse Breakdown Voltage (Note 6) | $V_{(BR)R}$ | 30 | — | — | V | $I_R$ = 100µA |
| Forward Voltage | $V_F$ | —<br>—<br>—<br>—<br>— | —<br>—<br>—<br>—<br>— | 240<br>320<br>400<br>500<br>1,000 | mV | $I_F$ = 0.1mA<br>$I_F$ = 1mA<br>$I_F$ = 10mA<br>$I_F$ = 30mA<br>$I_F$ = 100mA |
| Reverse Leakage Current (Note 6) | $I_R$ | — | — | 2.0 | µA | $V_R$ = 25V |
| Total Capacitance | $C_T$ | — | — | 10 | pF | $V_R$ = 10V, f = 1.0MHz |
| Reverse Recovery Time | $t_{RR}$ | — | — | 5.0 | ns | $I_F$ = $I_R$ = 10mA<br>$I_{RR}$ = 0.1 x $I_R$, $R_L$ = 100Ω |

Notes: 5. Device mounted on FR-4 substrate PC board with recommended pad layout, which can be found on our website at http://www.diodes.com/package-outlines.html.
6. Short duration pulse test used to minimize self-heating effect.


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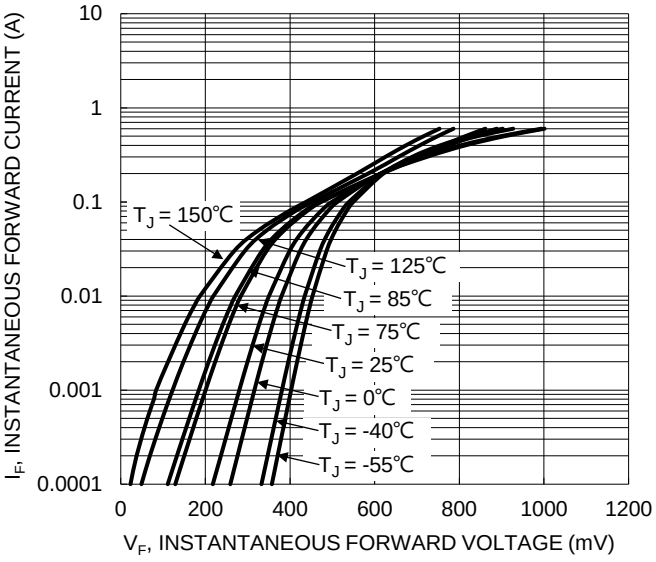


Figure 1. Typical Forward Characteristics

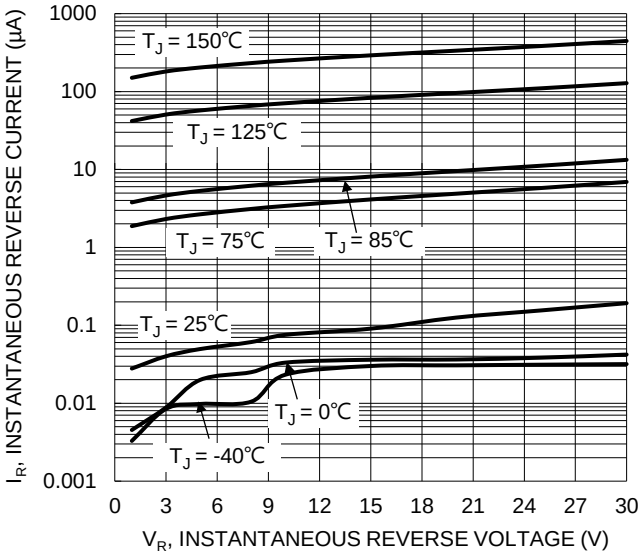


Figure 2. Typical Reverse Characteristics

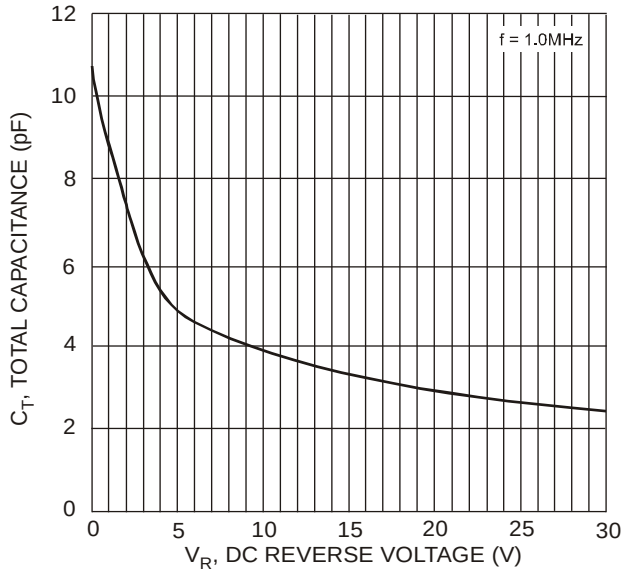


Figure 3. Total Capacitance vs. Reverse Voltage

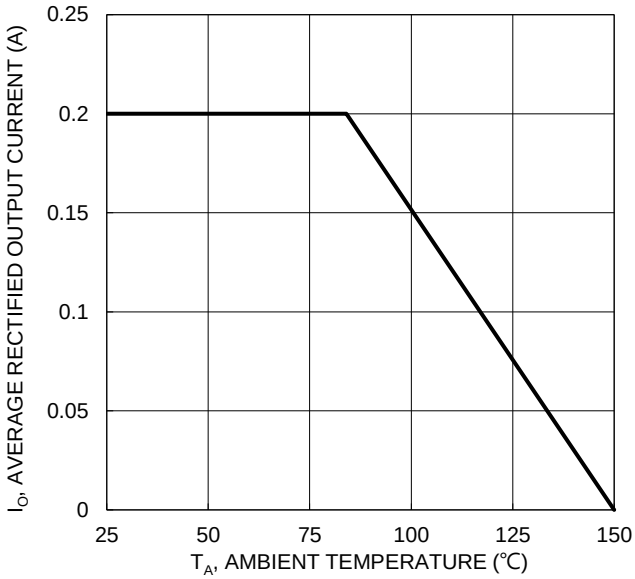


Figure 4. DC Forward Current Derating


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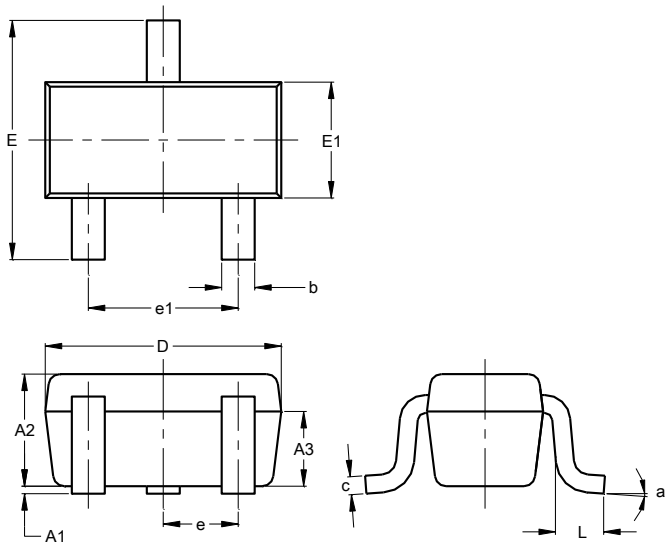
## Package Outline Dimensions

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

**SOT523**

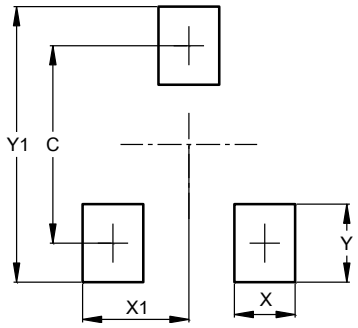



| SOT523 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.60 | 0.80 | 0.75 |
| **A3** | 0.45 | 0.65 | 0.50 |
| **b** | 0.15 | 0.30 | 0.22 |
| **c** | 0.10 | 0.20 | 0.12 |
| **D** | 1.50 | 1.70 | 1.60 |
| **E** | 1.45 | 1.75 | 1.60 |
| **E1** | 0.75 | 0.85 | 0.80 |
| **e** | 0.50 BSC | | |
| **e1** | 0.90 | 1.10 | 1.00 |
| **L** | 0.20 | 0.40 | 0.33 |
| **a** | 0° | -- | 8° |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT523**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 1.29 |
| **X** | 0.40 |
| **X1** | 0.70 |
| **Y** | 0.51 |
| **Y1** | 1.80 |

Notes:
7. The suggested land pattern dimensions have been provided for reference only, as actual pad layouts may vary depending on application. These dimensions may be modified based on user equipment capability or fabrication criteria. A more robust pattern may be desired for wave soldering and is calculated by adding 0.2 mm to the 'Z' dimension. For further information, please reference document IPC-7351A, Naming Convention for Standard SMT Land Patterns, and for International grid details, please see document IEC, Publication 97.
8. 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.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