

# BAT54 / BAT54A / BAT54C / BAT54S

## List

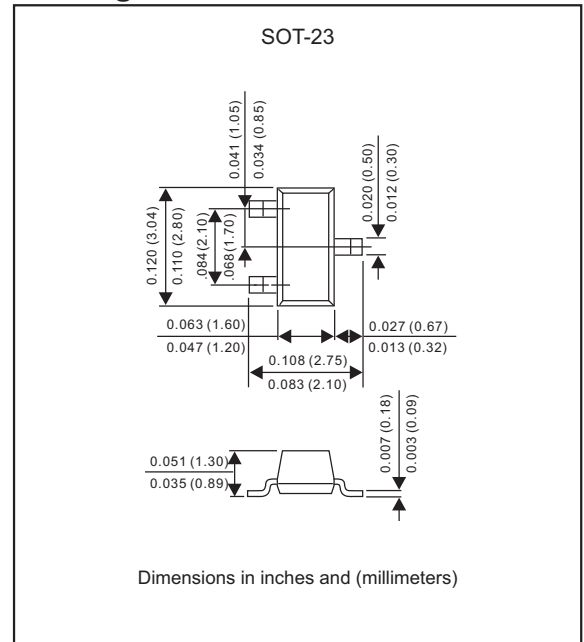
|                                                         |   |
|---------------------------------------------------------|---|
| List.....                                               | 1 |
| Package outline.....                                    | 2 |
| Features.....                                           | 2 |
| Mechanical data.....                                    | 2 |
| Maximum ratings and Electrical characteristics .....    | 2 |
| Rating and characteristic curves.....                   | 3 |
| Pinning information.....                                | 4 |
| Marking.....                                            | 4 |
| Suggested solder pad layout.....                        | 4 |
| Packing information.....                                | 5 |
| Reel packing.....                                       | 6 |
| Suggested thermal profiles for soldering processes..... | 6 |
| High reliability test capabilities.....                 | 7 |

**BAT54 / BAT54A / BAT54C / BAT54S****200mA Surface Mount Small Signal  
Schottky Diodes 30V****Features**

- Low current rectification and high speed switching
- Small surface mount type
- Up to 200mA current capability
- Low forward voltage drop
- Silicon epitaxial planar chip, metal silicon junction
- High speed (  $t_{rr} < 5 \text{ ns}$  )
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex. BAT54-H

**Mechanical data**

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per  
MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

**Package outline****Maximum ratings** (AT  $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                            | Conditions                                                                       | Symbol                             | MIN. | TYP.       | MAX.       | Unit                                                   |
|--------------------------------------|----------------------------------------------------------------------------------|------------------------------------|------|------------|------------|--------------------------------------------------------|
| Repetitive peak reverse voltage      |                                                                                  | $V_{RRM}$                          |      |            | 30         | V                                                      |
| Reverse voltage                      |                                                                                  | $V_R$                              |      |            | 30         | V                                                      |
| Total device dissipation             | FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$                              |      |            | 200<br>2.0 | mW<br>mW/ $^\circ\text{C}$                             |
| Repetitive peak forward current      |                                                                                  | $I_{FRM}$                          |      |            | 300        | mA                                                     |
| Non-repetitive peak forward current  | $t_p < 1\text{s}$                                                                | $I_{FSM}$                          |      |            | 600        | mA                                                     |
| Forward current                      |                                                                                  | $I_F$                              |      |            | 200        | mA                                                     |
| Thermal resistance                   | Junction to ambient<br>Junction to case                                          | $R_{\theta JA}$<br>$R_{\theta JC}$ |      | 500<br>350 |            | $^\circ\text{C}/\text{W}$<br>$^\circ\text{C}/\text{W}$ |
| Operating junction temperature range |                                                                                  | $T_J$                              | -55  |            | +125       | $^\circ\text{C}$                                       |
| Storage temperature range            |                                                                                  | $T_{STG}$                          | -55  |            | +125       | $^\circ\text{C}$                                       |

**Electrical characteristics** (AT  $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Parameter               | Conditions                                              | Symbol   | MIN. | TYP.  | MAX.  | Unit          |
|-------------------------|---------------------------------------------------------|----------|------|-------|-------|---------------|
| Forward voltage         | $I_F = 0.1\text{mA}$                                    | $V_F$    |      | 0.220 | 0.240 | V             |
|                         | $I_F = 1\text{mA}$                                      |          |      | 0.290 | 0.320 | V             |
|                         | $I_F = 10\text{mA}$                                     |          |      | 0.350 | 0.400 | V             |
|                         | $I_F = 30\text{mA}$                                     |          |      | 0.410 | 0.500 | V             |
|                         | $I_F = 100\text{mA}$                                    |          |      | 0.520 | 1.000 | V             |
| Reverse leakage current | $V_R = 25\text{V}$                                      | $I_R$    |      | 0.5   | 2.0   | $\mu\text{A}$ |
| Diode capacitance       | $V_R = 1.0\text{V}$ , $f = 1.0\text{MHz}$               | $C_T$    |      |       | 10.0  | pF            |
| Reverse recovery time   | $I_F = I_R = 10\text{mA}$ , $I_{R(REC)} = 1.0\text{mA}$ | $t_{rr}$ |      |       | 5.0   | ns            |

Note 1: FR-5 = 1.0 x 0.75 x 0.062 in

## Rating and characteristic curves for each diode (BAT54 / A / C / S)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

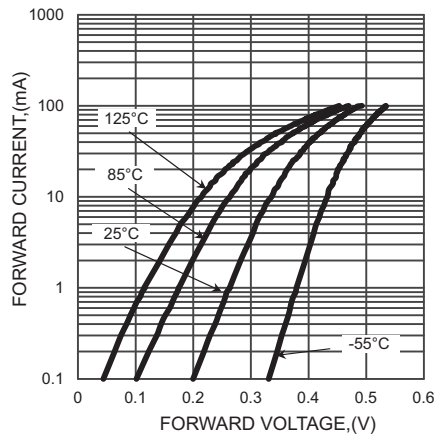


FIG.2 - TYPICAL LEAKAGE CURRENT CHARACTERISTICS

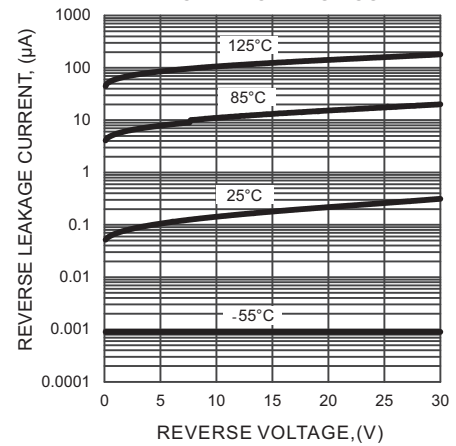
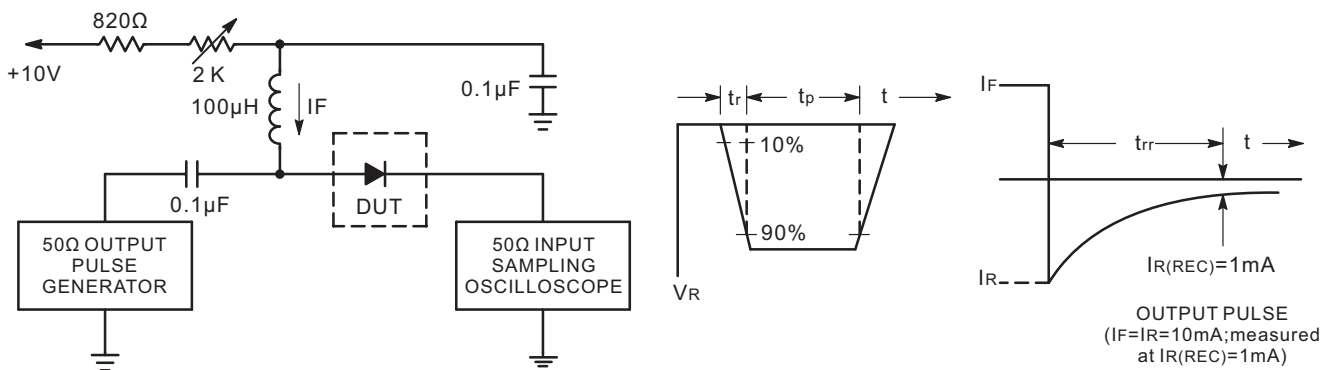
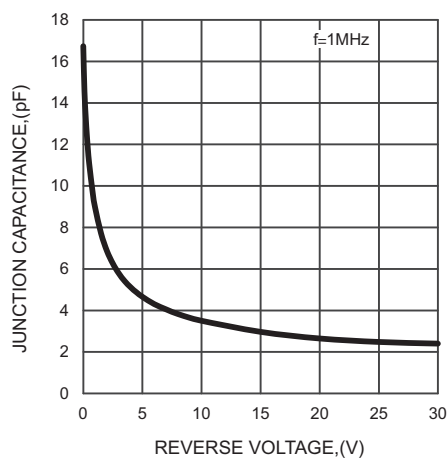


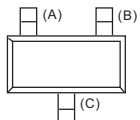
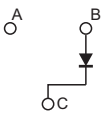
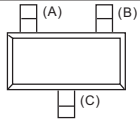
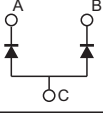
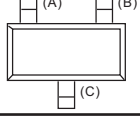
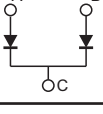
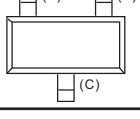
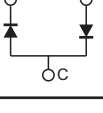
FIG.3-TYPICAL JUNCTION CAPACITANCE

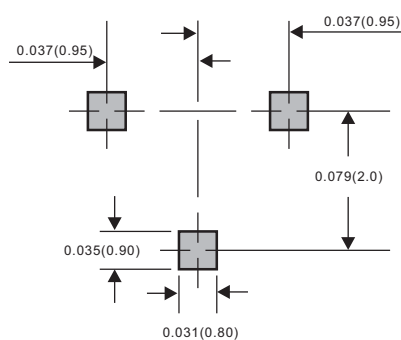


Notes 1: A 2.0K $\Omega$  variable resistor adjusted for a forward Current ( $I_F$ ) of 10mA.  
 2: Input pulse is adjusted so  $I_R(\text{peak})$  is equal to 10 mA.  
 3:  $t_p \gg t_{rr}$ .

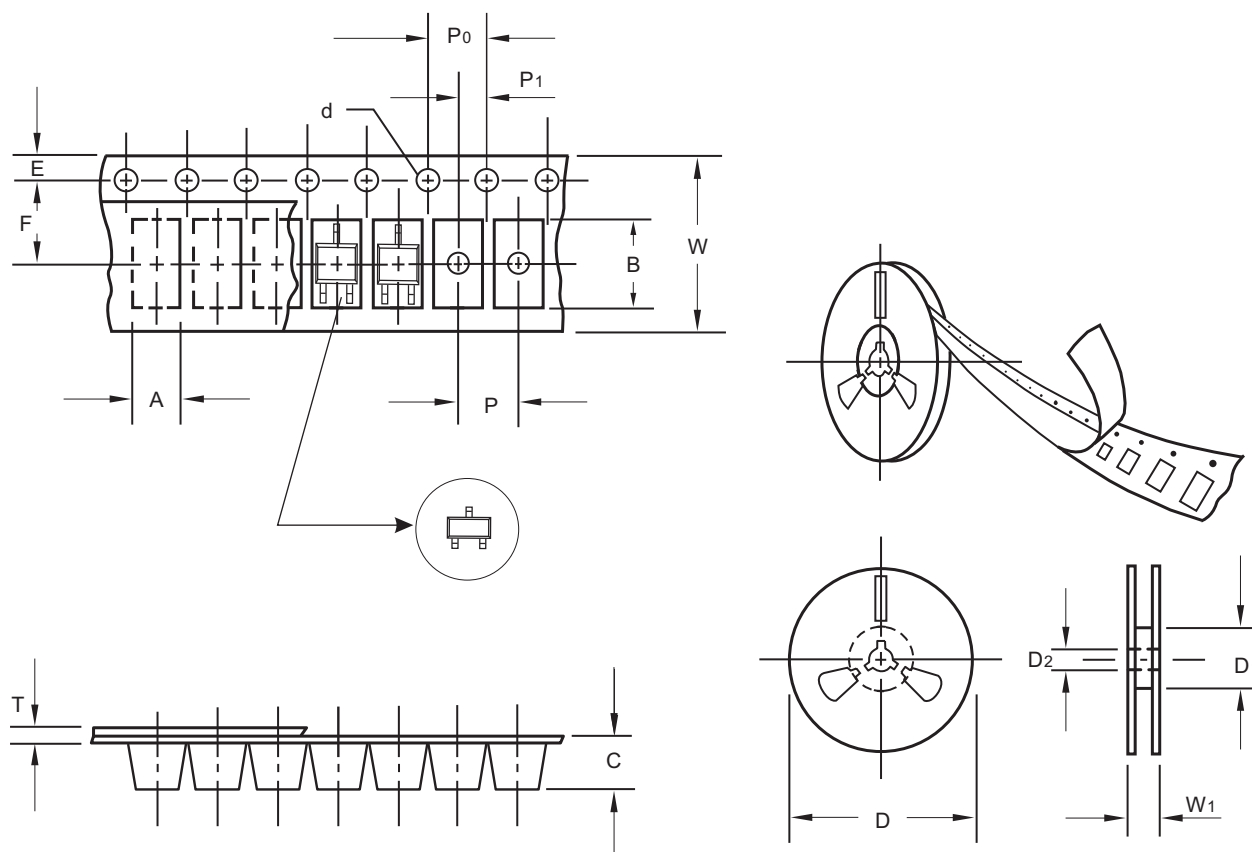
### Recovery Time Equivalent Test Circuit

**BAT54 / BAT54A / BAT54C / BAT54S****Pinning information**

| Type number | Marking code      | Simplified outline                                                                | Symbol                                                                              |
|-------------|-------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| BAT54       | JV3, LV3, L4, KL1 |  |  |
| BAT54A      | B6, L42, KL2      |  |  |
| BAT54C      | 5C, KL3, L43      |  |  |
| BAT54S      | LD3, L44, KL4     |  |  |

**Suggested solder pad layout****SOT-23**

Dimensions in inches and (millimeters)

**BAT54 / BAT54A / BAT54C / BAT54S****Packing information**

unit:mm

| Item                      | Symbol | Tolerance | SOT-23 |
|---------------------------|--------|-----------|--------|
| Carrier width             | A      | 0.1       | 3.15   |
| Carrier length            | B      | 0.1       | 2.77   |
| Carrier depth             | C      | 0.1       | 1.22   |
| Sprocket hole             | d      | 0.1       | 1.50   |
| 13" Reel outside diameter | D      | 2.0       | -      |
| 13" Reel inner diameter   | D1     | min       | -      |
| 7" Reel outside diameter  | D      | 2.0       | 178.00 |
| 7" Reel inner diameter    | D1     | min       | 62.00  |
| Feed hole diameter        | D2     | 0.5       | 13.00  |
| Sprocket hole position    | E      | 0.1       | 1.75   |
| Punch hole position       | F      | 0.1       | 3.50   |
| Punch hole pitch          | P      | 0.1       | 4.00   |
| Sprocket hole pitch       | P0     | 0.1       | 4.00   |
| Embossment center         | P1     | 0.1       | 2.00   |
| Overall tape thickness    | T      | 0.1       | 0.23   |
| Tape width                | W      | 0.3       | 8.00   |
| Reel width                | W1     | 1.0       | 11.40  |

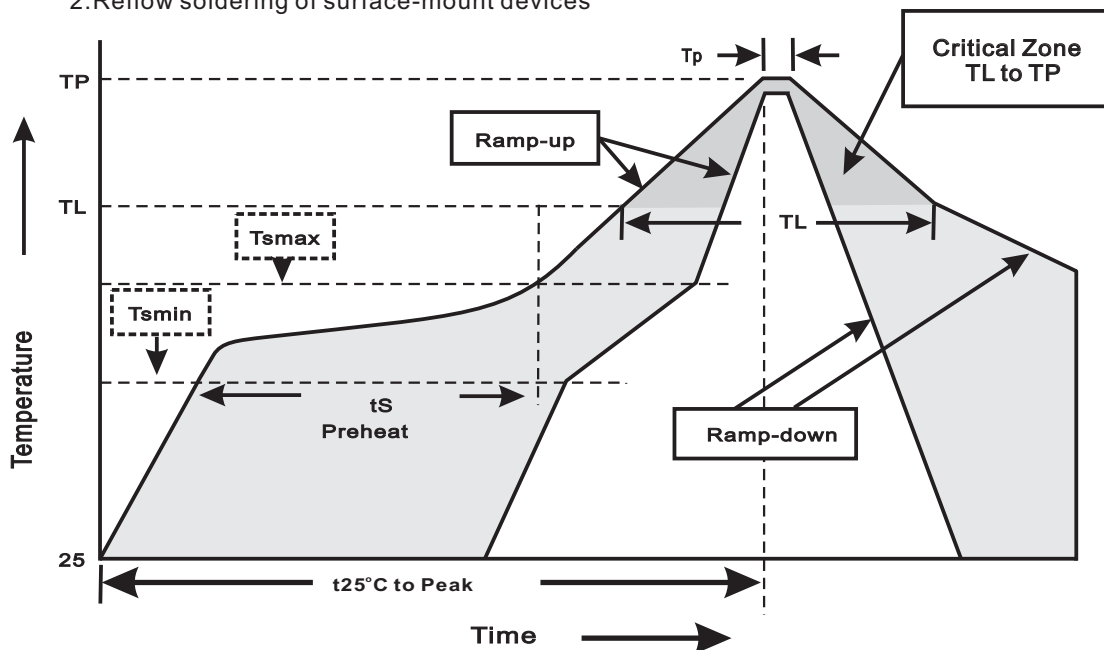
Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

**BAT54 / BAT54A / BAT54C / BAT54S****Reel packing**

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SOT-23  | 7"        | 3,000      | 4.0                     | 30,000    | 183*123*183     | 178             | 382*257*387       | 240,000      | 11.6                      |

**Suggested thermal profiles for soldering processes**

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices

**3.Reflow soldering**

| Profile Feature                                                                                                                 | Soldering Condition         |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate(T <sub>L</sub> to T <sub>P</sub> )                                                                         | <3°C/sec                    |
| Preheat<br>-Temperature Min(T <sub>smmin</sub> )<br>-Temperature Max(T <sub>smmax</sub> )<br>-Time(min to max)(t <sub>s</sub> ) | 150°C<br>200°C<br>60~120sec |
| T <sub>smmax</sub> to T <sub>L</sub><br>-Ramp-upRate                                                                            | <3°C/sec                    |
| Time maintained above:<br>-Temperature(T <sub>L</sub> )<br>-Time(t <sub>L</sub> )                                               | 217°C<br>60~260sec          |
| Peak Temperature(T <sub>P</sub> )                                                                                               | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(t <sub>P</sub> )                                                                     | 10~30sec                    |
| Ramp-down Rate                                                                                                                  | <6°C/sec                    |
| Time 25°C to Peak Temperature                                                                                                   | <6minutes                   |

**BAT54 / BAT54A / BAT54C / BAT54S****High reliability test capabilities**

| Item Test                         | Conditions                                                                                                                               | Reference                     |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. Solder Resistance              | at $260 \pm 5^\circ\text{C}$ for $10 \pm 2\text{sec.}$                                                                                   | MIL-STD-750D<br>METHOD-2031   |
| 2. Solderability                  | at $245 \pm 5^\circ\text{C}$ for 5 sec.                                                                                                  | MIL-STD-202F<br>METHOD-208    |
| 3. High Temperature Reverse Bias  | $V_R = 80\%$ rate at $T_J = 125^\circ\text{C}$ for 168 hrs.                                                                              | MIL-STD-750D<br>METHOD-1038   |
| 4. Forward Operation Life         | Rated average rectifier current at $T_A = 25^\circ\text{C}$ for 500hrs.                                                                  | MIL-STD-750D<br>METHOD-1027   |
| 5. Intermittent Operation Life    | $T_A = 25^\circ\text{C}$ , $I_F = I_O$<br>On state: power on for 5 min.<br>off state: power off for 5 min.<br>on and off for 500 cycles. | MIL-STD-750D<br>METHOD-1036   |
| 6. Pressure Cooker                | $15P_{SIG}$ at $T_A = 121^\circ\text{C}$ for 4 hrs.                                                                                      | JESD22-A102                   |
| 7. Temperature Cycling            | $-55^\circ\text{C}$ to $+125^\circ\text{C}$ dwelled for 30 min.<br>and transferred for 5min. total 10 cycles.                            | MIL-STD-750D<br>METHOD-1051   |
| 8. Forward Surge                  | Forward surge current                                                                                                                    | MIL-STD-750D<br>METHOD-4066-2 |
| 9. Humidity                       | at $T_A = 85^\circ\text{C}$ , RH=85% for 1000hrs.                                                                                        | MIL-STD-750D<br>METHOD-1021   |
| 10. High Temperature Storage Life | at $175^\circ\text{C}$ for 1000 hrs.                                                                                                     | MIL-STD-750D<br>METHOD-1031   |