



BAT54 series

Schottky barrier diodes

Rev. 5 — 5 October 2012

Product data sheet

1. Product profile

1.1 General description

Planar Schottky barrier diodes with an integrated guard ring for stress protection, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Low forward voltage
- Low capacitance
- AEC-Q101 qualified

1.3 Applications

- Ultra high-speed switching
- Line termination
- Voltage clamping
- Reverse polarity protection

1.4 Quick reference data

Table 1. Quick reference data

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-----------------|-----------------------|-------|-----|-----|---------------|
| Per diode | | | | | | |
| V_R | reverse voltage | | - | - | 30 | V |
| V_F | forward voltage | $I_F = 100\text{ mA}$ | [1] - | - | 800 | mV |
| I_R | reverse current | $V_R = 25\text{ V}$ | [1] - | - | 2 | μA |

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

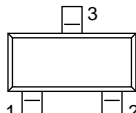
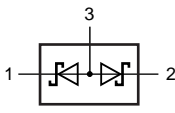
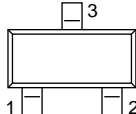
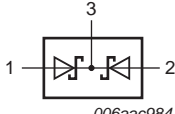
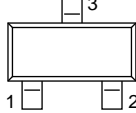
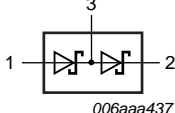
2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|--------------|---------------|--------------------|----------------|
| BAT54 | | | |
| 1 | anode | | |
| 2 | not connected | | |
| 3 | cathode | | |



Table 2. Pinning ...continued

| Pin | Description | Simplified outline | Graphic symbol |
|--------|---------------------------------------|--|--|
| BAT54A | | | |
| 1 | cathode (diode 1) |  |  |
| 2 | cathode (diode 2) | | |
| 3 | common anode | | |
| BAT54C | | | |
| 1 | anode (diode 1) |  |  |
| 2 | anode (diode 2) | | |
| 3 | common cathode | | |
| BAT54S | | | |
| 1 | anode (diode 1) |  |  |
| 2 | cathode (diode 2) | | |
| 3 | cathode (diode 1), anode (diode 2) | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|--------------|---------|--|---------|
| | Name | Description | Version |
| BAT54 series | - | plastic surface-mounted package; 3 leads | SOT23 |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| BAT54 | L4* |
| BAT54A | *V3 |
| BAT54C | *W1 |
| BAT54S | *V4 |

[1] * = placeholder for manufacturing site code.

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-------------------------------------|-------------------------------------|---|-------|------|------|
| Per diode | | | | | |
| V_R | reverse voltage | | - | 30 | V |
| I_F | forward current | $T_{amb} = 25\text{ °C}$ | - | 200 | mA |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ s}$; $\delta \leq 0.5$; $T_{amb} = 25\text{ °C}$ | - | 300 | mA |
| I_{FSM} | non-repetitive peak forward current | square wave; $t_p < 10\text{ ms}$ | [1] - | 600 | mA |
| Per device; one diode loaded | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2] - | 250 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] $T_j = 25\text{ °C}$ before surge.

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------------|---|-------------|----------|-----|-----|------|
| Per device; one diode loaded | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1][2] - | - | 500 | K/W |

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

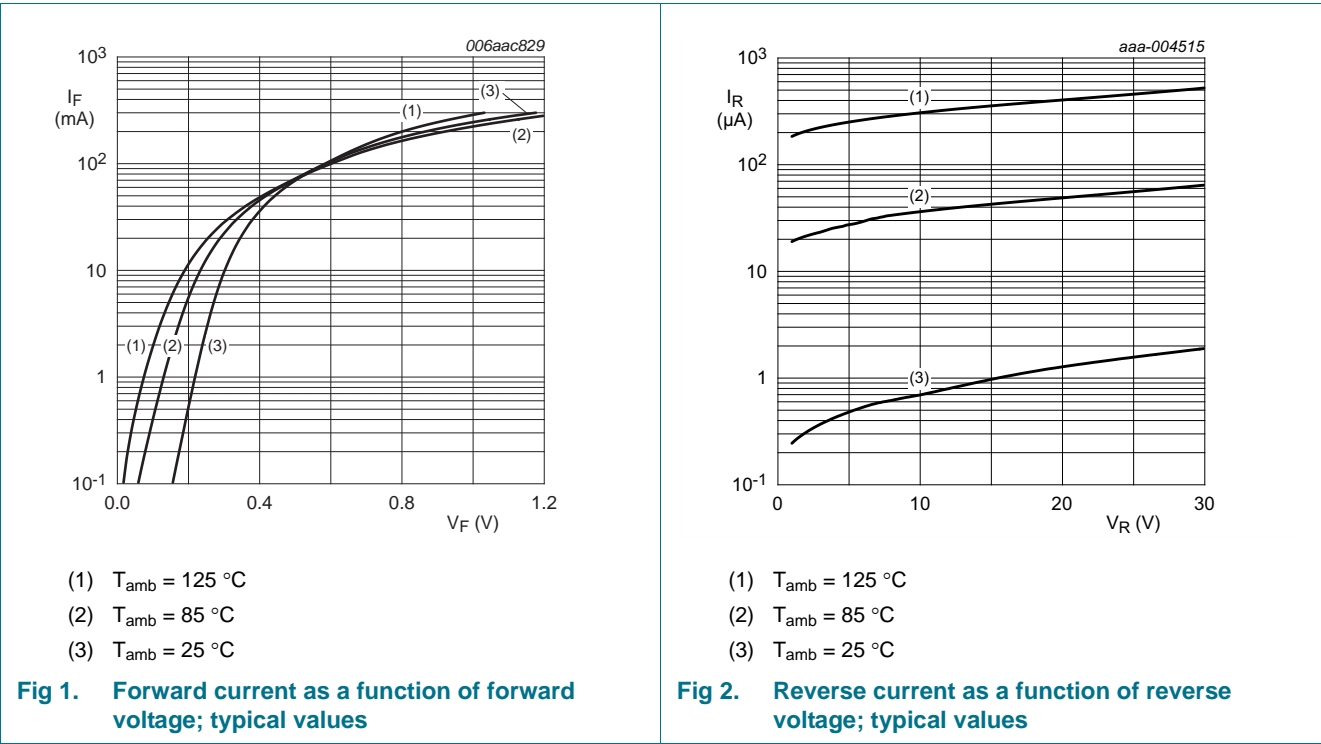
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

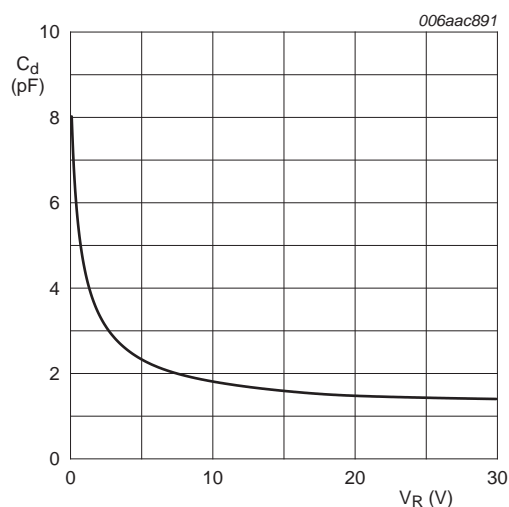
7. Characteristics

Table 7. Characteristics
T_{amb} = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|-----------------------|---------------------------------|-----|-----|-----|------|
| Per diode | | | | | | |
| V _F | forward voltage | | [1] | | | |
| | | I _F = 0.1 mA | - | - | 240 | mV |
| | | I _F = 1 mA | - | - | 320 | mV |
| | | I _F = 10 mA | - | - | 400 | mV |
| | | I _F = 30 mA | - | - | 500 | mV |
| | | I _F = 100 mA | - | - | 800 | mV |
| I _R | reverse current | V _R = 25 V | [1] | - | 2 | μA |
| C _d | diode capacitance | f = 1 MHz; V _R = 1 V | - | - | 10 | pF |
| t _{rr} | reverse recovery time | | [2] | - | 5 | ns |

[1] Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.
[2] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA.

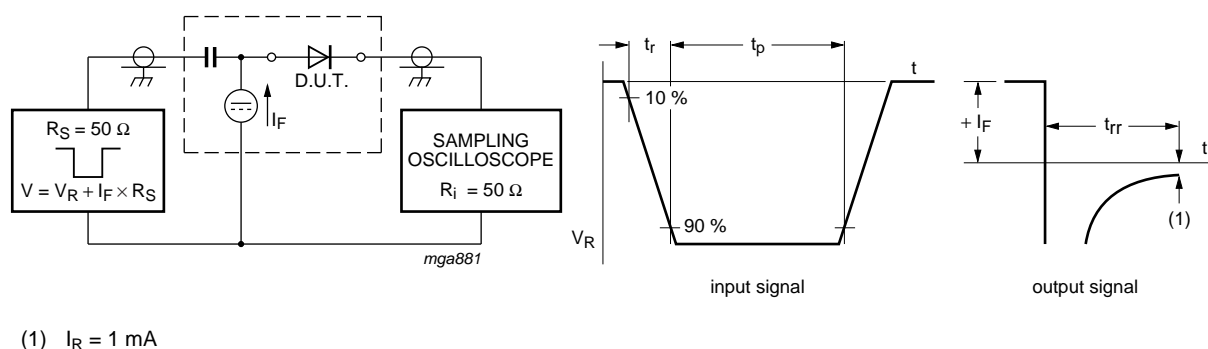




$f = 1 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$

Fig 3. Diode capacitance as a function of reverse voltage; typical values

8. Test information



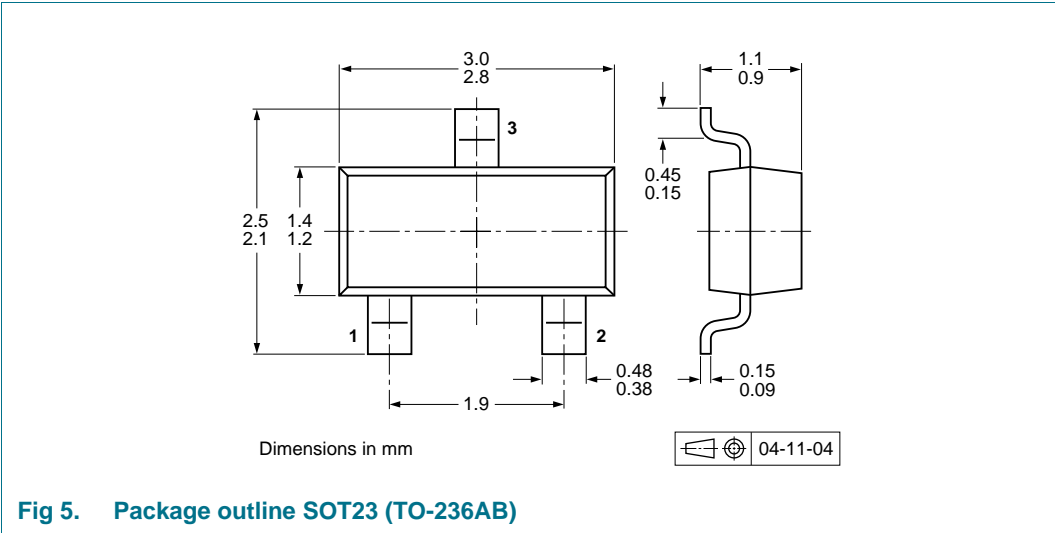
(1) $I_R = 1 \text{ mA}$

Fig 4. Reverse recovery time test circuit and waveforms

8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

9. Package outline



10. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | |
|--------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| BAT54 series | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | -235 |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

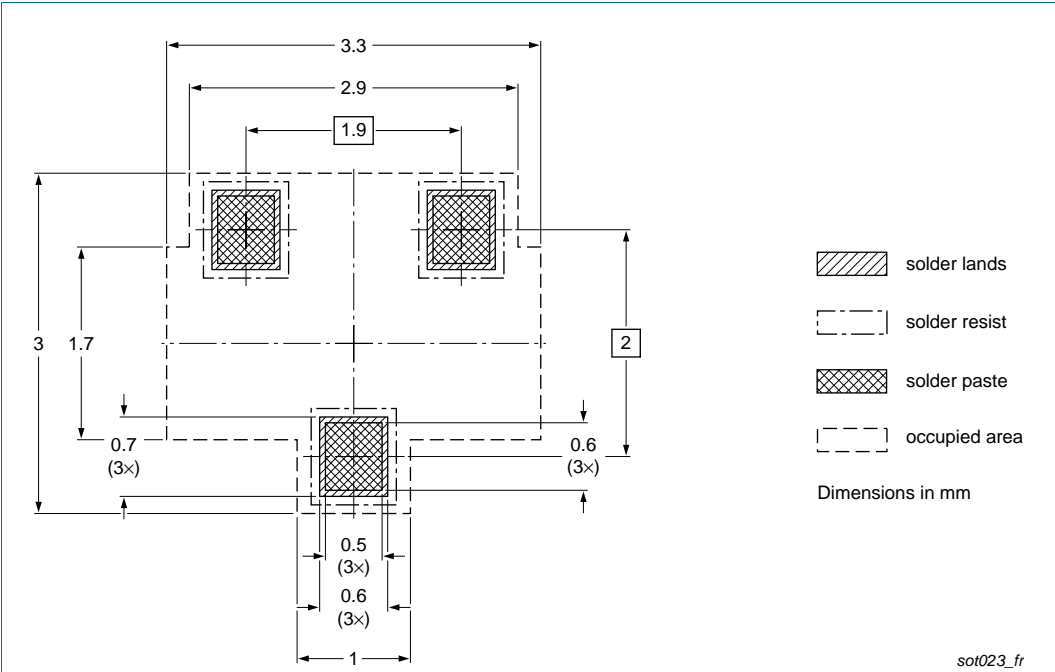


Fig 6. Reflow soldering footprint SOT23 (TO-236AB)

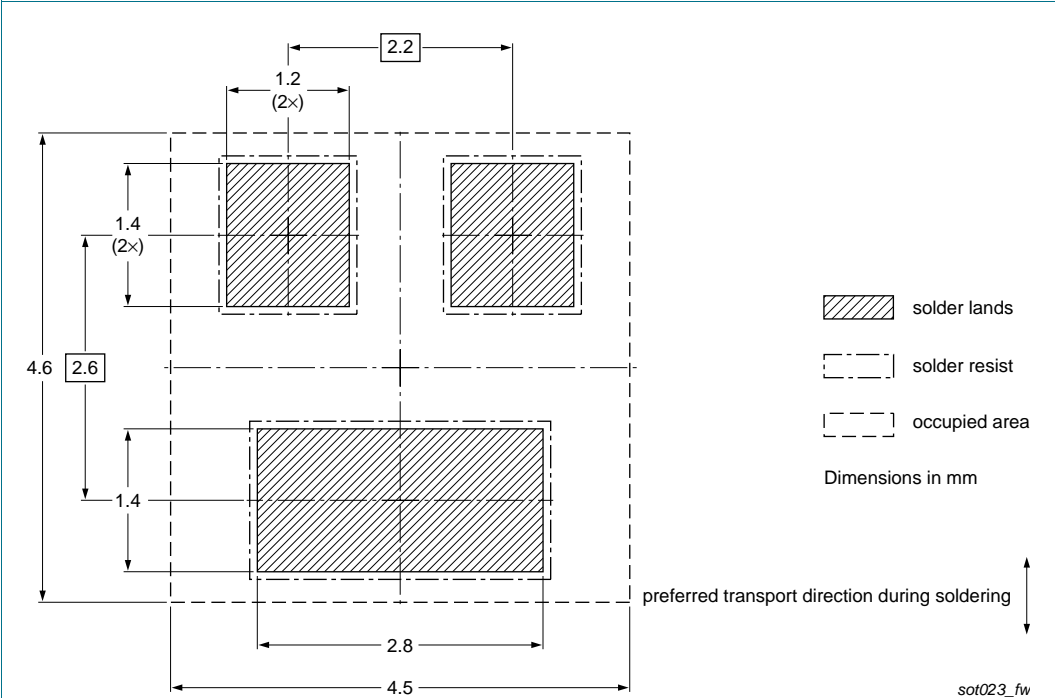


Fig 7. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--|-----------------------|---------------|------------------|
| BAT54_SER v.5 | 20121005 | Product data sheet | - | BAT54_SERIES v.4 |
| Modifications: | <ul style="list-style-type: none"> • The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Section 1: updated • Section 4: updated • Table 5: added ambient temperature T_{amb}, updated total power dissipation P_{tot}, updated junction temperature T_j • Figure 1 to 4: updated • Section 8 "Test information": added • Figure 5: replaced by minimized package outline drawing • Section 10 "Packing information": added • Section 11 "Soldering": added • Section 13 "Legal information": updated | | | |
| BAT54_SERIES v.4 | 20020304 | Product data sheet | - | BAT54_SERIES v.3 |
| BAT54_SERIES v.3 | 20011012 | Product specification | - | BAT54 v.2 |
| BAT54 v.2 | 19990506 | Product specification | - | BAT54 v.1 |
| BAT54 v.1 | 19960319 | Product specification | - | - |

13. Legal information

13.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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15. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features and benefits | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| 2 | Pinning information | 1 |
| 3 | Ordering information | 2 |
| 4 | Marking | 2 |
| 5 | Limiting values | 3 |
| 6 | Thermal characteristics | 3 |
| 7 | Characteristics | 4 |
| 8 | Test information | 5 |
| 8.1 | Quality information | 5 |
| 9 | Package outline | 6 |
| 10 | Packing information | 6 |
| 11 | Soldering | 7 |
| 12 | Revision history | 8 |
| 13 | Legal information | 9 |
| 13.1 | Data sheet status | 9 |
| 13.2 | Definitions | 9 |
| 13.3 | Disclaimers | 9 |
| 13.4 | Trademarks | 10 |
| 14 | Contact information | 10 |
| 15 | Contents | 11 |

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