



# BAT54W series

Schottky barrier diodes

Rev. 3 — 20 November 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 very small SOT323 (SC-70) 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          |
|------------------|-----------------|-----------------------|-----|-----|-----|---------------|
| <b>Per diode</b> |                 |                       |     |     |     |               |
| $V_R$            | 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   | $\mu\text{A}$ |

[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 |
|---------------|---------------|--------------------|----------------|
| <b>BAT54W</b> |               |                    |                |
| 1             | anode         |                    |                |
| 2             | not connected |                    |                |
| 3             | cathode       |                    |                |



**Table 2. Pinning ...continued**

| Pin            | Description                           | Simplified outline | Graphic symbol |
|----------------|---------------------------------------|--------------------|----------------|
| <b>BAT54AW</b> |                                       |                    |                |
| 1              | cathode (diode 1)                     |                    | <br>006aaa439  |
| 2              | cathode (diode 2)                     |                    |                |
| 3              | common anode                          |                    |                |
| <b>BAT54CW</b> |                                       |                    |                |
| 1              | anode (diode 1)                       |                    | <br>006aac984  |
| 2              | anode (diode 2)                       |                    |                |
| 3              | common cathode                        |                    |                |
| <b>BAT54SW</b> |                                       |                    |                |
| 1              | anode (diode 1)                       |                    | <br>006aaa437  |
| 2              | cathode (diode 2)                     |                    |                |
| 3              | cathode (diode 1),<br>anode (diode 2) |                    |                |

## 3. Ordering information

**Table 3. Ordering information**

| Type number   | Package |  | Version |
|---------------|---------|--|---------|
|               | Name    | Description                              |         |
| BAT54W series | SC-70   | plastic surface-mounted package; 3 leads | SOT323  |

## 4. Marking

**Table 4. Marking codes**

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| BAT54W      | L4*                         |
| BAT54AW     | 42*                         |
| BAT54CW     | 43*                         |
| BAT54SW     | 44*                         |

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

[1]  $T_j = 25$  °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 |
|-------------------------------------|---|-------------|-------|-----|-----|------|
| <b>Per device; one diode loaded</b> |   |             |       |     |     |      |
| $R_{th(j-a)}$                       | thermal resistance from junction to ambient | in free air | [1] - | -   | 625 | K/W  |

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

**7. Characteristics**

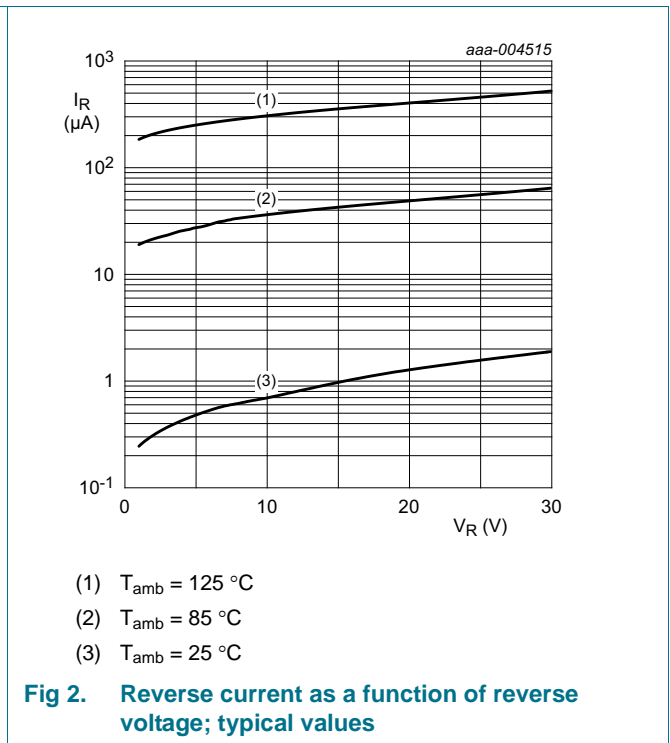
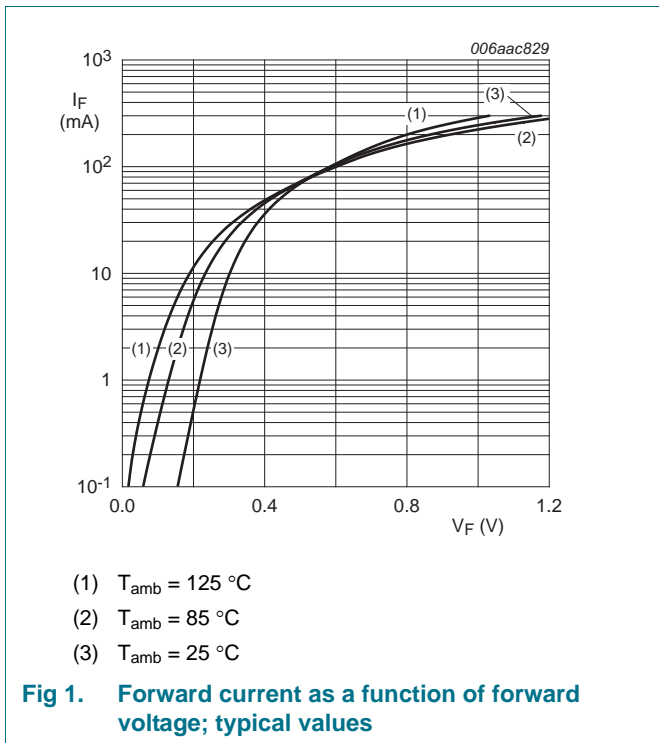
**Table 7. Characteristics**

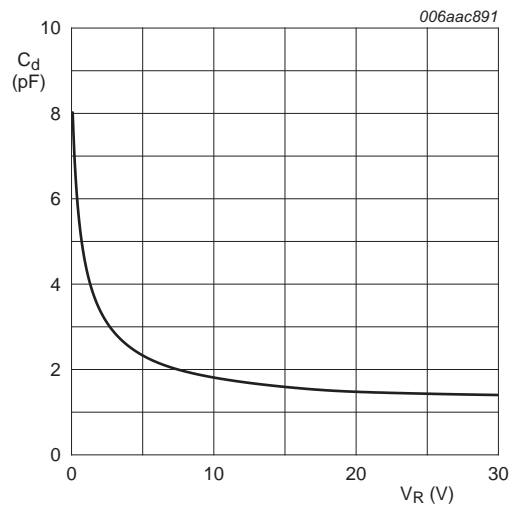
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| Symbol                | Parameter             | Conditions                           | Min | Typ | Max | Unit          |
|-----------------------|-----------------------|--------------------------------------|-----|-----|-----|---------------|
| <b>Per diode</b>      |                       |                                      |     |     |     |               |
| $V_F$                 | forward voltage       |                                      | [1] |     |     |               |
|                       |                       | $I_F = 0.1\text{ mA}$                | -   | -   | 240 | mV            |
|                       |                       | $I_F = 1\text{ mA}$                  | -   | -   | 320 | mV            |
|                       |                       | $I_F = 10\text{ mA}$                 | -   | -   | 400 | mV            |
|                       |                       | $I_F = 30\text{ mA}$                 | -   | -   | 500 | mV            |
| $I_F = 100\text{ mA}$ | -                     | -                                    | 800 | mV  |     |               |
| $I_R$                 | reverse current       | $V_R = 25\text{ V}$                  | [1] | -   | 2   | $\mu\text{A}$ |
| $C_d$                 | diode capacitance     | $f = 1\text{ MHz}; V_R = 1\text{ V}$ | -   | -   | 10  | pF            |
| $t_{rr}$              | reverse recovery time |                                      | [2] | -   | 5   | ns            |

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

[2] When switched from  $I_F = 10\text{ mA}$  to  $I_R = 10\text{ mA}; R_L = 100\text{ }\Omega$ ; measured at  $I_R = 1\text{ mA}$ .

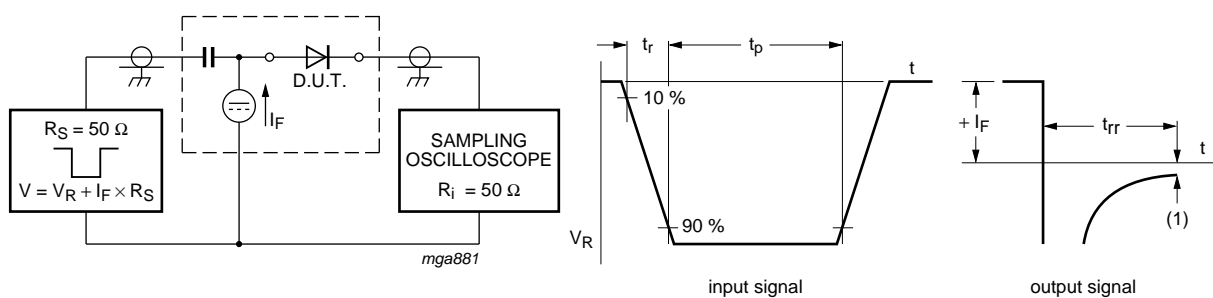




f = 1 MHz; T<sub>amb</sub> = 25 °C

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

## 8. Test information



(1) I<sub>R</sub> = 1 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

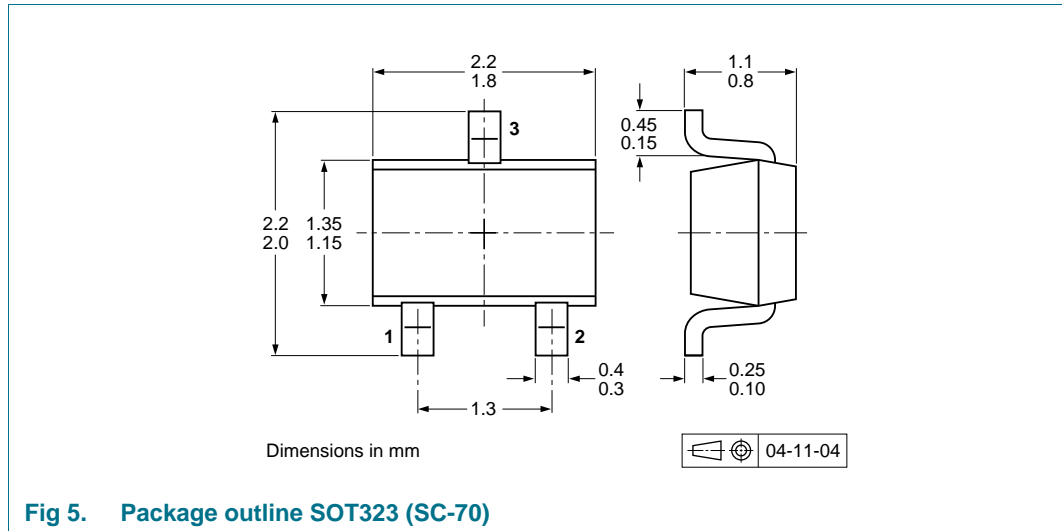


Fig 5. Package outline SOT323 (SC-70)

## 10. Packing information

**Table 8. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

| Type number   | Package | Description                    | Packing quantity |       |
|---------------|---------|--------------------------------|------------------|-------|
|               |         |                                | 3000             | 10000 |
| BAT54W series | SOT323  | 4 mm pitch, 8 mm tape and reel | -115             | -135  |

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

11. Soldering

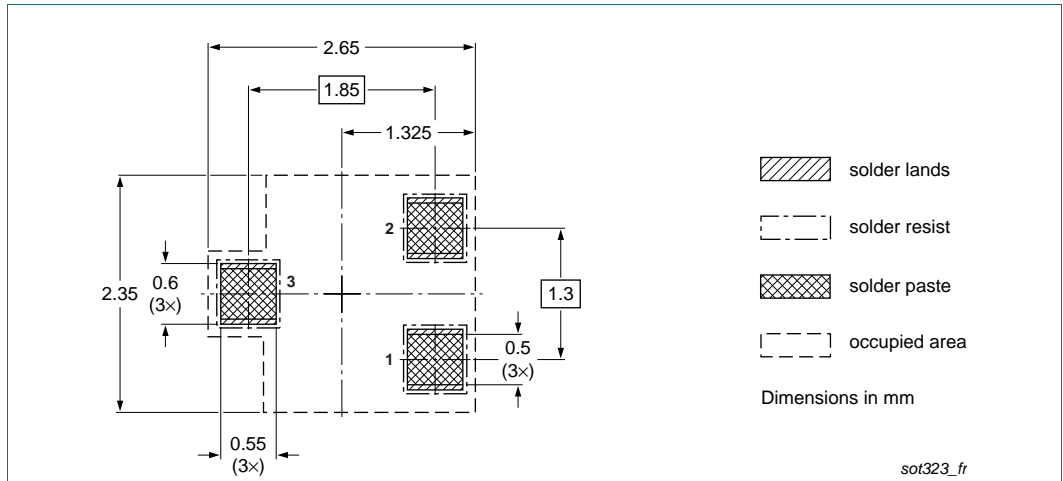


Fig 6. Reflow soldering footprint SOT323 (SC-70)

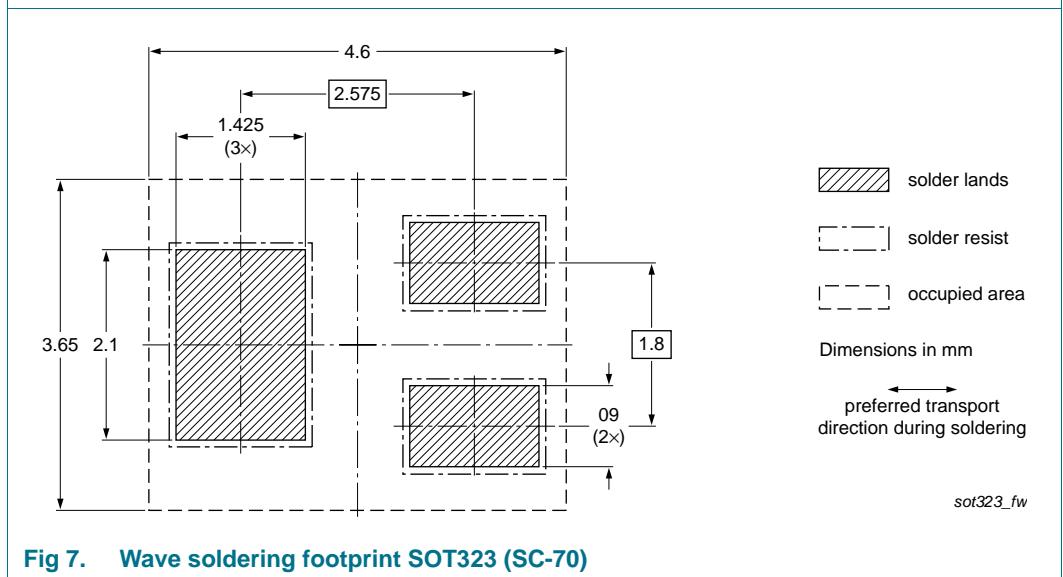


Fig 7. Wave soldering footprint SOT323 (SC-70)

## 12. Revision history

Table 9. Revision history

| Document ID    | Release date  | Data sheet status     | Change notice | Supersedes |
|----------------|---|-----------------------|---------------|------------|
| BAT54W_SER v.3 | 20121120  | Product data sheet    | -             | BAT54W v.2 |
| Modifications: | <ul style="list-style-type: none"> <li>• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• <a href="#">Section 1</a>: updated</li> <li>• <a href="#">Section 4</a>: updated</li> <li>• <a href="#">Table 5</a>: updated ambient temperature <math>T_{amb}</math> maximum value to 150 °C</li> <li>• <a href="#">Figure 1</a> to <a href="#">4</a>: updated</li> <li>• <a href="#">Section 8 "Test information"</a>: added</li> <li>• <a href="#">Figure 5</a>: replaced by minimized package outline drawing</li> <li>• <a href="#">Section 10 "Packing information"</a>: added</li> <li>• <a href="#">Section 11 "Soldering"</a>: added</li> <li>• <a href="#">Section 13 "Legal information"</a>: updated</li> </ul> |                       |               |            |
| BAT54W v.2     | 19960319  | Product specification | -             | BAT54W v.1 |



## 13. Legal information

### 13.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

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

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