



# BAT54W

## Schottky barrier diode

1 October 2022

Product data sheet

## 1. General description

Planar Schottky barrier diode with an integrated guard ring for stress protection, encapsulated in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Low forward voltage
- Low capacitance

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter       | Conditions                                                                                                                              | Min | Typ | Max | Unit          |
|-----------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Per diode |                 |                                                                                                                                         |     |     |     |               |
| $V_R$     | reverse voltage |                                                                                                                                         | -   | -   | 30  | V             |
| $V_F$     | forward voltage | $I_F = 100 \text{ mA}$ ; $t_p \leq 300 \text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -   | -   | 800 | mV            |
| $I_R$     | reverse current | $V_R = 25 \text{ V}$ ; $t_p \leq 300 \text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$   | -   | -   | 2   | $\mu\text{A}$ |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline | Graphic symbol |
|-----|--------|---------------|--------------------|----------------|
| 1   | A      | anode         | <br>SC-70 (SOT323) | <br>006aaa436  |
| 2   | n.c.   | not connected |                    |                |
| 3   | K      | cathode       |                    |                |

## 6. Ordering information

Table 3. Ordering information

| Type number            | Package |                                                                                        |                        |
|------------------------|---------|----------------------------------------------------------------------------------------|------------------------|
|                        | Name    | Description                                                                            | Version                |
| <a href="#">BAT54W</a> | SC-70   | plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body | <a href="#">SOT323</a> |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| BAT54W      | L4%             |

[1] % = placeholder for manufacturing site code

## 8. 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     | $t_p \leq 1 \text{ s}$ ; $\delta \leq 0.5$                                            |     | -   | 300 | mA               |
| $I_{FSM}$                           | non-repetitive peak forward current | $t_p < 10 \text{ ms}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | [1] | -   | 600 | mA               |
| <b>Per device; one diode loaded</b> |                                     |                                                                                       |     |     |     |                  |
| $P_{\text{tot}}$                    | total power dissipation             | $T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$                                       | [2] | -   | 200 | mW               |
| $T_j$                               | junction temperature                |                                                                                       |     | -   | 150 | $^\circ\text{C}$ |
| $T_{\text{amb}}$                    | ambient temperature                 |                                                                                       |     | -55 | 150 | $^\circ\text{C}$ |
| $T_{\text{stg}}$                    | storage temperature                 |                                                                                       |     | -65 | 150 | $^\circ\text{C}$ |

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

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

## 9. Thermal characteristics

Table 6. Thermal characteristics

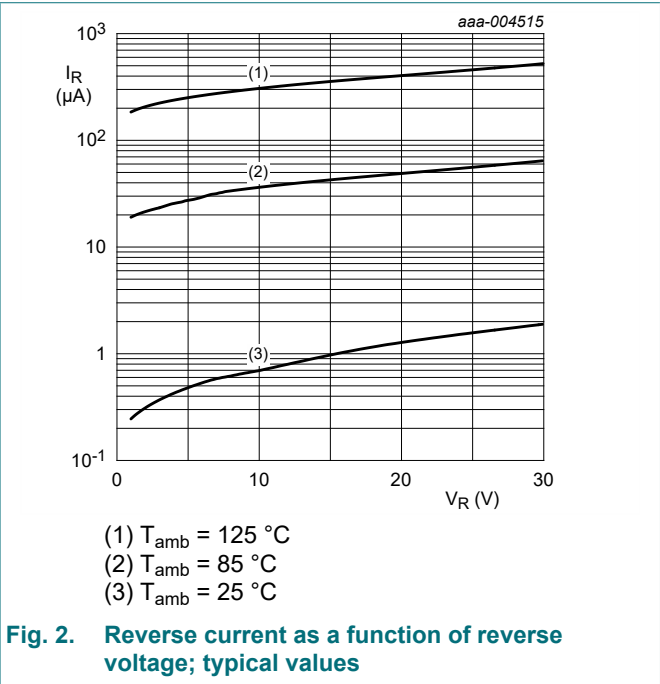
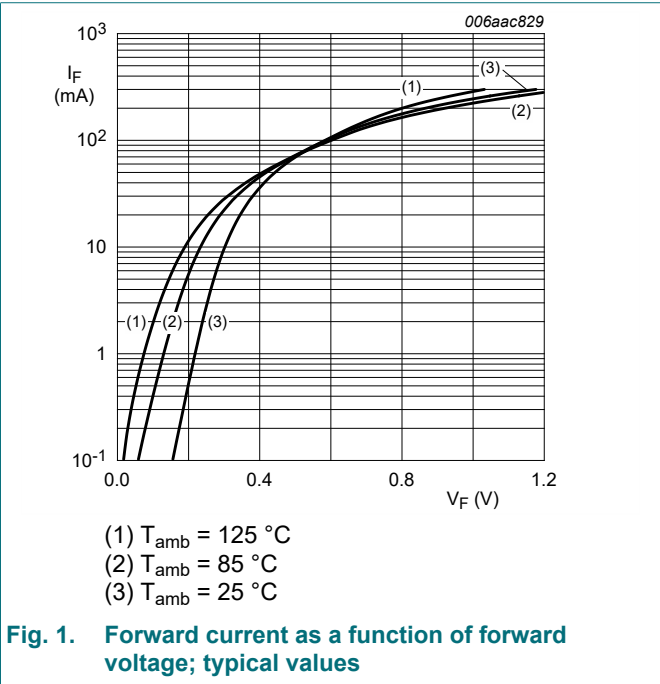
| Symbol               | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| $R_{\text{th}(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 625 | K/W  |

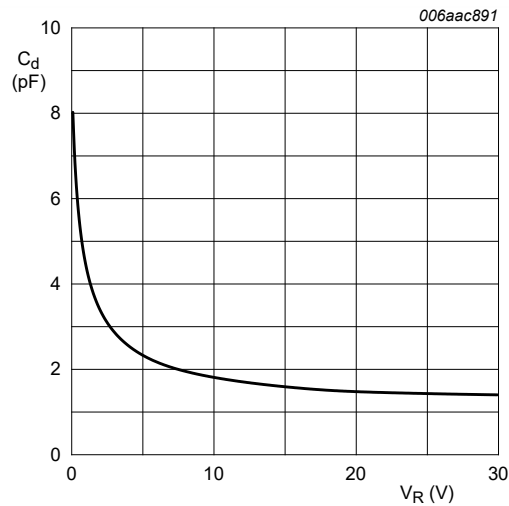
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

| Symbol          | Parameter             | Conditions                                                                                                                    | Min | Typ | Max | Unit |
|-----------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| Per diode       |                       |                                                                                                                               |     |     |     |      |
| V <sub>F</sub>  | forward voltage       | I <sub>F</sub> = 0.1 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C                                  | -   | -   | 240 | mV   |
|                 |                       | I <sub>F</sub> = 1 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C                                    | -   | -   | 320 | mV   |
|                 |                       | I <sub>F</sub> = 10 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C                                   | -   | -   | 400 | mV   |
|                 |                       | I <sub>F</sub> ≤ 300 mA; t <sub>p</sub> ≤ 0.02 μs; pulsed; T <sub>amb</sub> = 25 °C                                           | -   | -   | 500 | mV   |
|                 |                       | I <sub>F</sub> = 100 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C                                  | -   | -   | 800 | mV   |
| I <sub>R</sub>  | reverse current       | V <sub>R</sub> = 25 V; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C                                    | -   | -   | 2   | μA   |
| C <sub>d</sub>  | diode capacitance     | V <sub>R</sub> = 1 V; f = 1 MHz; T <sub>amb</sub> = 25 °C                                                                     | -   | -   | 10  | pF   |
| t <sub>rr</sub> | reverse recovery time | I <sub>F</sub> = 10 mA; I <sub>R</sub> = 10 mA; I <sub>R(meas)</sub> = 1 mA; R <sub>L</sub> = 100 Ω; T <sub>amb</sub> = 25 °C | -   | -   | 5   | ns   |





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

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

11. Test information

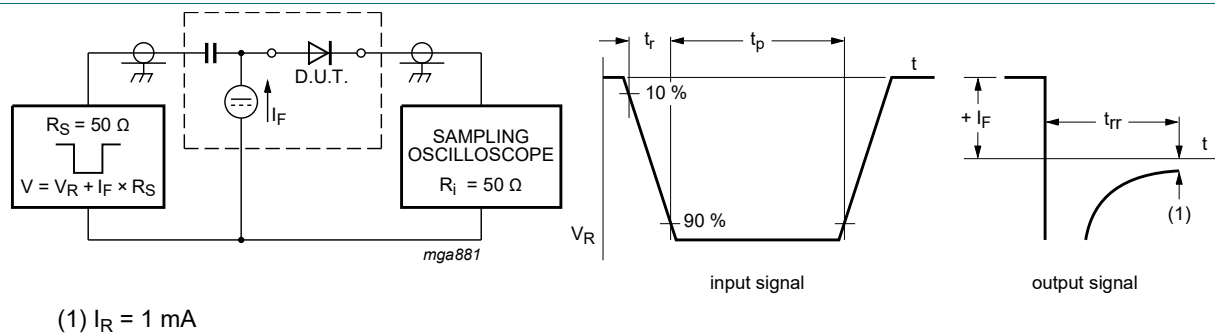


Fig. 4. Reverse recovery time test circuit and waveforms

12. Package outline

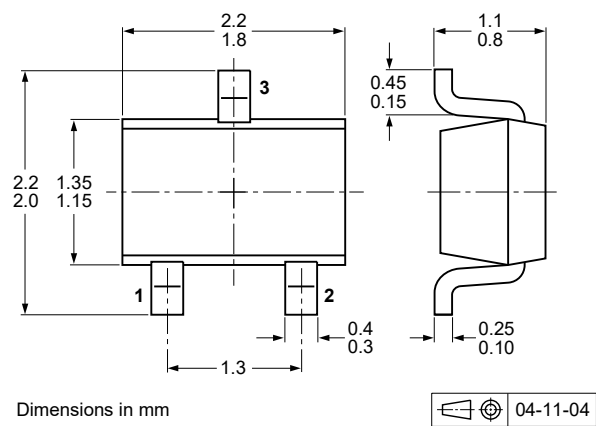


Fig. 5. Package outline SC-70 (SOT323)

13. Soldering

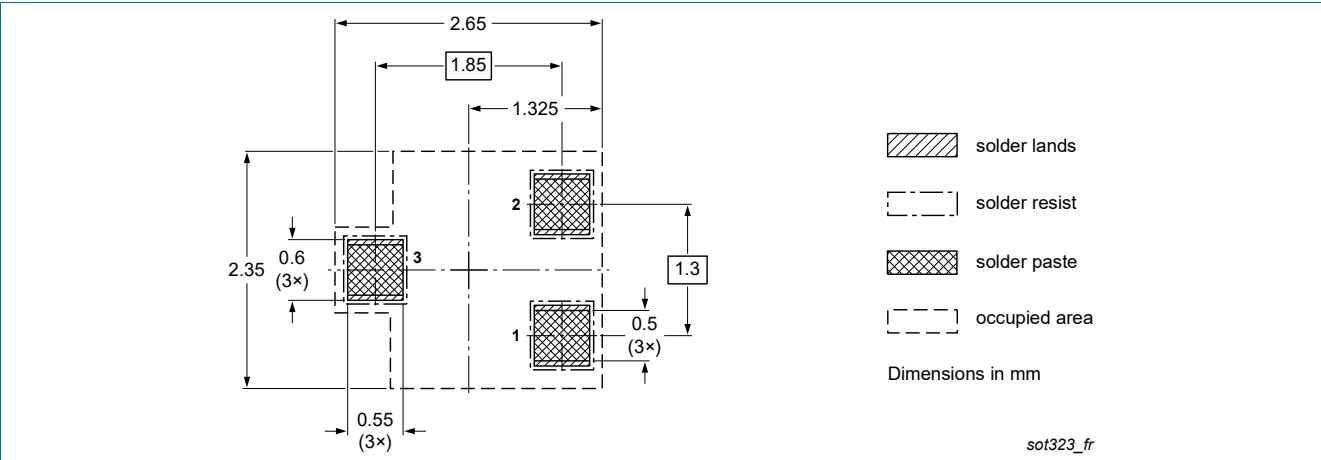


Fig. 6. Reflow soldering footprint for SC-70 (SOT323)

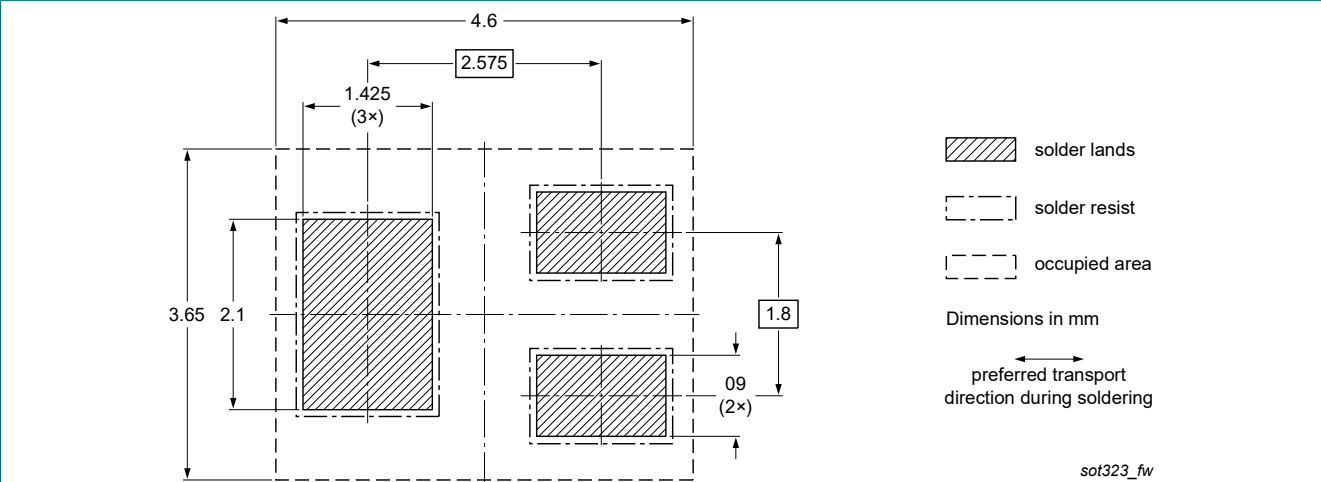


Fig. 7. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date                                                                                                                                                                                                                                                                  | Data sheet status     | Change notice | Supersedes     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|----------------|
| BAT54W v.4     | 20221001                                                                                                                                                                                                                                                                      | Product data sheet    | -             | BAT54W_SER v.3 |
| Modifications: | <ul style="list-style-type: none"><li>Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li><li>Family data sheet splitted to single type data sheets.</li><li>Packing information removed.</li></ul> |                       |               |                |
| BAT54W_SER v.3 | 20121120                                                                                                                                                                                                                                                                      | Product data sheet    | -             | BAT54W v.2     |
| BAT54W v.2     | 9960319                                                                                                                                                                                                                                                                       | Product specification | -             | BAT54W v.1     |

## 15. Legal information

### Data sheet status

| Document status<br>[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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Date of release: 1 October 2022



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