



BAV99

High-speed switching diode

1 July 2022

Product data sheet

1. General description

High-speed switching diode, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Low capacitance: $C_d \leq 1.5$ pF
- Low leakage current
- Reverse voltage: $V_R \leq 100$ V
- Small SMD plastic packages

3. Applications

- High-speed switching
- Reverse polarity protection
- General-purpose switching

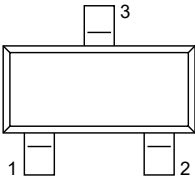
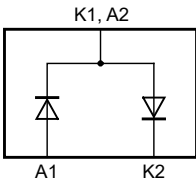
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-----------------------|---|-----|-----|-----|------|
| Per diode | | | | | | |
| I_R | reverse current | $V_R = 80$ V; $T_{amb} = 25$ °C | - | - | 0.5 | µA |
| V_R | reverse voltage | | - | - | 100 | V |
| t_{rr} | reverse recovery time | $I_F = 10$ mA; $I_R = 10$ mA; $I_{R(meas)} = 1$ mA; $R_L = 100$ Ω; $T_{amb} = 25$ °C | - | - | 4 | ns |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|---------------------------------------|--|--|
| 1 | A1 | anode (diode 1) |  SOT23 |  006aaa763 |
| 2 | K2 | cathode (diode 2) | | |
| 3 | K1, A2 | cathode (diode 1) and anode (diode 2) | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BAV99 | SOT23 | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| BAV99 | A7% |

[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 |
|------------------------------|-------------------------------------|--|-----|-----|-----|------|
| Per diode | | | | | | |
| V _R | reverse voltage | | | - | 100 | V |
| V _{RRM} | repetitive peak reverse voltage | | | - | 100 | V |
| I _F | forward current | single diode loaded | | - | 215 | mA |
| | | double diode loaded | | - | 125 | mA |
| I _{FRM} | repetitive peak forward current | | | - | 500 | mA |
| I _{FSM} | non-repetitive peak forward current | t _p = 1 μs; square wave; T _{j(init)} = 25 °C | | - | 4 | A |
| | | t _p = 1 ms; square wave; T _{j(init)} = 25 °C | | - | 1 | A |
| | | t _p = 1 s; square wave; T _{j(init)} = 25 °C | | - | 0.5 | A |
| Per device; one diode loaded | | | | | | |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | [1] | - | 250 | mW |
| T _j | junction temperature | | | - | 150 | °C |
| T _{amb} | ambient temperature | | | -65 | 150 | °C |
| T _{stg} | storage temperature | | | -65 | 150 | °C |

[1] 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 |
|----------------|--|----------------------------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | single diode loaded; in free air | [1] | - | - | 500 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | - | 360 | 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_F | forward voltage | $I_F = 1\text{ mA}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 715 | mV |
| | | $I_F = 10\text{ mA}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 855 | mV |
| | | $I_F = 50\text{ mA}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 1 | V |
| | | $I_F = 150\text{ mA}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 1.25 | V |
| I_R | reverse current | $V_R = 25\text{ V}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 30 | nA |
| | | $V_R = 80\text{ V}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 0.5 | μA |
| | | $V_R = 25\text{ V}; T_J = 150\text{ }^{\circ}\text{C}$ | - | - | 30 | μA |
| | | $V_R = 80\text{ V}; T_J = 150\text{ }^{\circ}\text{C}$ | - | - | 50 | μA |
| C_d | diode capacitance | $V_R = 0\text{ V}; f = 1\text{ MHz}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 1.5 | pF |
| t_{rr} | reverse recovery time | $I_F = 10\text{ mA}; I_R = 10\text{ mA}; I_{R(\text{meas})} = 1\text{ mA}; R_L = 100\text{ }\Omega; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 4 | ns |
| V_{FRM} | peak forward recovery voltage | $I_F = 10\text{ mA}; t_r = 20\text{ ns}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ | - | - | 1.75 | V |

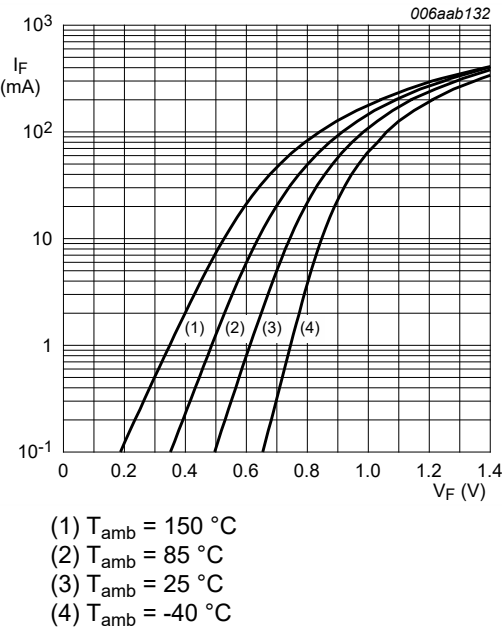


Fig. 1. Forward current as a function of forward voltage; typical values

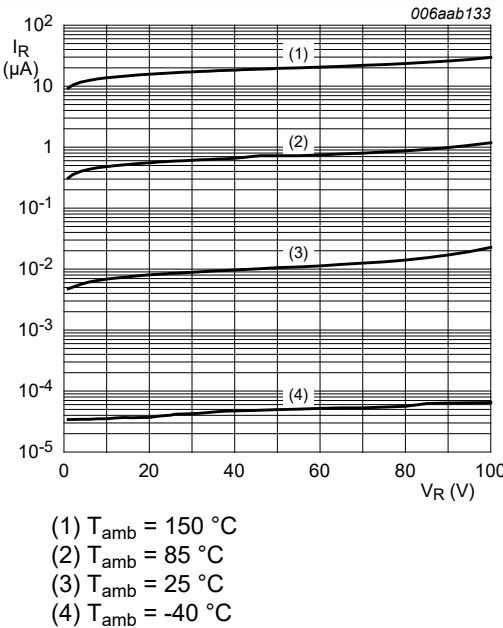
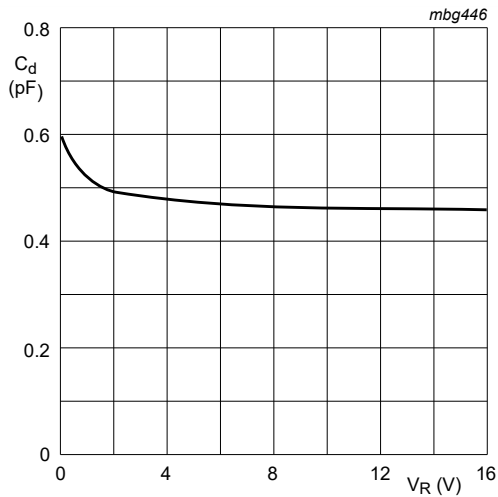
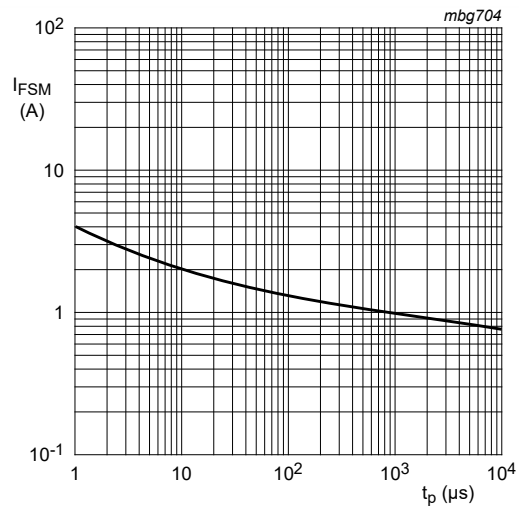


Fig. 2. Reverse current as a function of reverse voltage; typical values



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

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

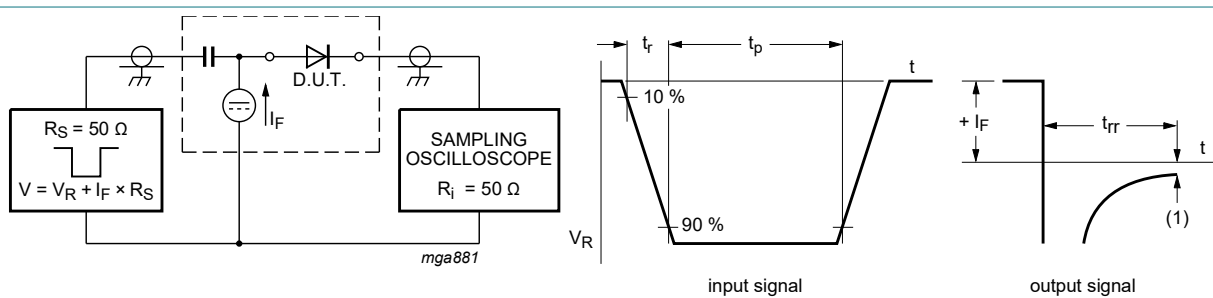


Based on square wave currents.

$T_{j(\text{init})} = 25 \text{ }^{\circ}\text{C}$

Fig. 4. Non-repetitive peak forward current as a function of pulse duration; typical values

11. Test information

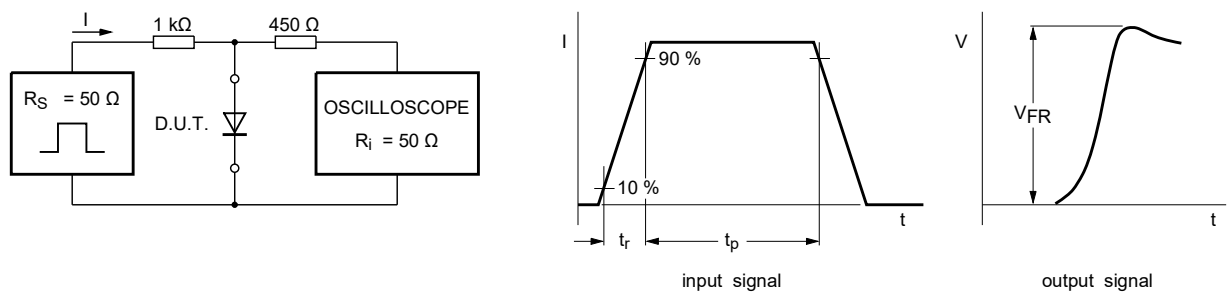


(1) $I_R = 1 \text{ mA}$

Input signal: reverse pulse rise time $t_r = 0.6 \text{ ns}$; reverse voltage pulse duration $t_p = 100 \text{ ns}$; duty cycle $\delta = 0.05$

Oscilloscope: rise time $t_r = 0.35 \text{ ns}$

Fig. 5. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time $t_r = 20 \text{ ns}$; forward current pulse duration $t_p \geq 100 \text{ ns}$; duty cycle $\delta \leq 0.005$

Fig. 6. Forward recovery voltage test circuit and waveforms

12. Package outline

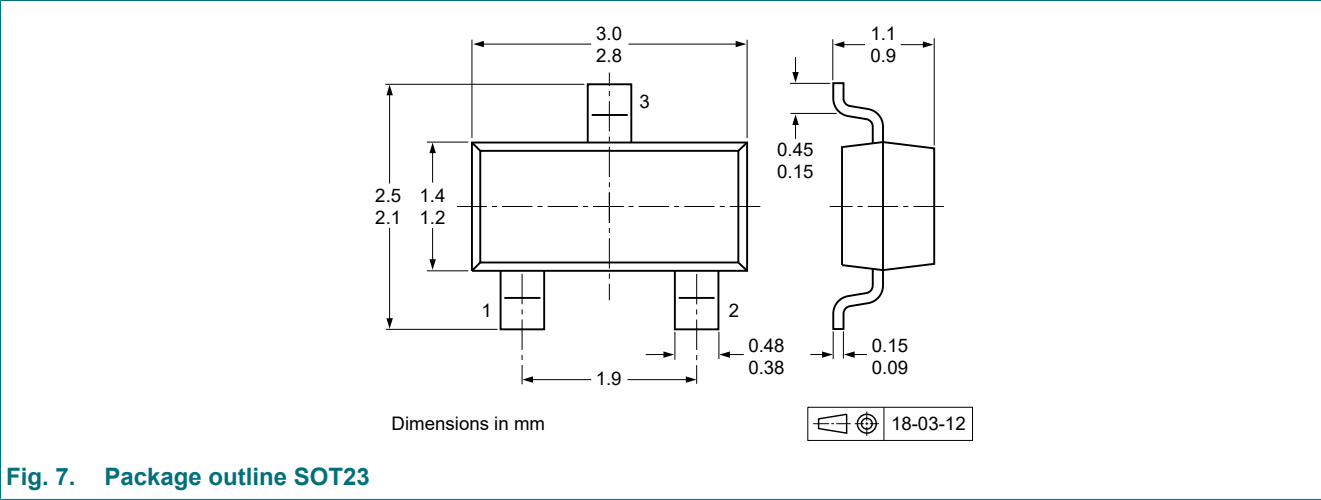


Fig. 7. Package outline SOT23

13. Soldering



Fig. 8. Reflow soldering footprint for SOT23

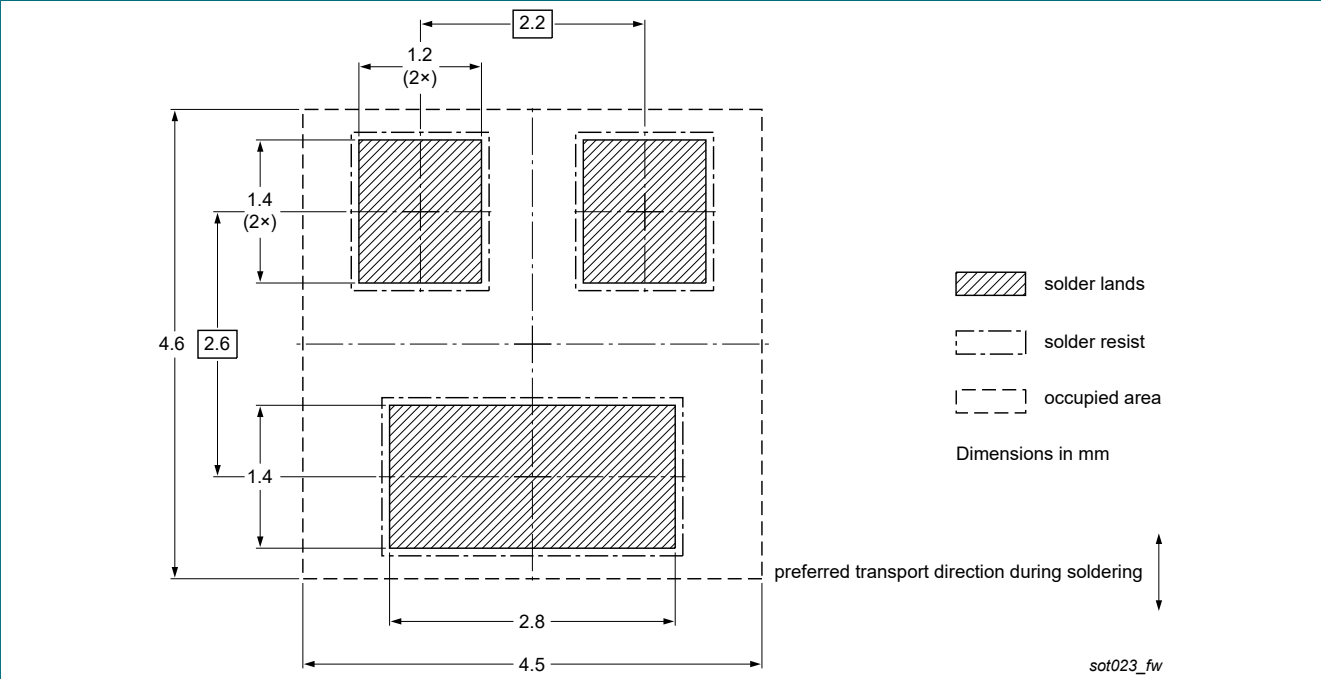


Fig. 9. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--|-----------------------|---------------|------------------------------|
| BAV99 v.9 | 20220701 | Product data sheet | - | BAV99_SER_8 |
| Modification: | <ul style="list-style-type: none"> Family data sheet reduced to single type data sheet. Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). Packing information removed. | | | |
| BAV99_SER_8 | 20101118 | Product data sheet | - | BAV99_SER_7 |
| BAV99_SER_7 | 20100414 | Product data sheet | - | BAV99_SER_6 |
| BAV99_SER_6 | 20100310 | Product data sheet | - | BAV99_SER_5 |
| BAV99_SER_5 | 20080820 | Product data sheet | - | BAV99_4 BAV99S_3 BAV99W_4 |
| BAV99_4 | 20011015 | Product specification | - | BAV99_3 |
| BAV99S_3 | 20010514 | Product specification | - | BAV99S_N_2 |
| BAV99W_4 | 19990511 | Product specification | - | BAV99W_3 |

15. Legal information

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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