



# BAV99S

## High-speed switching diode

18 September 2023

Product data sheet

## 1. General description

High-speed switching diode, encapsulated in a very small SOT363 (SC-88) 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
- Very 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 | $\mu$ A |
| $V_R$     | reverse voltage       |                                                                                              | -   | -   | 100 | V       |
| $t_{rr}$  | reverse recovery time | $I_F = 10$ mA; $I_R = 10$ mA; $I_{R(meas)} = 1$ mA; $R_L = 100$ $\Omega$ ; $T_{amb} = 25$ °C | -   | -   | 4   | ns      |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                        | Simplified outline     | Graphic symbol   |
|-----|--------|------------------------------------|------------------------|------------------|
| 1   | A1     | anode (diode 1)                    | <p>TSSOP6 (SOT363)</p> | <p>006aab101</p> |
| 2   | K2     | cathode (diode 2)                  |                        |                  |
| 3   | K3; A4 | cathode (diode 3), anode (diode 4) |                        |                  |
| 4   | A3     | anode (diode 3)                    |                        |                  |
| 5   | K4     | cathode (diode 4)                  |                        |                  |
| 6   | K1; A2 | cathode (diode 1), anode (diode 2) |                        |                  |

6. Ordering information

Table 3. Ordering information

| Type number | Package |                                                                                           |         |
|-------------|---------|-------------------------------------------------------------------------------------------|---------|
|             | Name    | Description                                                                               | Version |
| BAV99S      | TSSOP6  | plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body | SOT363  |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| BAV99S      | K1%             |

[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 <sub>R</sub>   | reverse voltage                     |                                                                  |     | -   | 100 | V    |
| V <sub>RRM</sub> | repetitive peak reverse voltage     |                                                                  |     | -   | 100 | V    |
| I <sub>F</sub>   | forward current                     | single diode loaded                                              | [1] | -   | 200 | mA   |
| I <sub>FRM</sub> | repetitive peak forward current     |                                                                  |     | -   | 500 | mA   |
| I <sub>FSM</sub> | non-repetitive peak forward current | t <sub>p</sub> = 1 µs; square wave; T <sub>j(init)</sub> = 25 °C |     | -   | 4   | A    |
|                  |                                     | t <sub>p</sub> = 1 ms; square wave; T <sub>j(init)</sub> = 25 °C |     | -   | 1   | A    |
|                  |                                     | t <sub>p</sub> = 1 s; square wave; T <sub>j(init)</sub> = 25 °C  |     | -   | 0.5 | A    |
| P <sub>tot</sub> | total power dissipation             | T <sub>sp</sub> ≤ 85 °C                                          | [2] | -   | 250 | mW   |
| Per device       |                                     |                                                                  |     |     |     |      |
| T <sub>j</sub>   | junction temperature                |                                                                  |     | -   | 150 | °C   |
| T <sub>amb</sub> | ambient temperature                 |                                                                  |     | -65 | 150 | °C   |
| T <sub>stg</sub> | storage temperature                 |                                                                  |     | -65 | 150 | °C   |

[1] Single diode loaded.  
[2] Soldering points at pins 2, 3, 5 and 6.

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol         | Parameter                                        | Conditions |     | Min | Typ | Max | Unit |
|----------------|--------------------------------------------------|------------|-----|-----|-----|-----|------|
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |            | [1] | -   | -   | 260 | K/W  |

[1] Soldering points at pins 2, 3, 5 and 6.

10. Characteristics

Table 7. Characteristics

| Symbol    | Parameter                     | Conditions                                                                                                                         |  | Min | Typ | Max  | Unit          |
|-----------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|------|---------------|
| Per diode |                               |                                                                                                                                    |  |     |     |      |               |
| $V_F$     | forward voltage               | $I_F = 1\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                          |  | -   | -   | 715  | mV            |
|           |                               | $I_F = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                         |  | -   | -   | 855  | mV            |
|           |                               | $I_F = 50\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                         |  | -   | -   | 1    | V             |
|           |                               | $I_F = 150\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                        |  | -   | -   | 1.25 | V             |
| $I_R$     | reverse current               | $V_R = 25\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                          |  | -   | -   | 30   | nA            |
|           |                               | $V_R = 80\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                          |  | -   | -   | 0.5  | $\mu\text{A}$ |
|           |                               | $V_R = 25\text{ V}; T_j = 150\text{ }^{\circ}\text{C}$                                                                             |  | -   | -   | 30   | $\mu\text{A}$ |
|           |                               | $V_R = 80\text{ V}; T_j = 150\text{ }^{\circ}\text{C}$                                                                             |  | -   | -   | 50   | $\mu\text{A}$ |
| $C_d$     | diode capacitance             | $V_R = 0\text{ V}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                         |  | -   | -   | 1.5  | pF            |
| $t_{rr}$  | reverse recovery time         | $I_F = 10\text{ mA}; I_R = 10\text{ mA}; I_{R(meas)} = 1\text{ mA}; R_L = 100\text{ }\Omega; T_{amb} = 25\text{ }^{\circ}\text{C}$ |  | -   | -   | 4    | ns            |
| $V_{FRM}$ | peak forward recovery voltage | $I_F = 10\text{ mA}; t_r = 20\text{ ns}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                     |  | -   | -   | 1.75 | V             |

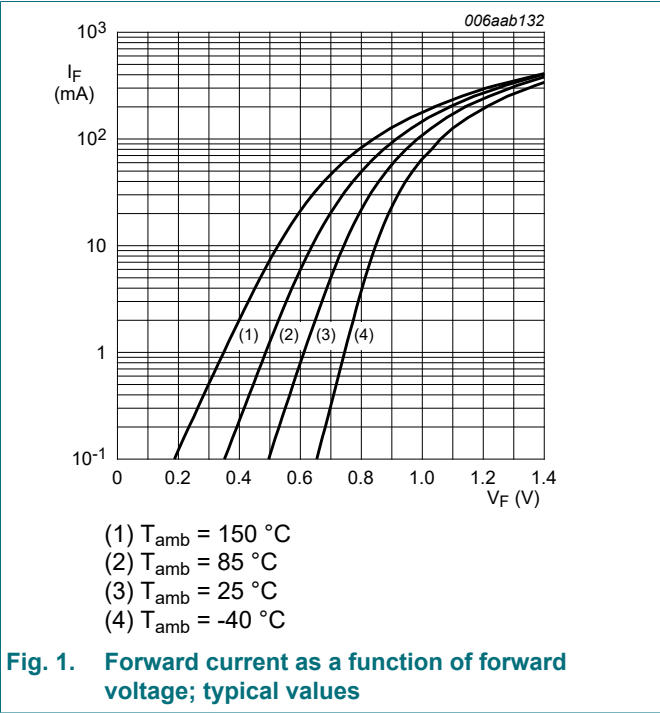


Fig. 1. Forward current as a function of forward voltage; typical values

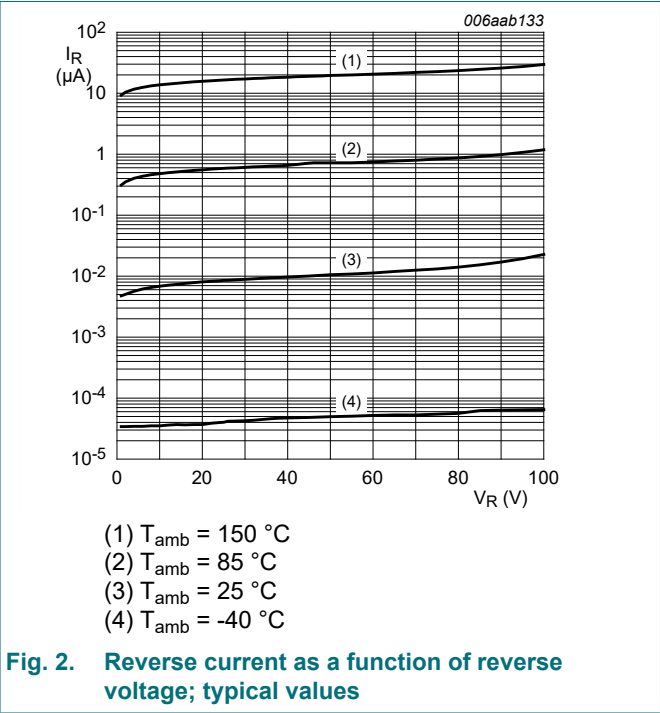
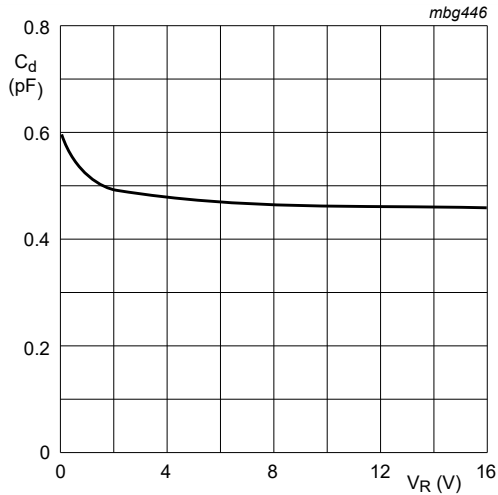
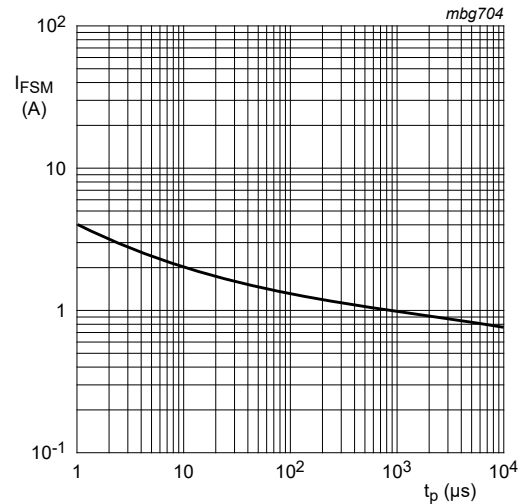


Fig. 2. Reverse current as a function of reverse voltage; typical values



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

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

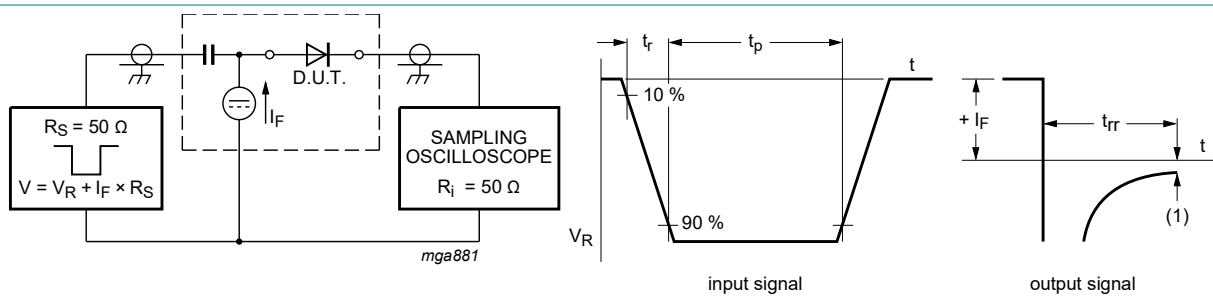


Based on square wave currents.

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

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

## 11. Test information

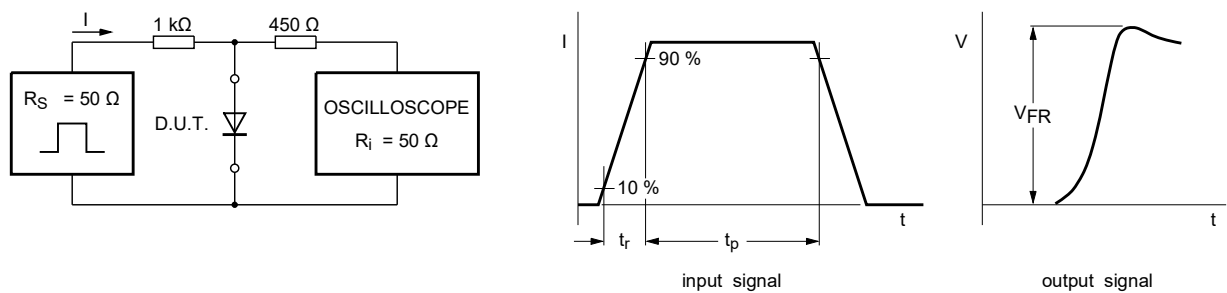


(1)  $I_R = 1 \text{ mA}$

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  $t_r = 0.35 \text{ ns}$

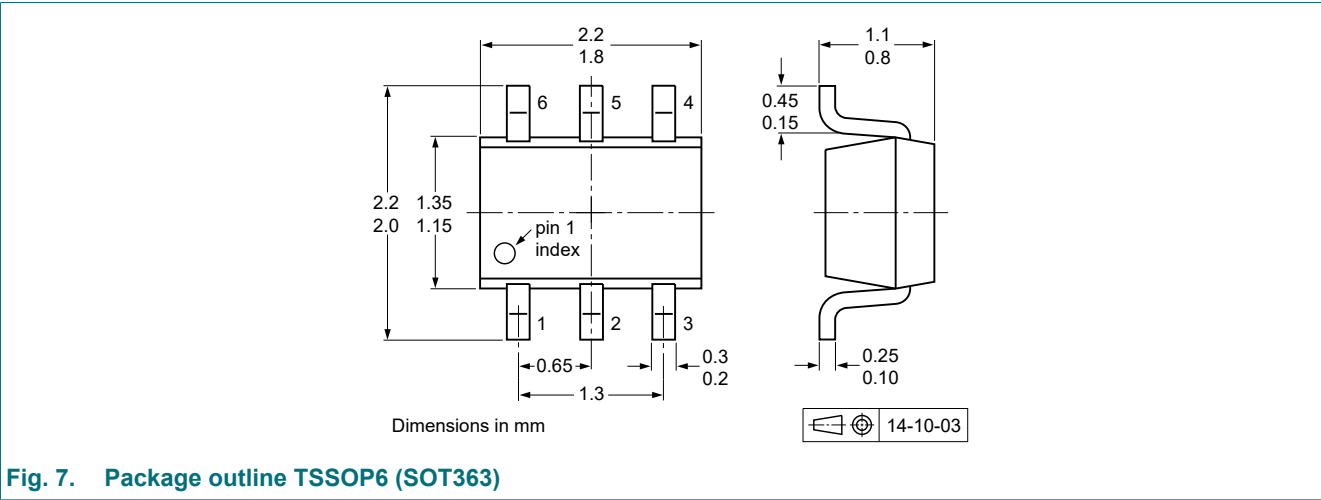
**Fig. 5. Reverse recovery time test circuit and waveforms**



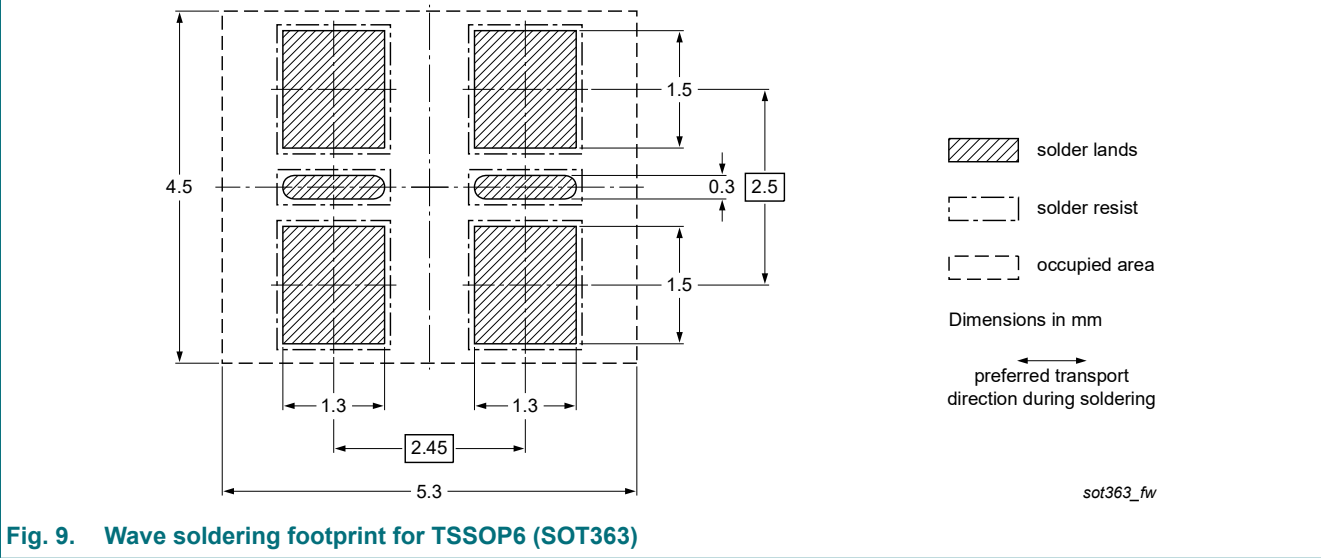
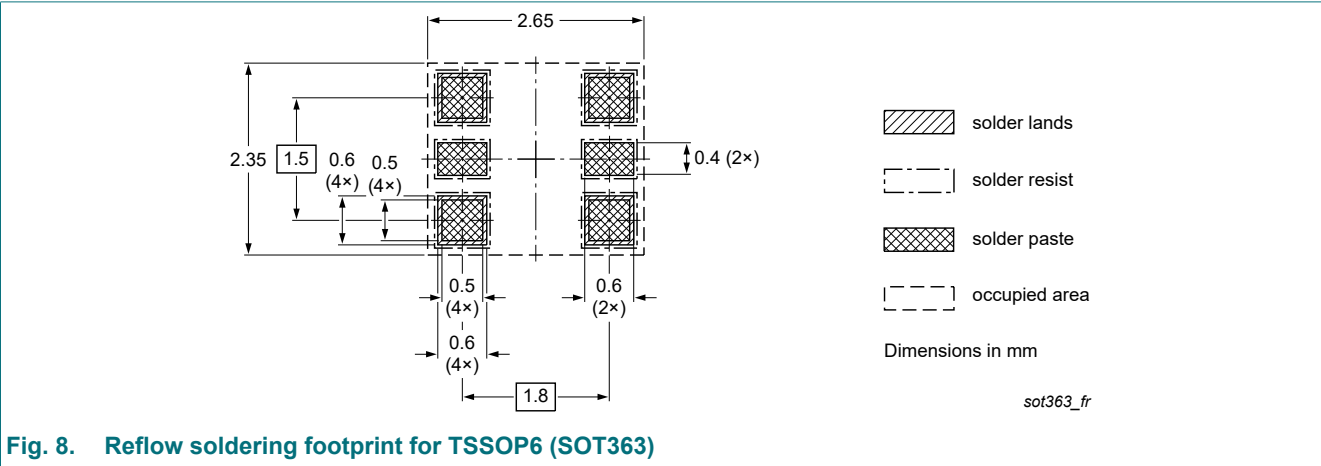
Input signal: forward pulse rise time  $t_r = 20 \text{ ns}$ ; forward current pulse duration  $t_p \geq 100 \text{ ns}$ ; duty cycle  $\delta \leq 0.005$

**Fig. 6. Forward recovery voltage test circuit and waveforms**

12. Package outline



13. Soldering



## 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date                                                                                                                                                                                                                                                                       | Data sheet status     | Change notice | Supersedes                   |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|------------------------------|
| BAV99S v.9    | 20230918                                                                                                                                                                                                                                                                           | Product data sheet    | -             | BAV99_SER_8                  |
| Modification: | <ul style="list-style-type: none"> <li>Family data sheet reduced to single type data sheet.</li> <li>Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li> <li>Packing information removed.</li> </ul> |                       |               |                              |
| 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<br>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.
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