



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

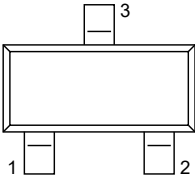
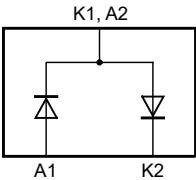
4. Quick reference data

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

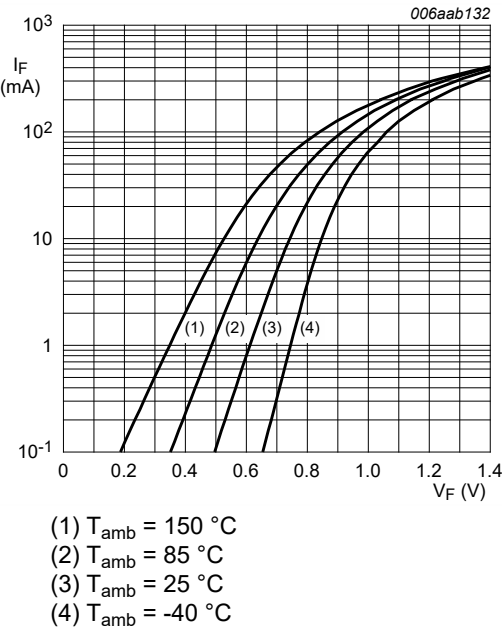


Fig. 1. Forward current as a function of forward voltage; typical values

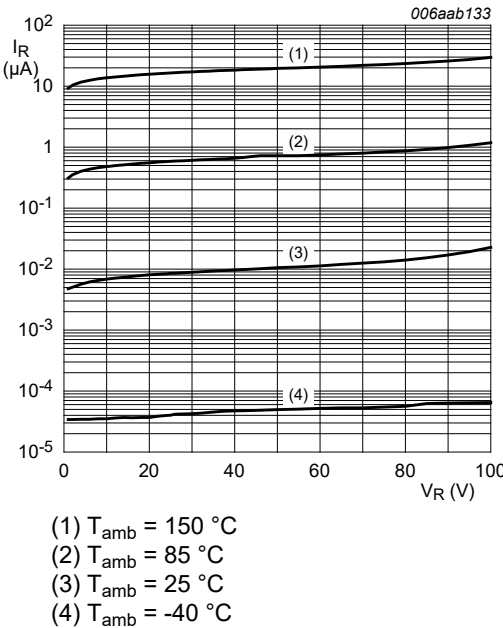
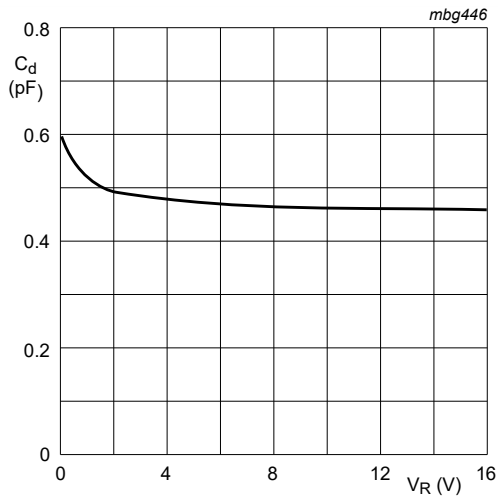
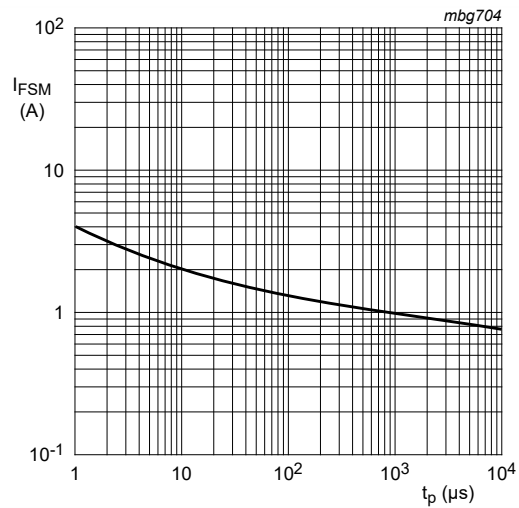


Fig. 2. Reverse current as a function of reverse voltage; typical values



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

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

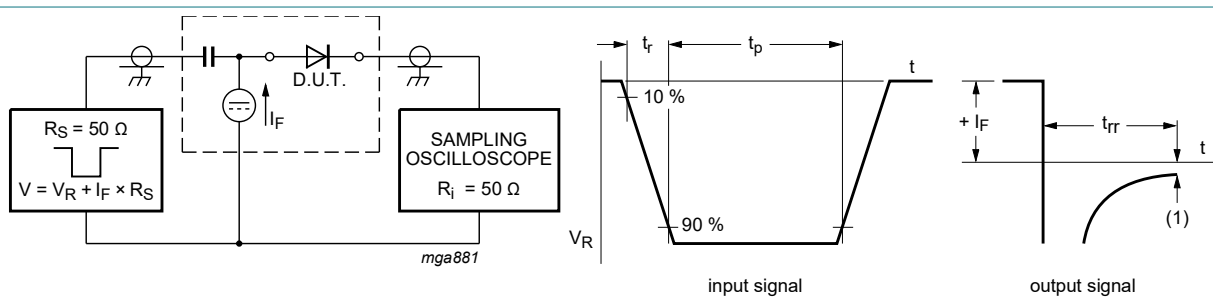


Based on square wave currents.

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

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

11. Test information

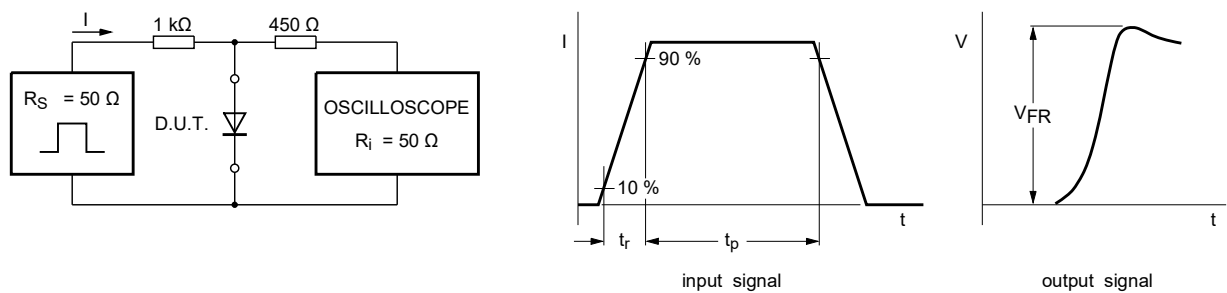


(1) $I_R = 1 \text{ mA}$

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

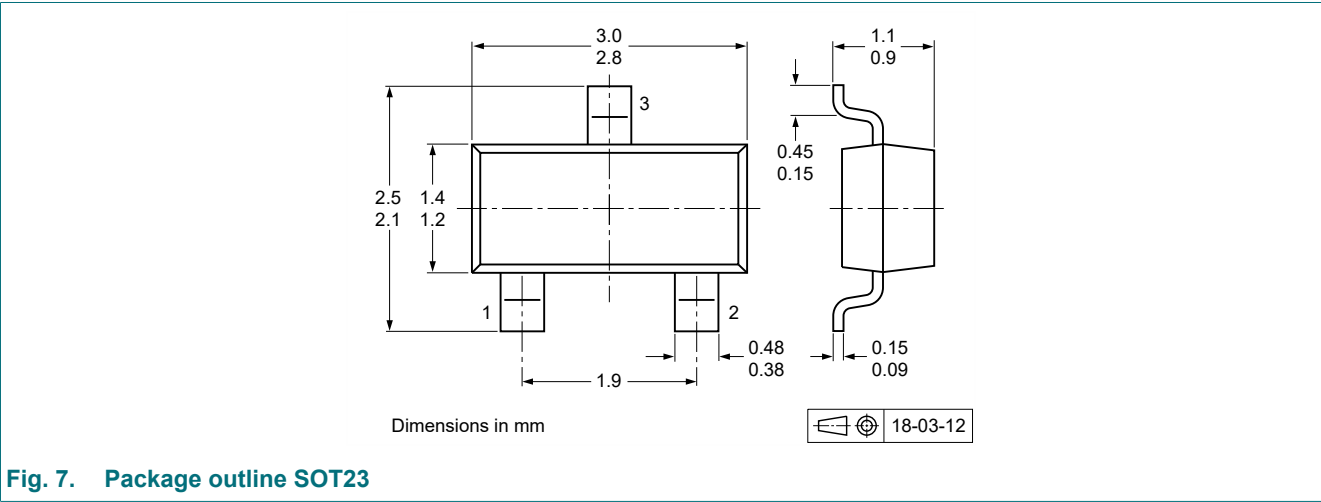


Fig. 7. Package outline SOT23

13. Soldering

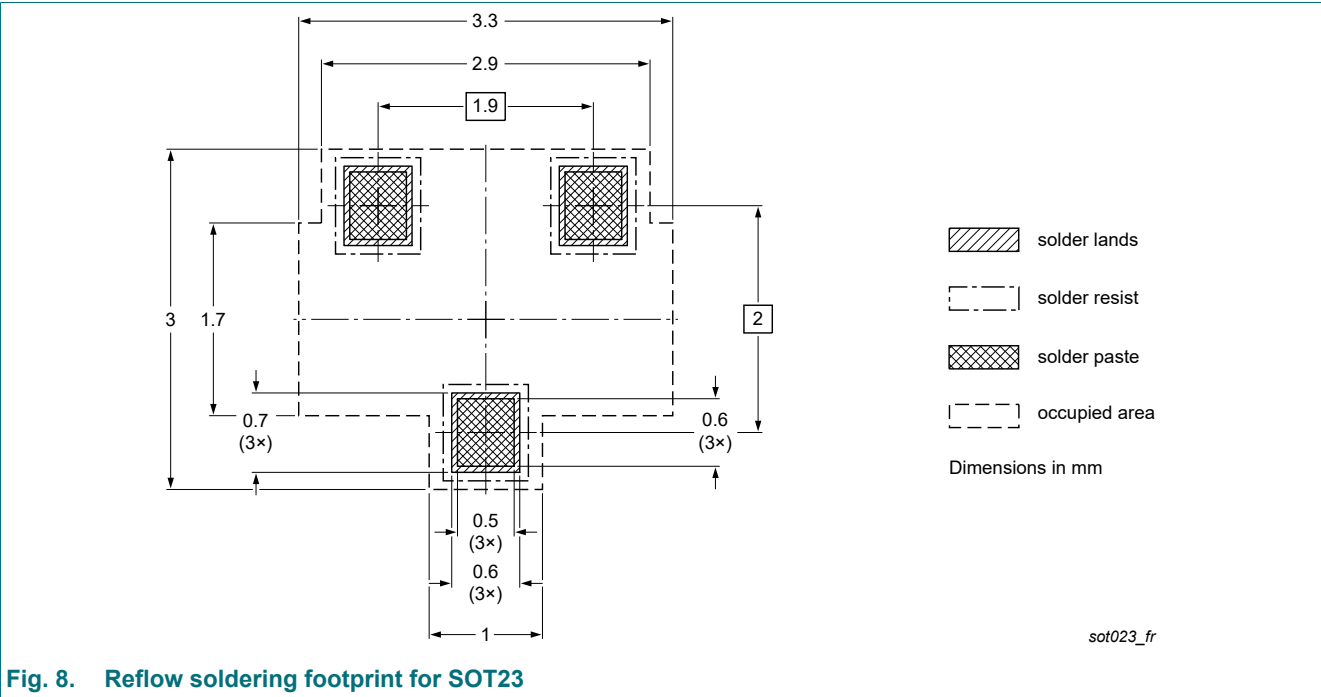


Fig. 8. Reflow soldering footprint for SOT23

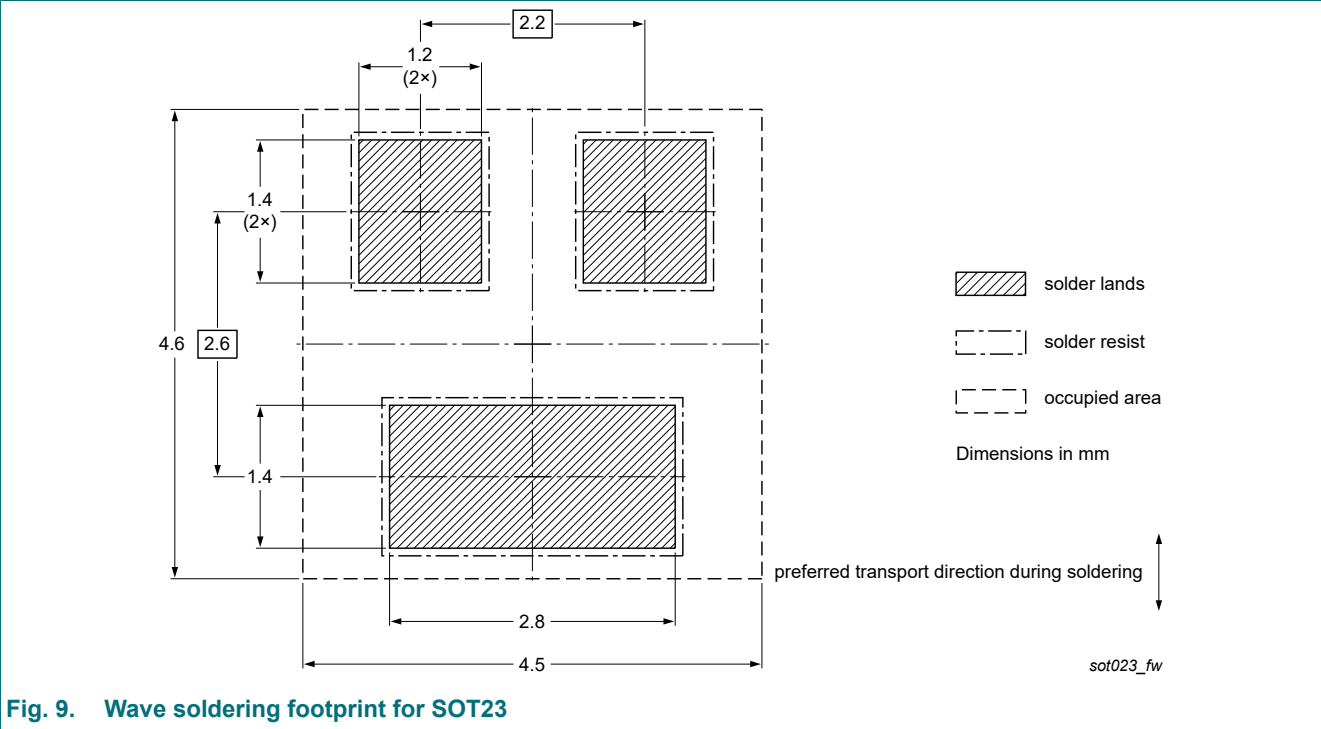


Fig. 9. Wave soldering footprint for SOT23

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:	- 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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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