**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<sub>rr</sub> ≤ 4 ns

Low capacitance: C<sub>d</sub> ≤ 1.5 pF

Low leakage current

Reverse voltage: V<sub>R</sub> ≤ 100 V

Small SMD plastic packages

Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

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

### 4. Quick reference data

#### Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Per diode						
I <sub>R</sub>	reverse current	V <sub>R</sub> = 80 V; T <sub>amb</sub> = 25 °C	-	-	0.5	μΑ
V <sub>R</sub>	reverse voltage		-	-	100	V
t <sub>rr</sub>	reverse recovery time	$I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; I_{R(meas)} = 1 \text{ mA};$ $R_L = 100 \Omega; T_{amb} = 25 \text{ °C}$	-	-	4	ns



High-speed switching diode

## 5. Pinning information

#### **Table 2. Pinning information**

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

# 6. Ordering information

#### **Table 3. Ordering information**

Type number	Package				
	Name	Description	Version		
BAV99-Q		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-Q	A7%

[1] % = placeholder for manufacturing site code

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High-speed switching diode

## 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				<u> </u>		
V <sub>R</sub>	reverse voltage			-	100	V
$V_{RRM}$	repetitive peak reverse voltage			-	100	V
l <sub>F</sub>	forward current	single diode loaded		-	215	mA
		double diode loaded		-	125	mA
I <sub>FRM</sub>	repetitive peak forward current			-	500	mA
I <sub>FSM</sub>	non-repetitive peak	t <sub>p</sub> = 1 μs; square wave; T <sub>j(init)</sub> = 25 °C		-	4	Α
	forward current	t <sub>p</sub> = 1 ms; square wave; T <sub>j(init)</sub> = 25 °C		-	1	Α
		t <sub>p</sub> = 1 s; square wave; T <sub>j(init)</sub> = 25 °C		-	0.5	Α
Per device;	one diode loaded		'			'
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	250	mW
Tj	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C

<sup>[1]</sup> 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	Тур	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	single diode loaded; in free air	[1]	-	-	500	K/W
R <sub>th(j-sp)</sub>	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.

### High-speed switching diode

### 10. Characteristics

**Table 7. Characteristics** 

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Per diode						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 1 mA; T <sub>amb</sub> = 25 °C	-	-	715	mV
		I <sub>F</sub> = 10 mA; T <sub>amb</sub> = 25 °C	-	-	855	mV
		I <sub>F</sub> = 50 mA; T <sub>amb</sub> = 25 °C	-	-	1	V
		I <sub>F</sub> = 150 mA; T <sub>amb</sub> = 25 °C	-	-	1.25	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 25 V; T <sub>amb</sub> = 25 °C	-	-	30	nA
		V <sub>R</sub> = 80 V; T <sub>amb</sub> = 25 °C	-	-	0.5	μA
		V <sub>R</sub> = 25 V; T <sub>j</sub> = 150 °C	-	-	30	μΑ
		V <sub>R</sub> = 80 V; T <sub>j</sub> = 150 °C	-	-	50	μΑ
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 0 V; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	-	1.5	pF
t <sub>rr</sub>	reverse recovery time	$I_F$ = 10 mA; $I_R$ = 10 mA; $I_{R(meas)}$ = 1 mA; $I_{L}$ = 100 $\Omega$ ; $I_{L}$ = 25 °C	-	-	4	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 10 \text{ mA}; t_r = 20 \text{ ns}; T_{amb} = 25 \text{ °C}$	-	-	1.75	V

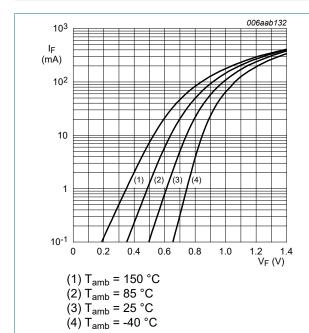
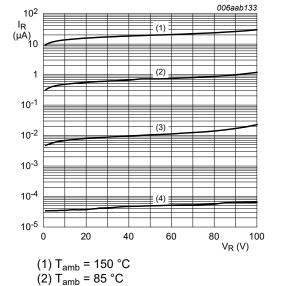


Fig. 1. Forward current as a function of forward voltage; typical values



- (3)  $T_{amb} = 25 \, ^{\circ}C$
- (4)  $T_{amb} = -40 \, ^{\circ}C$

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

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#### **High-speed switching diode**

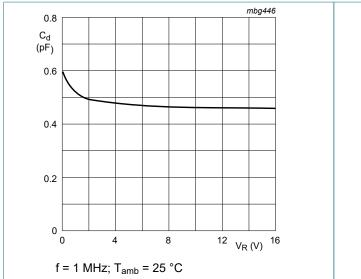
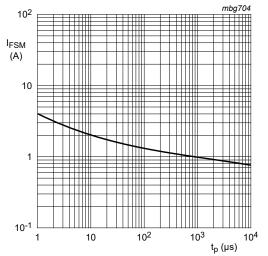


Fig. 3. Diode capacitance as a function of reverse voltage; typical values

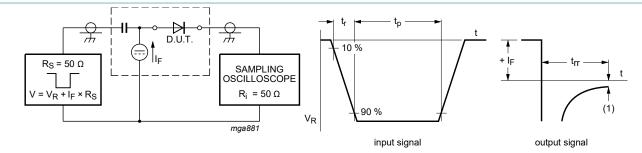


Based on square wave currents.

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

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

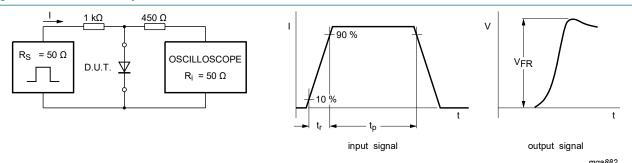
#### 11. Test information



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

Input signal: reverse pulse rise time  $t_r$  = 0.6 ns; reverse voltage pulse duration  $t_p$  = 100 ns; duty cycle  $\delta$  = 0.05 Oscilloscope: rise time  $t_r$  = 0.35 ns

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



Input signal: forward pulse rise time  $t_r$  = 20 ns; forward current pulse duration  $t_p \ge 100$  ns; duty cycle  $\delta \le 0.005$ 

Fig. 6. Forward recovery voltage test circuit and waveforms

#### **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.

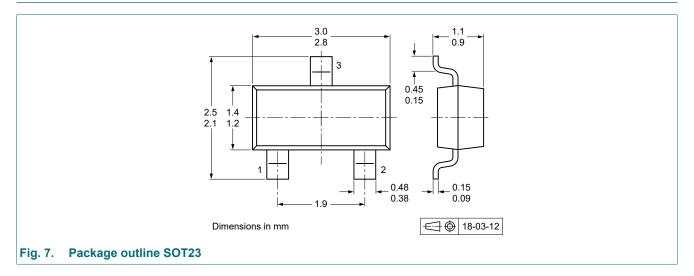
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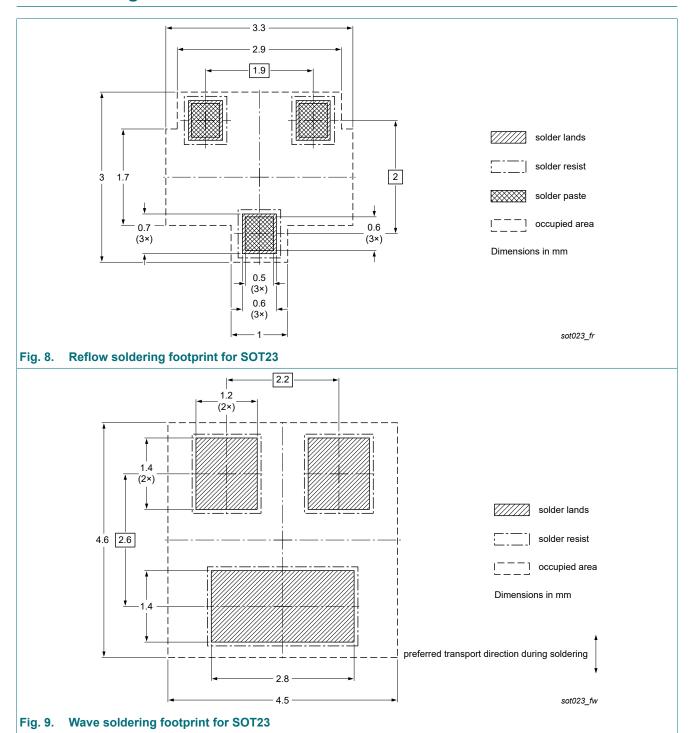
### **High-speed switching diode**

# 12. Package outline



### High-speed switching diode

## 13. Soldering



## **High-speed switching diode**

# 14. Revision history

### Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAV99-Q v.1	20210607	Product data sheet	-	-

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#### **High-speed switching diode**

### 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.

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### High-speed switching diode

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