



# BAS21W

## High-voltage switching diode

5 January 2023

Product data sheet

### 1. General description

High-voltage switching diode encapsulated in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current
- High reverse voltage  $V_R \leq 250$  V
- Low capacitance:  $C_d \leq 2$  pF
- Very small SMD plastic package
- AEC-Q101 qualified

### 3. Applications

- High-speed switching at high voltage
- High-voltage general-purpose switching
- Voltage clamping
- Reverse polarity protection

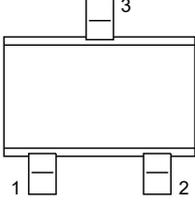
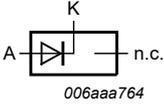
### 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_F$	forward current		-	-	225	mA
$I_R$	reverse current	$V_R = 200$ V; $T_{amb} = 25$ °C	-	-	100	nA
$V_R$	reverse voltage		-	-	250	V
$t_{rr}$	reverse recovery time	$I_F = 10$ mA; $I_R = 10$ mA; $R_L = 100$ $\Omega$ ; $I_{R(meas)} = 1$ mA; $T_{amb} = 25$ °C	-	-	50	ns

## 5. Pinning information

Table 2. Pinning information

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

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BAS21W</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]
BAS21W	X4%

[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			-	250	V
$I_F$	forward current			-	225	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p = 1 \mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		-	9	A
		$t_p = 100 \mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		-	3	A
		$t_p = 10 \text{ ms}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		-	1.7	A
$I_{FRM}$	repetitive peak forward current			-	625	mA
<b>Per device</b>						
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$	[1]	-	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] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

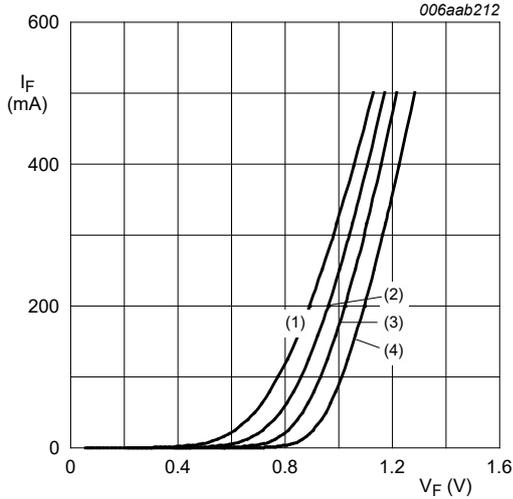
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
$R_{\text{th}(j-sp)}$	thermal resistance from junction to solder point			-	-	300	K/W

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

## 10. Characteristics

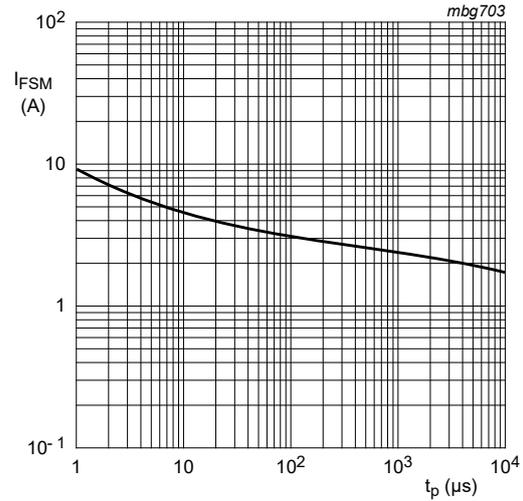
**Table 7. Characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per diode</b>							
$V_F$	forward voltage	$I_F = 100 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	1	V
		$I_F = 200 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	1.25	V
$I_R$	reverse current	$V_R = 200 \text{ V}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	100	nA
		$V_R = 200 \text{ V}$ ; $T_j = 150 \text{ }^\circ\text{C}$		-	-	100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 0 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	2	pF
$t_{rr}$	reverse recovery time	$I_F = 10 \text{ mA}$ ; $I_R = 10 \text{ mA}$ ; $R_L = 100 \Omega$ ; $I_{R(\text{meas})} = 1 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	50	ns



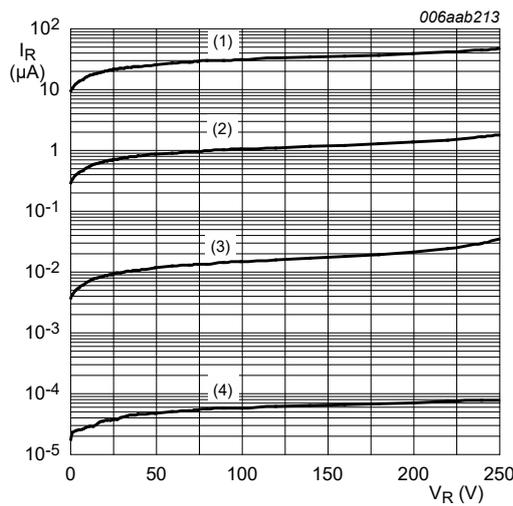
- (1)  $T_{amb} = 150^\circ\text{C}$
- (2)  $T_{amb} = 85^\circ\text{C}$
- (3)  $T_{amb} = 25^\circ\text{C}$
- (4)  $T_{amb} = -40^\circ\text{C}$

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



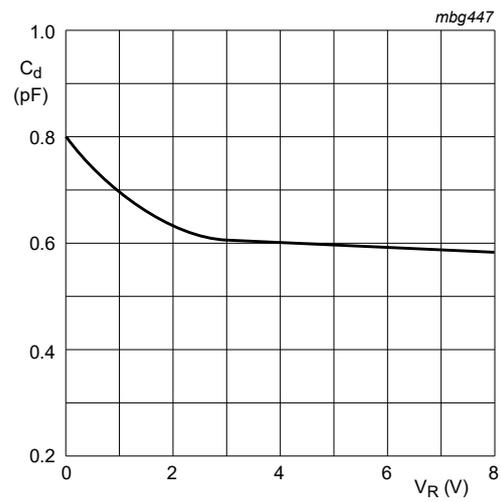
Based on square wave currents  
 $T_j = 25^\circ\text{C}$  prior to surge

**Fig. 2. Maximum permissible non-repetitive peak forward current as a function of pulse duration**



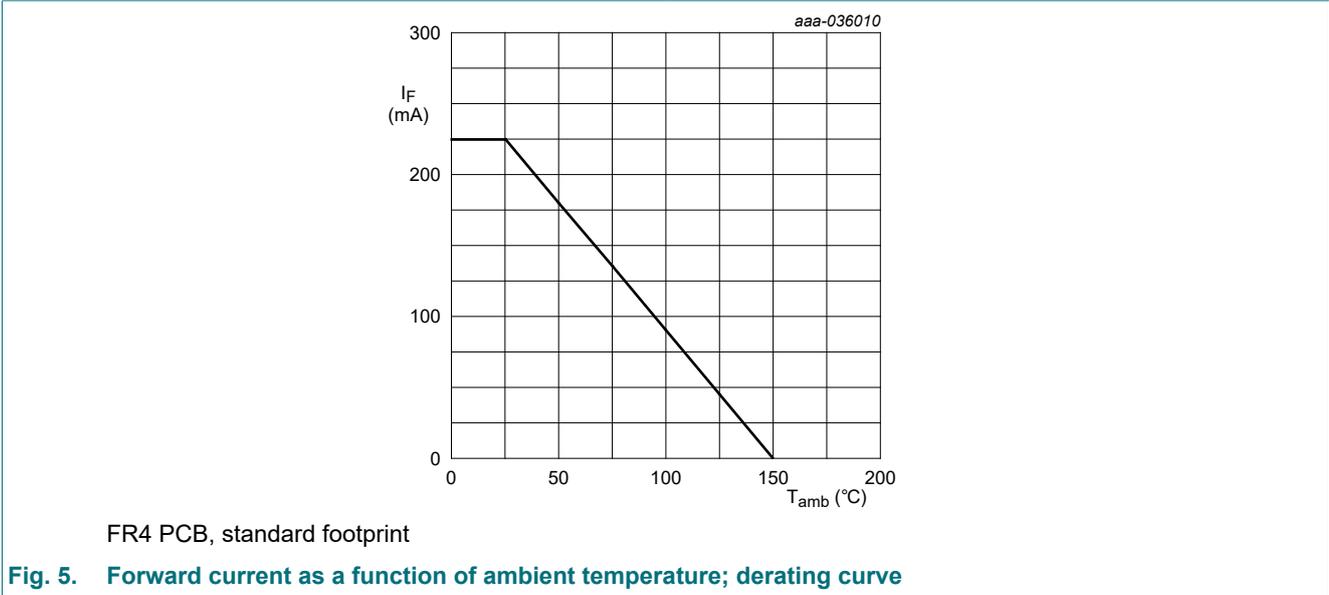
- (1)  $T_{amb} = 150^\circ\text{C}$
- (2)  $T_{amb} = 85^\circ\text{C}$
- (3)  $T_{amb} = 25^\circ\text{C}$
- (4)  $T_{amb} = -40^\circ\text{C}$

**Fig. 3. Reverse current as a function of reverse voltage; typical values**

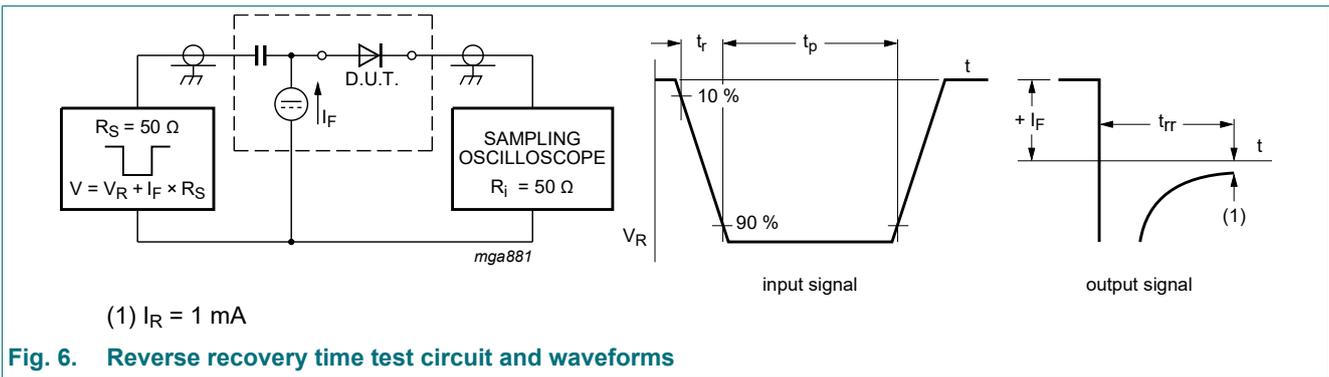


$f = 1\text{ MHz}$   
 $T_j = 25^\circ\text{C}$ .

**Fig. 4. Diode capacitance as a function of reverse voltage; typical values.**



### 11. Test information



#### 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.

## 12. Package outline

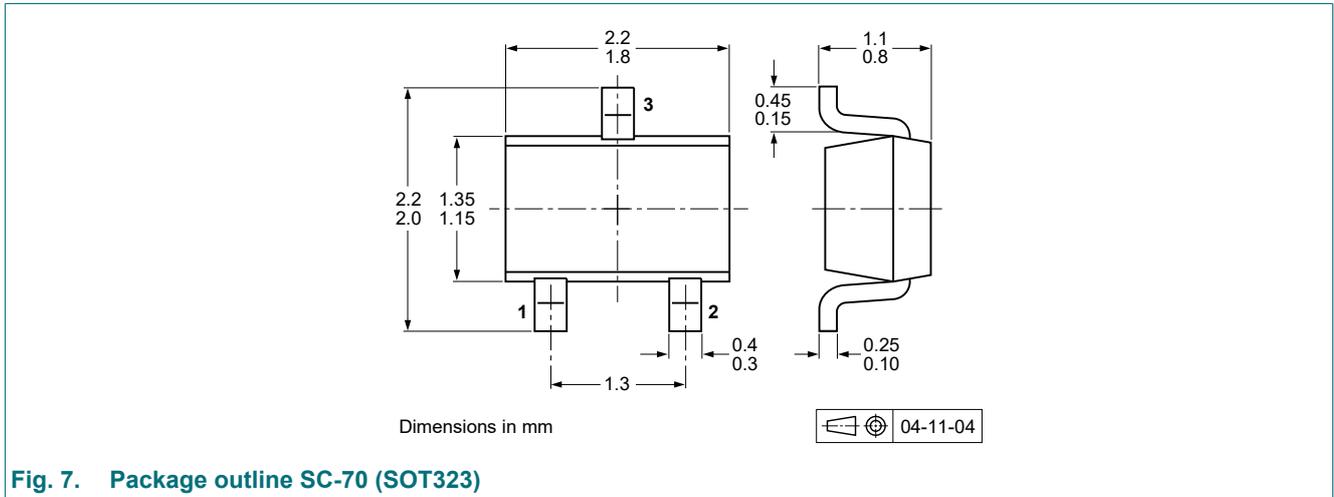


Fig. 7. Package outline SC-70 (SOT323)

## 13. Soldering

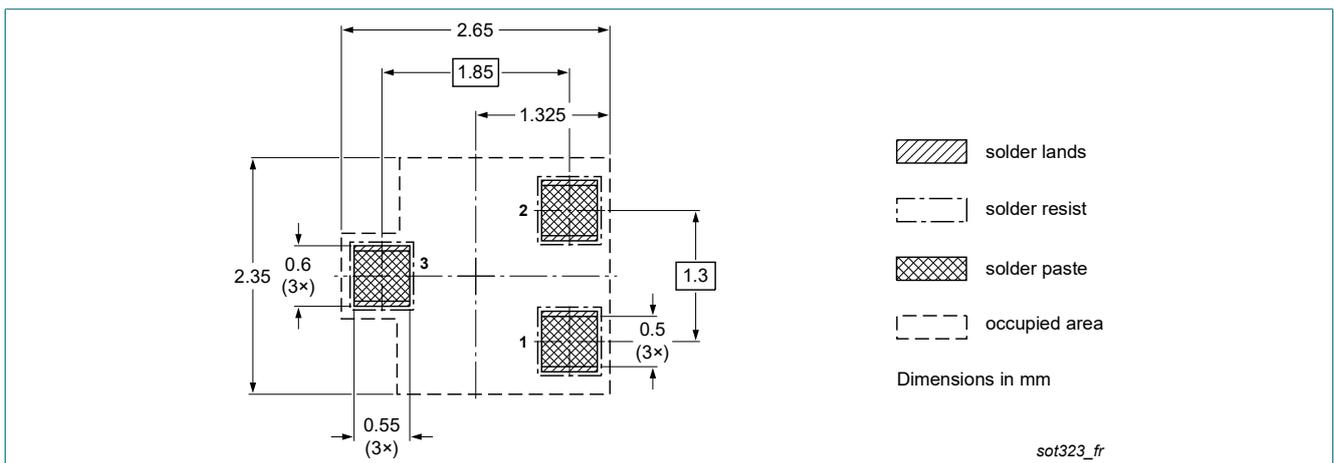


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

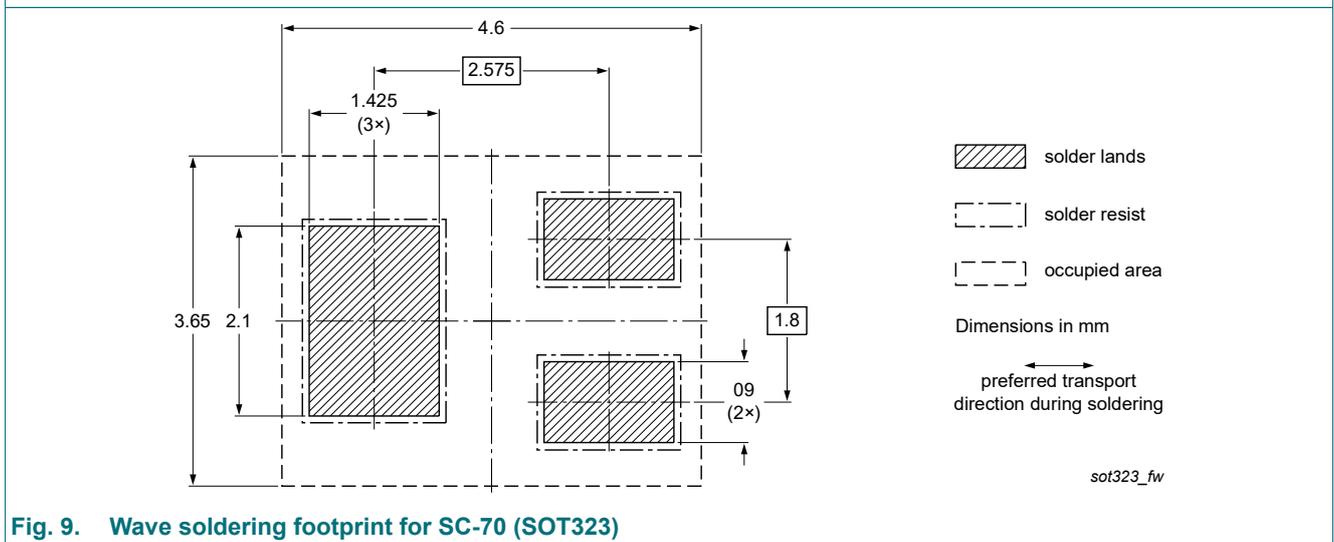


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21W v.2	20230105	Product data sheet	-	BAS21W_SER_1
Modifications:	<ul style="list-style-type: none"><li>Family data sheet is transferred to single data sheets.</li><li>Section packing information removed.</li></ul>			
BAS21W_SER_1	20091009	Product data sheet	-	-

## 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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