



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

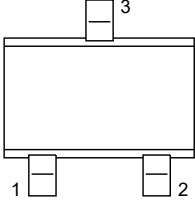
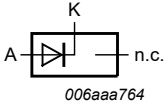
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
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; $R_L = 100$ Ω; $I_{R(meas)} = 1$ 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
BAS21W	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

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
Per diode						
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
Per device						
P_{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_{amb}	ambient temperature			-55	150	$^\circ\text{C}$
T_{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

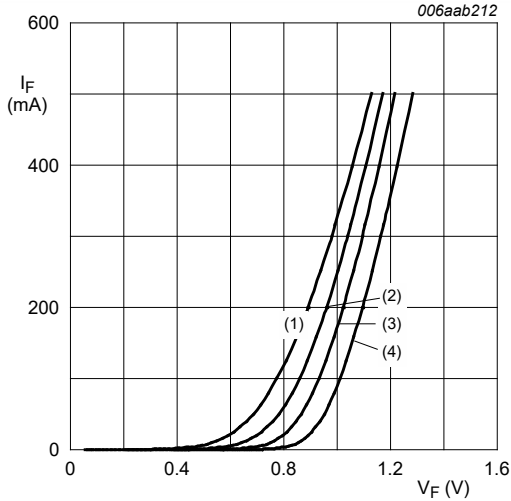
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
$R_{\text{th}(j-sp)}$	thermal resistance from junction to solder point			-	-	300	K/W

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

10. Characteristics

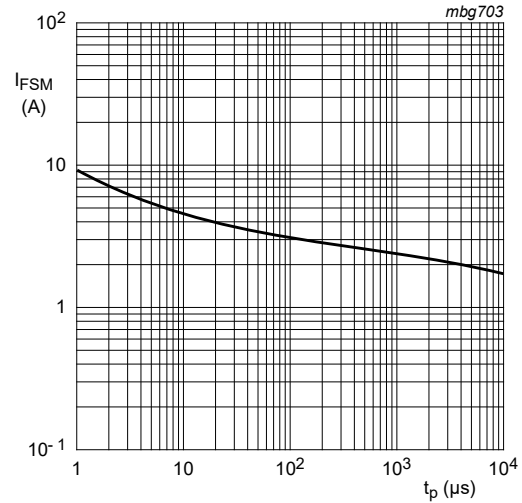
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
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	μA
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



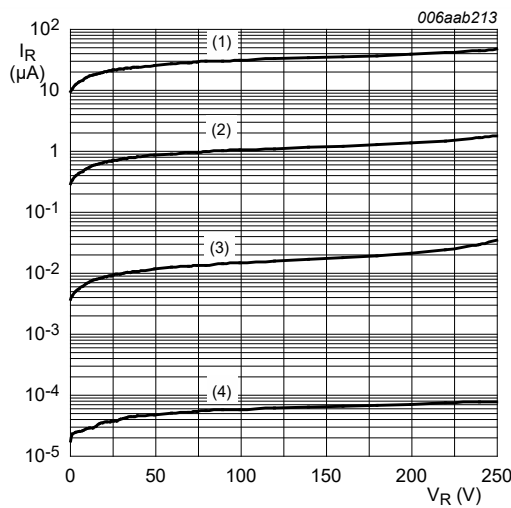
- (1) $T_{amb} = 150^\circ C$
- (2) $T_{amb} = 85^\circ C$
- (3) $T_{amb} = 25^\circ C$
- (4) $T_{amb} = -40^\circ C$

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



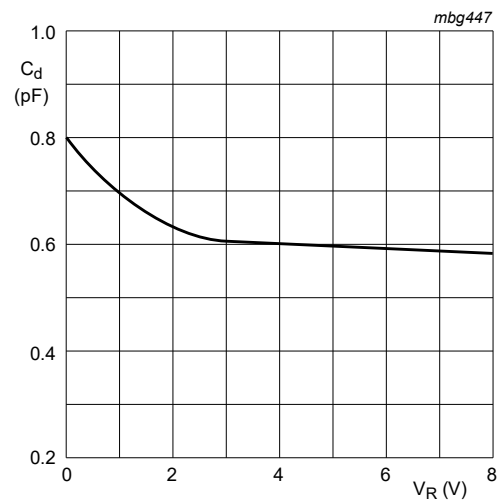
Based on square wave currents
 $T_j = 25^\circ C$ prior to surge

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



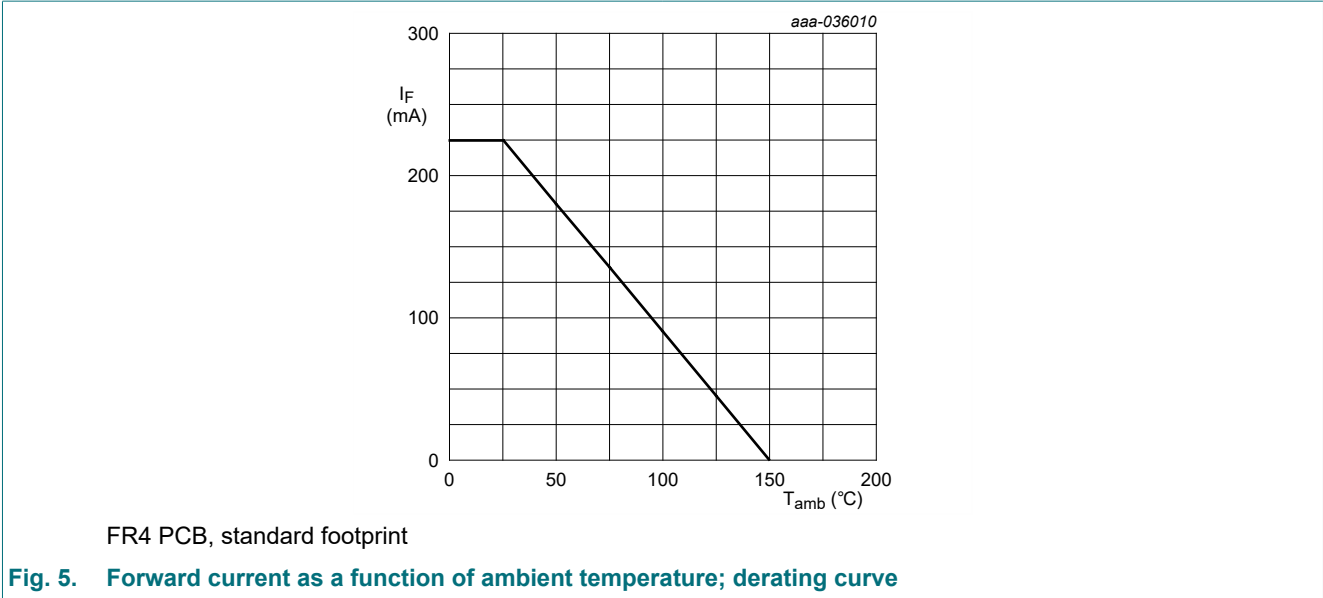
- (1) $T_{amb} = 150^\circ C$
- (2) $T_{amb} = 85^\circ C$
- (3) $T_{amb} = 25^\circ C$
- (4) $T_{amb} = -40^\circ C$

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

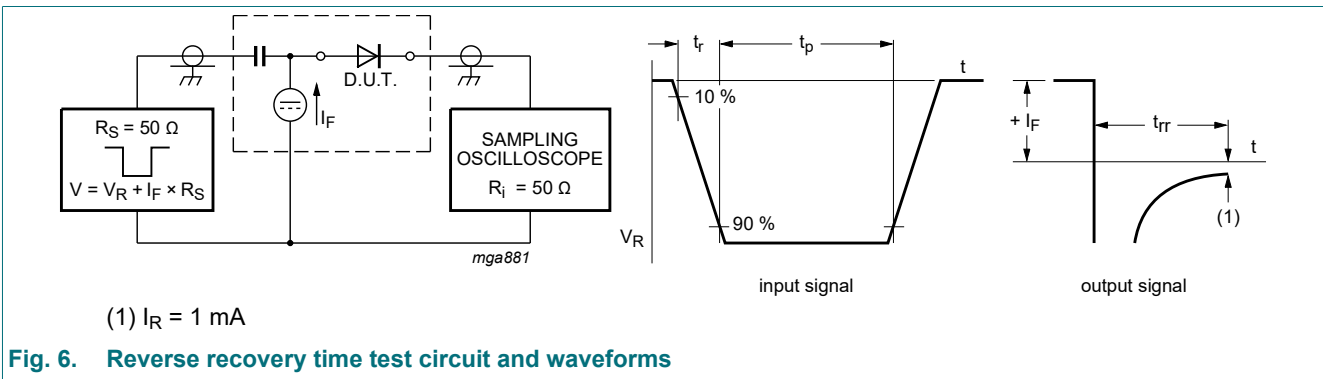


$f = 1\text{ MHz}$
 $T_j = 25^\circ C$.

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

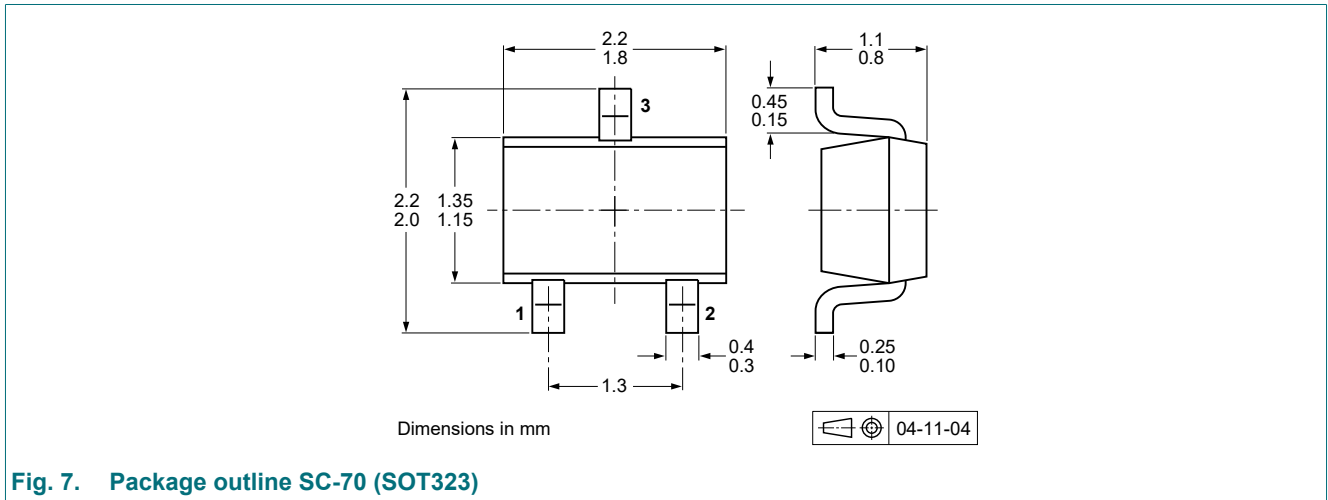


Fig. 7. Package outline SC-70 (SOT323)

13. Soldering

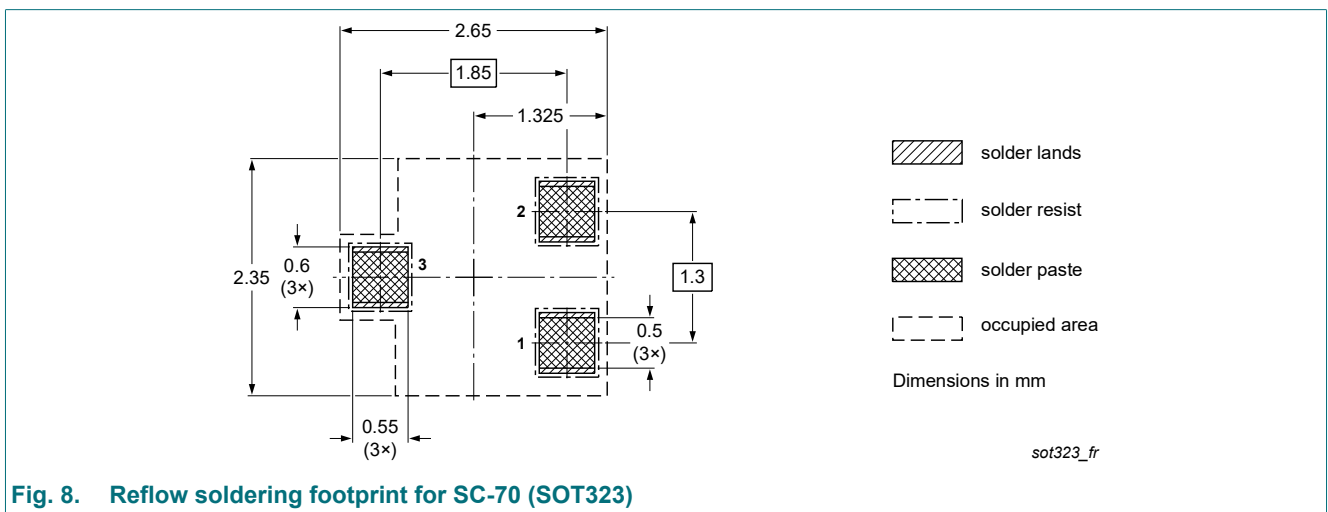


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

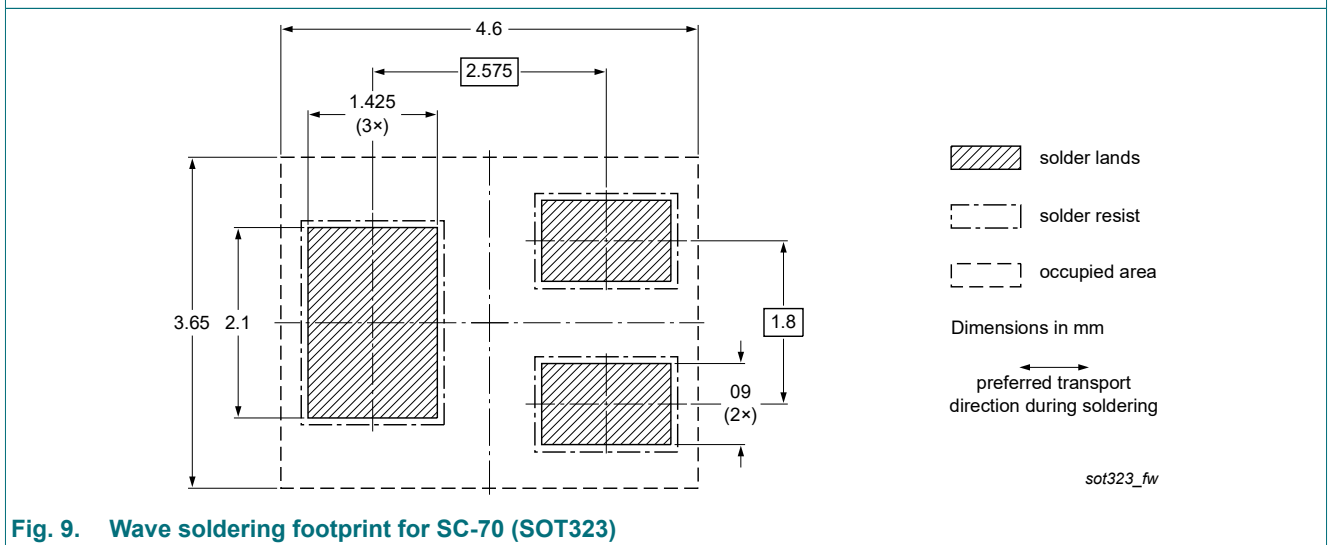


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

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">Family data sheet is transferred to single data sheets.Section packing information removed.			
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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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