



# BAS21AW-Q

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

## 3. Applications

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

## 4. Quick reference data

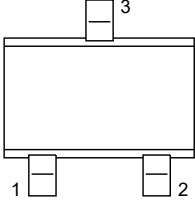
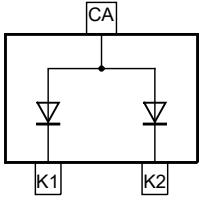
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_F$	forward current	[1]	-	-	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

[1] Single diode loaded.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 <p>SC-70 (SOT323)</p>	 <p>006aab099</p>
2	K2	cathode (diode 2)		
3	CA	common anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BAS21AW-Q</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]
BAS21AW-Q	X6%

[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		[1]	-	225	mA
			[2]	-	125	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	$T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$	[3]	-	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] Single diode loaded.

[2] Double diode loaded.

[3] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

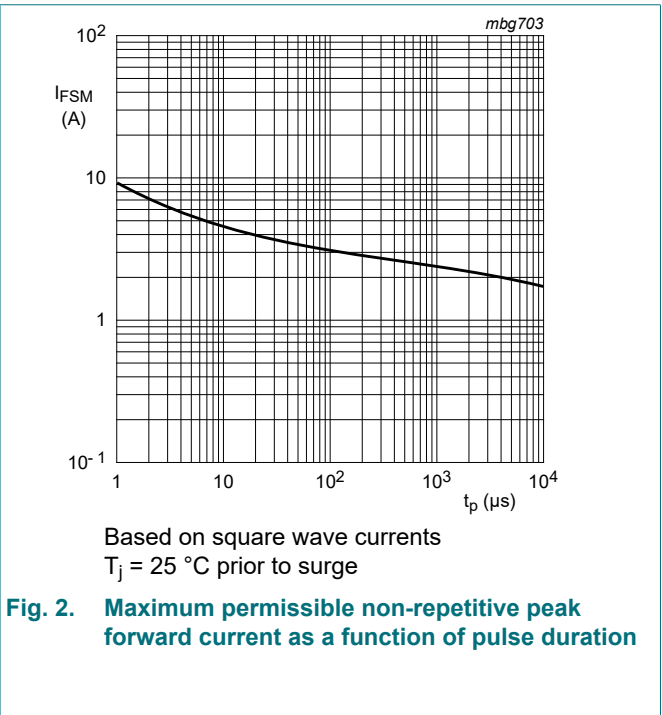
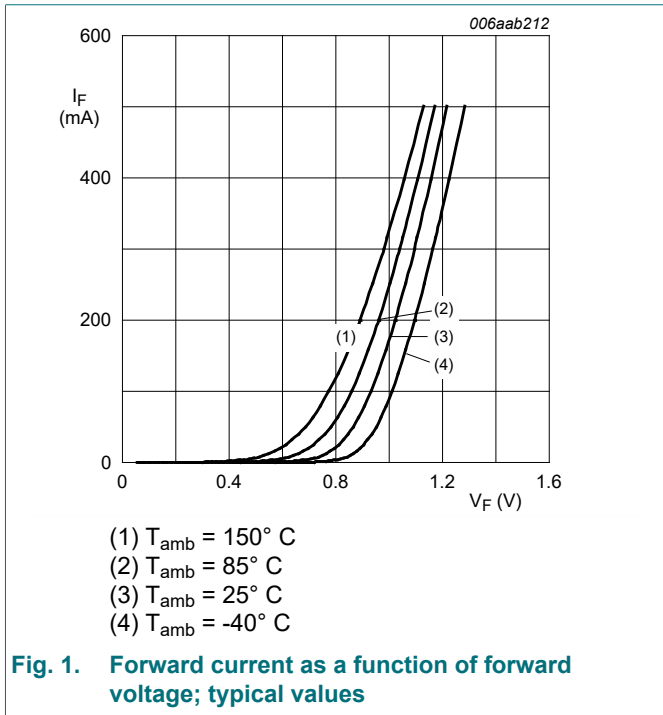
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
$R_{\text{th}(j-sp)}$	thermal resistance from junction to solder point			-	-	300	K/W

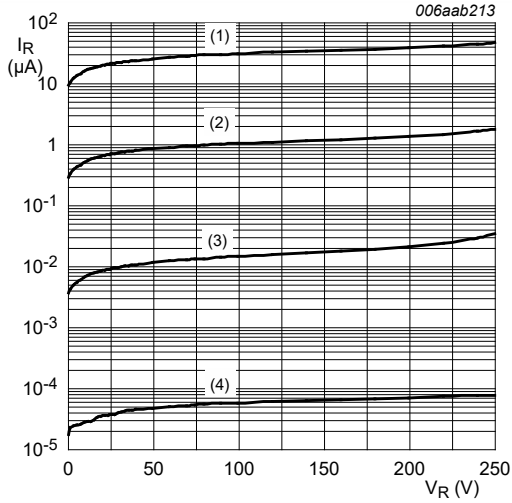
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

### 10. Characteristics

Table 7. Characteristics

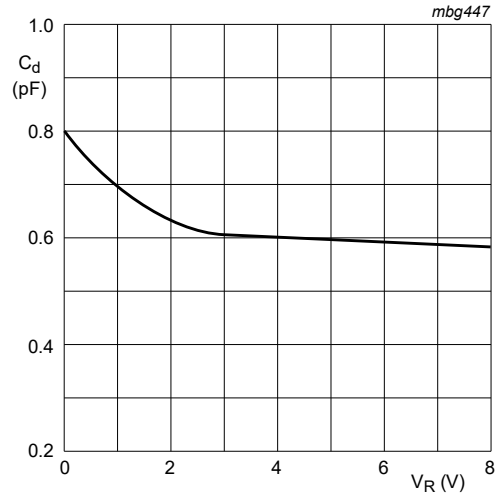
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 100 mA; T <sub>amb</sub> = 25 °C	-	-	1	V
		I <sub>F</sub> = 200 mA; T <sub>amb</sub> = 25 °C	-	-	1.25	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 200 V; T <sub>amb</sub> = 25 °C	-	-	100	nA
		V <sub>R</sub> = 200 V; T <sub>j</sub> = 150 °C	-	-	100	μA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 0 V; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	-	2	pF
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 10 mA; I <sub>R</sub> = 10 mA; R <sub>L</sub> = 100 Ω; I <sub>R(meas)</sub> = 1 mA; T <sub>amb</sub> = 25 °C	-	-	50	ns





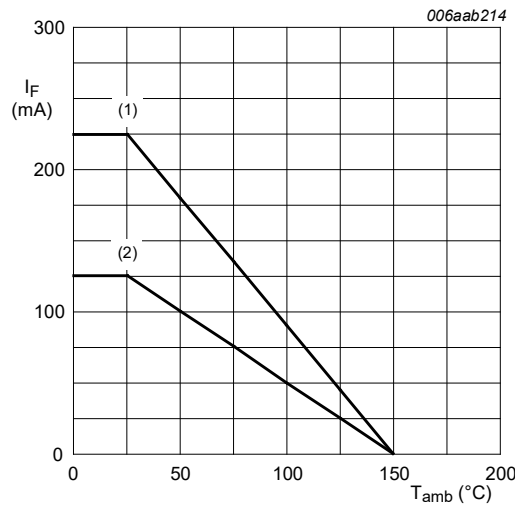
- (1)  $T_{amb} = 150^{\circ}C$
- (2)  $T_{amb} = 85^{\circ}C$
- (3)  $T_{amb} = 25^{\circ}C$
- (4)  $T_{amb} = -40^{\circ}C$

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



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

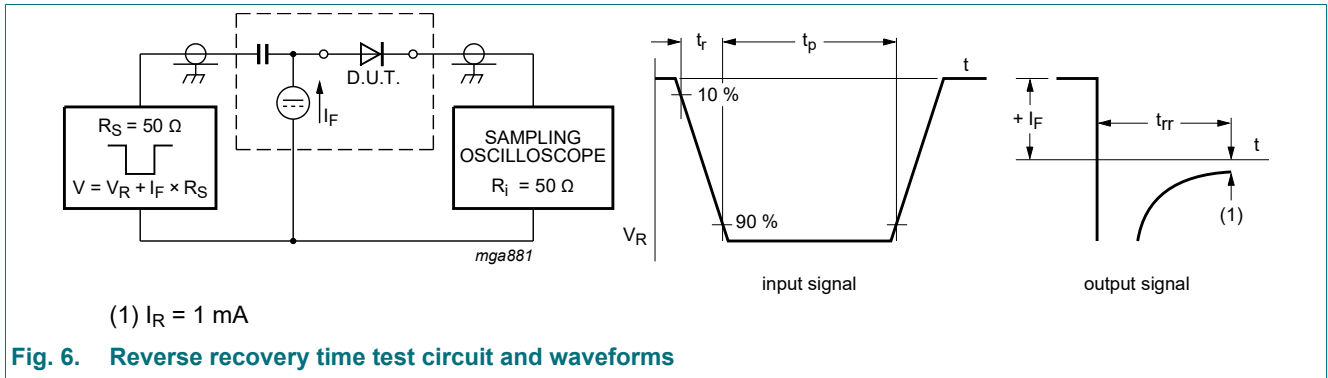
**Fig. 4. Diode capacitance as a function of reverse voltage; typical values.**



FR4 PCB, standard footprint  
 (1) Single diode loaded  
 (2) Double diode loaded

**Fig. 5. Forward current as a function of ambient temperature; derating curves**

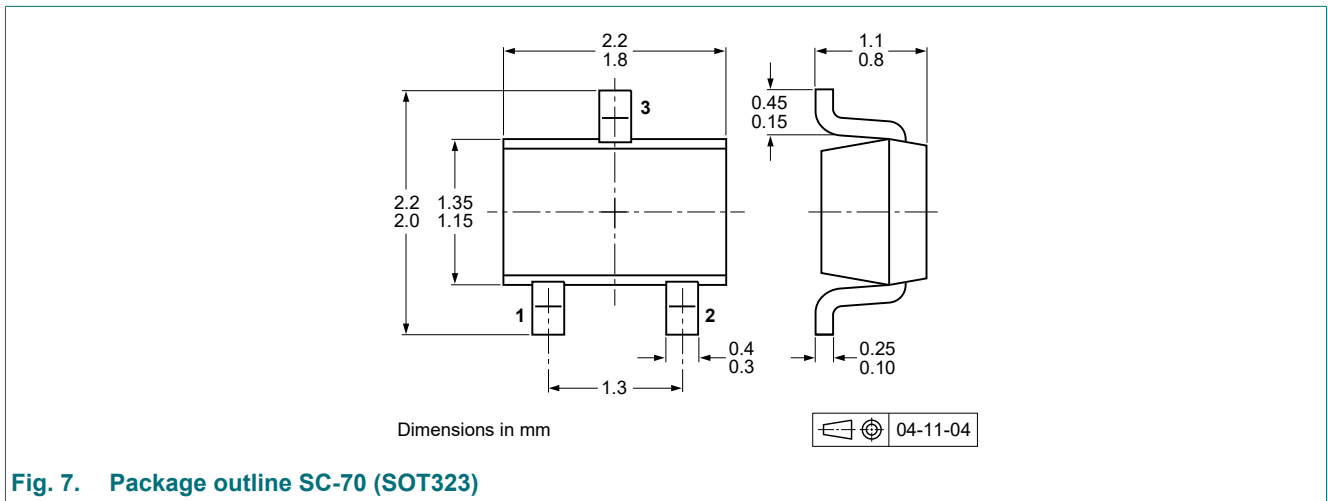
### 11. Test information



#### 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



### 13. Soldering

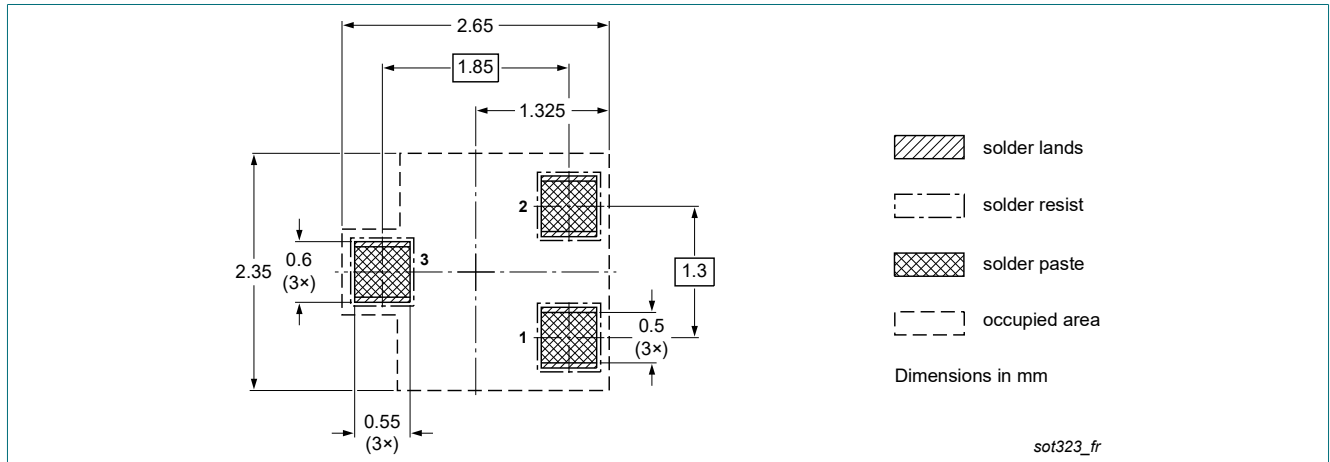


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

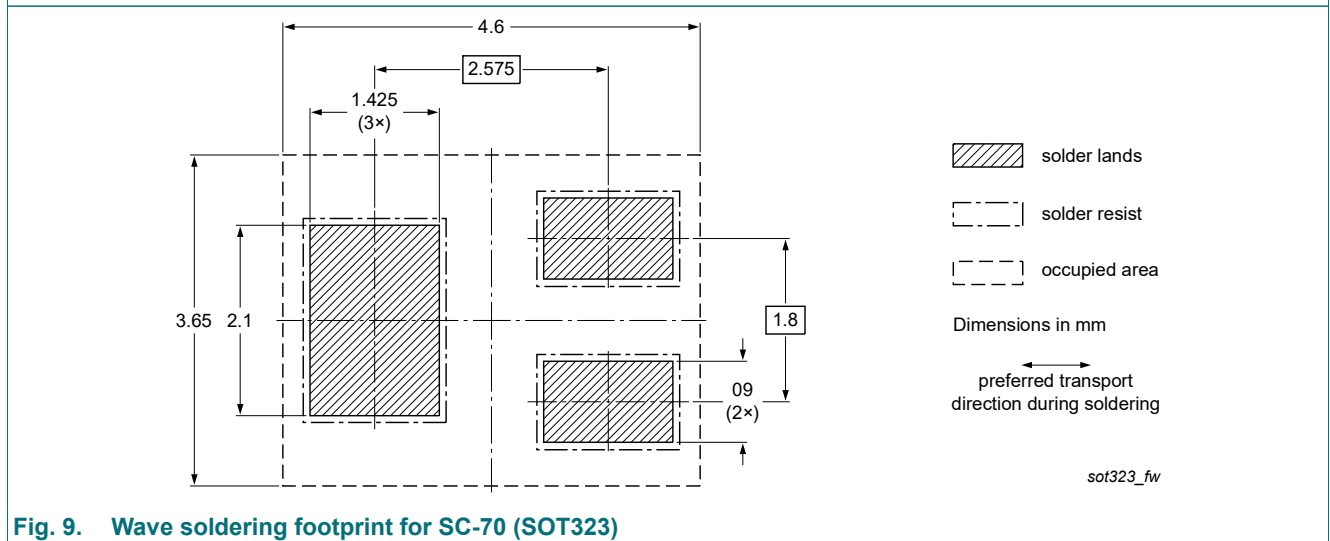


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21AW-Q v.3	20230105	Product data sheet	-	BAS21AW-Q v.2
Modifications:	• Section 1 General description: Typo corrected.			
BAS21AW-Q v.2	20220120	Product data sheet	-	BAS21W_SER_1
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".
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