



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

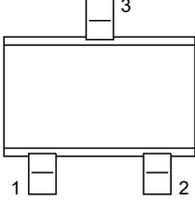
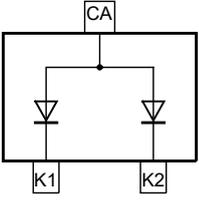
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
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
BAS21AW-Q	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]
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
Per diode						
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
Per device						
P_{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_{amb}	ambient temperature			-55	150	$^\circ\text{C}$
T_{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

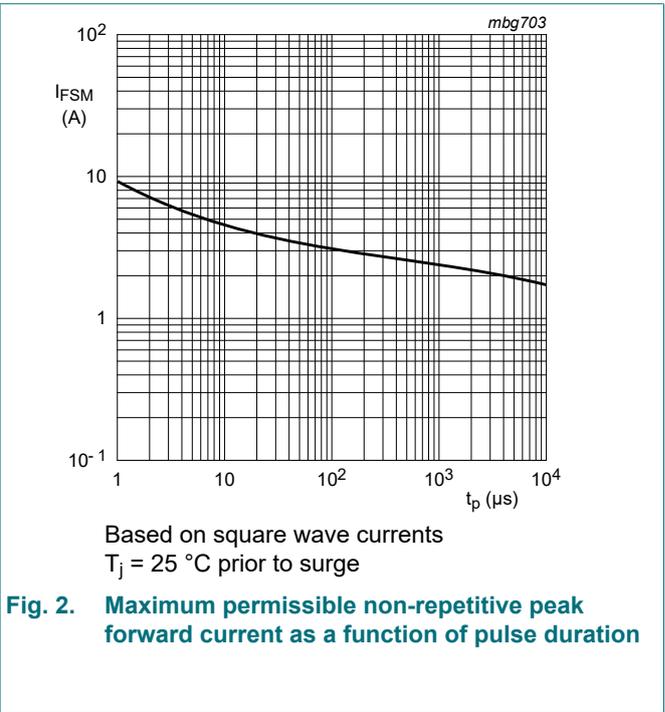
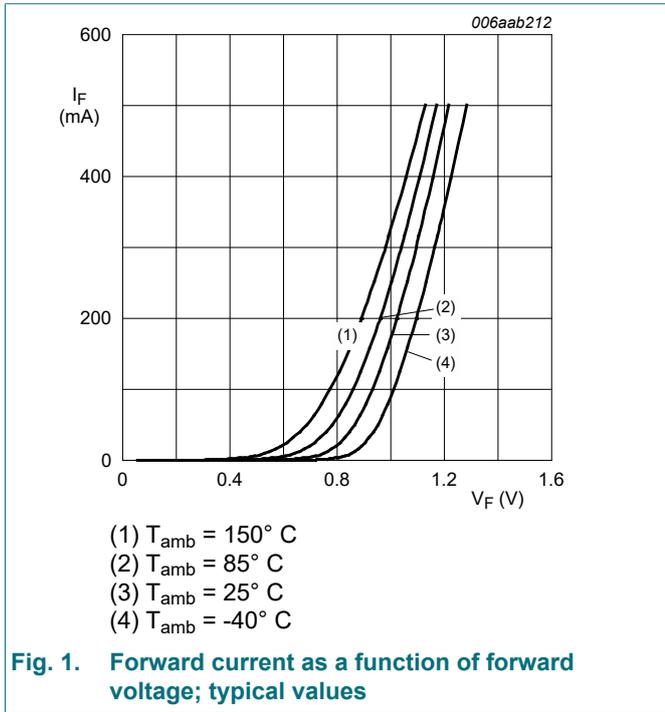
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
$R_{\text{th}(j-sp)}$	thermal resistance from junction to solder point			-	-	300	K/W

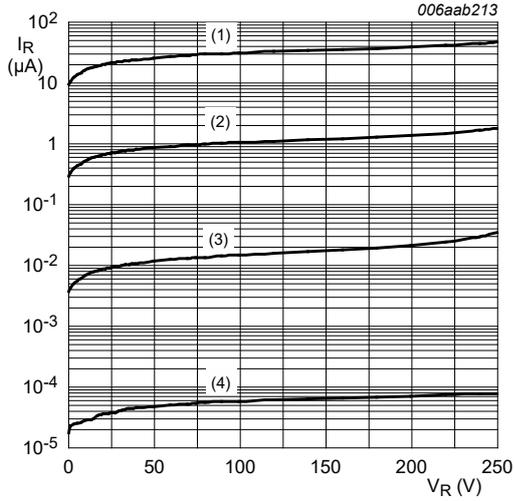
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

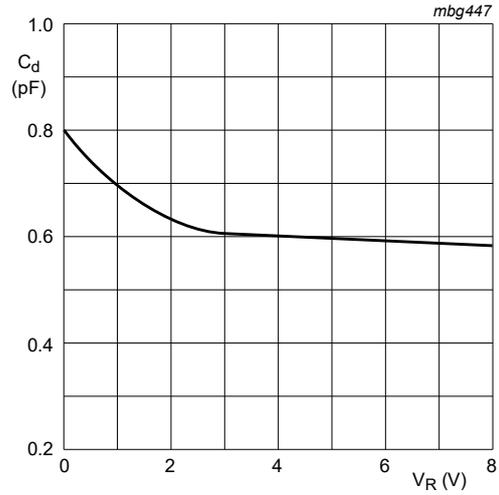
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V _F	forward voltage	I _F = 100 mA; T _{amb} = 25 °C	-	-	1	V
		I _F = 200 mA; T _{amb} = 25 °C	-	-	1.25	V
I _R	reverse current	V _R = 200 V; T _{amb} = 25 °C	-	-	100	nA
		V _R = 200 V; T _j = 150 °C	-	-	100	μA
C _d	diode capacitance	V _R = 0 V; f = 1 MHz; T _{amb} = 25 °C	-	-	2	pF
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





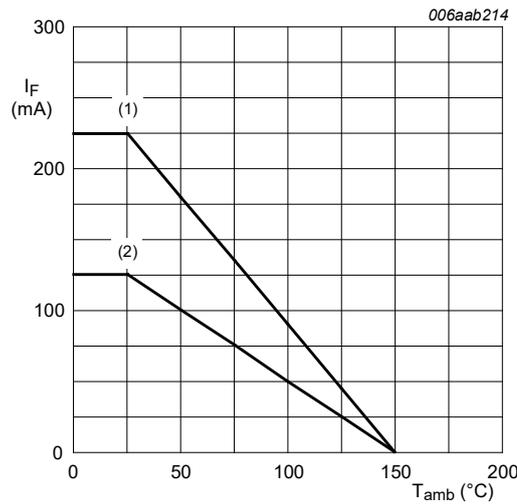
- (1) $T_{amb} = 150^{\circ}C$
- (2) $T_{amb} = 85^{\circ}C$
- (3) $T_{amb} = 25^{\circ}C$
- (4) $T_{amb} = -40^{\circ}C$

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



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

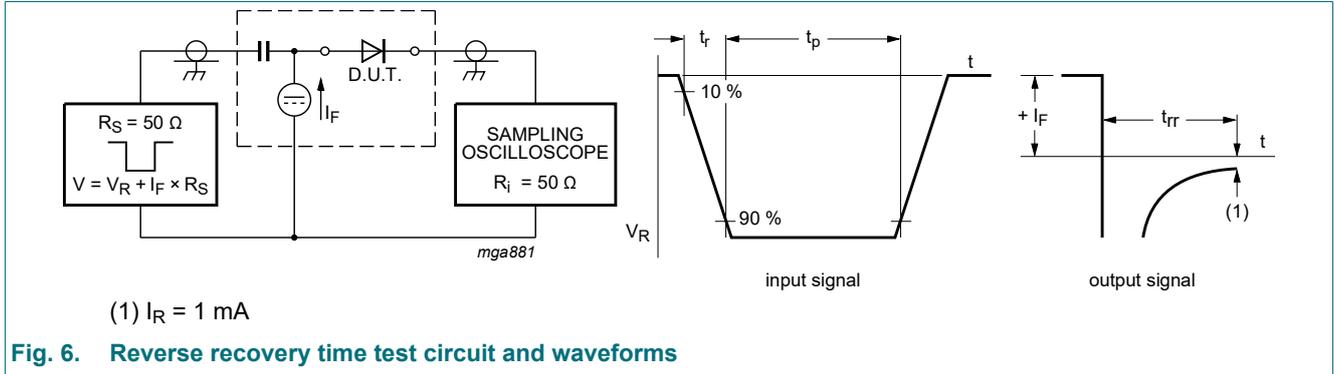
Fig. 4. Diode capacitance as a function of reverse voltage; typical values.



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

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

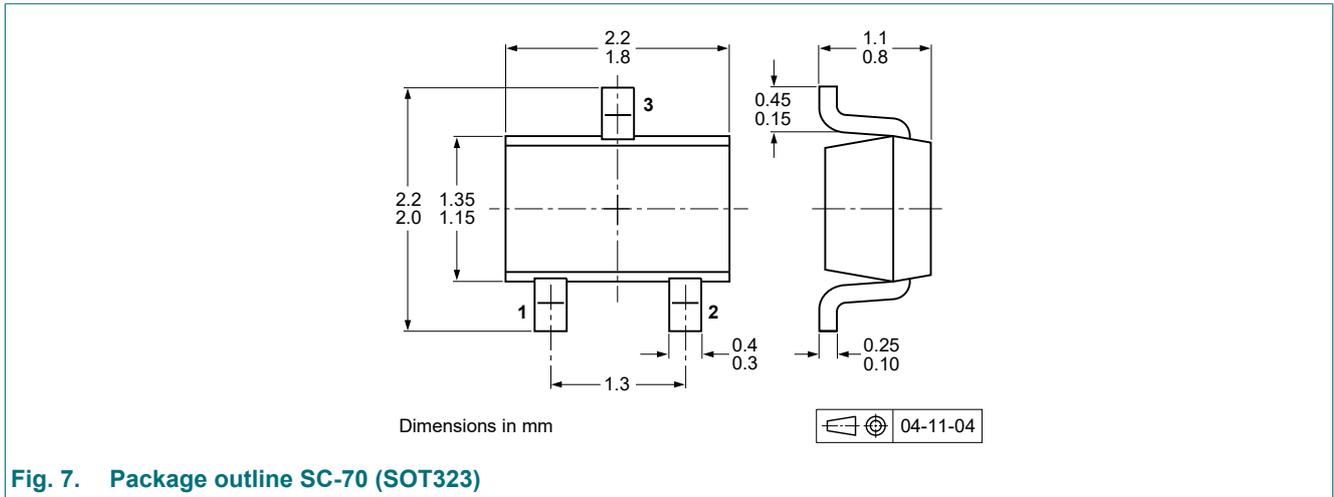
11. Test information



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

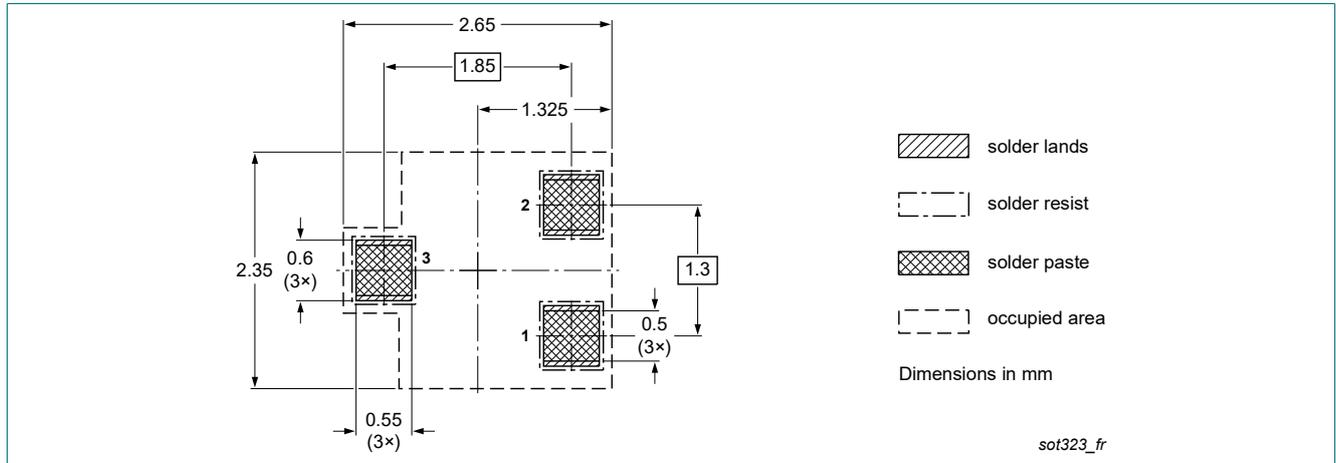


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

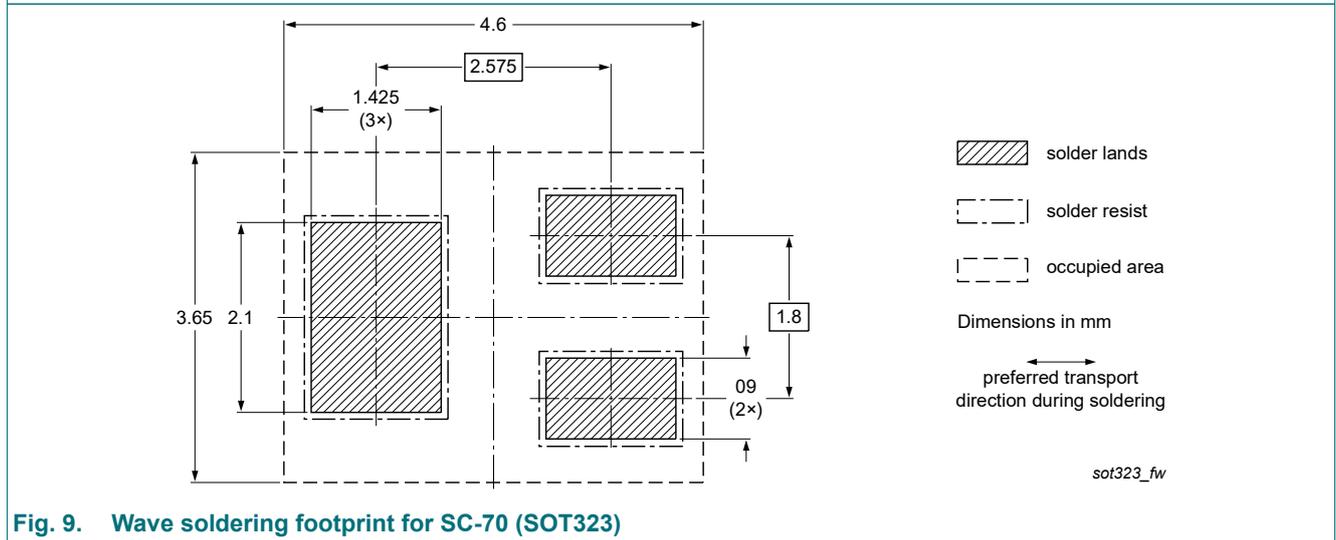


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

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".
- [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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Date of release: 5 January 2023