BAS21SW-Q

High-voltage switching diode

22 April 2024 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

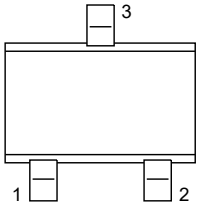
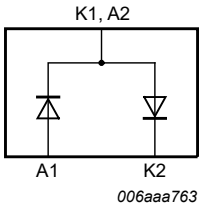
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current		[1]	-	-	225	mA
I_R	reverse current	V_R = 200 V; T_{amb} = 25 °C		-	-	100	nA
V_R	reverse voltage			-	-	250	V
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; R_L = 100 Ω; $I_{R(meas)}$ = 1 mA; T_{amb} = 25 °C		-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

[1] Single diode loaded.

nexperia

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode (diode 1)	 SC-70 (SOT323)	
2	K2	cathode (diode 2)		
3	K1, A2	cathode (diode 1) and anode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21SW-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]
BAS21SW-Q	X5%

[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
I_{FSM}	non-repetitive peak forward current	t_p = 1 µs; square wave; $T_{j(init)}$ = 25 °C		-	9	A
		t_p = 100 µs; square wave; $T_{j(init)}$ = 25 °C		-	3	A
		t_p = 10 ms; square wave; $T_{j(init)}$ = 25 °C		-	1.7	A
I_{FRM}	repetitive peak forward current			-	625	mA
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[2]	-	200	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

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

9. Thermal characteristics

Table 6. Thermal characteristics

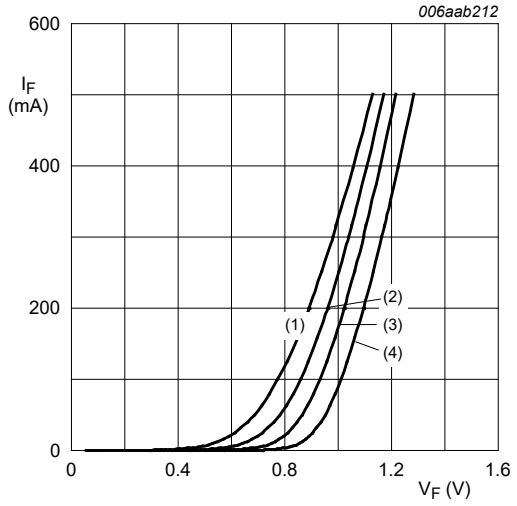
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	300	K/W

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

10. Characteristics

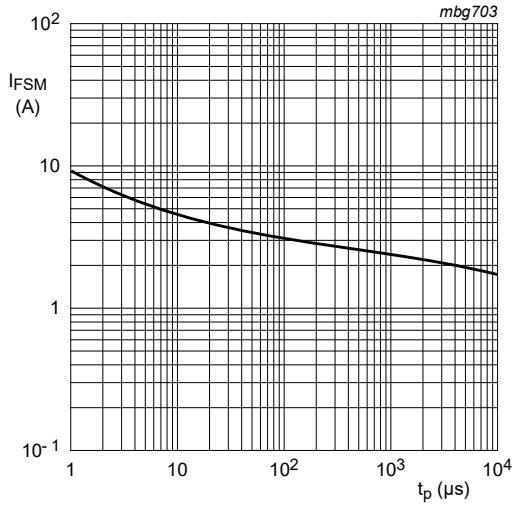
Table 7. Characteristics

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



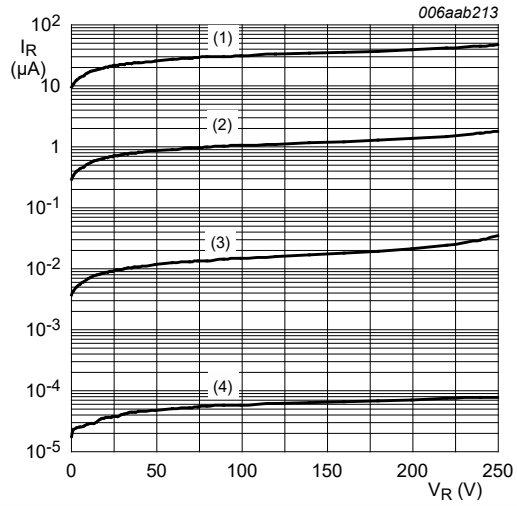
(1) T_{amb} = 150° C
(2) T_{amb} = 85° C
(3) T_{amb} = 25° C
(4) T_{amb} = -40° C

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



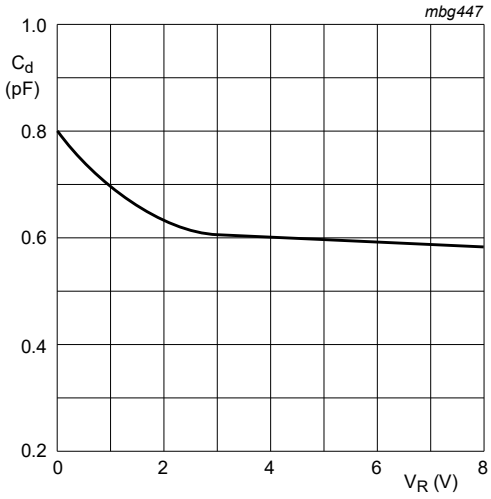
Based on square wave currents
T_j = 25 °C prior to surge

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



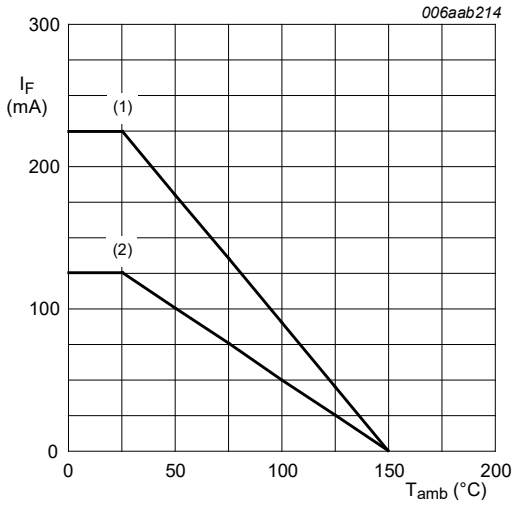
(1) T_{amb} = 150° C
(2) T_{amb} = 85° C
(3) T_{amb} = 25° C
(4) T_{amb} = -40° C

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



f = 1 MHz
T_j = 25 °C

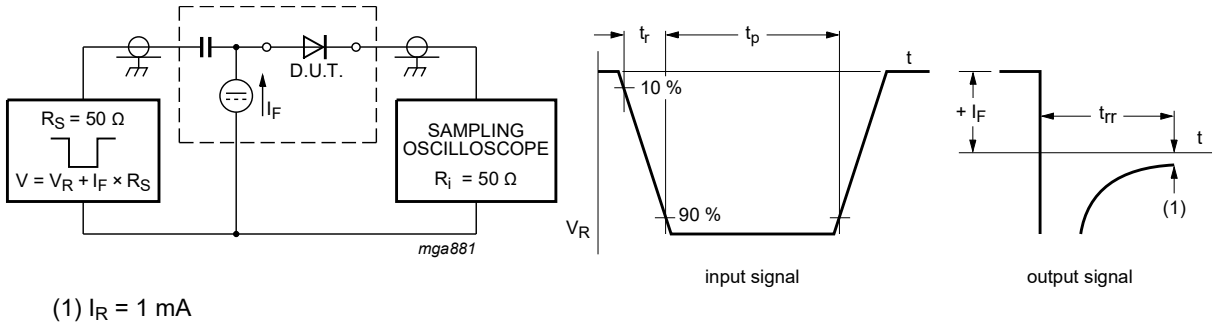
Fig. 4. Diode capacitance as a function of reverse voltage; typical values



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



(1) I_R = 1 mA

Fig. 6. Reverse recovery time 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.

12. Package outline

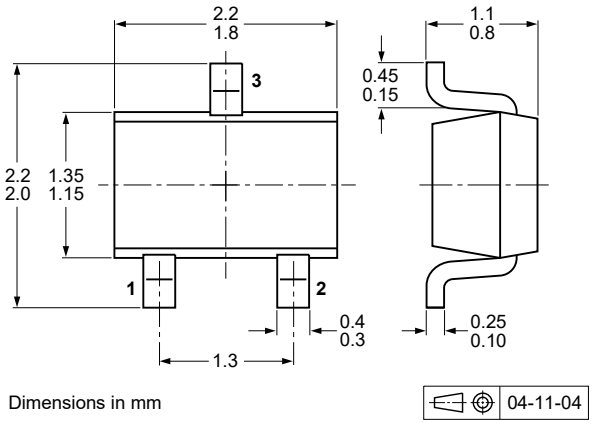


Fig. 7. Package outline SC-70 (SOT323)

13. Soldering

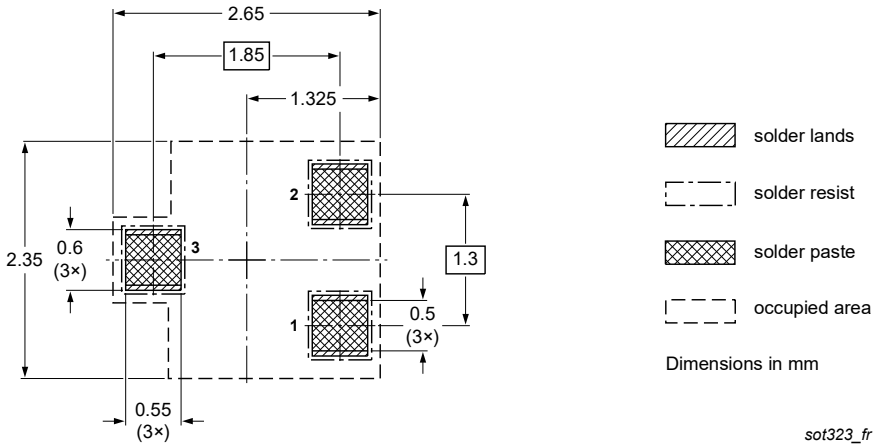


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

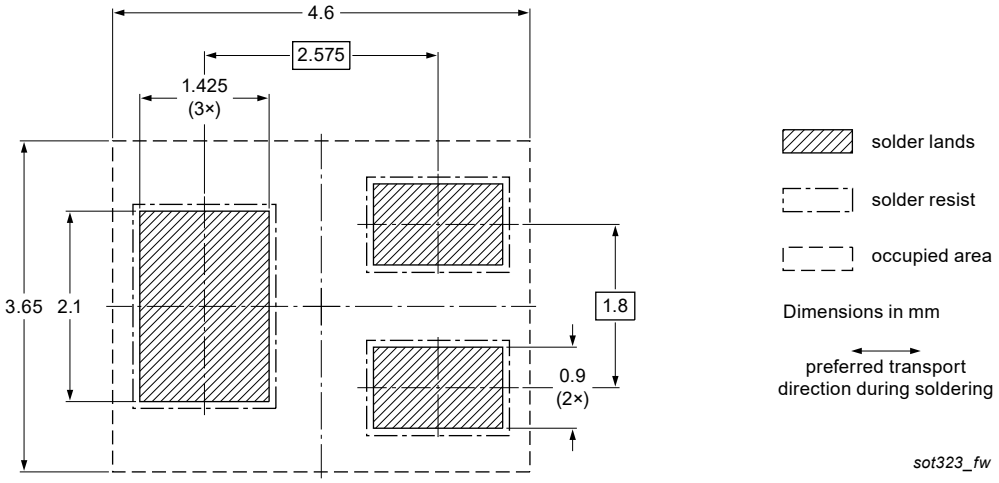


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21SW-Q v.1	20240422	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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