BAS21-Q

High-voltage switching diode

2 June 2021 Product data sheet

1. General description

High-voltage switching diode encapsulated in a small SOT23 Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High switching speed: t_{rr} ≤ 50 ns
- Low leakage current
- Reverse voltage V_R ≤ 200 V
- Low capacitance: C_d ≤ 5 pF
- 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

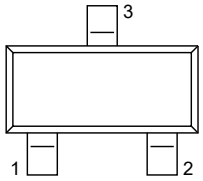
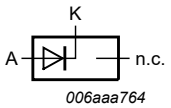
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	250	V
V_R	reverse voltage			-	-	200	V
V_F	forward voltage	I_F = 100 mA; T_j = 25 °C		-	-	1	V
		I_F = 200 mA; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 200 V; T_j = 25 °C		-	-	100	nA
		V_R = 200 V; T_j = 150 °C		-	-	100	µA

nexperia

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 SOT23	
2	n.c.	not connected		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21-Q	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BAS21-Q	JS%

[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
V_{RRM}	repetitive peak reverse voltage			-	250	V
V_R	reverse voltage			-	200	V
I_F	forward current	continuous		-	200	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
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	250	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 printed-circuit board.

9. Thermal characteristics

Table 6. Thermal characteristics

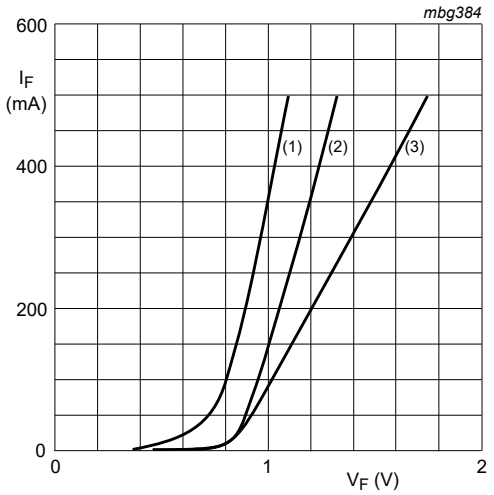
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	330	K/W

[1] Device mounted on an FR4 printed-circuit board.

10. Characteristics

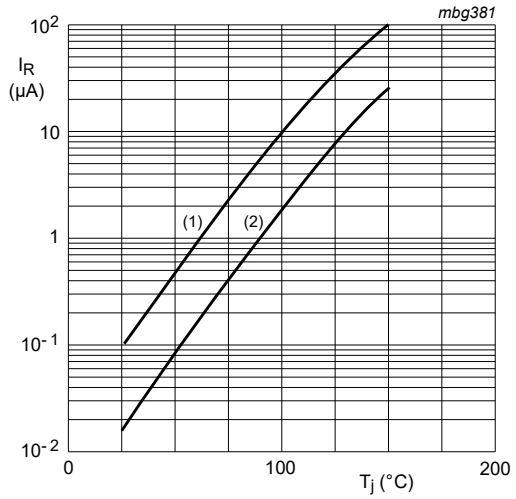
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA; T_j = 25 °C		-	-	1	V
		I_F = 200 mA; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 200 V; T_j = 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		-	-	5	pF
t_{rr}	reverse recovery time	I_F = 30 mA; I_R = 30 mA; R_L = 100 Ω; $I_{R(meas)}$ = 3 mA; T_{amb} = 25 °C		-	-	50	ns



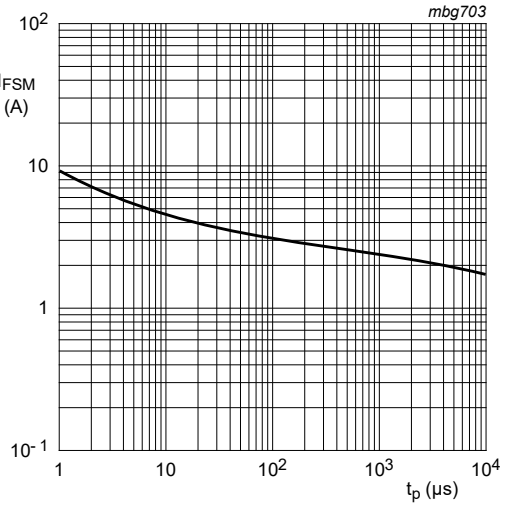
(1) T_j = 150 °C; typical values
(2) T_j = 25 °C; typical values
(3) T_j = 25 °C; maximum values

Fig. 1. Forward current as a function of forward voltage



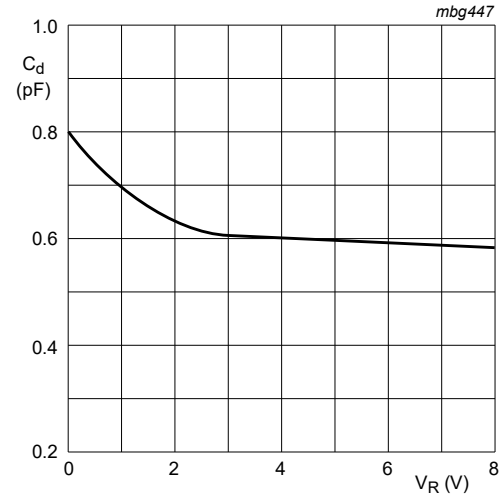
(1) $V_R = V_{Rmax}$; maximum values
(2) $V_R = V_{Rmax}$; typical values

Fig. 2. Reverse current as a function of junction temperature



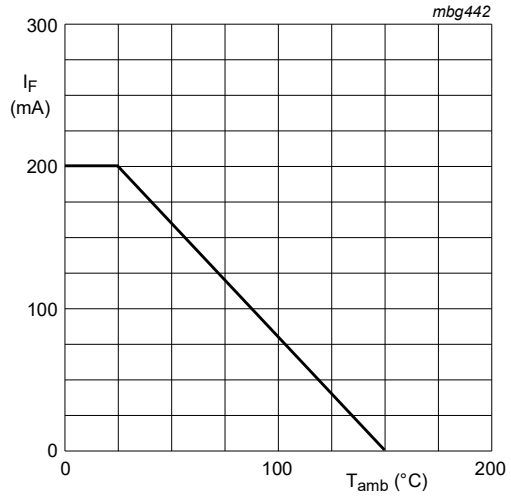
Based on square wave currents.
$T_{j(init)}$ = 25 °C

Fig. 3. Non-repetitive peak forward current as a function of pulse duration; maximum values



f = 1 MHz
T_j = 25 °C.

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



FR4 PCB, standard footprint

Fig. 5. Maximum forward current as a function of ambient temperature; derating curve

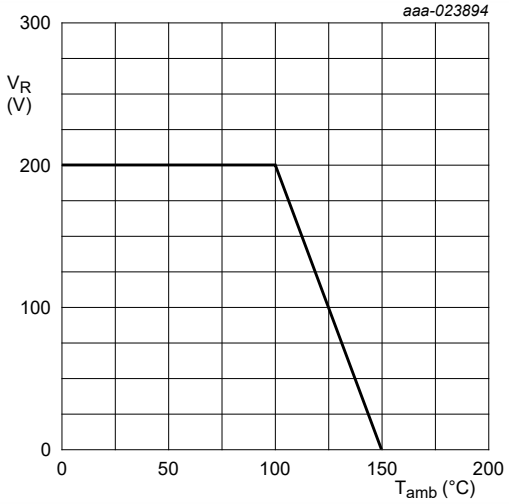
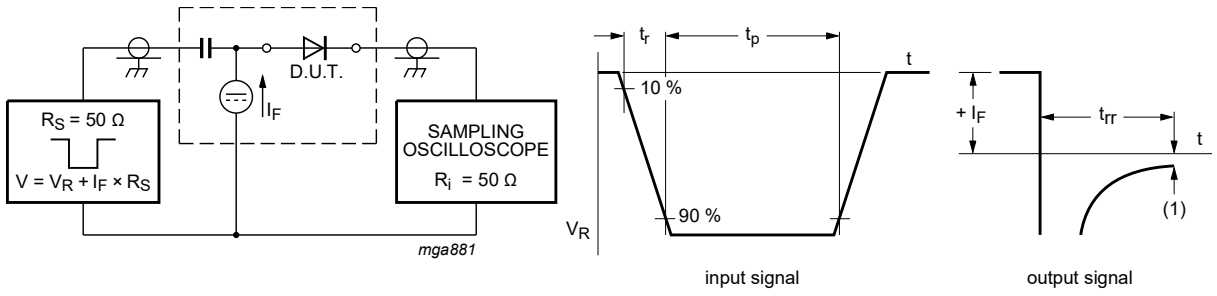


Fig. 6. Maximum continuous reverse voltage as a function of the ambient temperature

11. Test information



(1) I_R = 3 mA

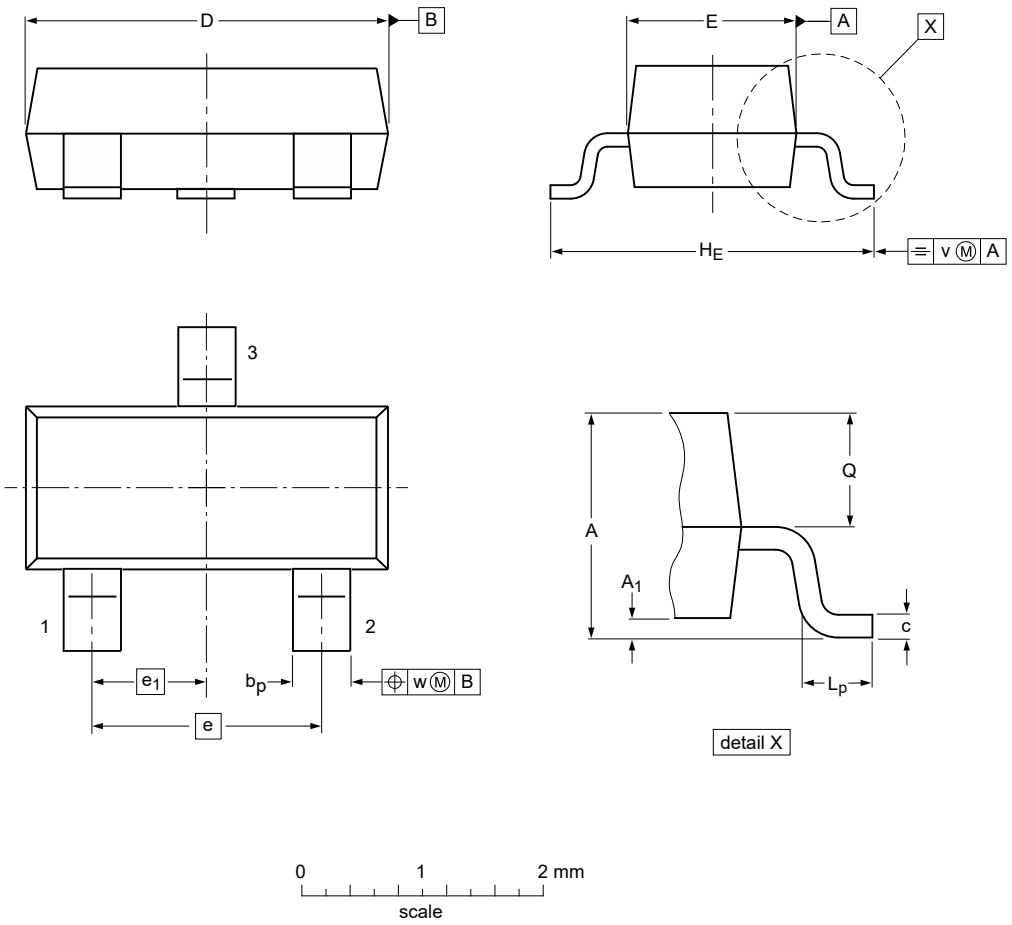
Fig. 7. Reverse recovery time test circuit and waveforms

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

Plastic surface-mounted package; 3 leads **SOT23**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	max	1.1	0.1	0.48	0.15	3.0	1.4			2.5	0.45	0.55		
	nom							1.9	0.95				0.2	0.1
	min	0.9		0.38	0.09	2.8	1.2			2.1	0.15	0.45		

sot023_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				~~14-06-19~~ 14-09-22

Fig. 8. Package outline SOT23

13. Soldering

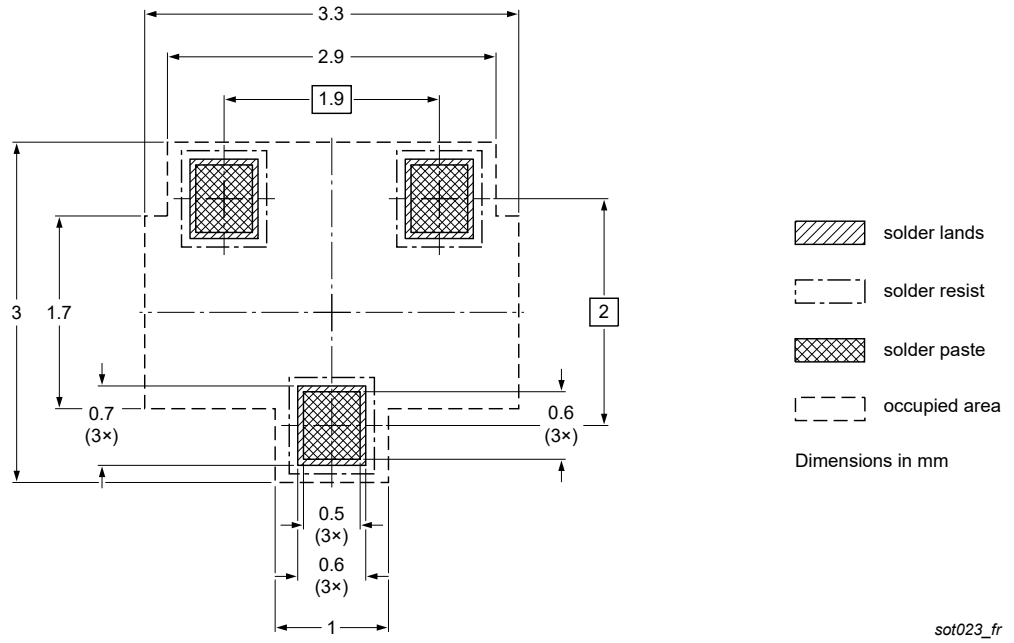


Fig. 9. Reflow soldering footprint for SOT23

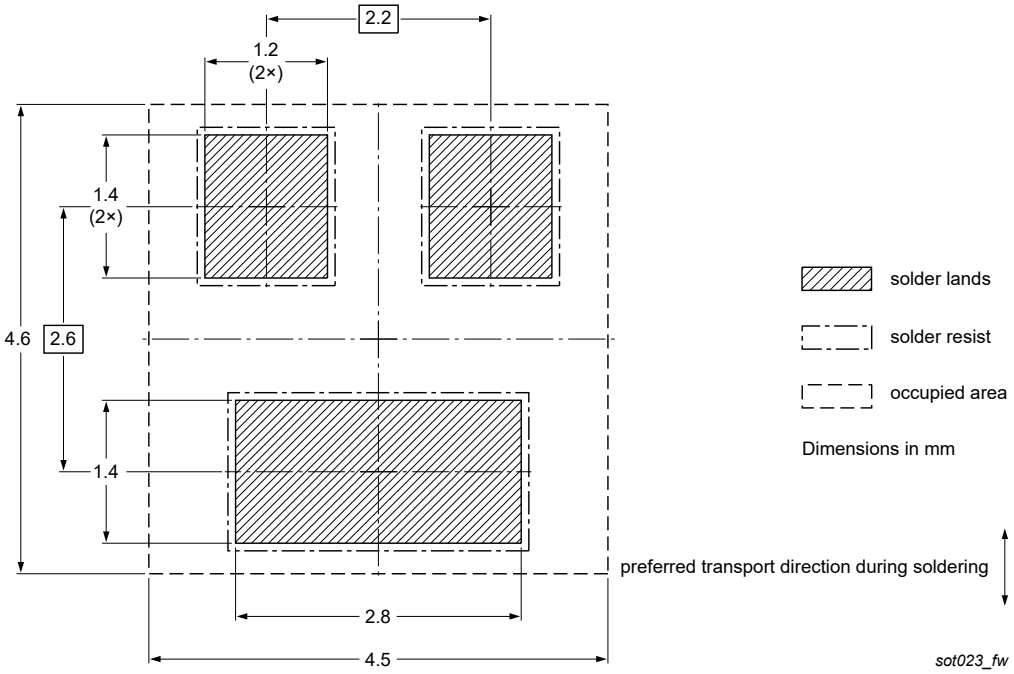


Fig. 10. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21-Q v.1	20210602	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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