



BAS21TH

High-voltage switching diode

7 December 2018

Product data sheet

1. General description

High-voltage switching diode, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Switching speed max. 50 ns
- Reverse voltage $V_R \leq 200$ V
- Repetitive peak reverse voltage $V_{RRM} \leq 250$ V
- Small SMD plastic package
- High-temperature applications up to 175 °C
- AEC-Q101 qualified

3. Applications

- High-speed switching
- General-purpose switching

4. Quick reference data

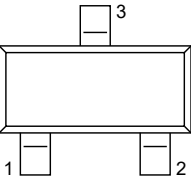
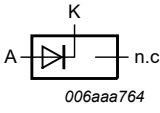
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	250	V
I_F	forward current	[1]	-	-	200	mA
V_R	reverse voltage		-	-	200	V
V_F	forward voltage	$I_F = 200$ mA; $t_p \leq 300$ μ s; $\delta \leq 0.02$; pulsed	-	-	1.25	V
I_R	reverse current	$V_R = 200$ V	-	-	100	nA
t_{rr}	reverse recovery time	$I_F = 30$ mA; $I_R = 30$ mA; $R_L = 100$ Ω ; $I_{R(meas)} = 3$ mA	-	-	50	ns

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>TO-236AB (SOT23)</p>	
2	n.c.	not connected		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21TH	TO-236AB	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]
BAS21TH	VX%

[1] % = placeholder for manufacturing site code

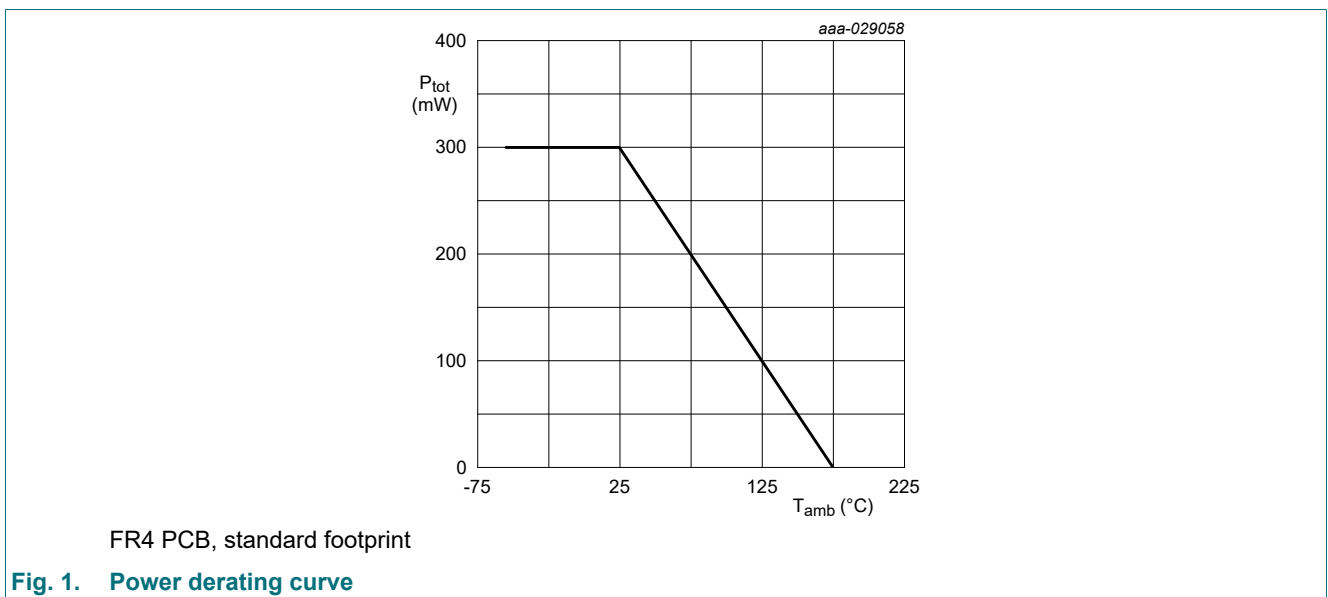
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). $T_j = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	250	V
V_R	reverse voltage			-	200	V
I_F	forward current		[1]	-	200	mA
I_{FSM}	non-repetitive peak forward current	$t_p = 1\ \mu\text{s}; T_{j(\text{init})} = 25\text{ °C};$		-	9	A
		$t_p = 100\ \mu\text{s}; T_{j(\text{init})} = 25\text{ °C};$		-	3	A
		$t_p = 10\ \text{ms}; T_{j(\text{init})} = 25\text{ °C};$		-	1.7	A
I_{FRM}	repetitive peak forward current	$t_p \leq 1\ \text{ms}; \delta = 0.25$		-	625	mA
P_{tot}	total power dissipation	$T_{\text{amb}} \leq 25\text{ °C}$	[1]	-	300	mW
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	storage temperature			-65	175	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-side 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] [2]	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	330	K/W

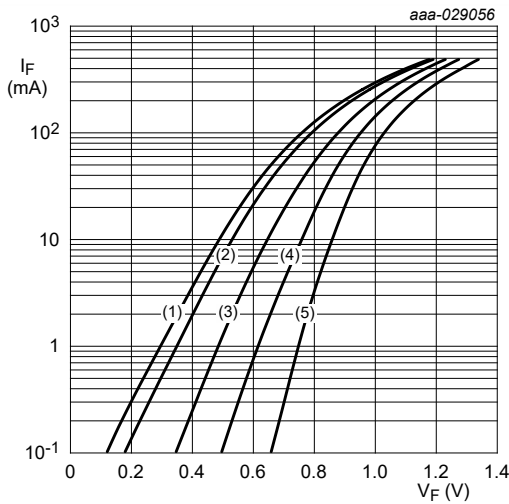
- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-side copper, tin-plated and standard footprint.
- [2] Thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.
- [3] Soldering point of cathode tab.

10. Characteristics

Table 7. Characteristics

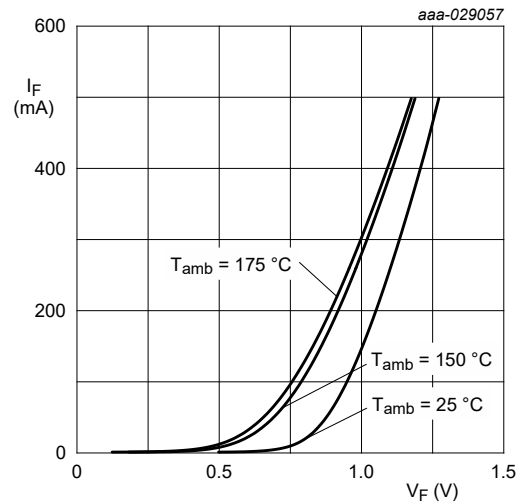
$T_j = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	$I_F = 100\text{ mA}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; pulsed	-	-	1	V
		$I_F = 200\text{ mA}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; pulsed	-	-	1.25	V
I_R	reverse current	$V_R = 200\text{ V}$	-	-	100	nA
		$V_R = 200\text{ V}$; $T_j = 150\text{ °C}$	-	-	100	μA
C_d	diode capacitance	$V_R = 0\text{ V}$; $f = 1\text{ MHz}$	-	-	5	pF
t_{rr}	reverse recovery time	$I_F = 30\text{ mA}$; $I_R = 30\text{ mA}$; $R_L = 100\text{ }\Omega$; $I_{R(meas)} = 3\text{ mA}$	-	-	50	ns



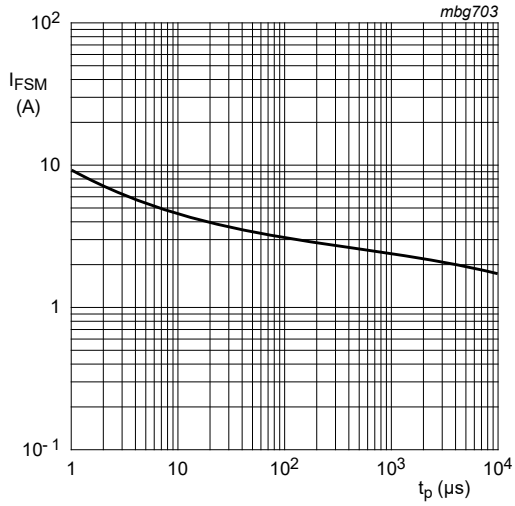
- (1) $T_j = 175\text{ °C}$
- (2) $T_j = 150\text{ °C}$
- (3) $T_j = 85\text{ °C}$
- (4) $T_j = 25\text{ °C}$
- (5) $T_j = -40\text{ °C}$

Fig. 2. Forward current as a function of forward voltage; typical values



- (1) $T_j = 175\text{ °C}$
- (2) $T_j = 150\text{ °C}$
- (3) $T_j = 25\text{ °C}$

Fig. 3. Forward current as a function of forward voltage; typical values



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

Fig. 4. Non-repetitive peak forward current as a function of pulse duration; maximum values

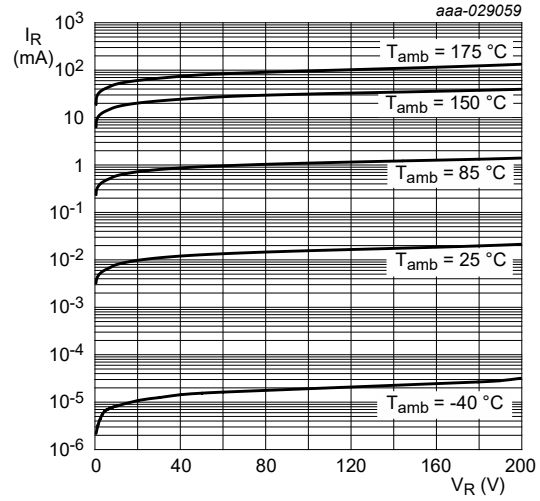
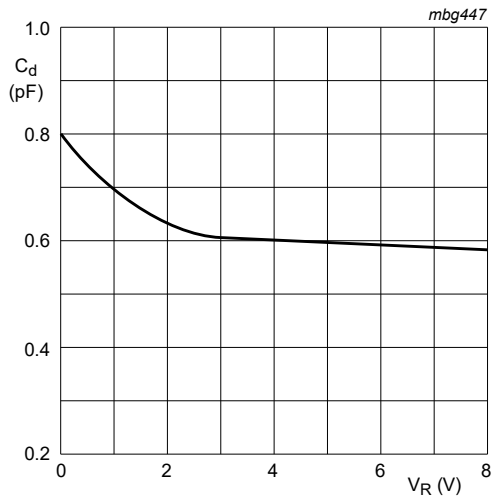


Fig. 5. Reverse current as a function of reverse voltage; typical values



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

Fig. 6. Diode capacitance as a function of reverse voltage; typical values.

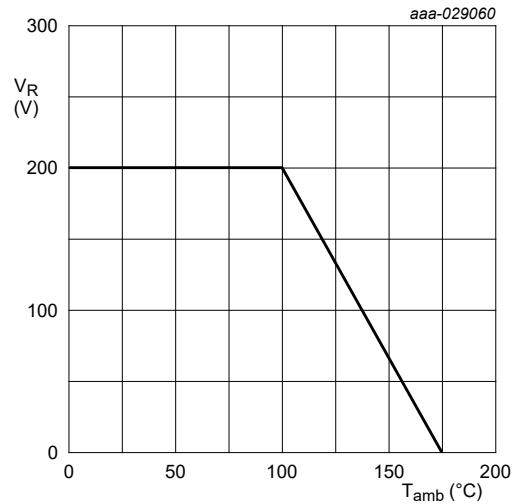
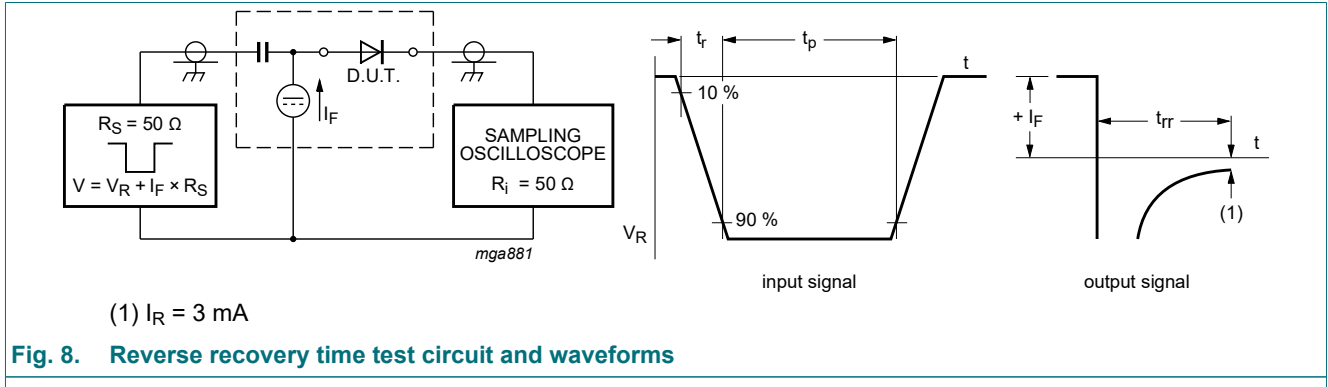


Fig. 7. Maximum continuous reverse voltage as a function of ambient temperature

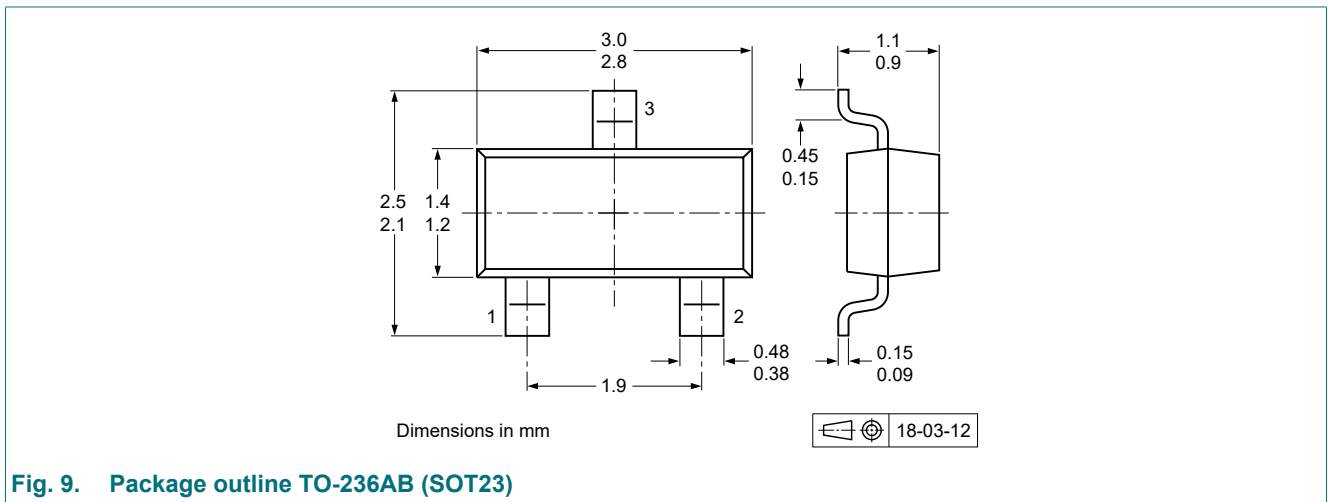
11. Test information



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

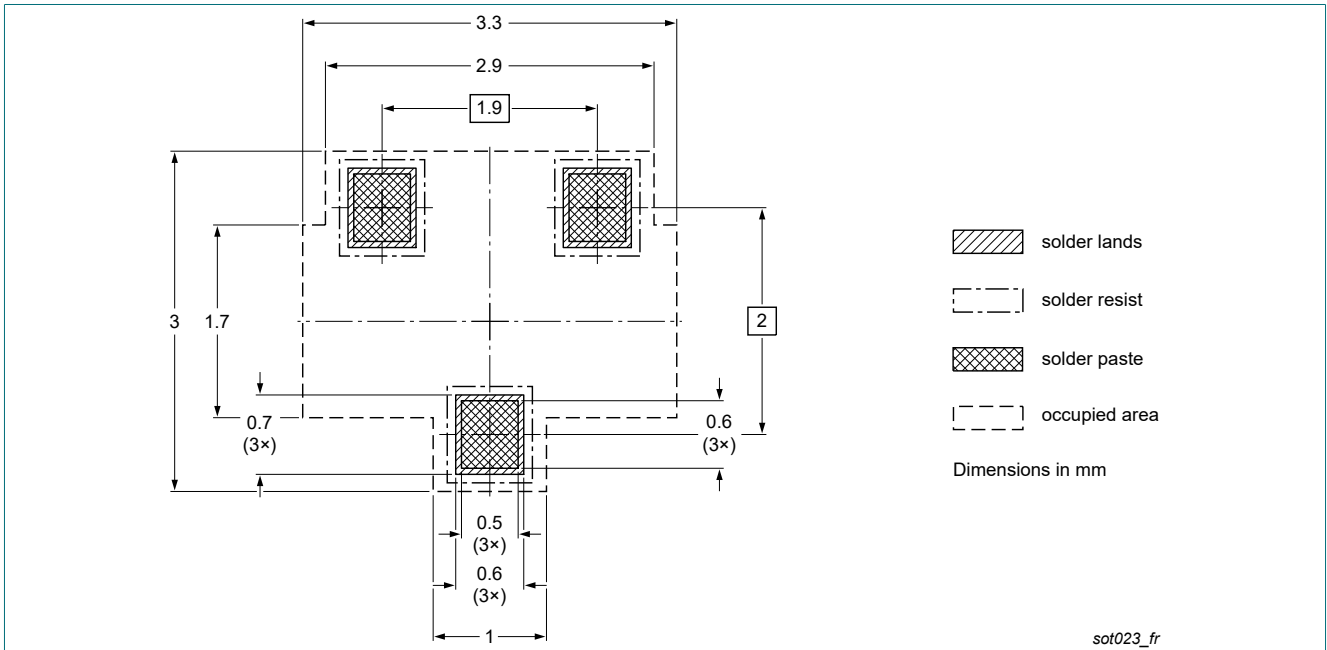


Fig. 10. Reflow soldering footprint for TO-236AB (SOT23)

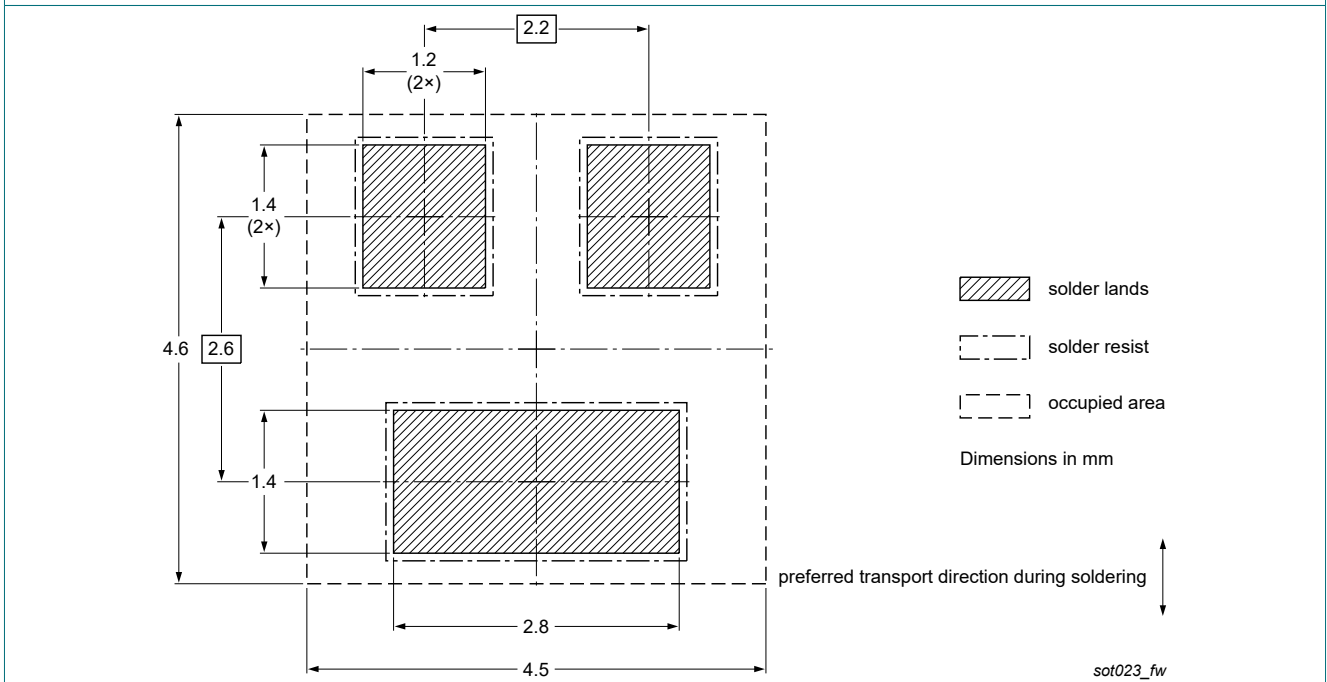


Fig. 11. Wave soldering footprint for TO-236AB (SOT23)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21TH v.1	20181207	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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