



# BAS21

## High-voltage switching diode

22 March 2019

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:  $t_{tr} \leq 50$  ns
- Low leakage current
- Reverse voltage  $V_R \leq 200$  V
- Low capacitance:  $C_d \leq 5$  pF
- Small SMD plastic package
- AEC-Q101 qualified

### 3. Applications

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

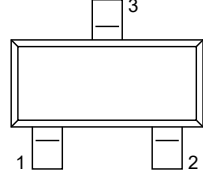
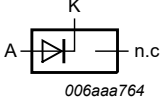
### 4. Quick reference data

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

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>TO-236AB (SOT23)</p>	 <p>006aaa764</p>
2	n.c.	not connected		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

## 7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BAS21	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	$t_p = 1 \mu\text{s}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; square wave		-	9	A
		$t_p = 100 \mu\text{s}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; square wave		-	3	A
		$t_p = 10 \text{ ms}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; square wave		-	1.7	A
$I_{FRM}$	repetitive peak forward current			-	625	mA
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$	[1]	-	250	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] Device mounted on an FR4 printed-circuit board.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

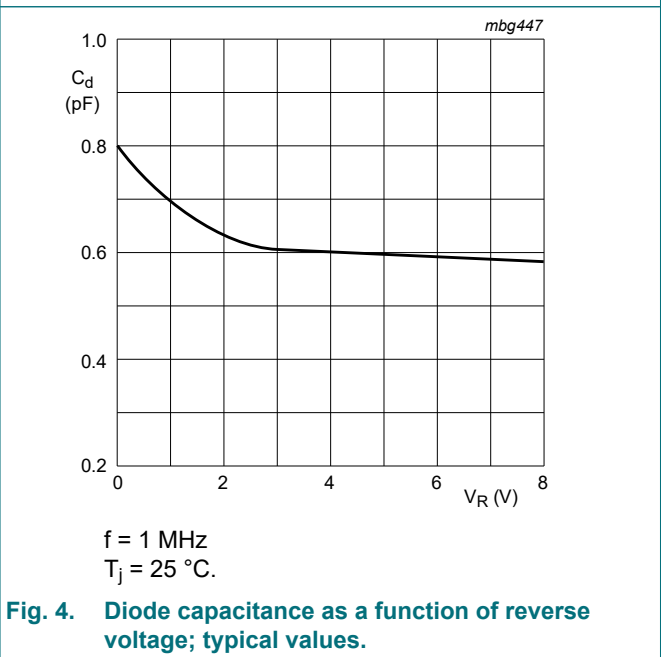
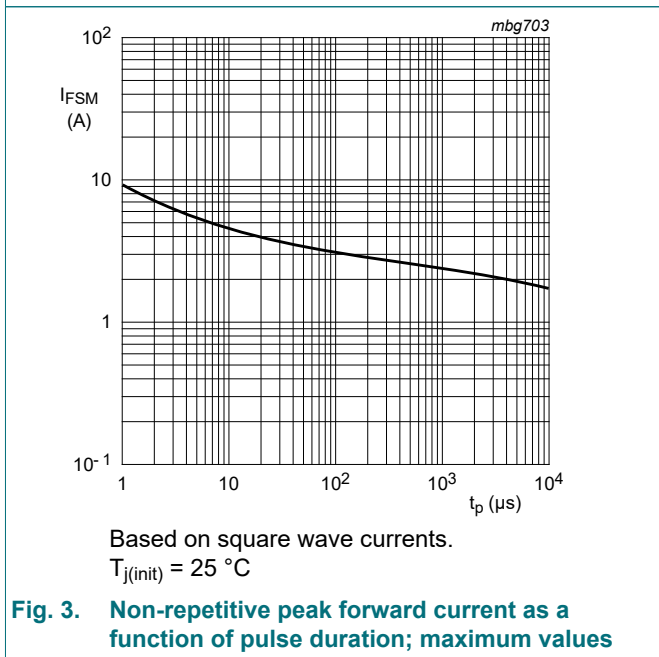
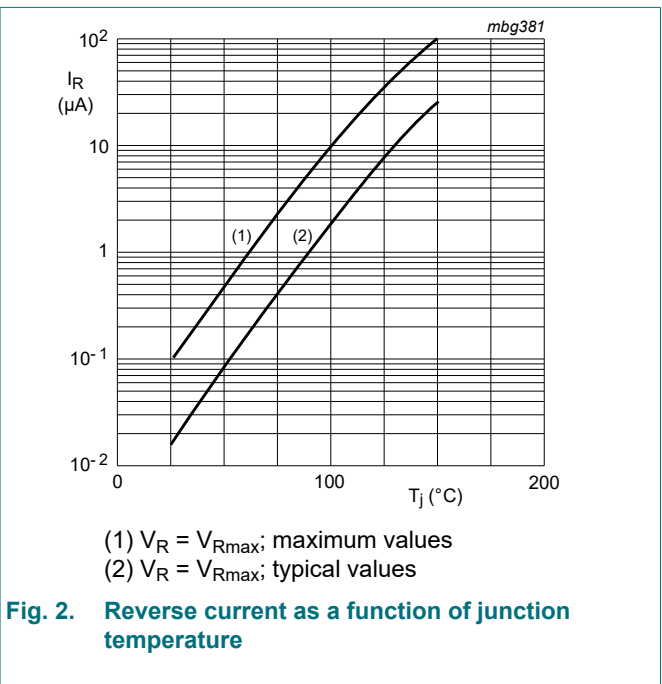
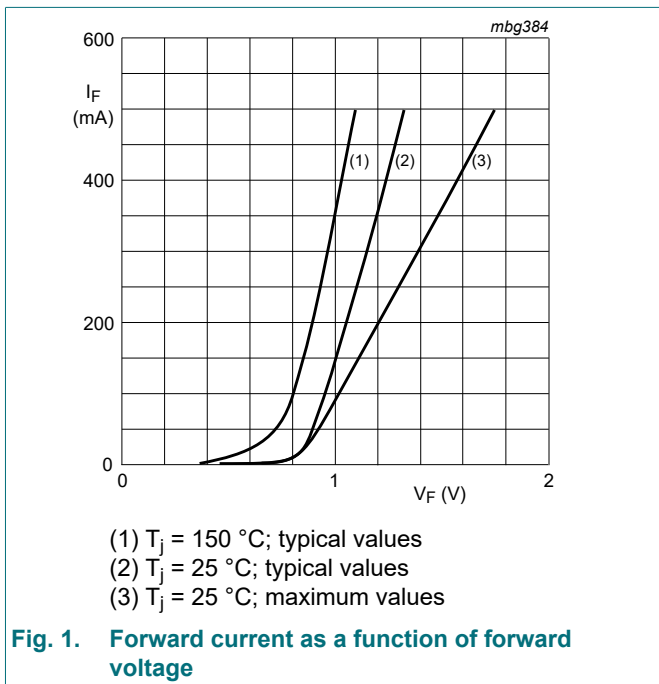
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	500	K/W
$R_{\text{th}(j-sp)}$	thermal resistance from junction to solder point			-	-	330	K/W

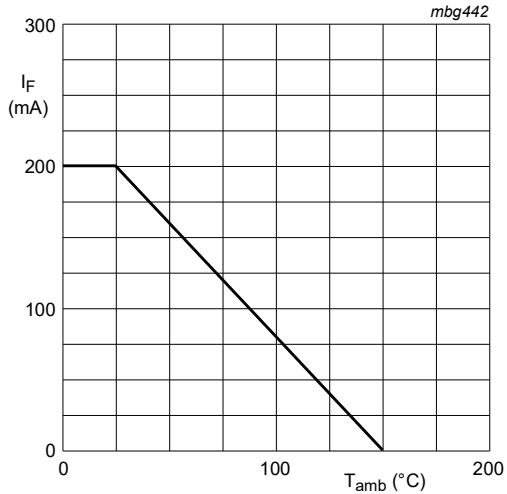
[1] Device mounted on an FR4 printed-circuit board.

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 100 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1	V
		$I_F = 200 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1.25	V
$I_R$	reverse current	$V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	100	nA
		$V_R = 200 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	5	pF
$t_{rr}$	reverse recovery time	$I_F = 30 \text{ mA}; I_R = 30 \text{ mA}; R_L = 100 \text{ } \Omega;$ $I_{R(\text{meas})} = 3 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	50	ns





FR4 PCB, standard footprint

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

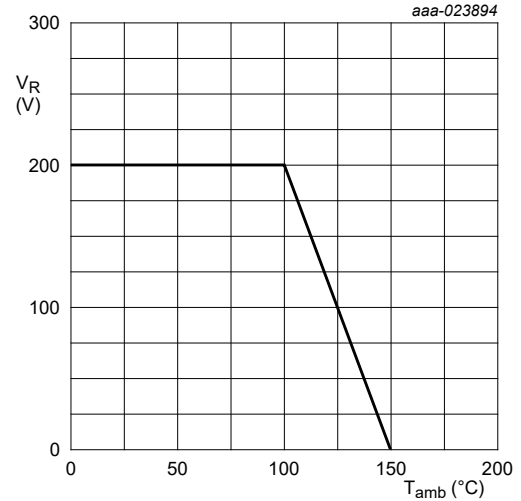


Fig. 6. Maximum continuous reverse voltage as a function of the ambient temperature

## 11. Test information

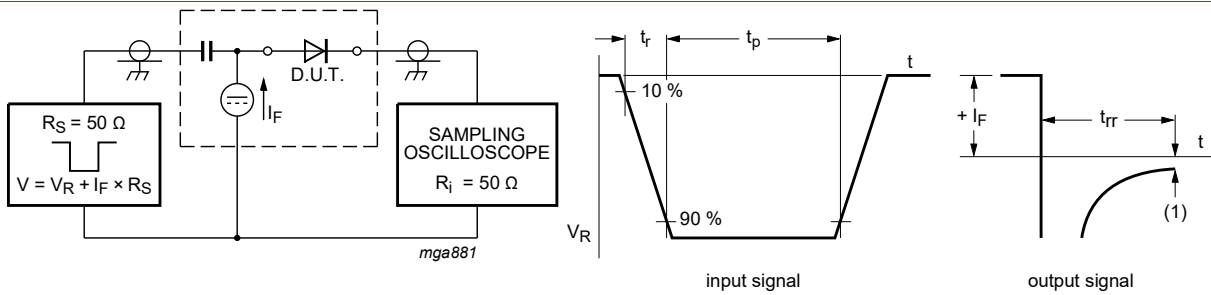


Fig. 7. Reverse recovery time test circuit and waveforms

### 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

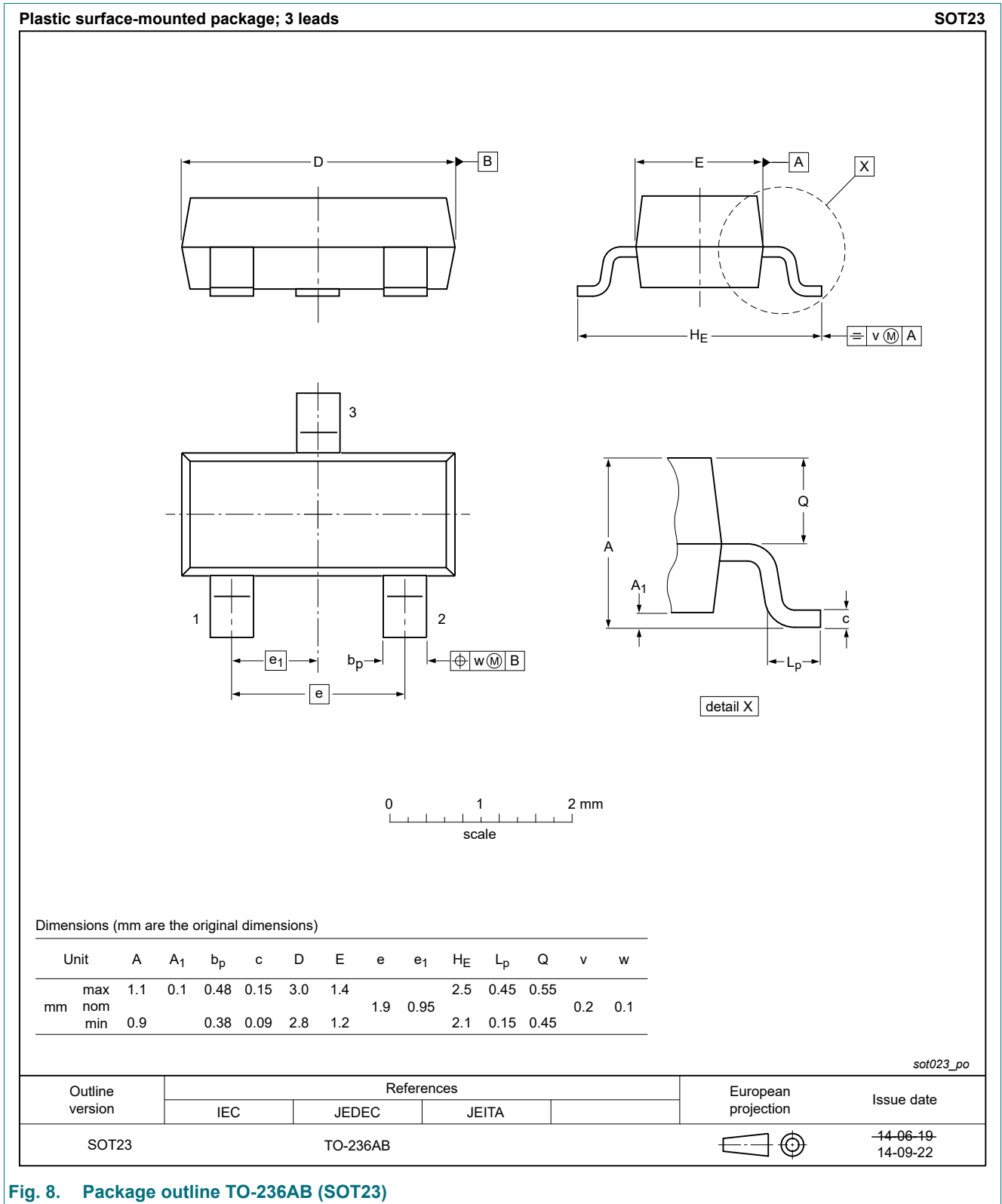


Fig. 8. Package outline TO-236AB (SOT23)

### 13. Soldering

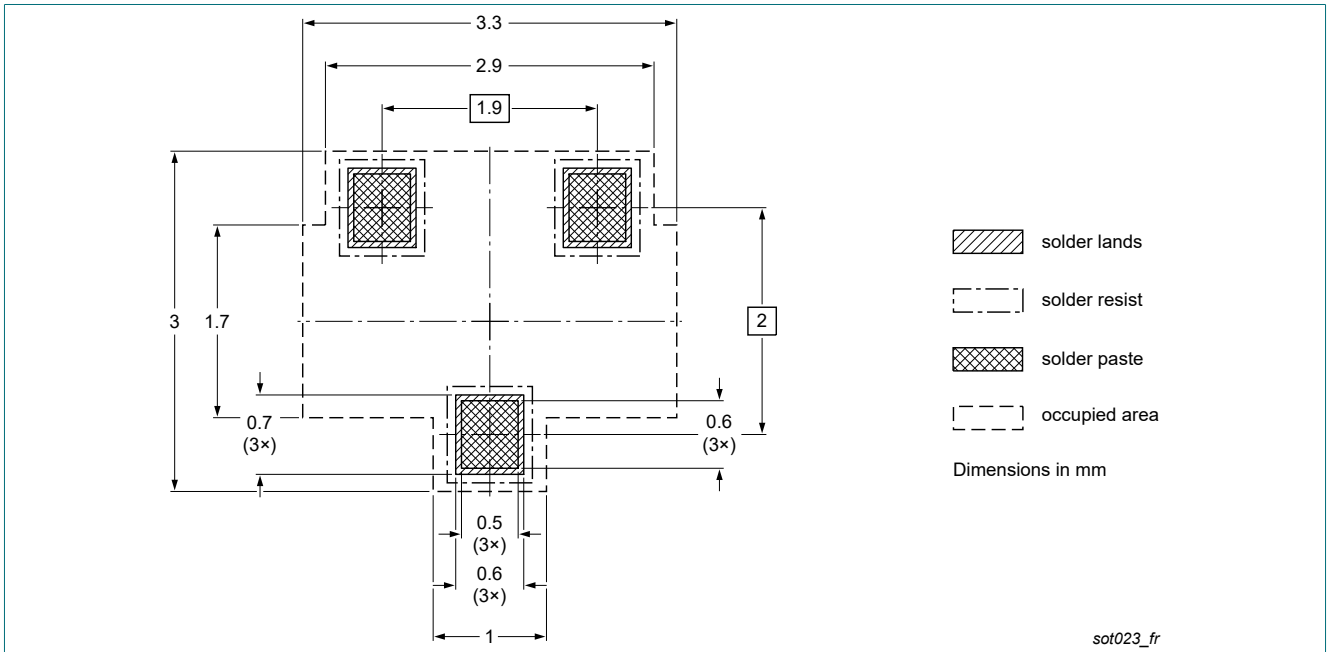


Fig. 9. Reflow soldering footprint for TO-236AB (SOT23)

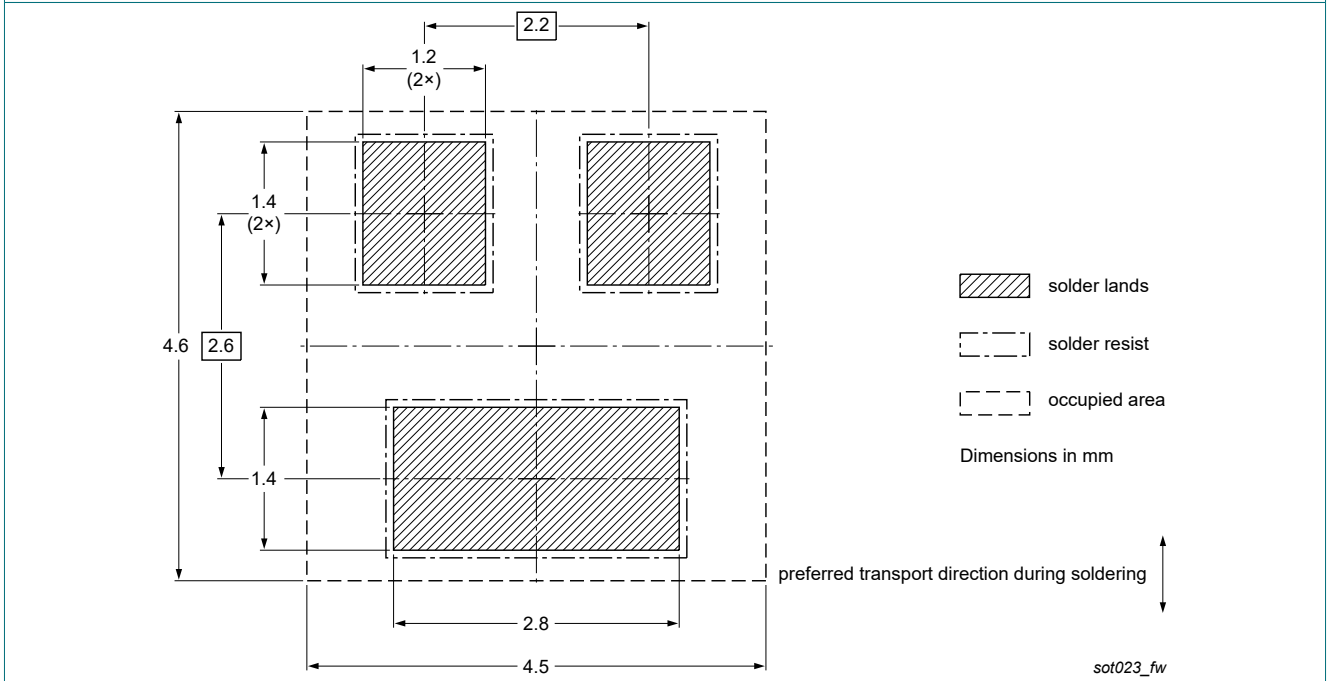


Fig. 10. Wave soldering footprint for TO-236AB (SOT23)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21 v.3	20190322	Product data sheet	-	BAS19_20_21 v.2
Modifications:	<ul style="list-style-type: none"><li>• Family data sheet BAS19_20_21 is transferred to single data sheets.</li><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li></ul>			
BAS19_20_21 v.2	20030320	Product data sheet	-	BAS19_20_21 v.1
BAS19_20_21 v.1	19990526	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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