



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

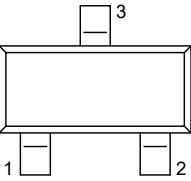
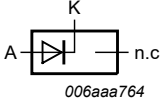
### 4. Quick reference data

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

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p style="text-align: center;"><b>SOT23</b></p>	 <p style="text-align: center;">006aaa764</p>
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 <sup>[1]</sup>
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	$t_p = 1 \mu\text{s}$ ; 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
$P_{\text{tot}}$	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

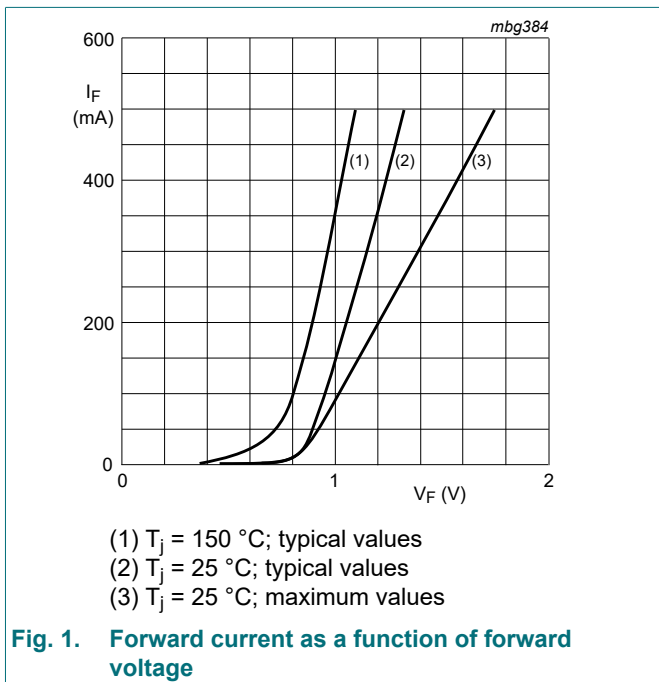


Fig. 1. Forward current as a function of forward voltage

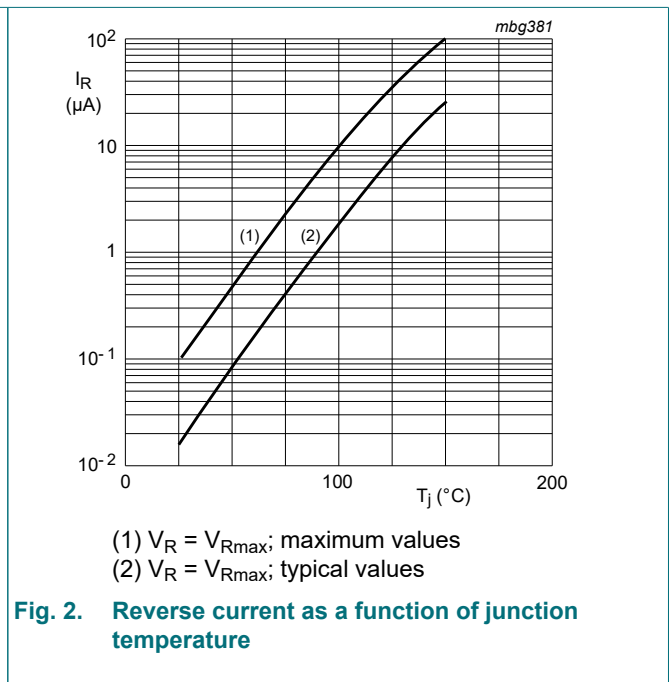


Fig. 2. Reverse current as a function of junction temperature

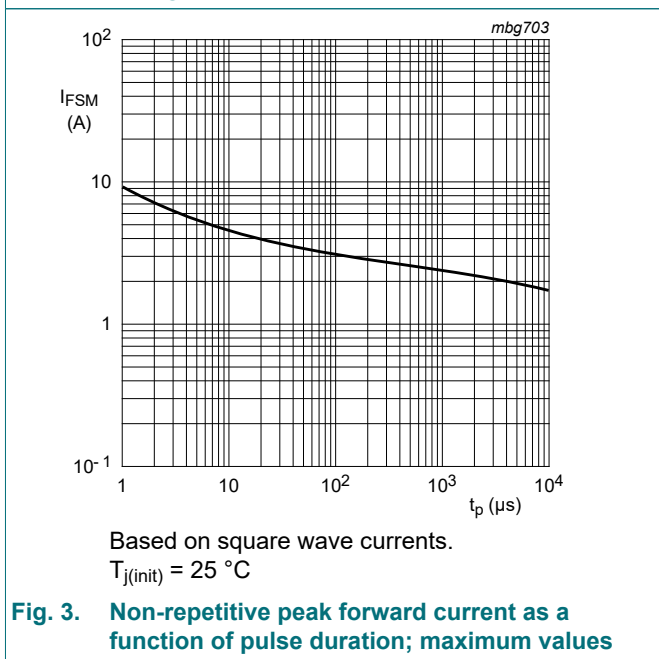


Fig. 3. Non-repetitive peak forward current as a function of pulse duration; maximum values

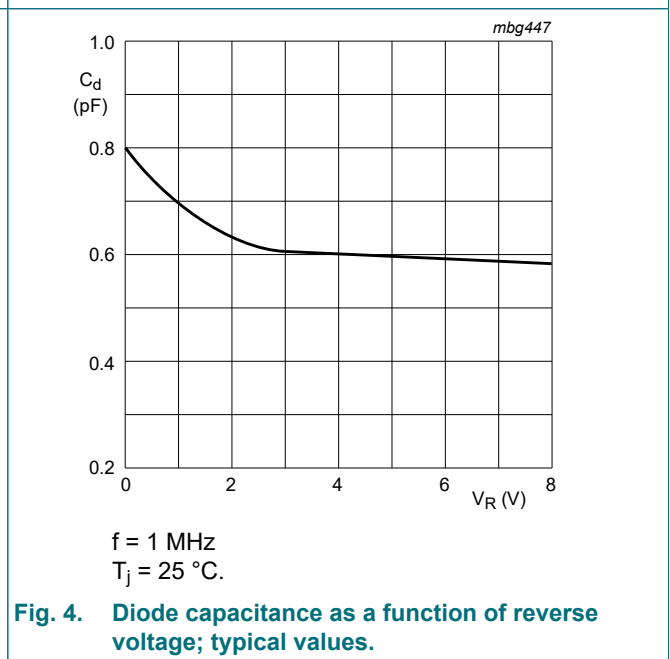
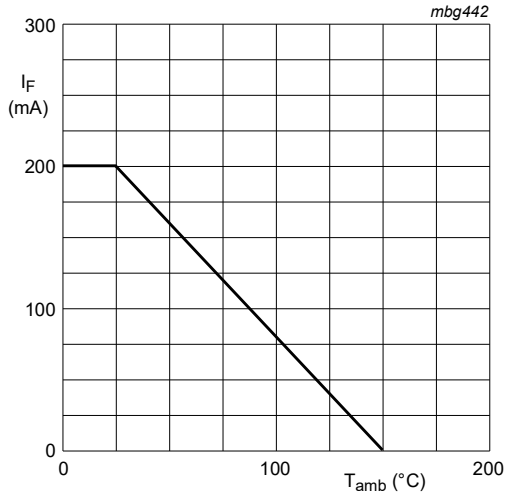


Fig. 4. Diode capacitance as a function of reverse voltage; typical values.



FR4 PCB, standard footprint

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

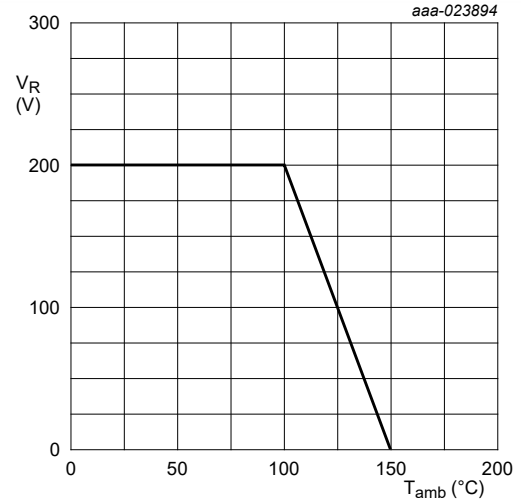
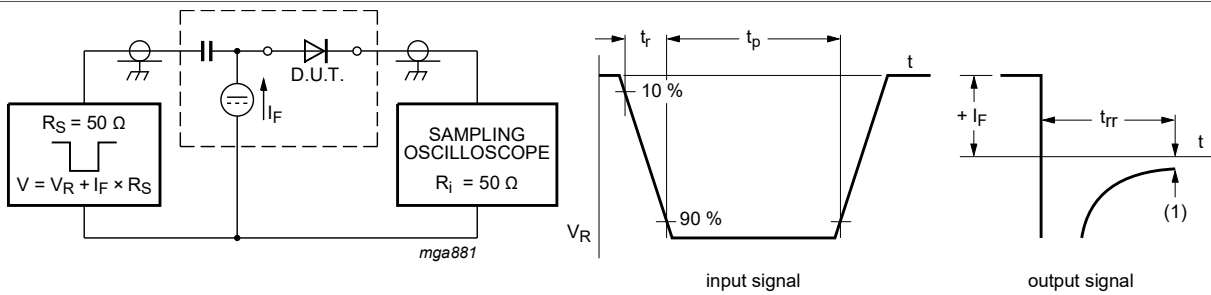


Fig. 6. Maximum continuous reverse voltage as a function of the ambient temperature

### 11. Test information



(1)  $I_R = 3 \text{ mA}$

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

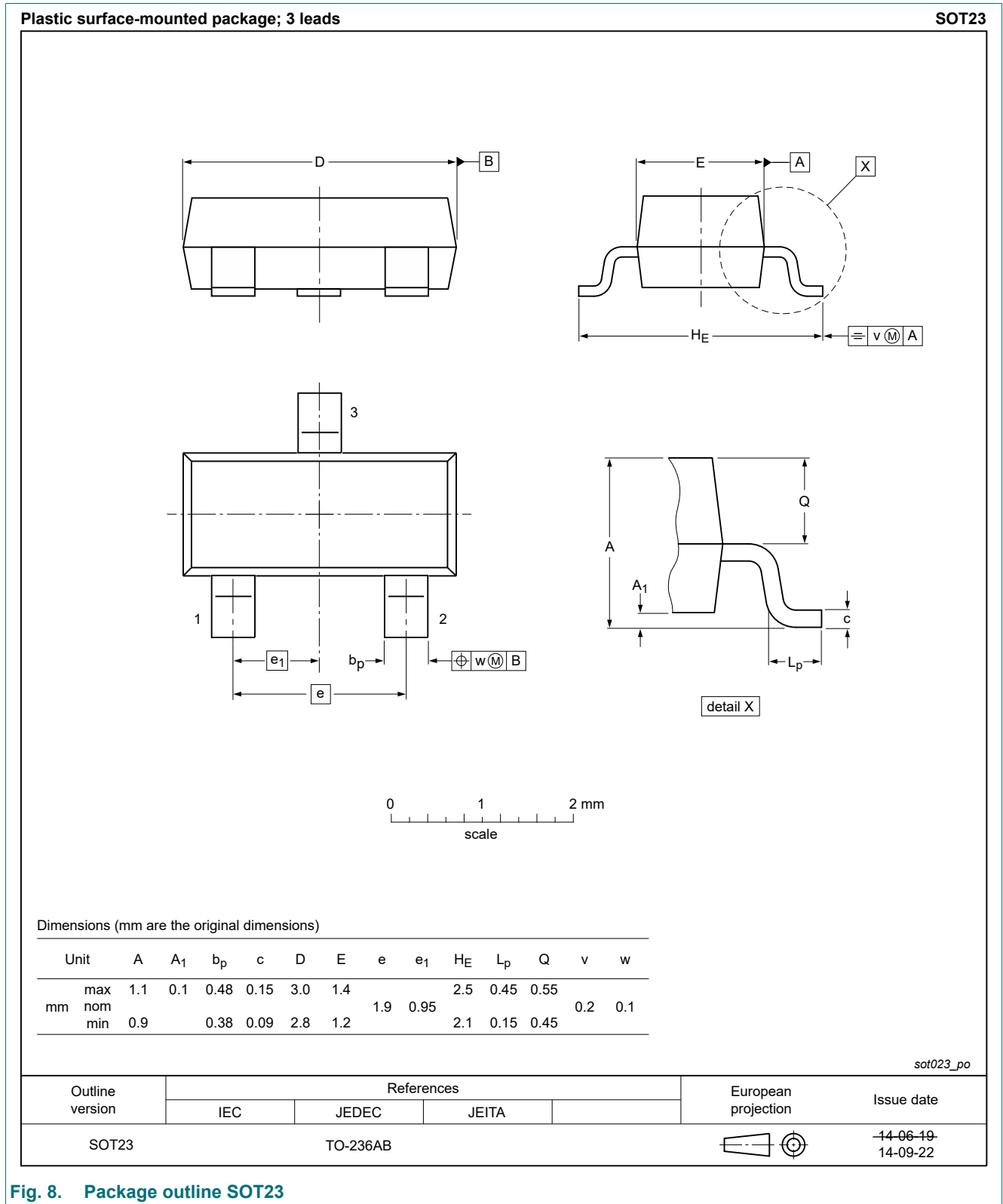


Fig. 8. Package outline SOT23

### 13. Soldering

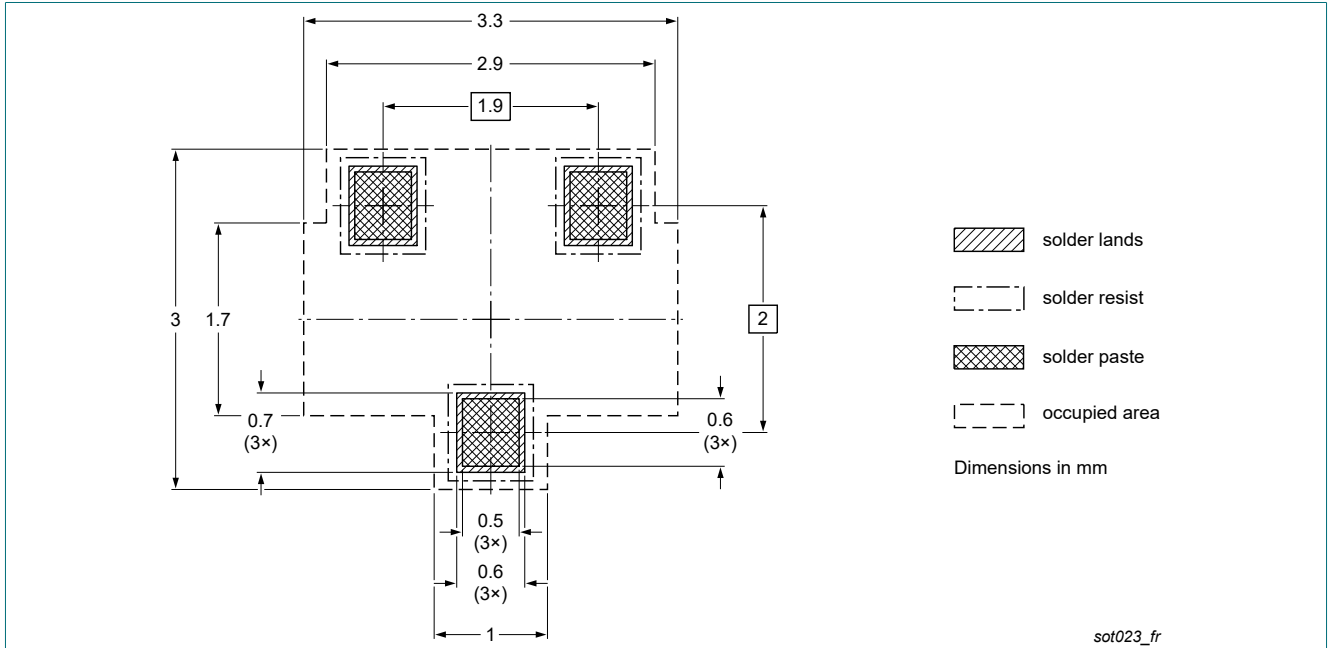


Fig. 9. Reflow soldering footprint for SOT23

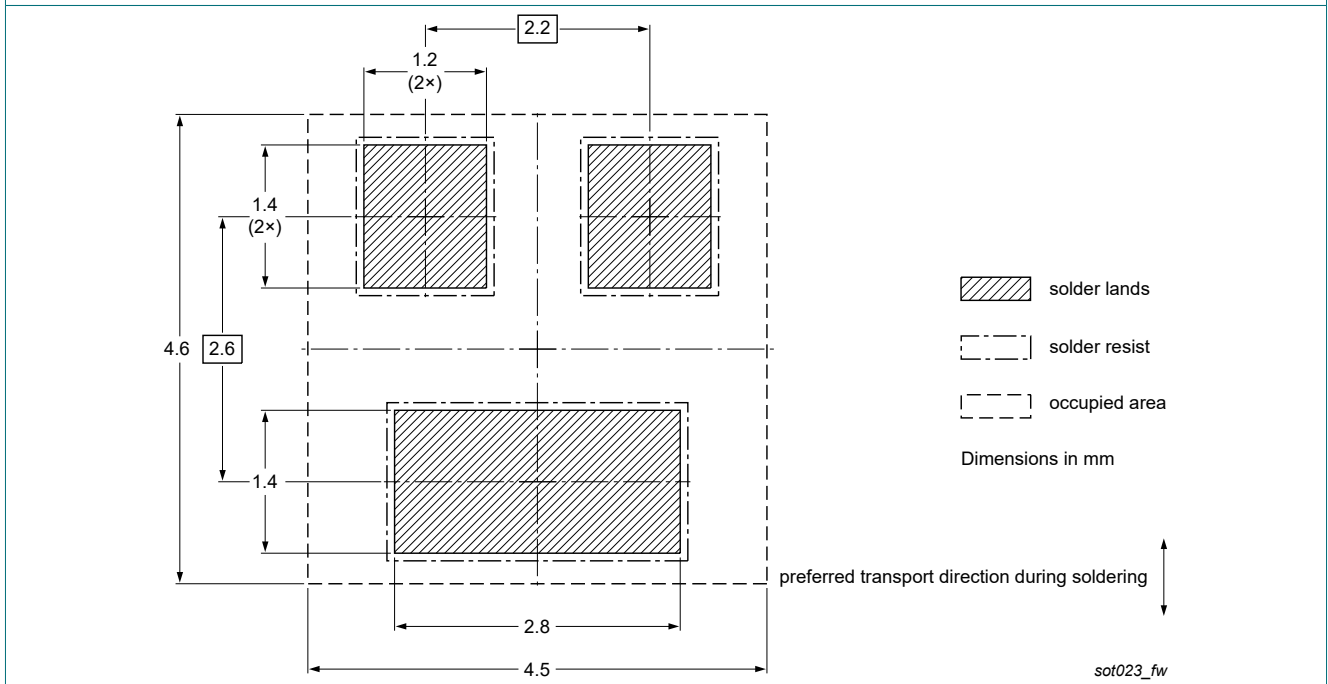


Fig. 10. Wave soldering footprint for SOT23

## 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	3
10. Characteristics.....	4
11. Test information.....	5
12. Package outline.....	6
13. Soldering.....	7
14. Revision history.....	8
15. Legal information.....	9

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