



# BAS21QB-Q

## High-voltage switching diode

4 May 2021

Product data sheet

## 1. General description

High-voltage switching diode, encapsulated in an ultra small DFN1110D-3 (SOT8015, JEDEC MO340-BA) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

## 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current
- High reverse voltage:  $V_R \leq 200$  V
- Low capacitance:  $C_d \leq 5$  pF
- Leadless ultra small SMD plastic package
- Low package height of 0.5 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- High-speed switching
- General-purpose switching
- Voltage clamping
- Reverse polarity protection

## 4. Quick reference data

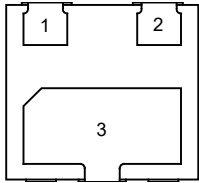
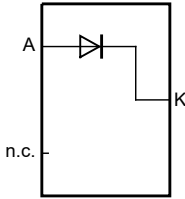
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_F$	forward current	$T_j = 25$ °C	[1]	-	-	250	mA
$V_R$	reverse voltage			-	-	200	V
$V_F$	forward voltage	$I_F = 200$ mA; $T_j = 25$ °C		-	-	1.25	V
$V_{RRM}$	repetitive peak reverse voltage	$T_j = 25$ °C		-	-	250	V
$I_R$	reverse current	$V_R = 200$ V; $T_j = 25$ °C		-	-	100	nA
$t_{rr}$	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] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated and standard footprint.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>DFN1110D-3 (SOT8015)</p>	 <p>aaa-021941</p>
2	n.c.	not connected		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21QB-Q	DFN1110D-3	plastic, leadless extremely thin small outline package with side-wettable flanks (SWF); 3 terminals; 0.65 mm pitch; 1.1 mm x 1 mm x 0.48 mm body	SOT8015

## 7. Marking

Table 4. Marking codes

Type number	Marking code
BAS21QB-Q	B6

## 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	$T_j = 25\text{ °C}$		-	250	V
$V_R$	reverse voltage			-	200	V
$I_F$	forward current		[1]	-	250	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p = 1\ \mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	9	A
		$t_p = 100\ \mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	3	A
		$t_p = 10\ \text{ms}$ ; square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	1.7	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\ \text{ms}$ ; $\delta \leq 0.25$		-	625	mA
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25\text{ °C}$	[1]	-	425	mW
			[2]	-	745	mW
$T_j$	junction temperature			-	150	°C
$T_{\text{amb}}$	ambient temperature			-55	150	°C
$T_{\text{stg}}$	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70  $\mu\text{m}$  copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70  $\mu\text{m}$  copper, tin-plated and mounting pad for cathode 1  $\text{cm}^2$ .

## 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]	-	-	295	K/W
			[2]	-	-	165	K/W

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70  $\mu\text{m}$  copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70  $\mu\text{m}$  copper, tin-plated and mounting pad for cathode 1  $\text{cm}^2$ .

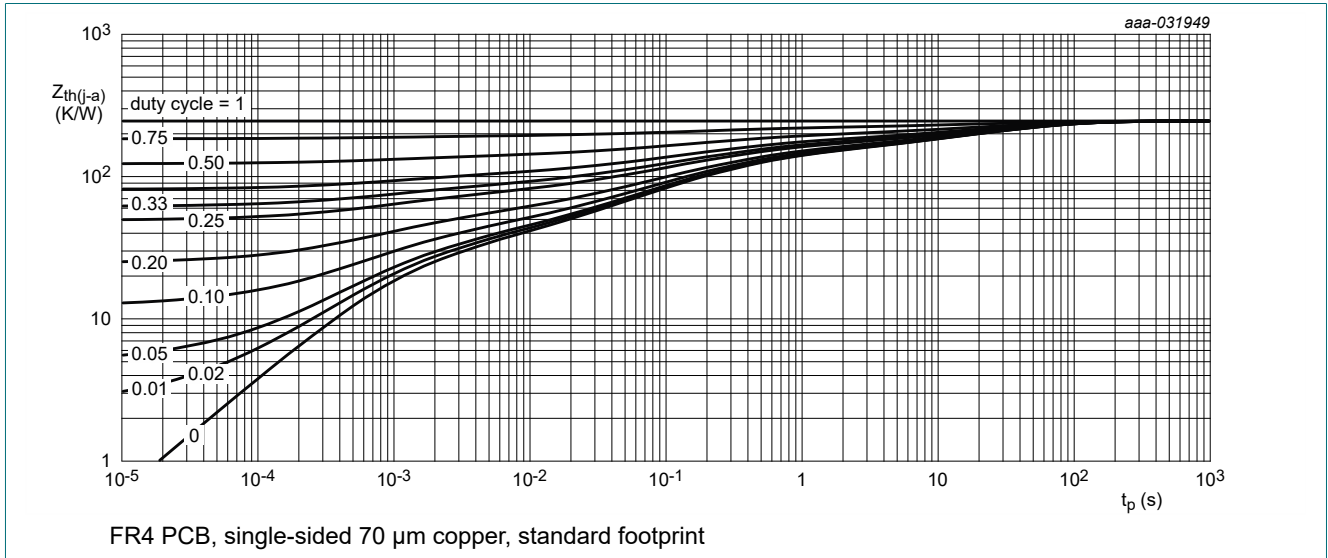


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

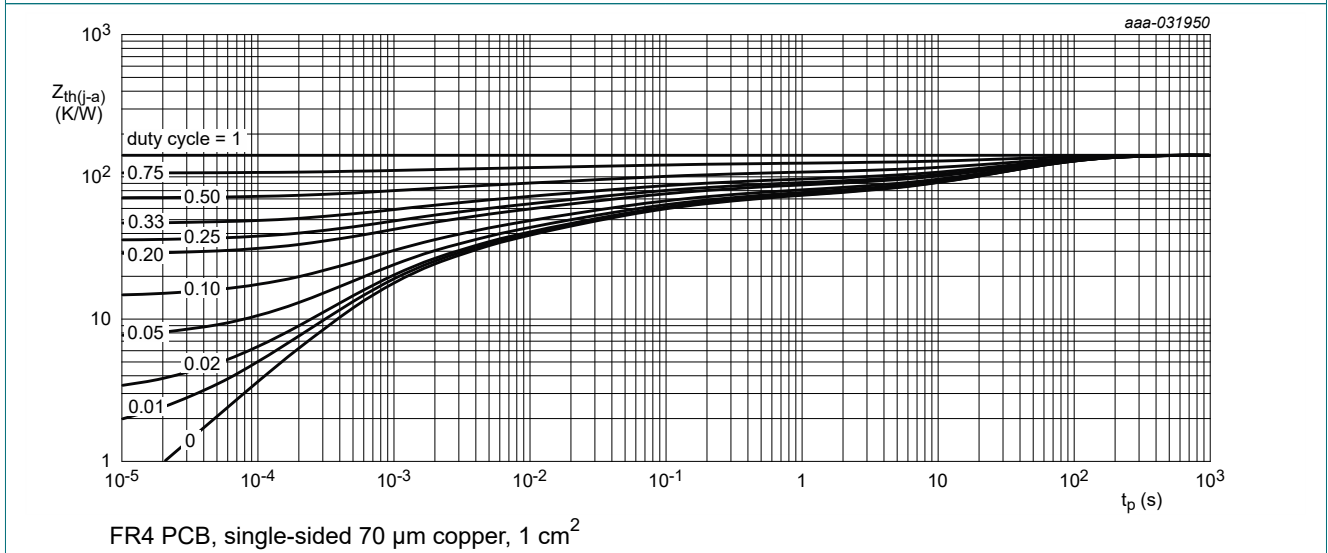
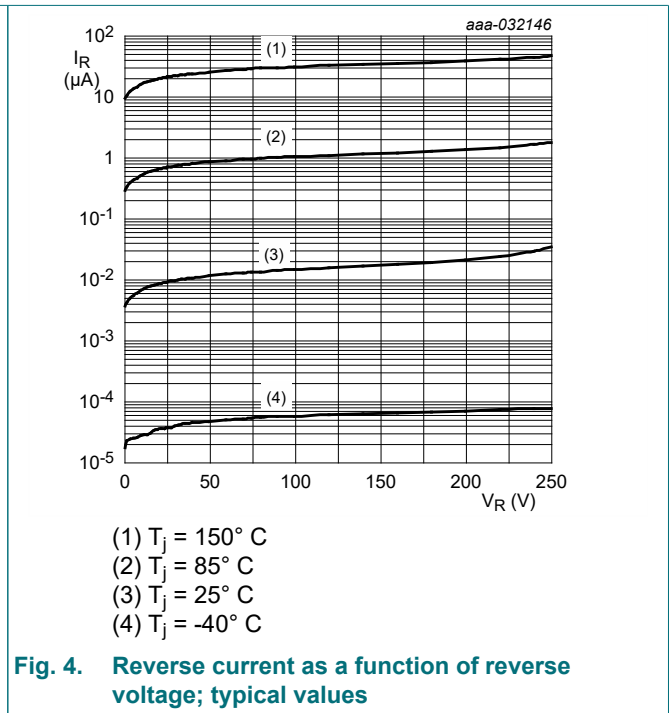
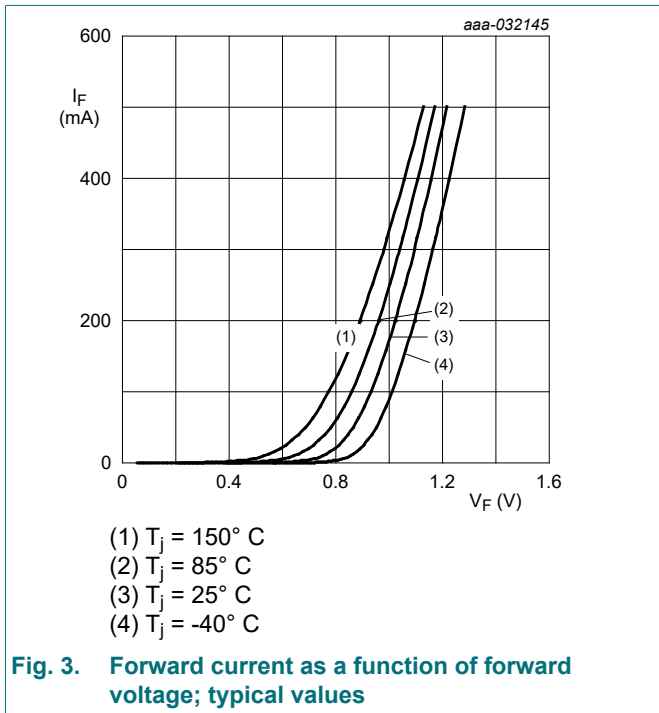


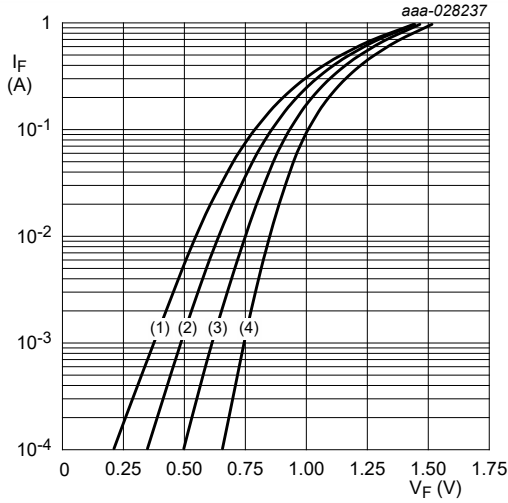
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

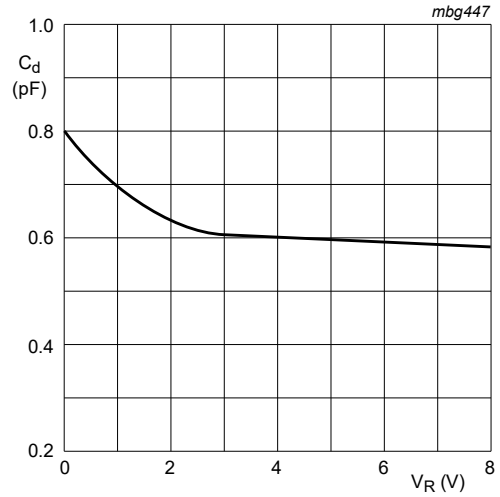
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 100 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1	V
		$I_F = 200 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1.25	V
$I_R$	reverse current	$V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	100	nA
		$V_R = 200 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	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





- (1)  $T_j = 150^\circ\text{C}$
- (2)  $T_j = 85^\circ\text{C}$
- (3)  $T_j = 25^\circ\text{C}$
- (4)  $T_j = -40^\circ\text{C}$

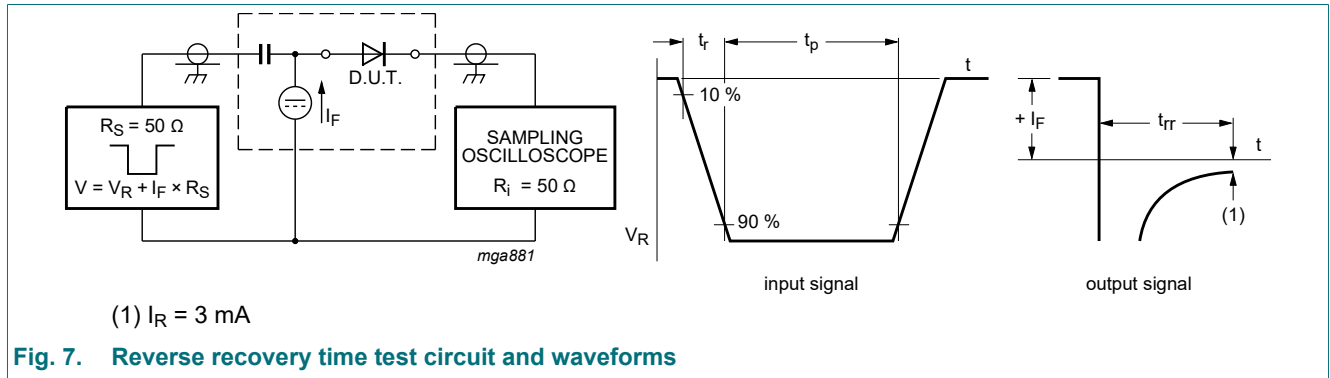
**Fig. 5.** Forward current as a function of forward voltage; typical values; (logarithmic scale)



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

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

### 11. Test information



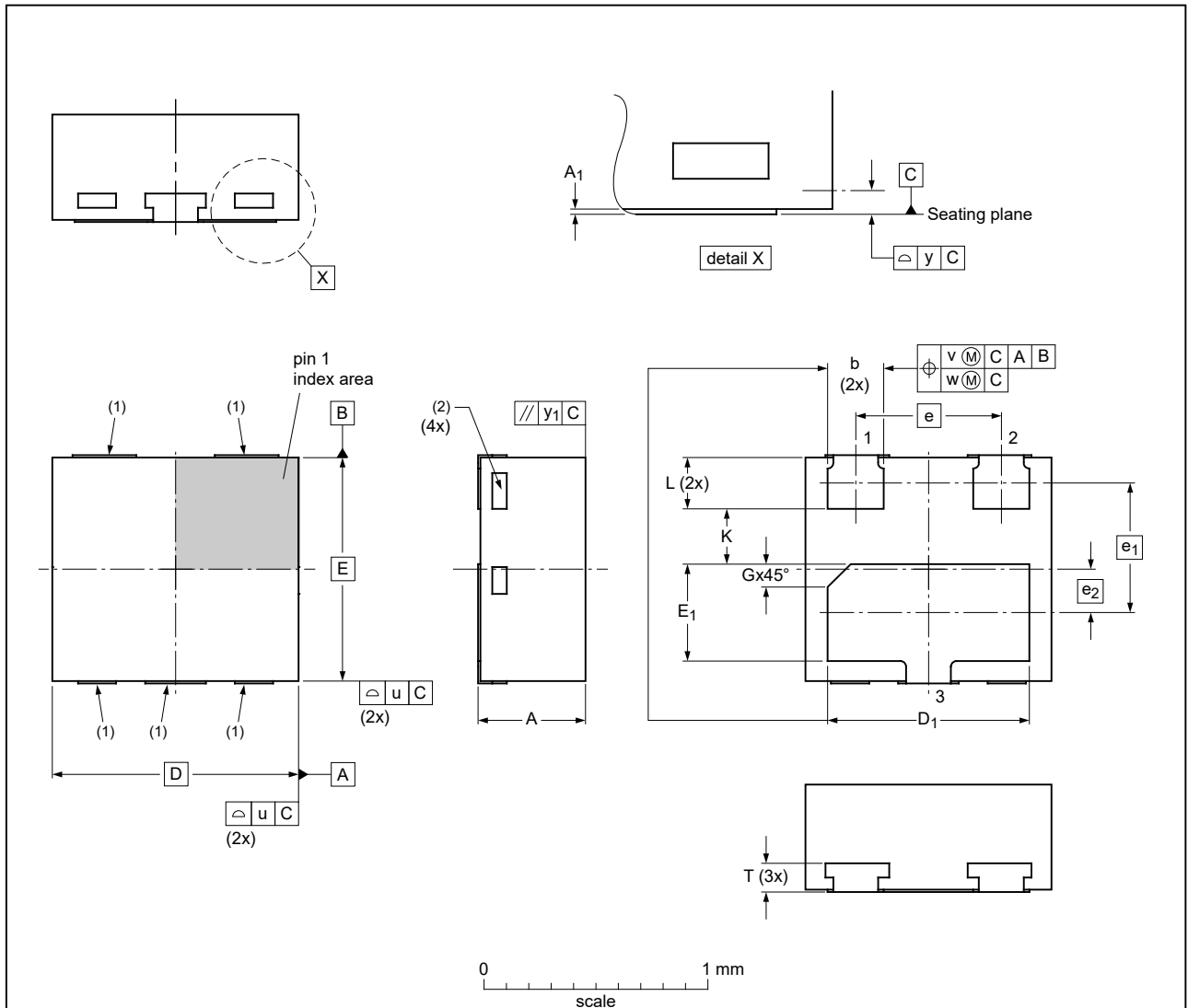
#### Quality information

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

DFN1110D-3: plastic, leadless extremely thin small outline package with side-wettable flanks (SWF); 3 terminals; 0.65 mm pitch; 1.1 mm x 1 mm x 0.48 mm body

SOT8015



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	D	D <sub>1</sub>	E	E <sub>1</sub>	e	e <sub>1</sub>	e <sub>2</sub>	G	K	L	T	u	v	w	y	y <sub>1</sub>
max	0.50	0.040	0.30		0.95		0.48						0.27	0.22					
nom	0.47	0.020	0.25	1.1	0.90	1	0.43	0.65	0.58	0.19	0.09 (ref)		0.23	0.16	0.05	0.1	0.05	0.05	0.05
min	0.44	0.005	0.22		0.87		0.40					0.2	0.20	0.10					

Note

- Side Wettable Flank, protrusion max. 0.02 mm.
  - Visible depend upon used manufacturing technology.
- Dimension A and T are including plating thickness.

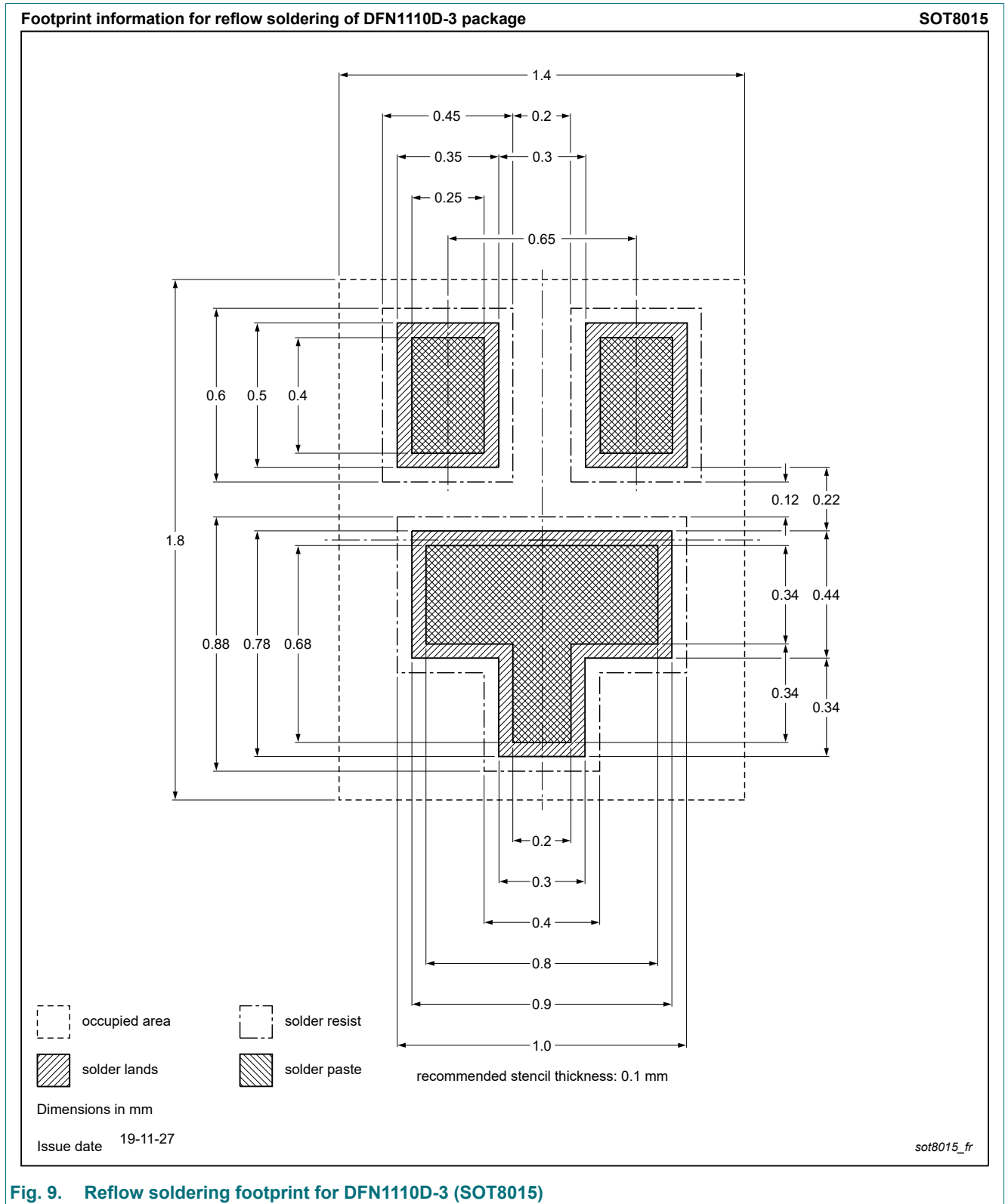
sot8015\_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT8015		MO-340BA				19-12-02 19-12-04

Fig. 8. Package outline DFN1110D-3 (SOT8015)



### 13. Soldering



**Fig. 9. Reflow soldering footprint for DFN1110D-3 (SOT8015)**

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21QB-Q v.2	20210504	Product data sheet	-	BAS21QB-Q v.1
Modifications:	• Features and benefits: added recommendation for automotive applications			
BAS21QB-Q v.1	20210331	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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Date of release: 4 May 2021

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