

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

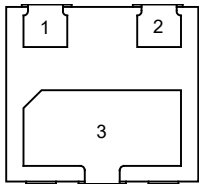
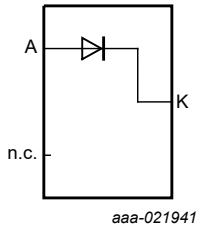
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_F	forward current	$T_j = 25$ °C	[1]	-	-	250	mA
V_R	reverse voltage			-	-	200	V
V_F	forward voltage	$I_F = 200$ mA; $T_j = 25$ °C		-	-	1.25	V
V_{RRM}	repetitive peak reverse voltage	$T_j = 25$ °C		-	-	250	V
I_R	reverse current	$V_R = 200$ V; $T_j = 25$ °C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

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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 DFN1110D-3 (SOT8015)	
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

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8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating Sytem (IEC 60134)

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage	T_j = 25 °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 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	$t_p \leq$ 1 ms; $\delta \leq$ 0.25		-	625	mA
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	425	mW
			[2]	-	745	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 (PCB), single-sided 70 µm copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated and mounting pad for cathode 1 cm^2.

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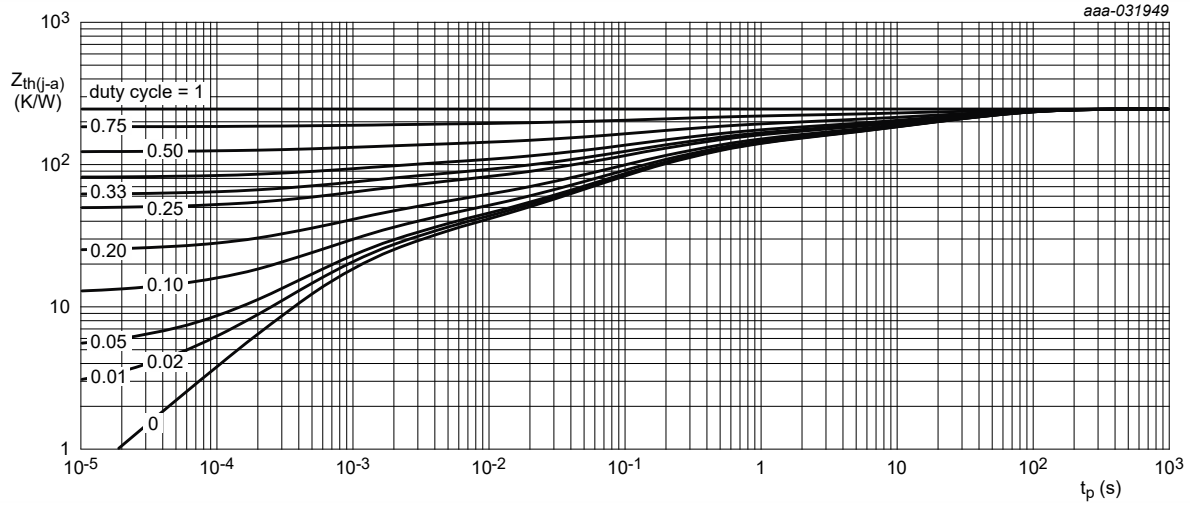
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9. Thermal characteristics

Table 6. Thermal characteristics

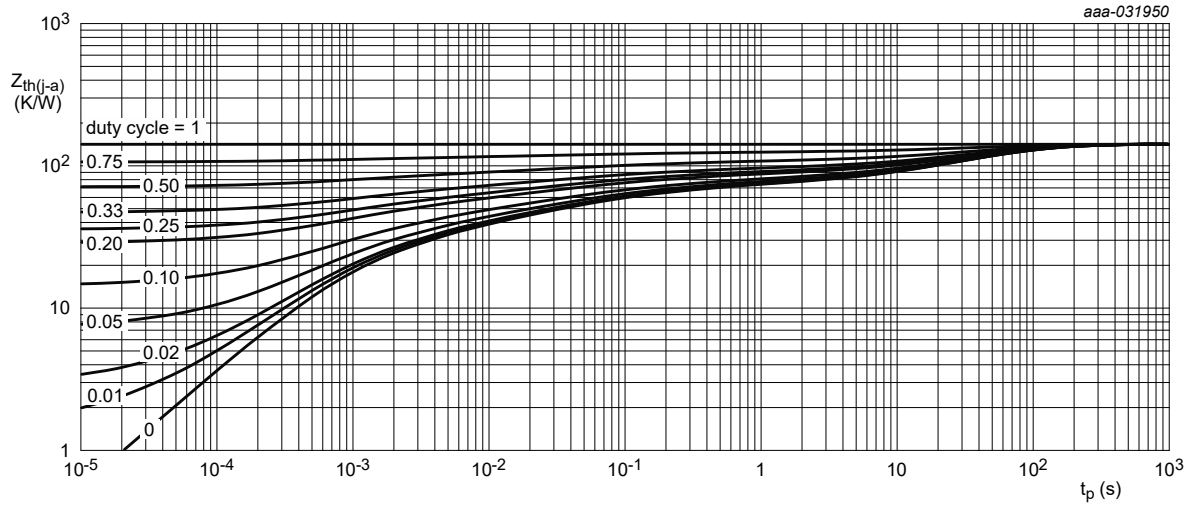
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	In free air	[1]	-	-	295	K/W
			[2]	-	-	165	K/W

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



FR4 PCB, single-sided 70 µm copper, standard footprint

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



FR4 PCB, single-sided 70 µm copper, 1 cm^2

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

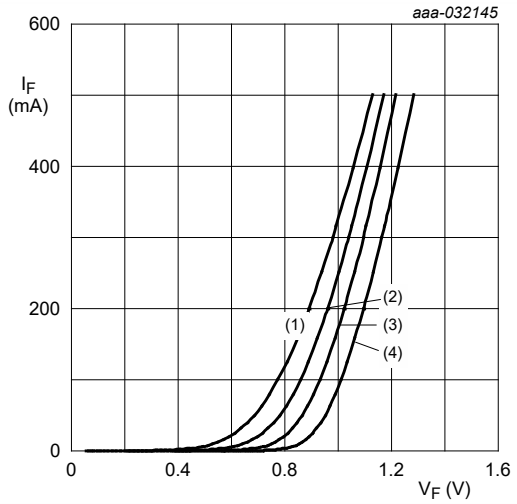
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10. Characteristics

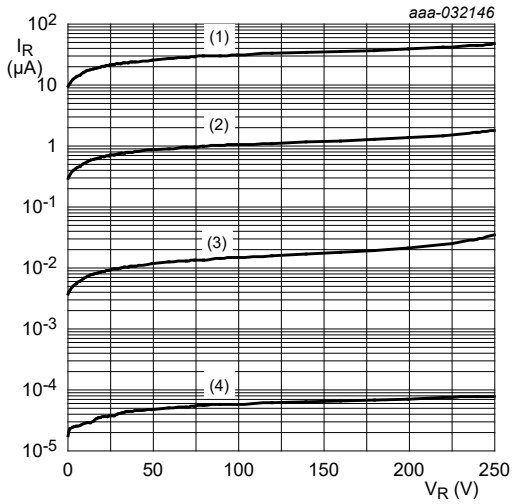
Table 7. Characteristics

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
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

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

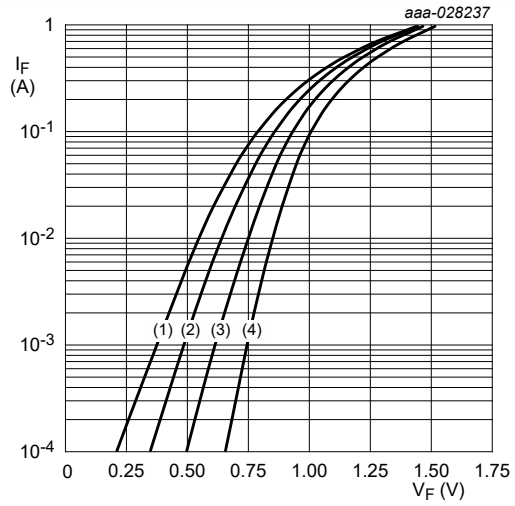


(1) T_j = 150° C
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

Fig. 4. Reverse current as a function of reverse voltage; typical values

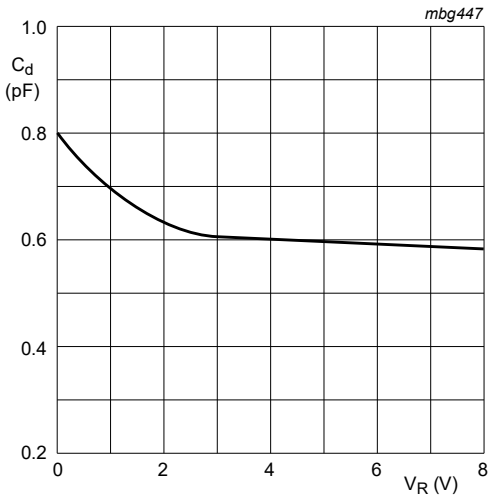
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(1) T_j = 150° C
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

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



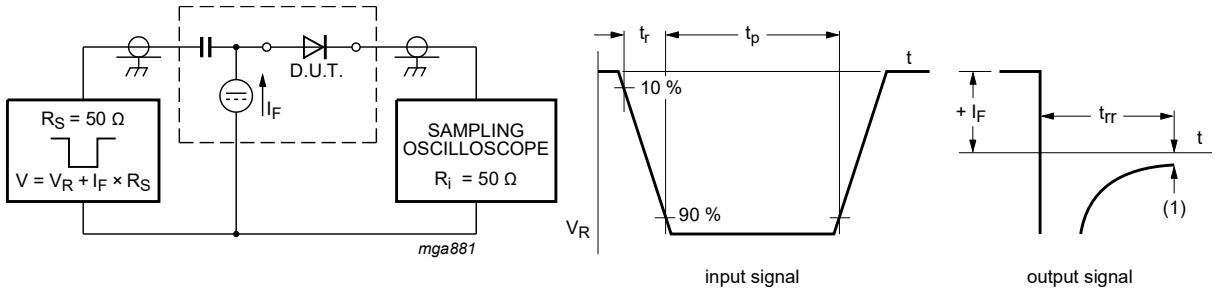
f = 1 MHz
T_j = 25 °C.

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

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11. Test information



(1) I_R = 3 mA

Fig. 7. Reverse recovery time test circuit and waveforms

Quality information

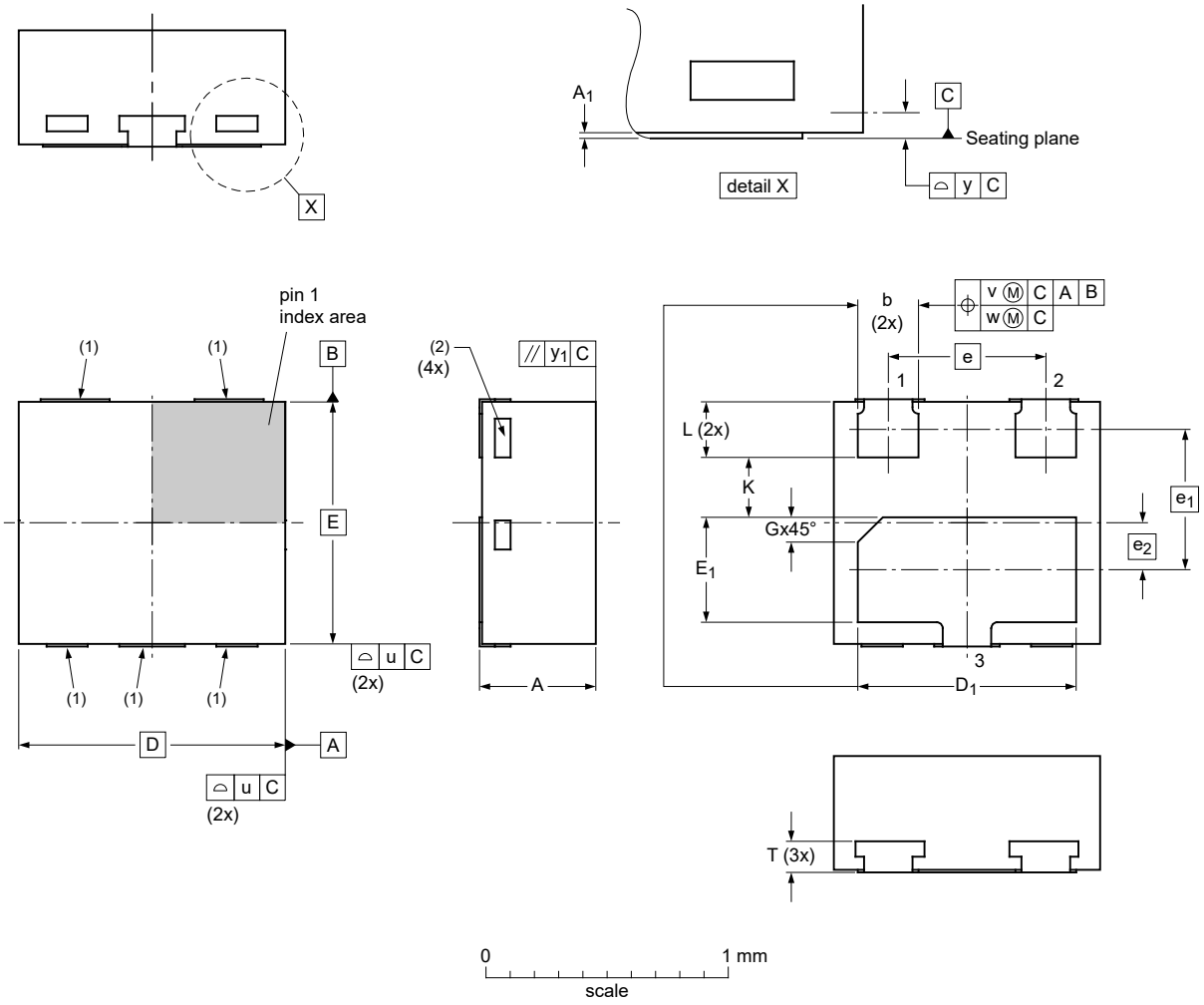
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

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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_1	b	D	D_1	E	E_1	e	e_1	e_2	G	K	L	T	u	v	w	y	y1
mm	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
1. Side Wettable Flank, protrusion max. 0.02 mm.
2. 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)

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13. Soldering

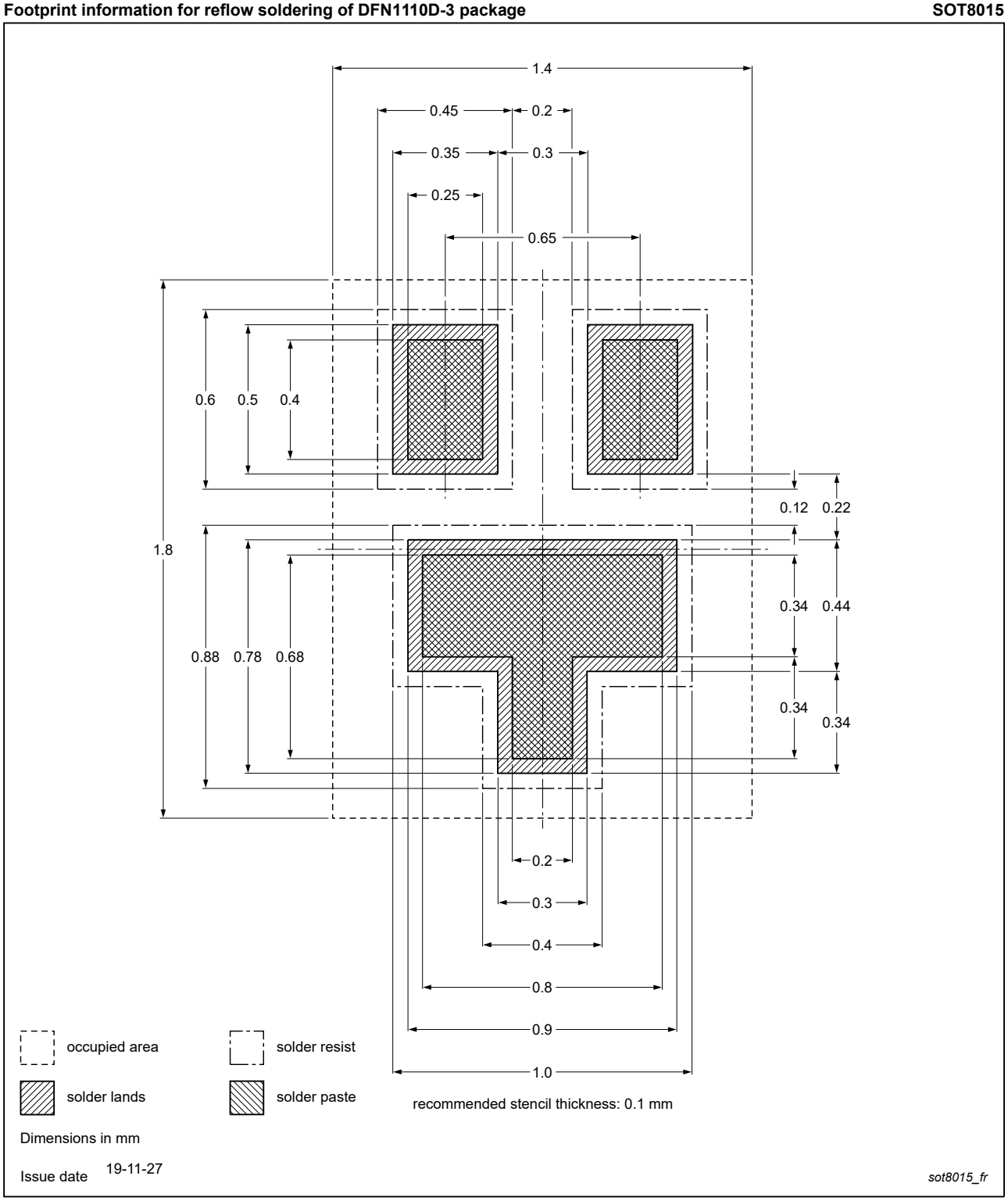


Fig. 9. Reflow soldering footprint for DFN1110D-3 (SOT8015)

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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	-	-

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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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