BAV70QB-Q

Dual common cathode high-speed switching diode

13 March 2024 Product data sheet

1. General description

Dual common cathode high-speed switching diode encapsulated in an ultra small DFN1110D-3 (SOT8015, JEDEC MO340-BA) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

2. Features and benefits

- High switching speed: t_{rr} ≤ 4 ns
- Low leakage current: I_R ≤ 0.5 µA
- Reverse voltage V_R ≤ 100 V
- Low capacitance C_d ≤ 1.5 pF
- 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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current	single diode loaded; T_{amb} = 25 °C	[1]	-	-	350	mA
V_R	reverse voltage	T_j = 25 °C		-	-	100	V
I_R	reverse current	V_R = 80 V; T_j = 25 °C		-	-	0.5	µA
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_{amb} = 25 °C		-	-	4	ns

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

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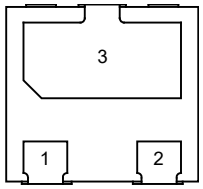
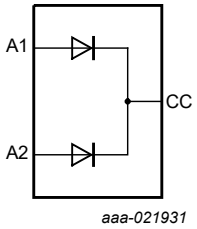
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode (diode 1)	 Transparent top view **DFN1110D-3 (SOT8015)**	
2	A2	anode (diode 2)		
3	CC	common cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAV70QB-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
BAV70QB-Q	G5

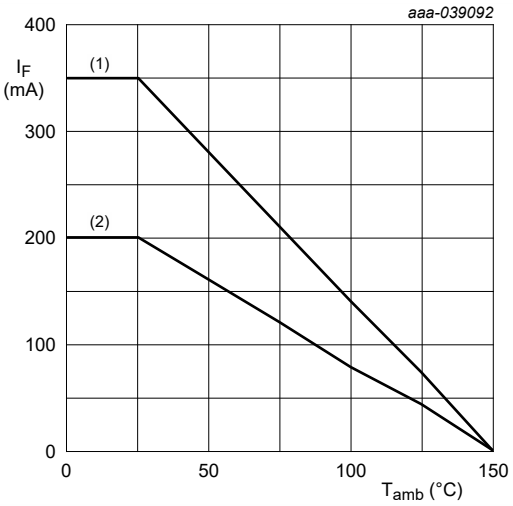
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
V_R	reverse voltage	T_j = 25 °C		-	100	V
V_{RRM}	repetitive peak reverse voltage			-	100	V
I_F	forward current	single diode loaded; T_{amb} = 25 °C	[1]	-	350	mA
		double diode loaded; T_{amb} = 25 °C	[1]	-	200	mA
I_{FRM}	repetitive peak forward current	$t_p \leq$ 0.5 ms; $\delta \leq$ 0.25; T_j = 25 °C		-	0.84	A
I_{FSM}	non-repetitive peak forward current	t_p = 100 µs; square wave; $T_{j(init)}$ = 25 °C		-	4.4	A
		t_p = 1 ms; square wave; $T_{j(init)}$ = 25 °C		-	2.3	A
		t_p = 10 ms; square wave; $T_{j(init)}$ = 25 °C		-	1.4	A
Per device; one diode loaded						
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	435	mW
			[2]	-	735	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 copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.



(1) single diode loaded
(2) double diode loaded

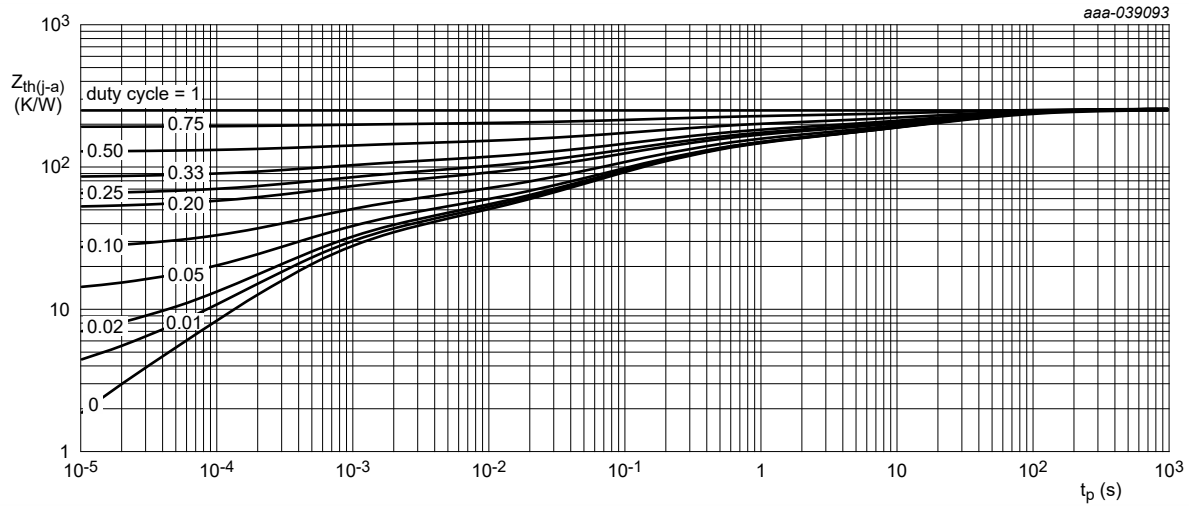
Fig. 1. Forward current as a function of ambient temperature; derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

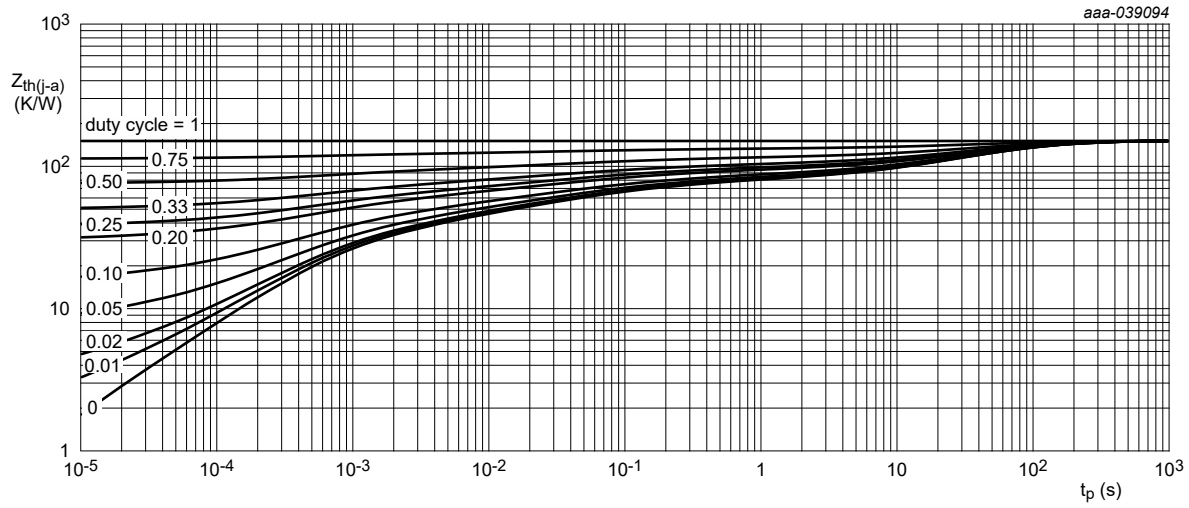
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	285	K/W
			[2]	-	-	170	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	40	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.
[3] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



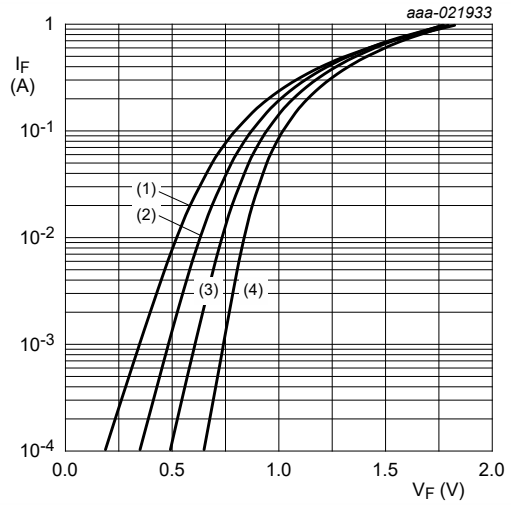
FR4 PCB, mounting pad for cathode 1 cm^2

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

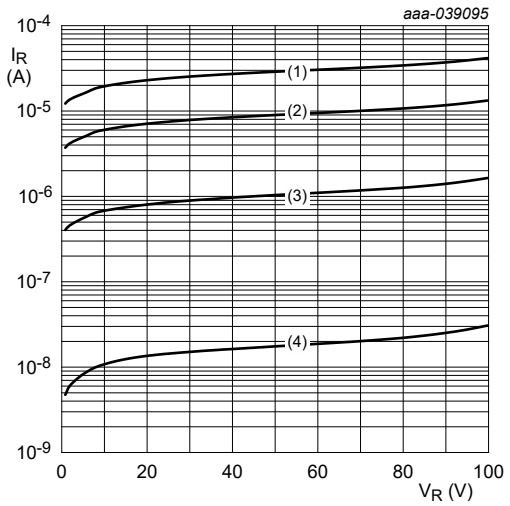
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
V_F	forward voltage	I_F = 1 mA; T_j = 25 °C		-	-	715	mV
		I_F = 10 mA; T_j = 25 °C		-	-	855	mV
		I_F = 50 mA; T_j = 25 °C		-	-	1	V
		I_F = 150 mA; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 25 V; T_j = 25 °C		-	-	30	nA
		V_R = 80 V; T_j = 25 °C		-	-	0.5	µA
		V_R = 25 V; T_j = 150 °C		-	-	30	µA
		V_R = 80 V; T_j = 150 °C		-	-	100	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_j = 25 °C		-	-	1.5	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_{amb} = 25 °C		-	-	4	ns
V_{FRM}	peak forward recovery voltage	I_F = 10 mA; t_r = 20 ns; T_{amb} = 25 °C		-	-	1.75	V



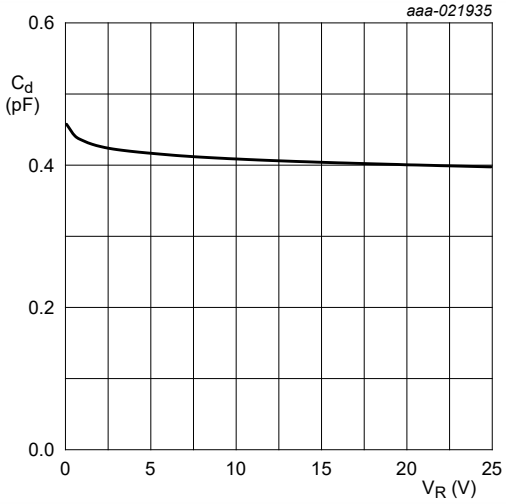
(1) T_j = 150 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

Fig. 4. Forward current as a function of forward voltage; typical values



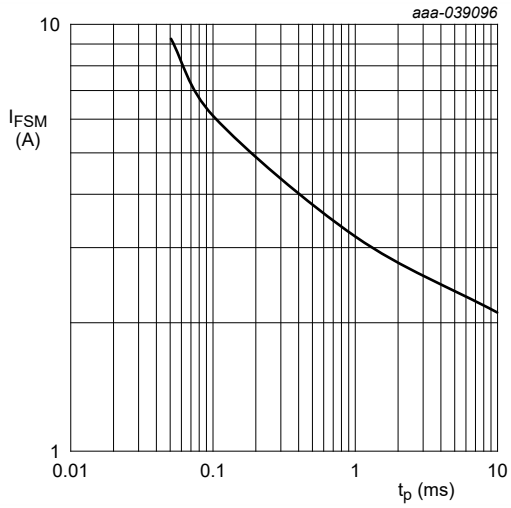
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C

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



f = 1MHz; T_{amb} = 25 °C

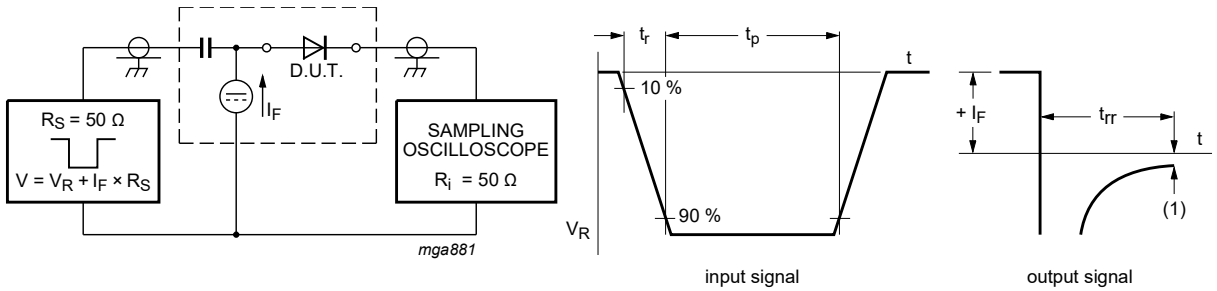
Fig. 6. Diode capacitance as a function of reverse voltage; typical values



Based on square wave currents
T_{amb} = 25 °C

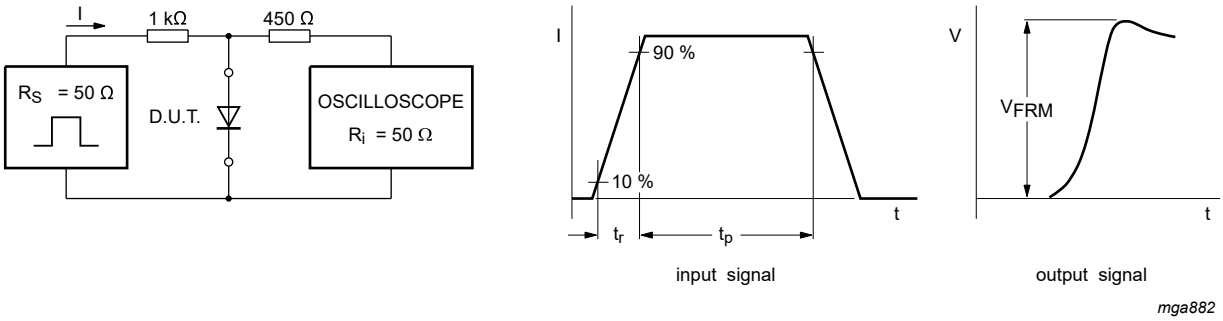
Fig. 7. Non-repetitive forward current as a function of pulse duration; typical values

11. Test information



(1) I_R = 1 mA
Input signal: reverse pulse rise time t_r = 0.6 ns; reverse voltage pulse duration t_p = 100 ns; duty cycle δ = 0.05
Oscilloscope: rise time t_r = 0.35 ns

Fig. 8. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time t_r = 20 ns; forward current pulse duration t_p ≥ 100 ns; duty cycle δ ≤ 0.005

Fig. 9. Forward recovery voltage 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

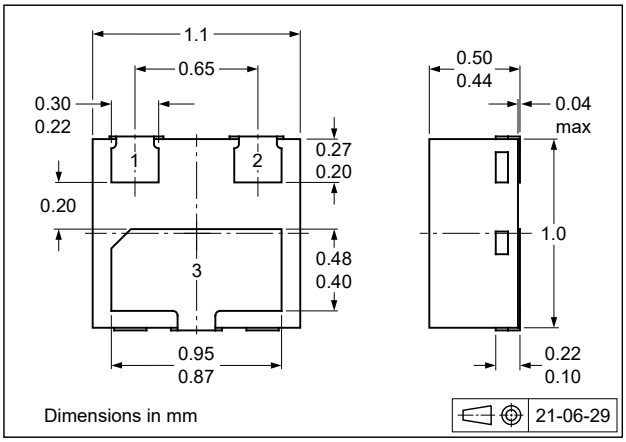


Fig. 10. Package outline DFN1110D-3 (SOT8015)

13. Soldering

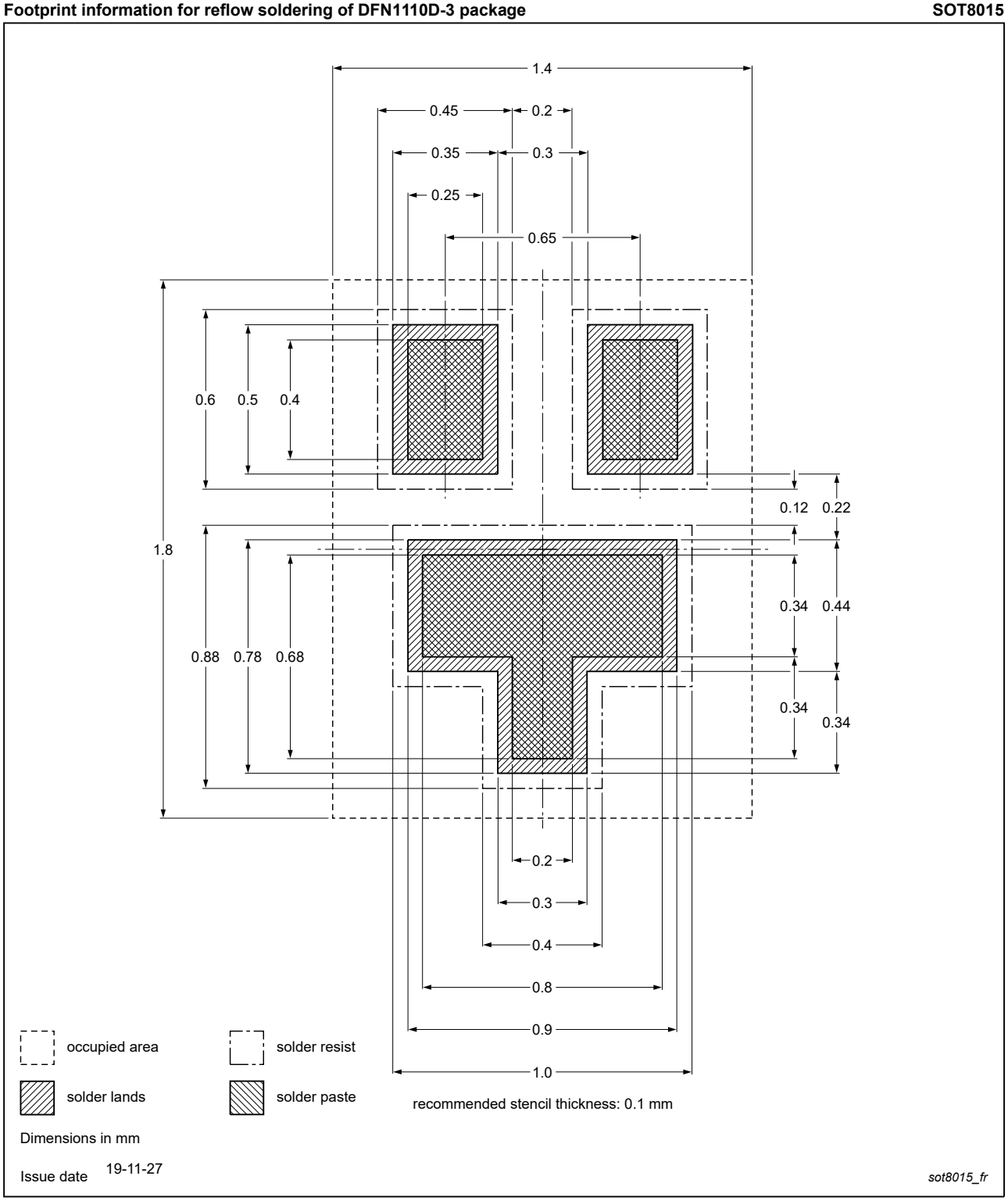


Fig. 11. Reflow soldering footprint for DFN1110D-3 (SOT8015)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAV70QB-Q v.1	20240313	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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