



BAS21QA-Q

High-voltage switching diode

22 April 2024

Product data sheet

1. General description

High-voltage switching diode, encapsulated in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

2. Features and benefits

- High switching speed: $t_{rr} \leq 50$ ns
- Low leakage current: $I_R \leq 100$ nA
- High reverse voltage: $V_R \leq 200$ V
- Low capacitance: $C_d \leq 2$ pF
- Ultra small and leadless SMD plastic package
- Low package height of 0.37 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

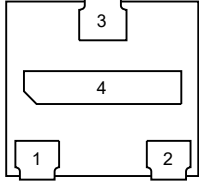
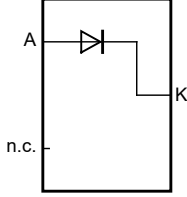
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_F	forward current	$T_j = 25$ °C	[1]	-	-	330	mA
V_R	reverse voltage			-	-	200	V
V_{RRM}	repetitive peak reverse voltage			-	-	250	V
V_F	forward voltage	$I_F = 200$ mA; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C		-	-	1.25	V
I_R	reverse current	$V_R = 200$ V; pulsed; $T_j = 25$ °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; $T_j = 25$ °C		-	-	50	ns

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>Transparent top view DFN1010D-3 (SOT1215)</p>	 <p>aaa-021941</p>
2	n.c.	not connected		
3	K	cathode		
4	K	cathode		

6. Ordering information

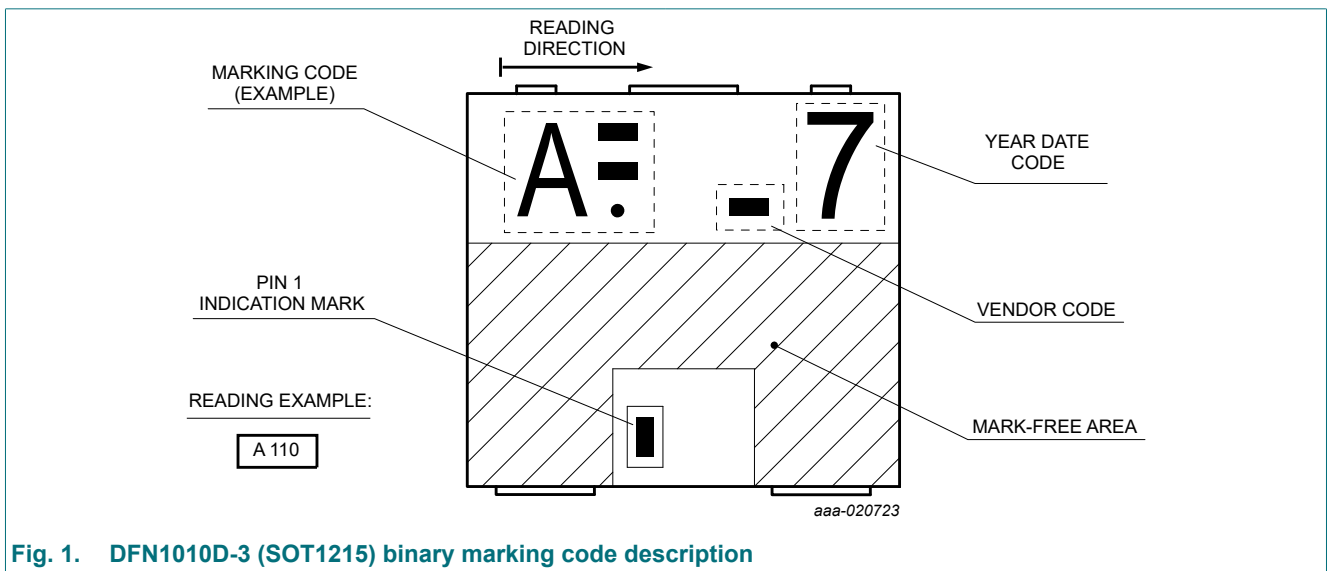
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21QA-Q	DFN1010D-3	plastic, leadless thermal enhanced ultra thin small outline package with side-wettable flanks (SWF); 3 terminals; 0.75 mm pitch; 1.1 mm x 1 mm x 0.37 mm body	SOT1215

7. Marking

Table 4. Marking codes

Type number	Marking code
BAS21QA-Q	X 001



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]	-	330	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	$t_p \leq 1\ \text{ms}$; $\delta \leq 0.25$		-	900	mA
P_{tot}	total power dissipation	$T_{\text{amb}} \leq 25\text{ °C}$	[1]	-	350	mW
			[2]	-	610	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode 1cm^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]	-	-	355	K/W
			[2]	-	-	205	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	45	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 1cm².
- [3] Soldering point of cathode tab.

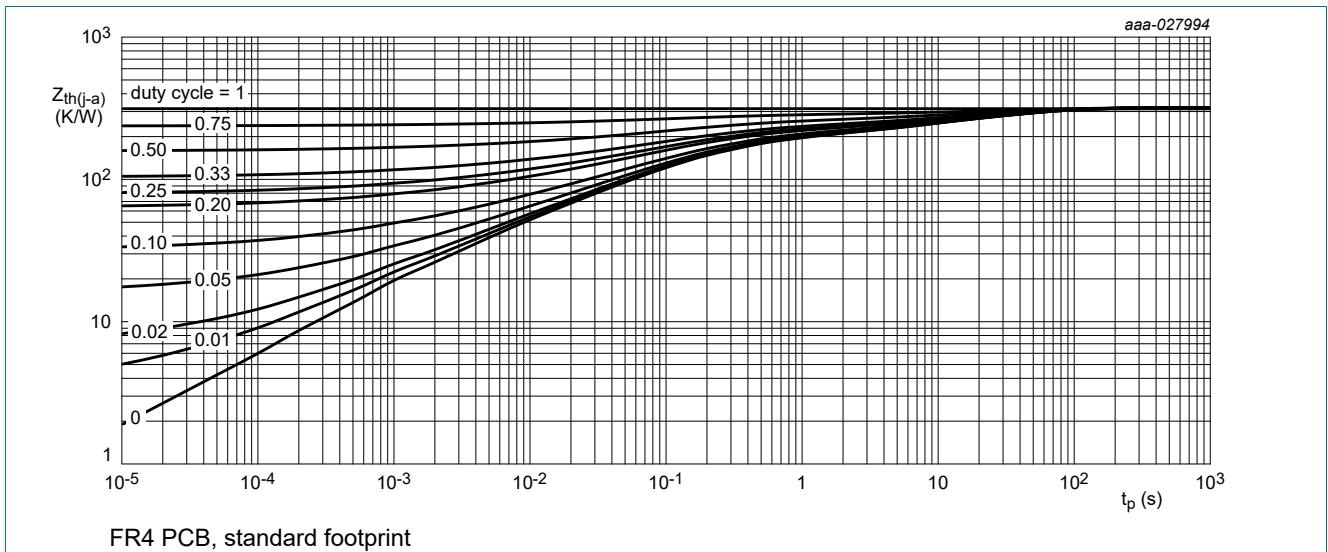


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

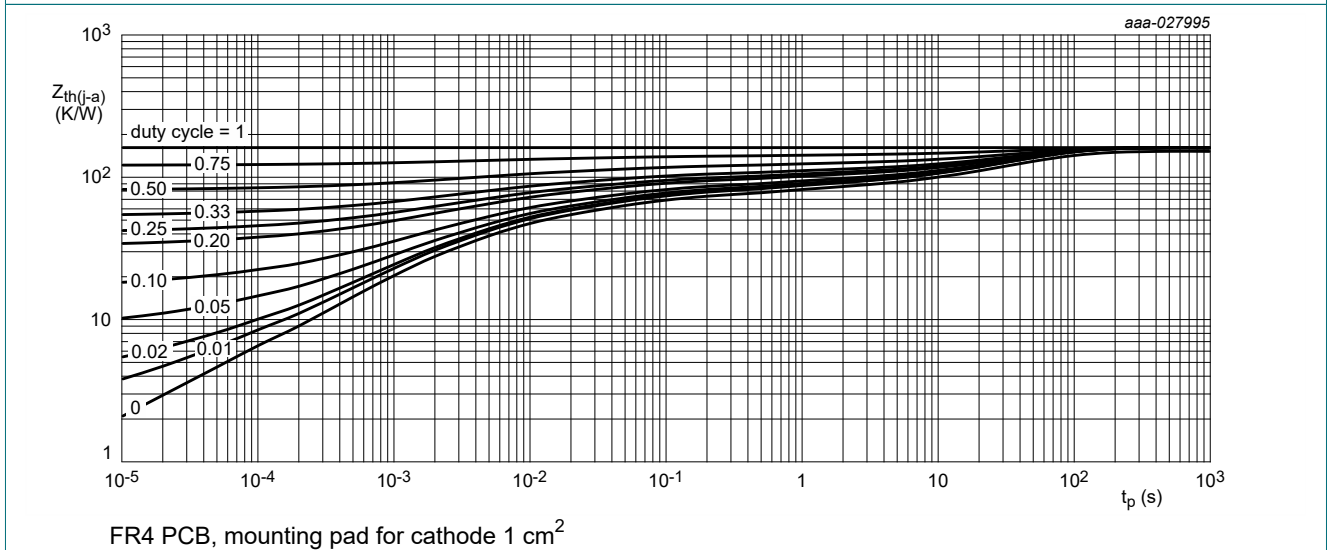
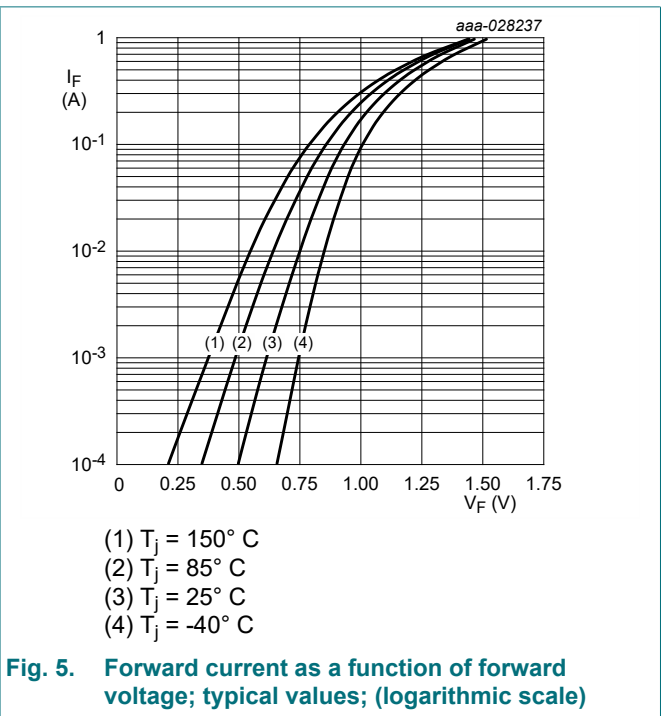
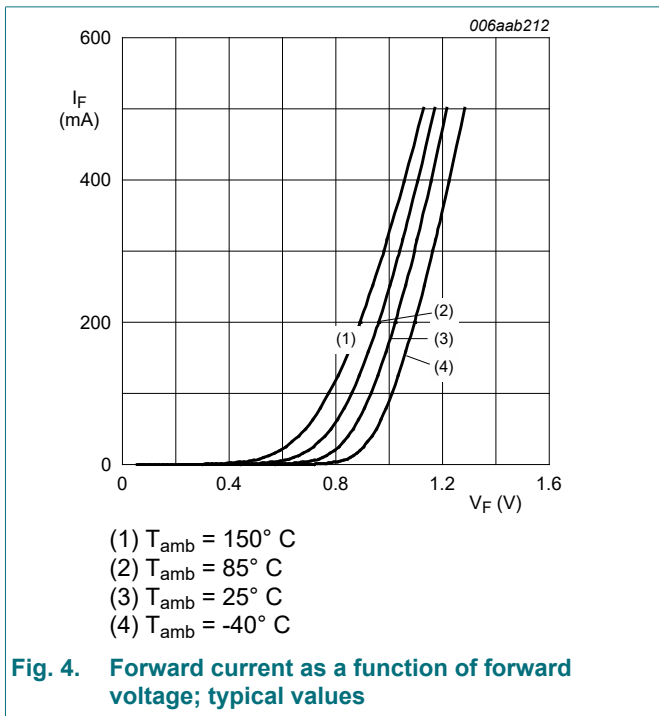


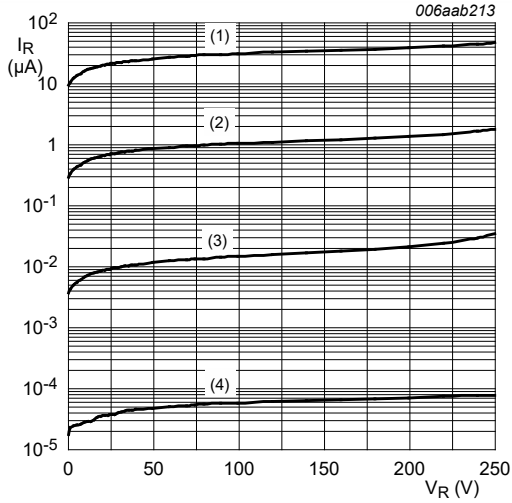
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

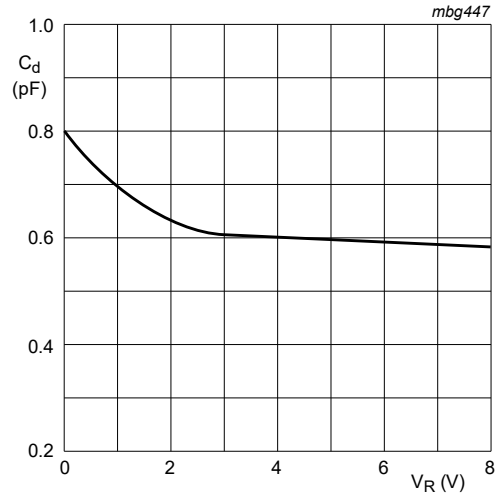
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	$I_F = 100 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ } ^\circ\text{C}$	-	-	1	V
		$I_F = 200 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ } ^\circ\text{C}$	-	-	1.25	V
I_R	reverse current	$V_R = 200 \text{ V}; \text{pulsed}; T_j = 25 \text{ } ^\circ\text{C}$	-	-	100	nA
		$V_R = 200 \text{ V}; \text{pulsed}; T_j = 150 \text{ } ^\circ\text{C}$	-	-	100	μA
C_d	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ } ^\circ\text{C}$	-	-	2	pF
t_{rr}	reverse recovery time	$I_F = 30 \text{ mA}; I_R = 30 \text{ mA}; R_L = 100 \text{ } \Omega;$ $I_{R(\text{meas})} = 3 \text{ mA}; T_j = 25 \text{ } ^\circ\text{C}$	-	-	50	ns





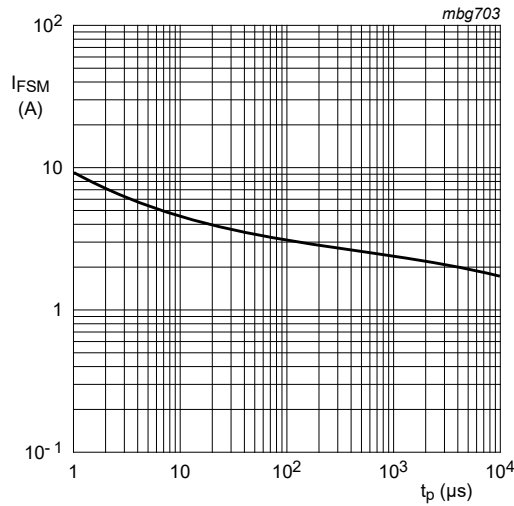
- (1) $T_{amb} = 150^{\circ}C$
- (2) $T_{amb} = 85^{\circ}C$
- (3) $T_{amb} = 25^{\circ}C$
- (4) $T_{amb} = -40^{\circ}C$

Fig. 6. Reverse current as a function of reverse voltage; typical values



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

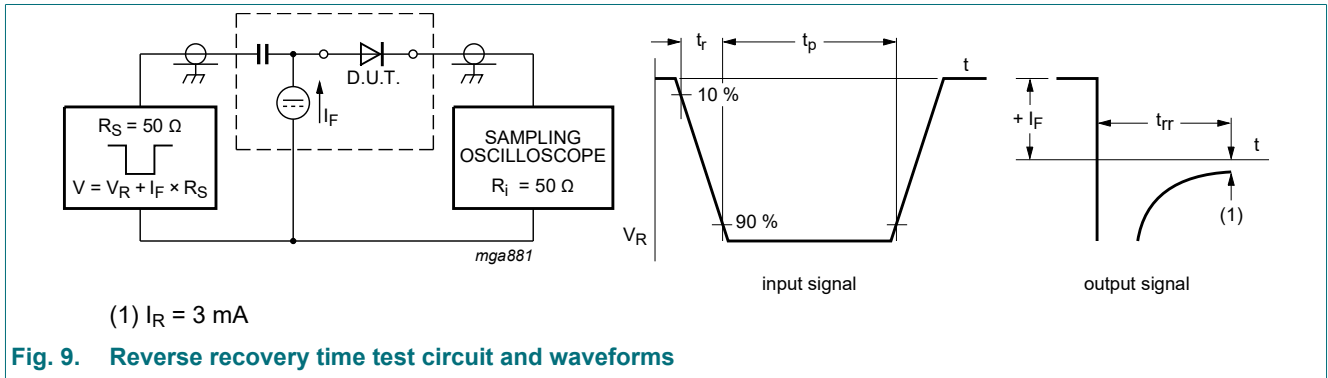
Fig. 7. Diode capacitance as a function of reverse voltage; typical values



Based on square wave currents.
 $T_{j(init)} = 25^{\circ}C$

Fig. 8. Non-repetitive peak forward current as a function of pulse duration; maximum values

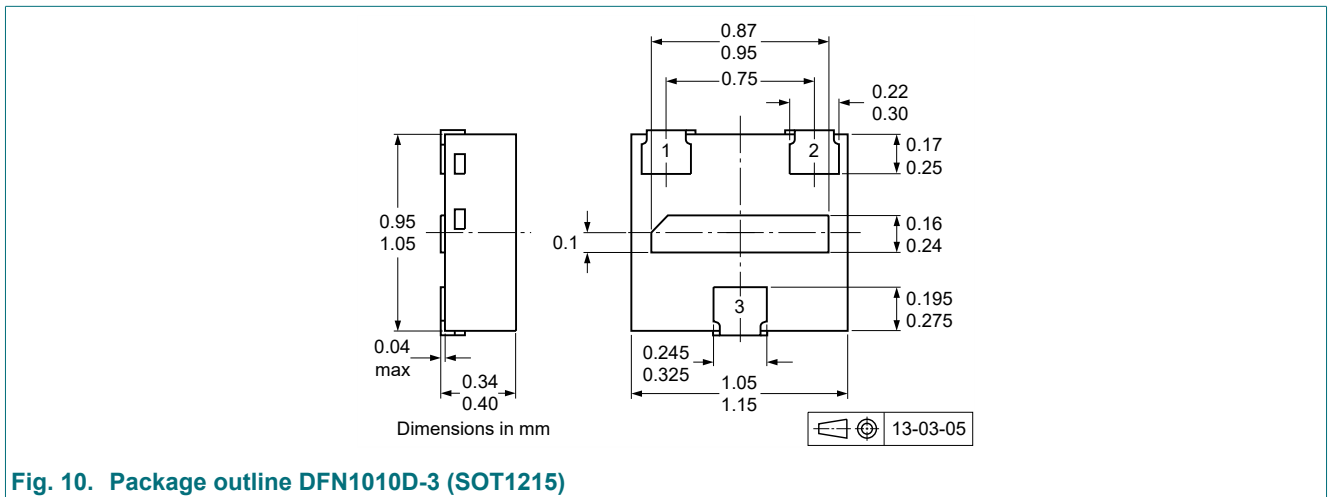
11. Test information



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



13. Soldering

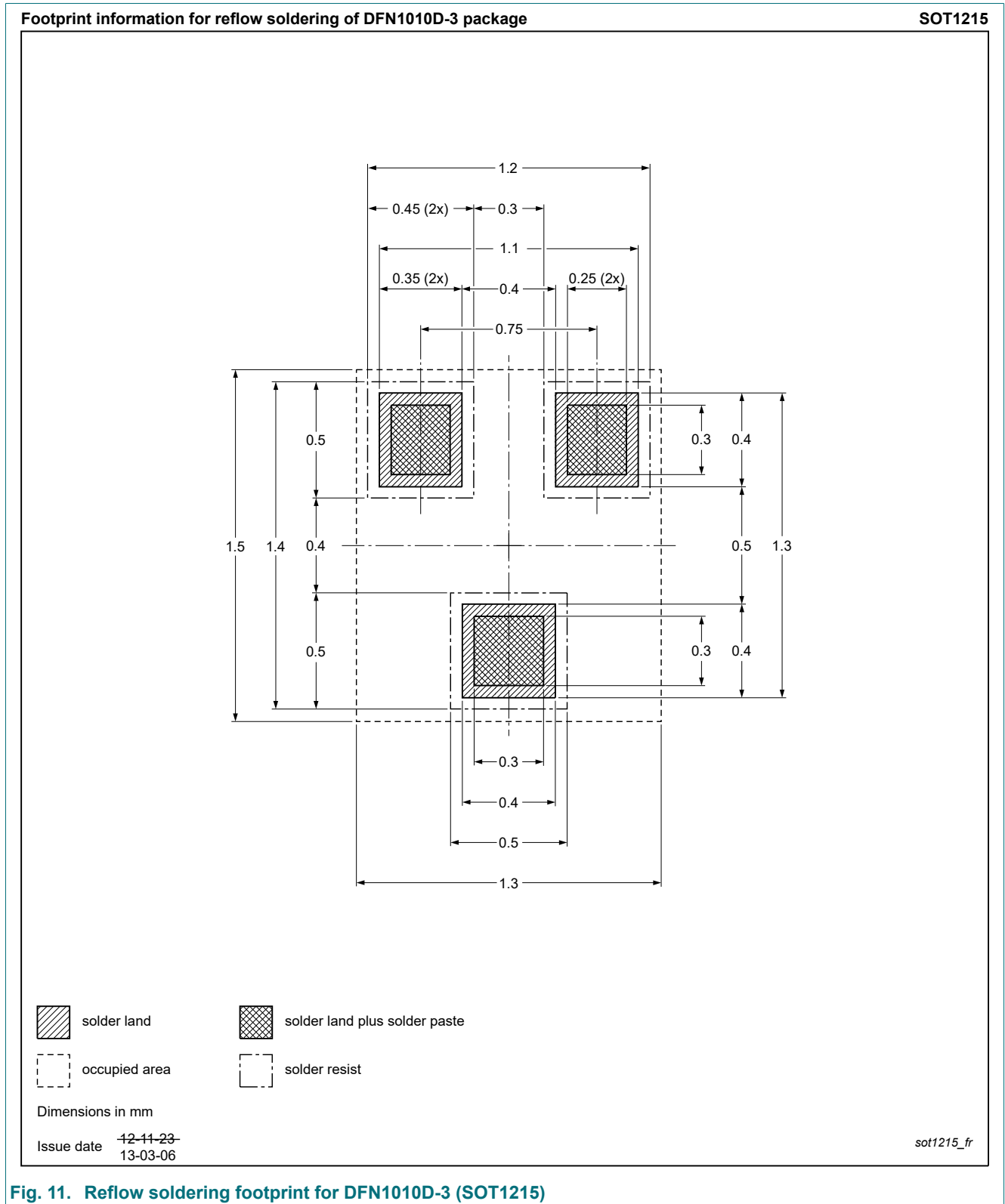


Fig. 11. Reflow soldering footprint for DFN1010D-3 (SOT1215)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21QA-Q v.1	20240422	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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