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BAW56QA

Dual common anode high-speed switching diode

4 May 2016 Product data sheet

1. General description

Dual common anode high-speed 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: $t_{rr} \leq 4$ ns
- Low leakage current
- Reverse voltage $V_R \leq 90$ V
- Low capacitance $C_d \leq 2$ pF
- Ultra small SMD plastic package
- Low package height of 0.37 mm
- AEC-Q101 qualified
- Suitable for Automatic Optical Inspection (AOI) of solder joint

3. Applications

- High-speed switching
- General-purpose switching

4. Quick reference data

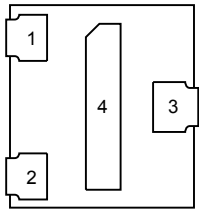
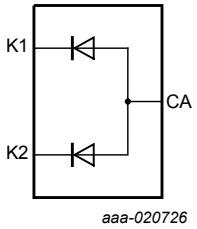
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current	T_{amb} = 25 °C; single diode loaded	[1]	-	-	310	mA
V_R	reverse voltage	T_j = 25 °C		-	-	90	V
V_F	forward voltage	I_F = 150 mA; T_j = 25 °C		-	-	1.25	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.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 Transparent top view **DFN1010D-3 (SOT1215)**	
2	K2	cathode (diode 2)		
3	CA	common anode		
4	CA	common anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAW56QA	DFN1010D-3	DFN1010D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 1.1 x 1.0 x 0.37 mm	SOT1215

7. Marking

Table 4. Marking codes

Type number	Marking code
BAW56QA	Z 001

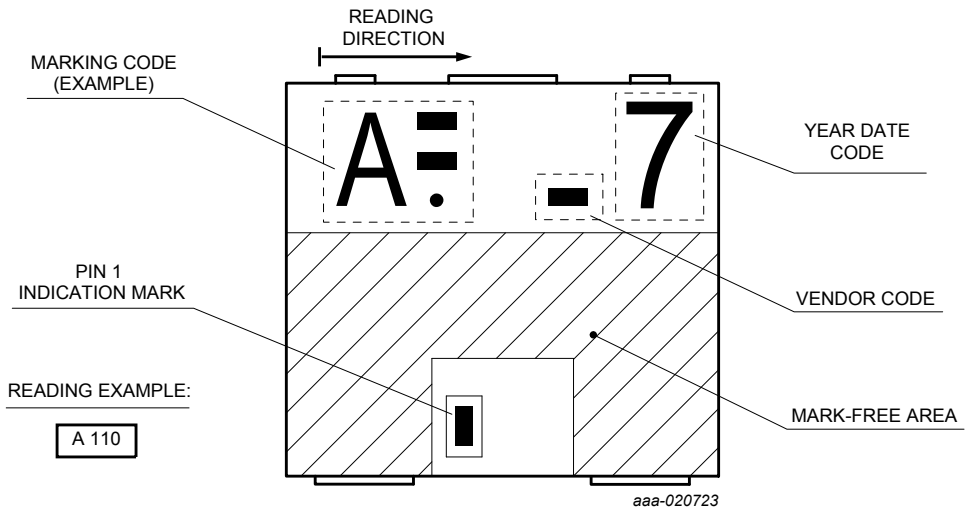


Fig. 1. DFN1010D-3 (SOT1215) binary marking code description

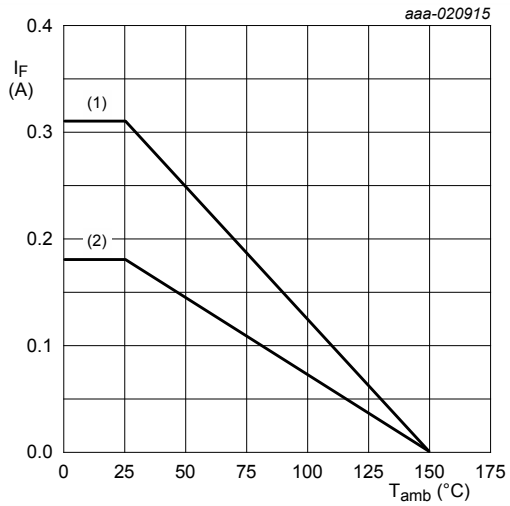
8. Limiting values

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		-	90	V
I_F	forward current	T_{amb} = 25 °C; single diode loaded	[1]	-	310	mA
		T_{amb} = 25 °C; double diode loaded	[1]	-	180	mA
I_{FRM}	repetitive peak forward current	$t_p \leq$ 0.5 ms; $\delta \leq$ 0.25 ; T_j = 25 °C		-	1	A
I_{FSM}	non-repetitive peak forward current	t_p = 100 µs; $T_{j(init)}$ = 25 °C; square wave		-	4	A
		t_p = 1 ms; $T_{j(init)}$ = 25 °C; square wave		-	1.5	A
		t_p = 1 s; $T_{j(init)}$ = 25 °C; square wave		-	0.5	A
Per device; one diode loaded						
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	325	mW
			[2]	-	540	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 cm².



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

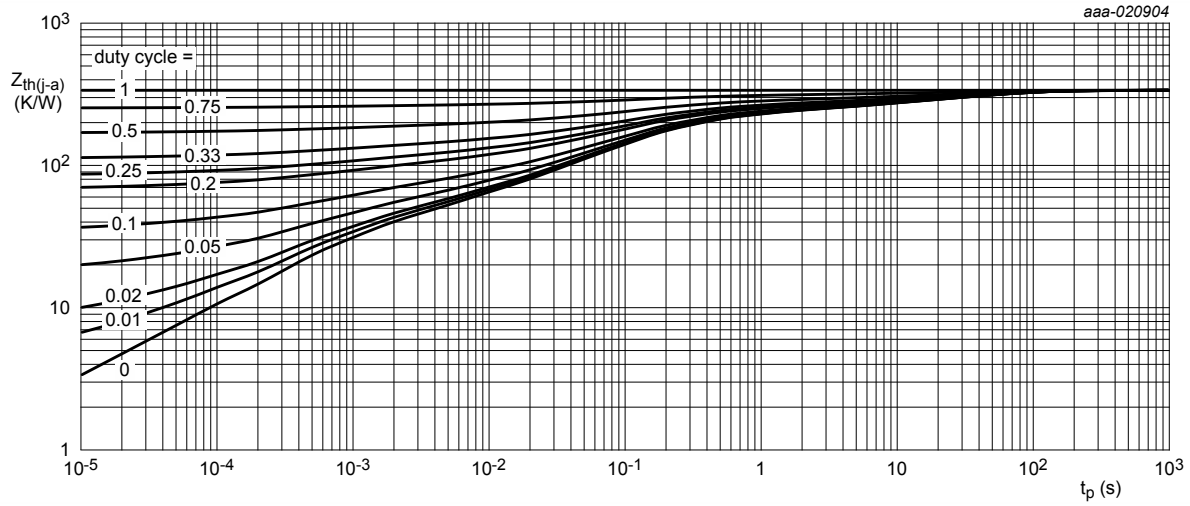
Fig. 2. Forward current as a function of ambient temperature; derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

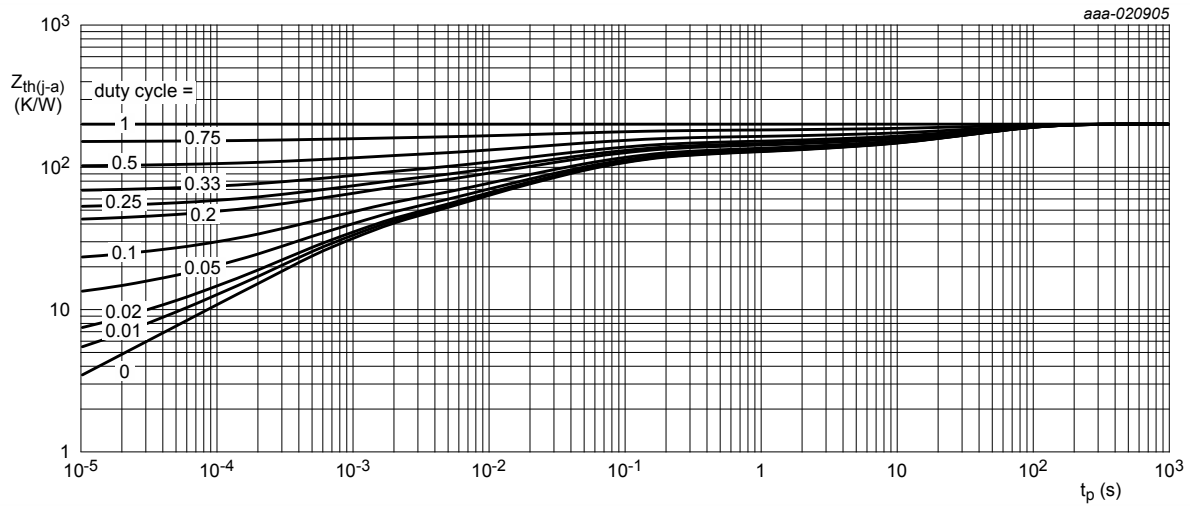
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	385	K/W
			[2]	-	-	230	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	50	K/W

[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 cm².
[3] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



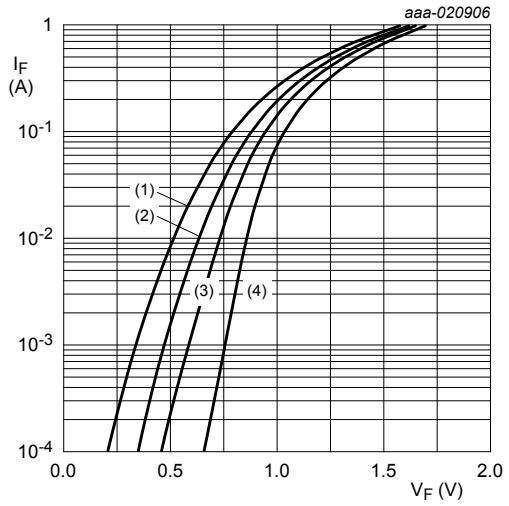
FR4 PCB, mounting pad for cathode 1 cm²

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

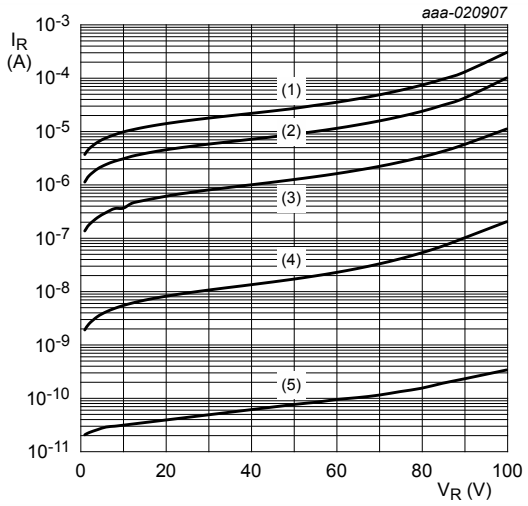
Table 7. Characteristics

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		-	-	150	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_{amb} = 25 °C		-	-	2	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_{FR}	forward recovery voltage	I_F = 10 mA; t_r = 20 ns; T_{amb} = 25 °C		-	-	1.75	V



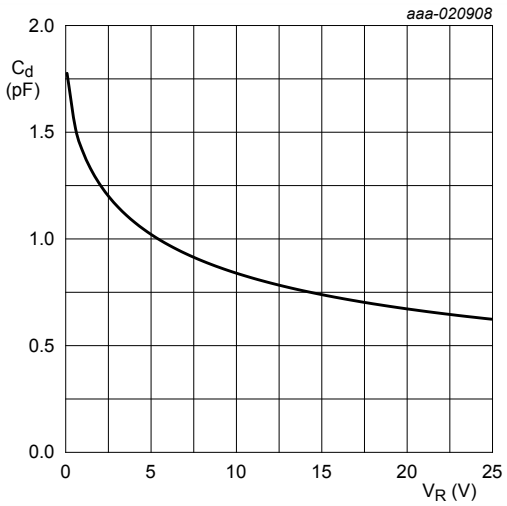
(1) T_j = 150 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

Fig. 5. Forward current as a function of forward voltage; typical values



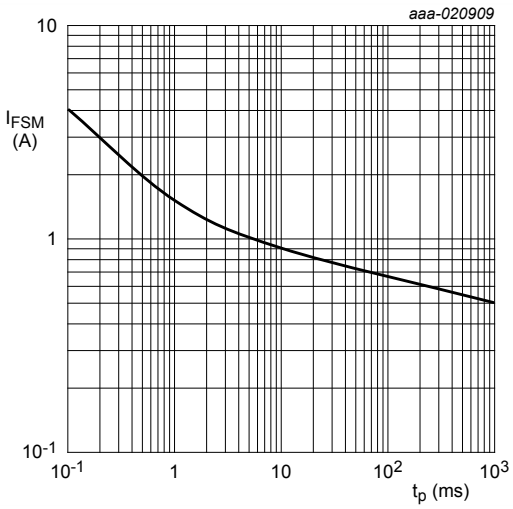
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

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



f = 1MHz; T_{amb} = 25 °C

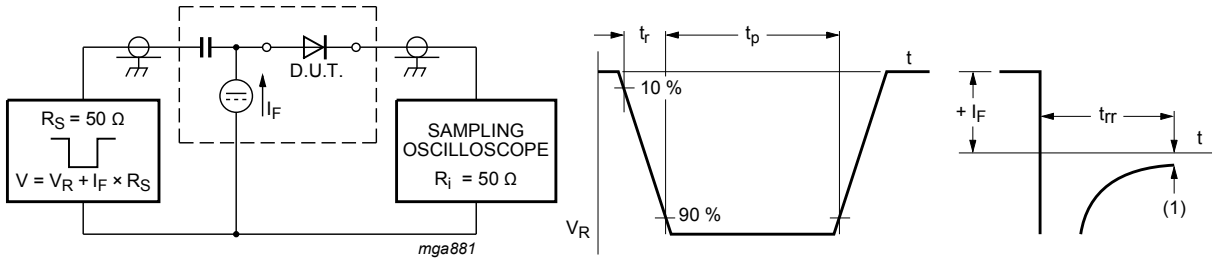
Fig. 7. Diode capacitance as a function of reverse voltage; typical values



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

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

11. Test information



(1) I_R = 1 mA

Fig. 9. Reverse recovery time test circuit and waveforms

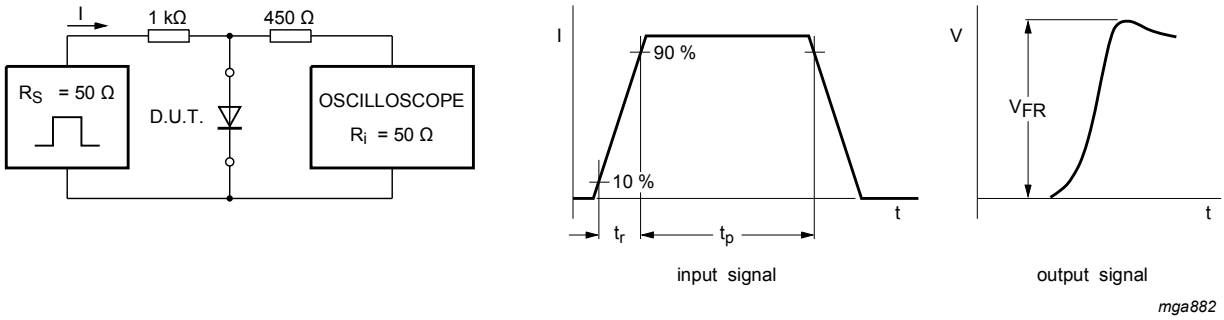


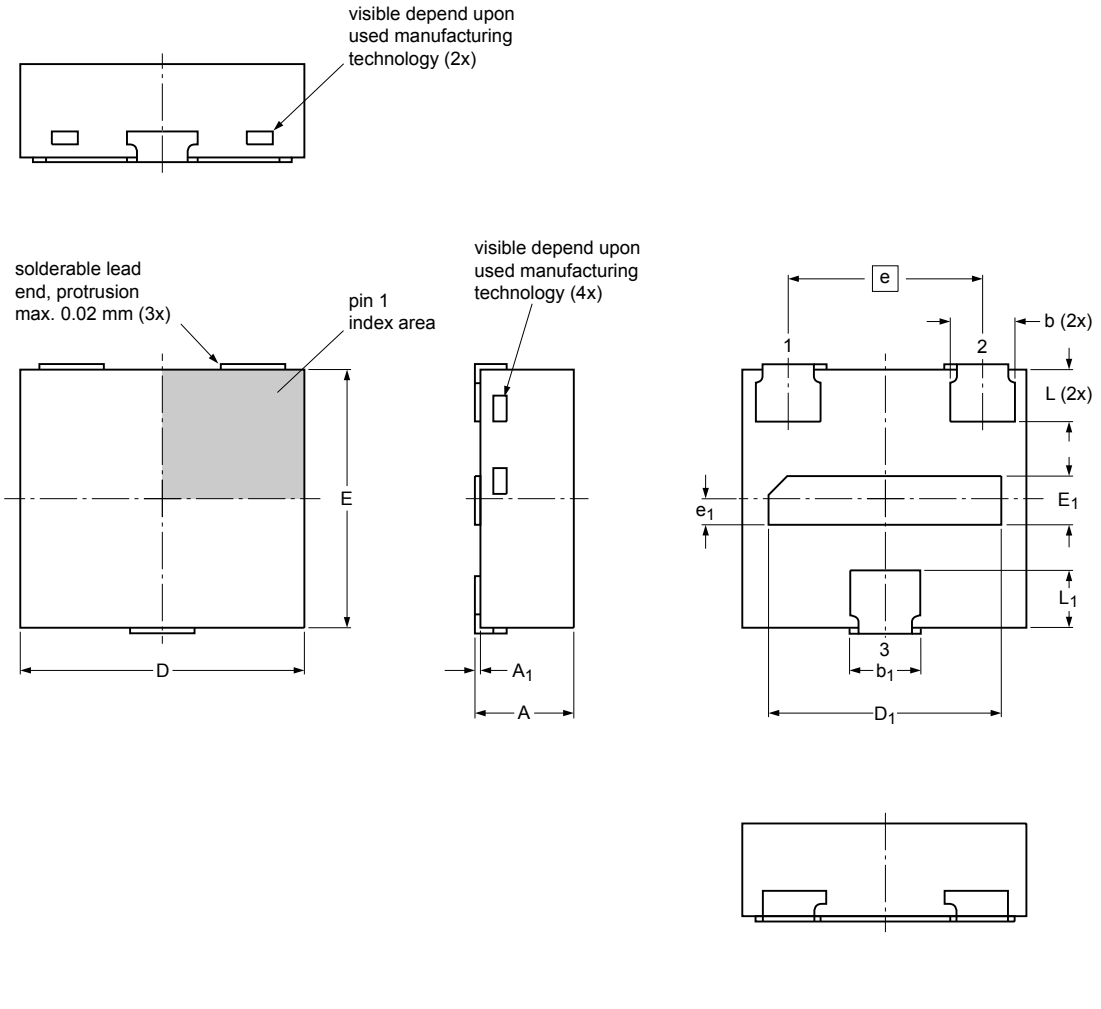
Fig. 10. Forward recovery voltage test circuit and waveforms

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

DFN1010D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 x 1.0 x 0.37 mm **SOT1215**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	b_1	D	D_1	E	E_1	e	e_1	L	L_1
	min	0.34		0.22	0.245	1.05	0.87	0.95	0.16			0.17	0.195
mm	nom	0.37		0.25	0.275	1.10	0.90	1.00	0.19	0.75	0.1	0.20	0.225
	max	0.40	0.04	0.30	0.325	1.15	0.95	1.05	0.24			0.25	0.275

Note
1. Dimension A is including plating thickness.

sot1215_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1215						~~13-03-05~~ 13-03-06

Fig. 11. Package outline DFN1010D-3 (SOT1215)

13. Package outline

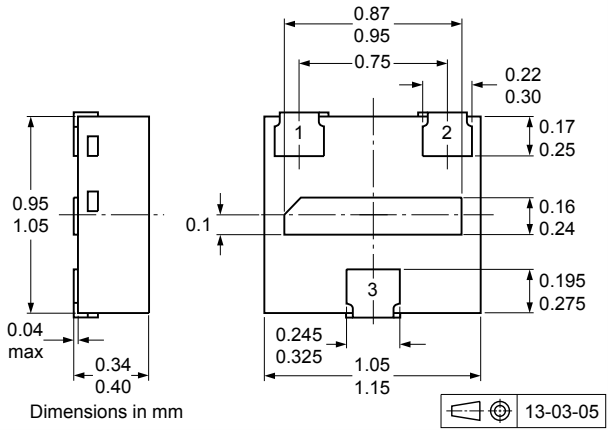


Fig. 12. Package outline DFN1010D-3 (SOT1215)

14. Soldering

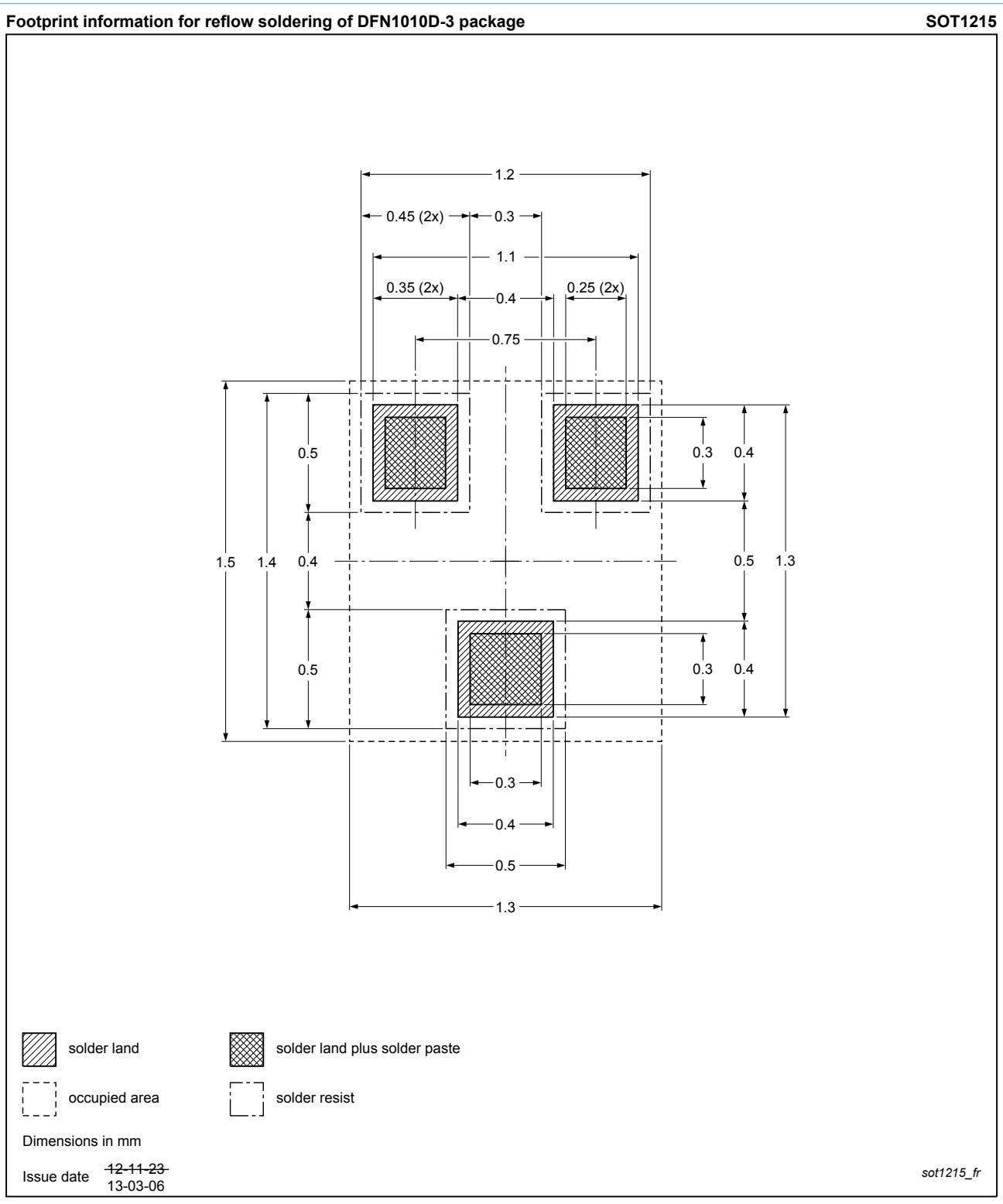


Fig. 13. Reflow soldering footprint for DFN1010D-3 (SOT1215)

15. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAW56QA v.3	20160504	Product data sheet	-	BAW56QA v.2
Modifications:	• Characteristics table: corrected typing error, replaced parameter peak forward recovery voltage V_{FRM} with forward recovery voltage V_{FR}			
BAW56QA v.2	20160129	Product data sheet	-	BAW56QA v.1
BAW56QA v.1	20151211	Product data sheet	-	-

16. 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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17. Contents

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Date of release: 04 May 2016