

# 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

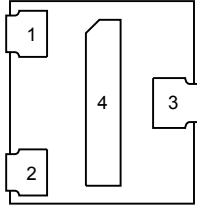
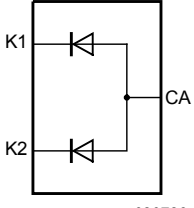
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per diode</b>							
$I_F$	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)	 <p>Transparent top view <b>DFN1010D-3 (SOT1215)</b></p>	 <p>aaa-020726</p>
2	K2	cathode (diode 2)		
3	CA	common anode		
4	CA	common anode		

### 6. Ordering information

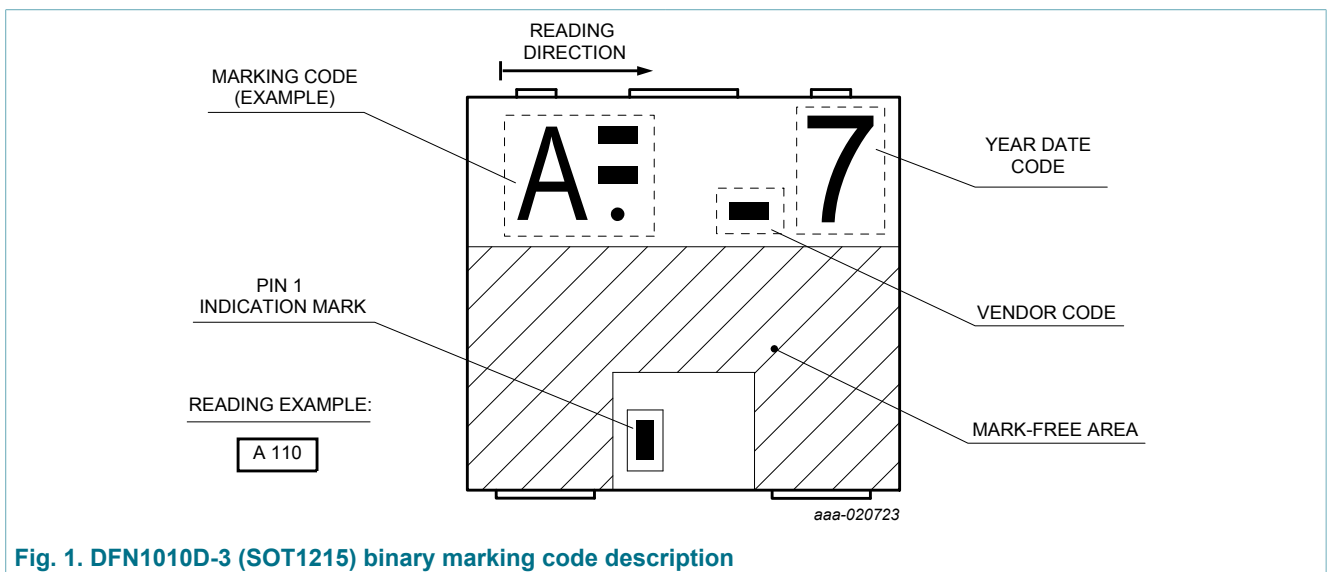
Table 3. Ordering information

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



## 8. Limiting values

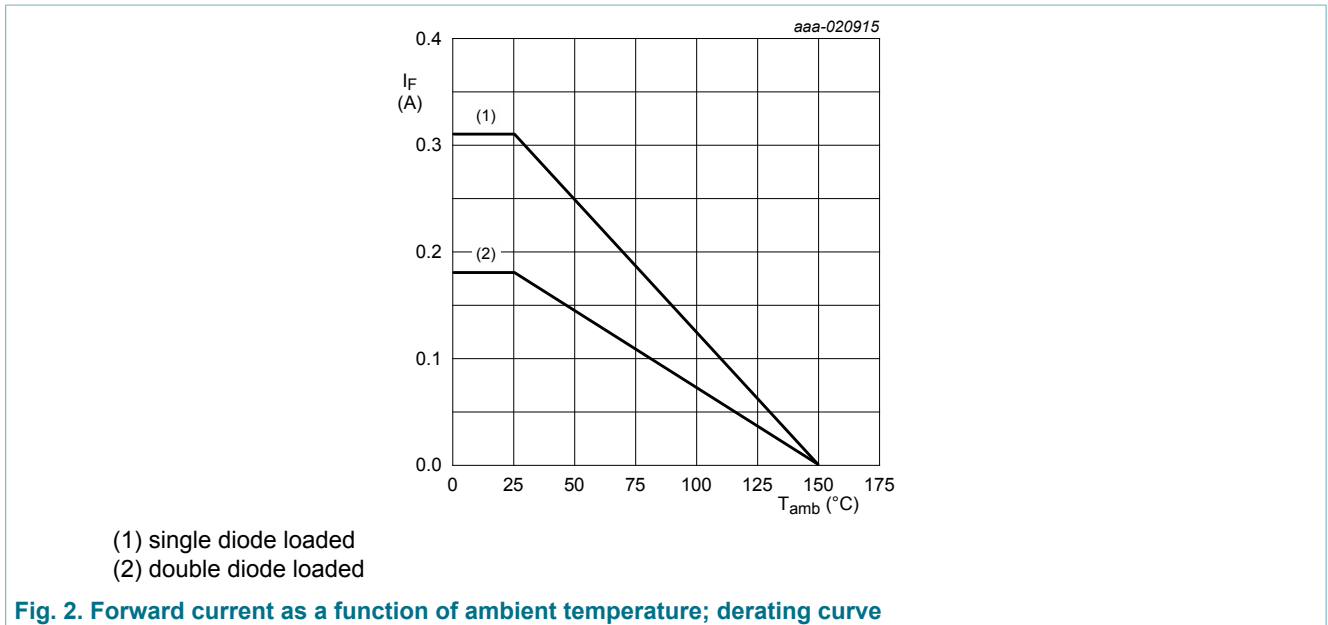
**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per diode</b>						
$V_R$	reverse voltage	$T_j = 25\text{ °C}$		-	90	V
$I_F$	forward current	$T_{amb} = 25\text{ °C}$ ; single diode loaded	[1]	-	310	mA
		$T_{amb} = 25\text{ °C}$ ; double diode loaded	[1]	-	180	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 0.5\text{ ms}$ ; $\delta \leq 0.25$ ; $T_j = 25\text{ °C}$		-	1	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 100\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave		-	4	A
		$t_p = 1\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave		-	1.5	A
		$t_p = 1\text{ s}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave		-	0.5	A
<b>Per device; one diode loaded</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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 cm<sup>2</sup>.



## 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 cm<sup>2</sup>.
- [3] Soldering point of cathode tab.

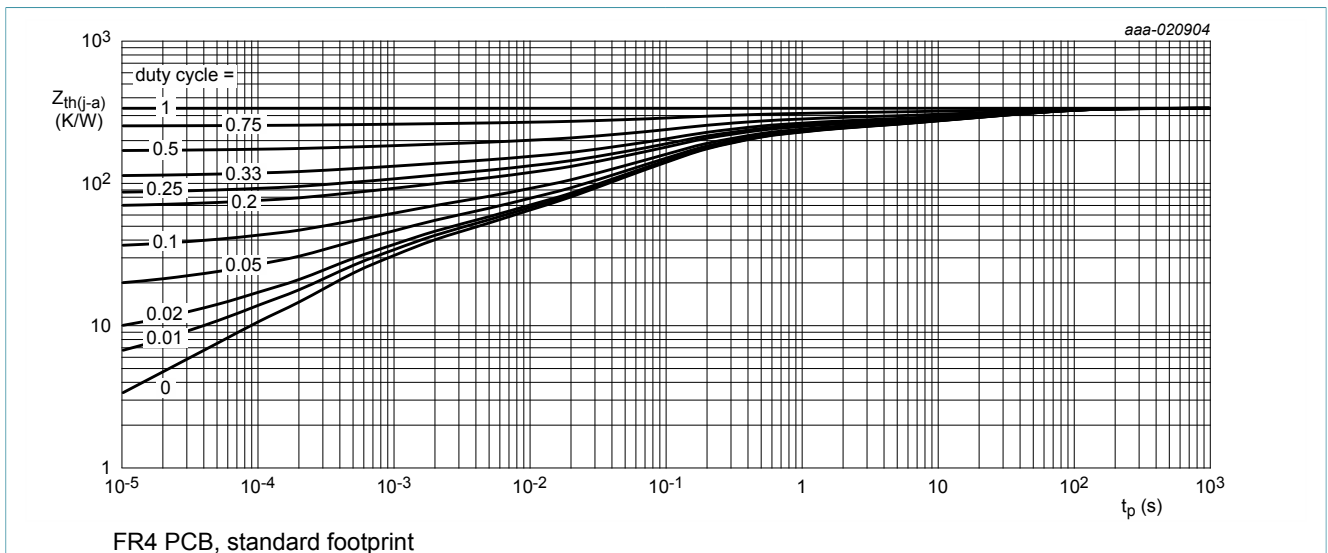


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

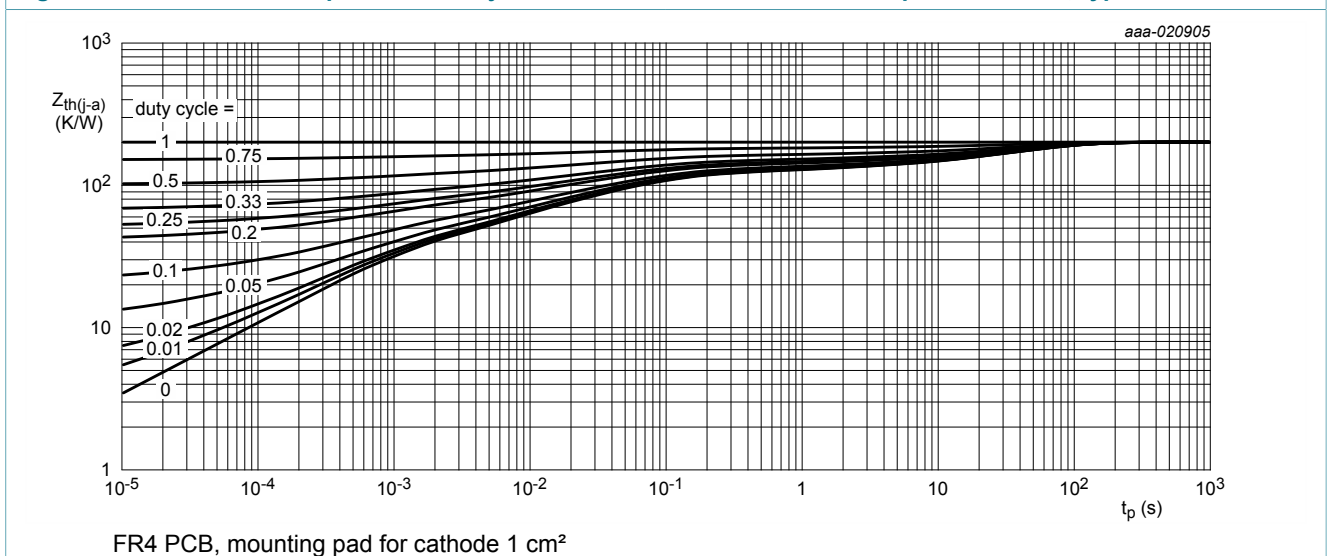


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_F$	forward voltage	$I_F = 1 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	715	mV
		$I_F = 10 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	855	mV
		$I_F = 50 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1	V
		$I_F = 150 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1.25	V
$I_R$	reverse current	$V_R = 25 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	30	nA
		$V_R = 80 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	0.5	$\mu\text{A}$
		$V_R = 25 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	30	$\mu\text{A}$
		$V_R = 80 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	150	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	2	pF
$t_{rr}$	reverse recovery time	$I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; I_{R(\text{meas})} = 1 \text{ mA}; R_L = 100 \text{ } \Omega; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	4	ns
$V_{FR}$	forward recovery voltage	$I_F = 10 \text{ mA}; t_r = 20 \text{ ns}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1.75	V

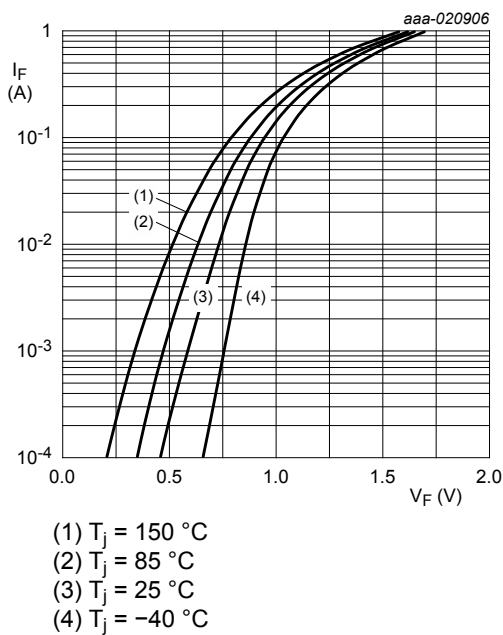


Fig. 5. Forward current as a function of forward voltage; typical values

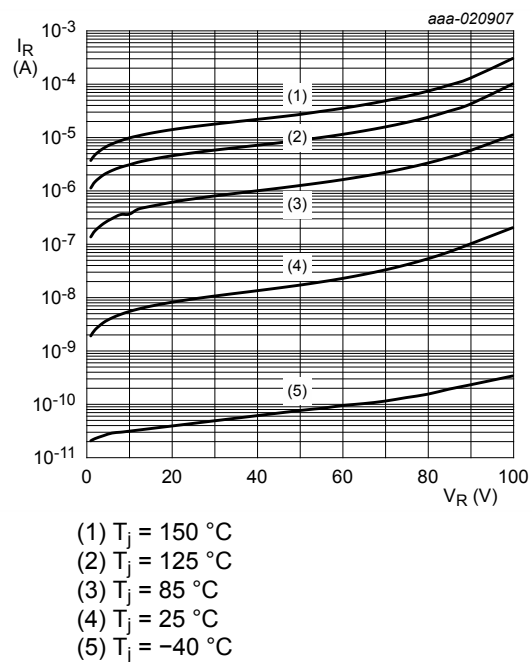


Fig. 6. Reverse current as a function of reverse voltage; typical values

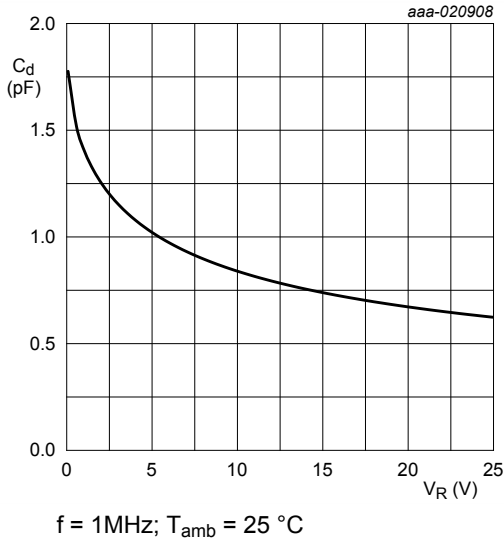


Fig. 7. Diode capacitance as a function of reverse voltage; typical values

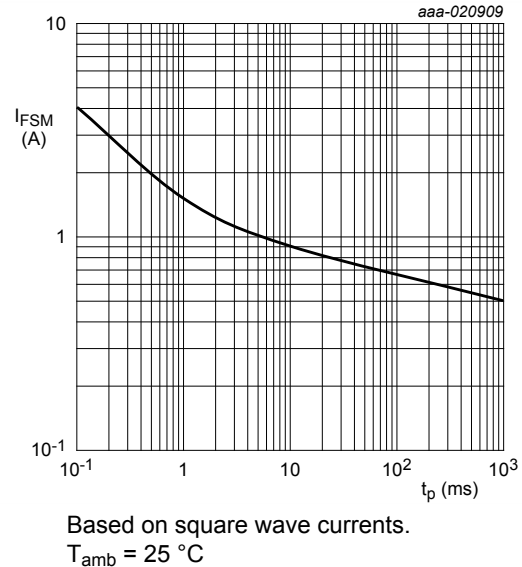


Fig. 8. Non-repetitive forward current as a function of pulse duration; maximum values

## 11. Test information

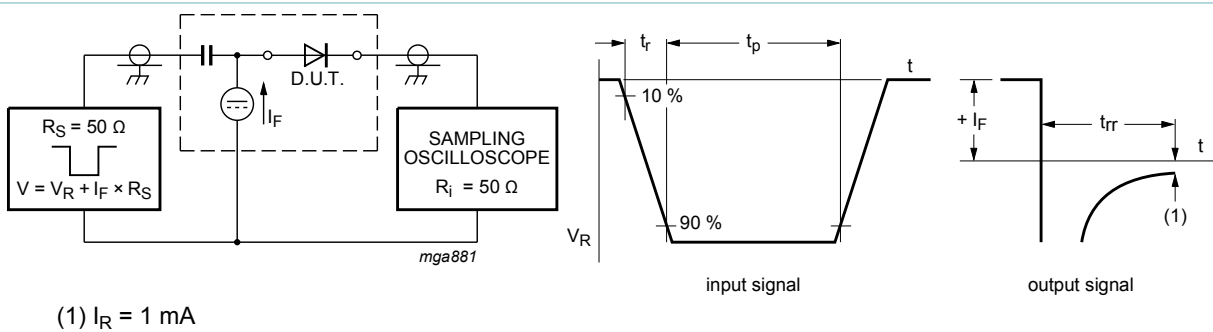


Fig. 9. Reverse recovery time test circuit and waveforms

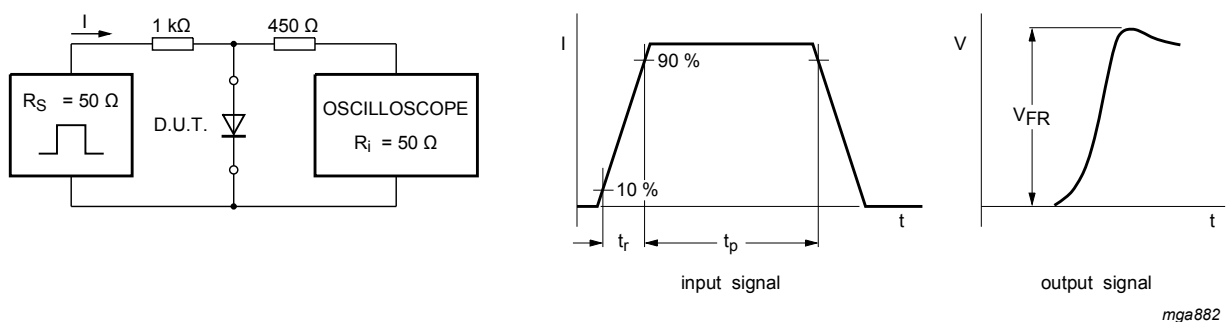


Fig. 10. Forward recovery voltage test circuit and waveforms

### 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

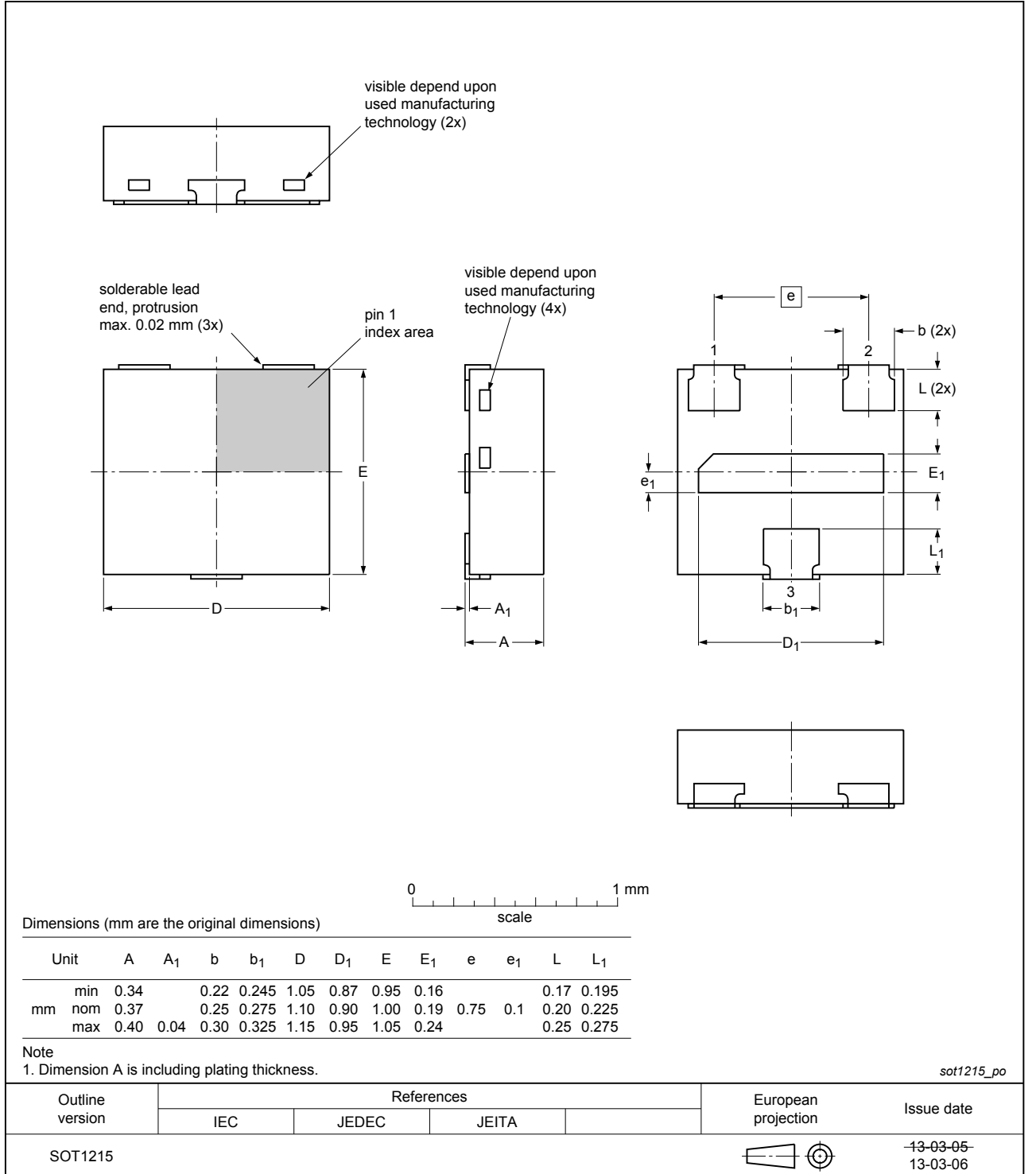


Fig. 11. Package outline DFN1010D-3 (SOT1215)

### 13. Package outline

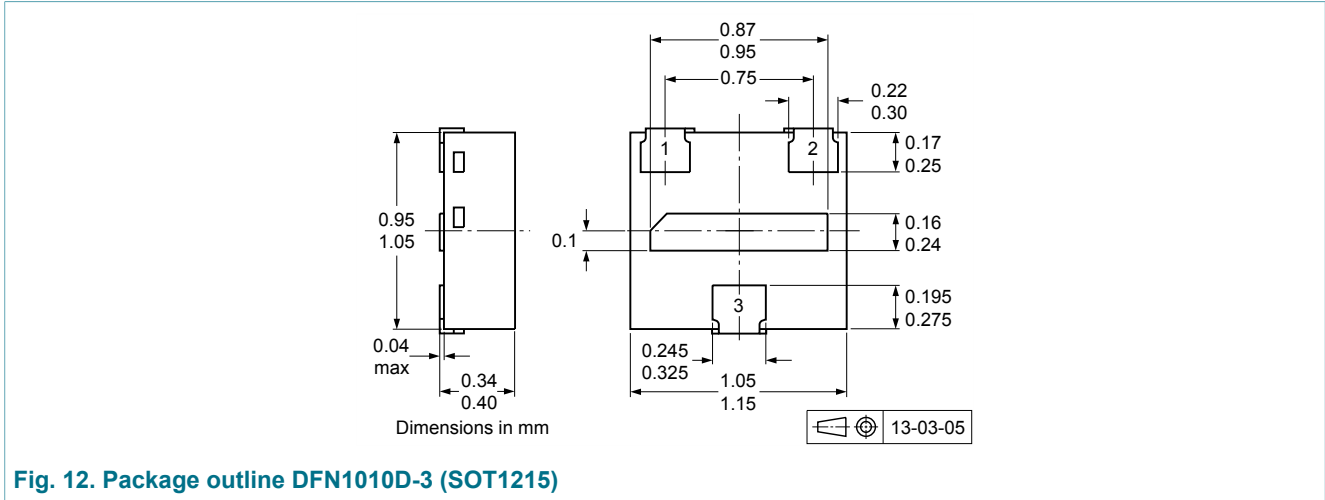


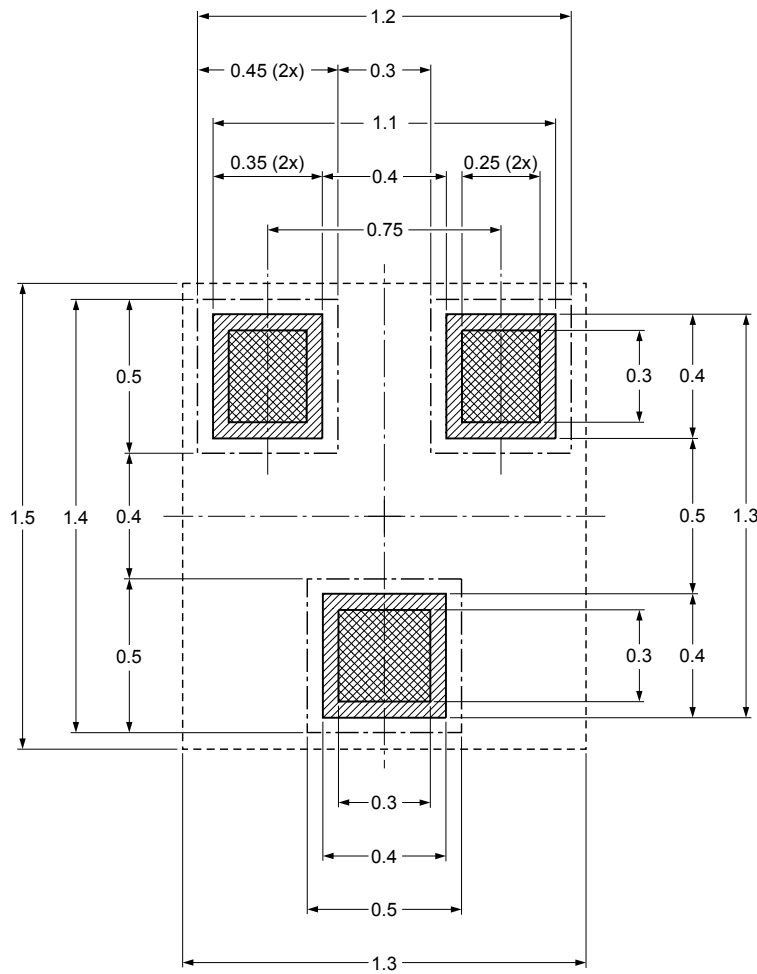
Fig. 12. Package outline DFN1010D-3 (SOT1215)



### 14. Soldering

Footprint information for reflow soldering of DFN1010D-3 package

SOT1215



- solder land
- solder land plus solder paste
- occupied area
- solder resist

Dimensions in mm

Issue date ~~12-11-23~~  
13-03-06

sot1215\_fr

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:	<ul style="list-style-type: none"><li>Characteristics table: corrected typing error, replaced parameter peak forward recovery voltage <math>V_{FRM}</math> with forward recovery voltage <math>V_{FR}</math></li></ul>			
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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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