



# BAS21QA

## High-voltage switching diode

9 April 2018

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
- AEC-Q101 qualified

## 3. Applications

- High-speed switching
- General-purpose switching
- Voltage clamping
- Reverse polarity protection

## 4. Quick reference data

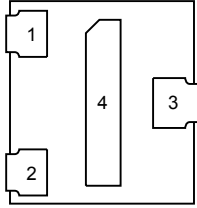
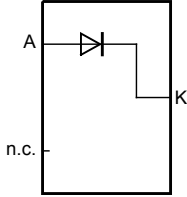
Table 1. Quick reference data

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; $t_p \leq 300$ $\mu$ 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; $R_L = 100$ $\Omega$ ; $I_{R(meas)} = 3$ 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 <b>DFN1010D-3 (SOT1215)</b></p>	 <p>aaa-021941</p>
2	n.c.	not connected		
3	K	cathode		
4	K	cathode		

## 6. Ordering information

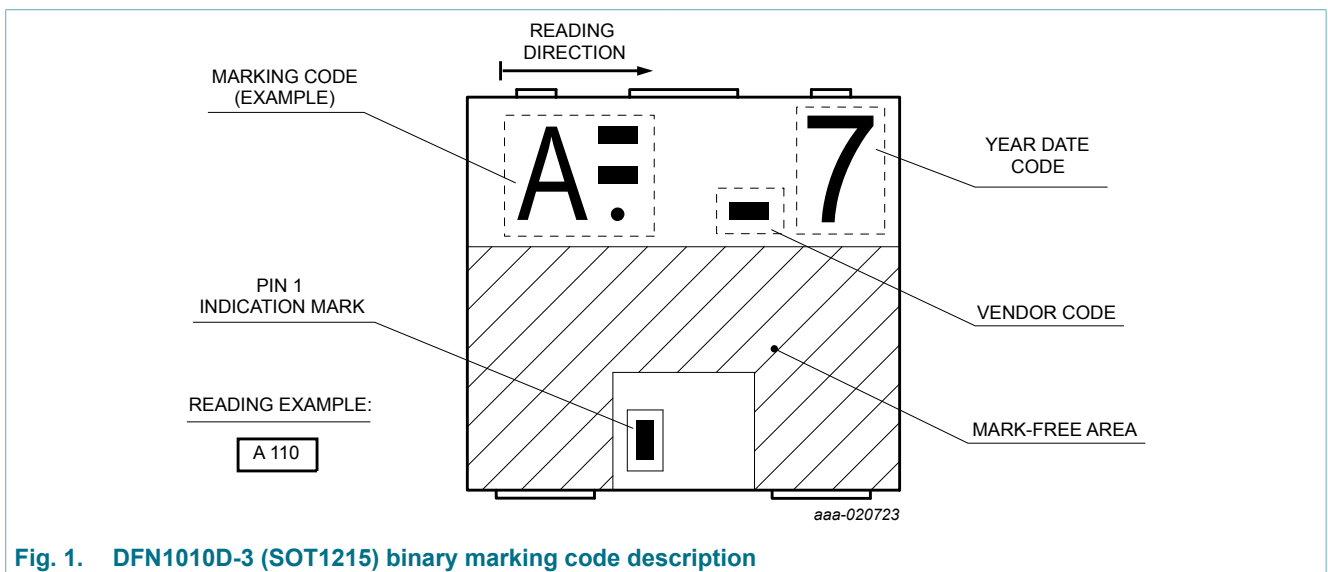
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21QA	DFN1010D-3	plastic, thermal enhanced ultra thin small outline package; 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	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	$t_p = 1\text{ }\mu\text{s}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$		-	9	A
		$t_p = 100\text{ }\mu\text{s}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$		-	3	A
		$t_p = 10\text{ ms}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$		-	1.7	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ ms}; \delta \leq 0.25$		-	900	mA
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25\text{ °C}$	[1]	-	350	mW
			[2]	-	610	mW
$T_j$	junction temperature			-	150	°C
$T_{\text{amb}}$	ambient temperature			-55	150	°C
$T_{\text{stg}}$	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<sup>2</sup>.

## 9. Thermal characteristics

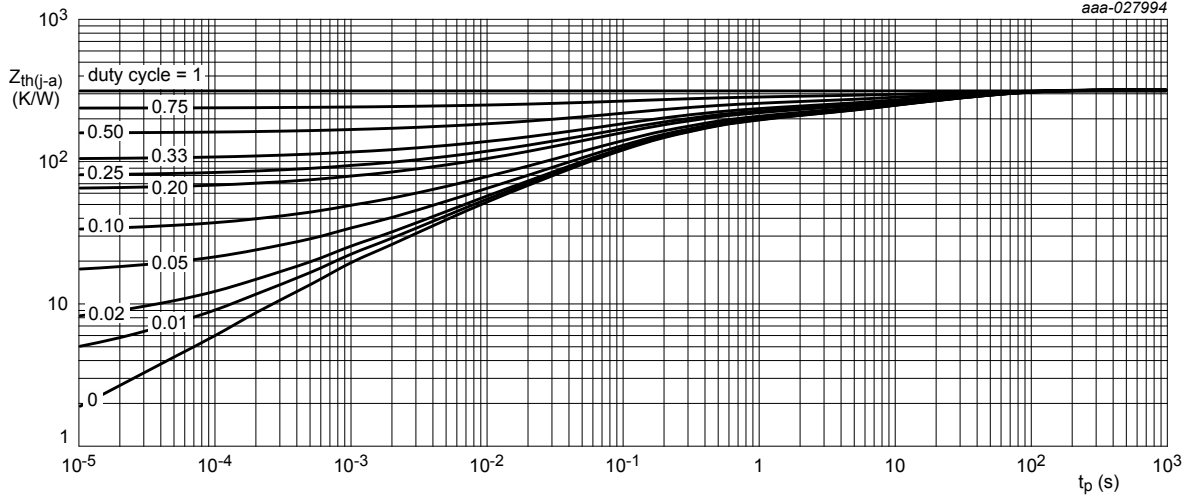
**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{\text{th}(j-a)}$	thermal resistance from junction to ambient	In free air	[1]	-	-	355	K/W
			[2]	-	-	205	K/W
$R_{\text{th}(j-sp)}$	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.

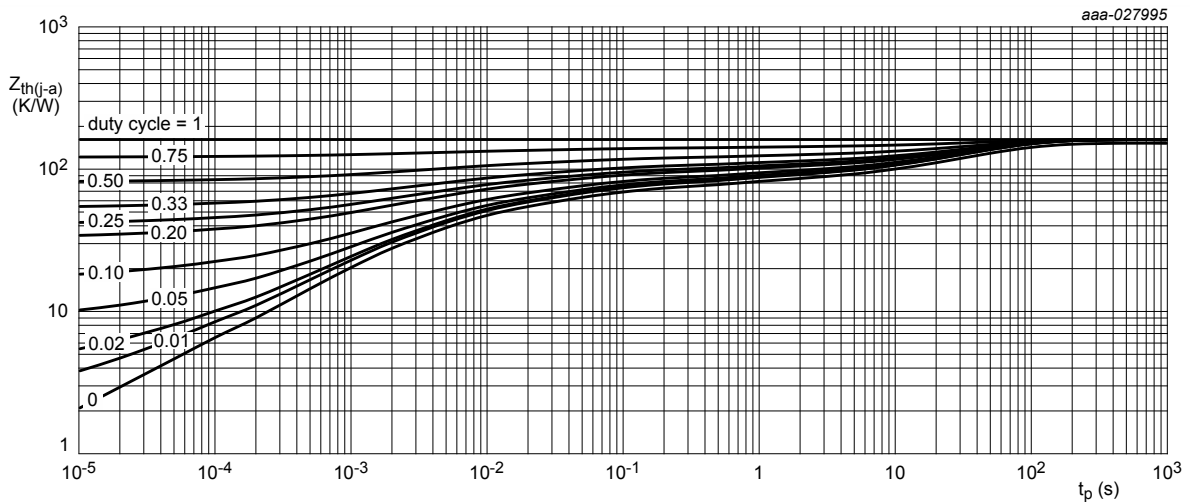
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for cathode 1cm<sup>2</sup>.

[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



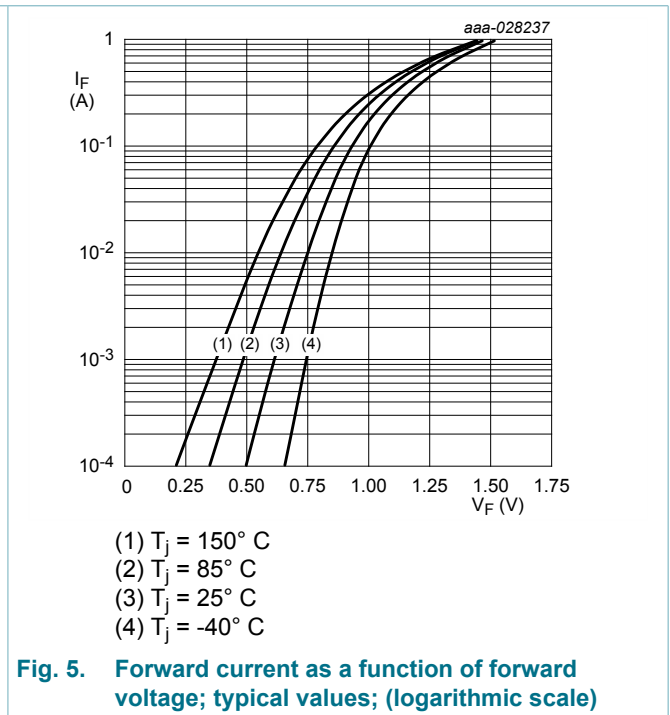
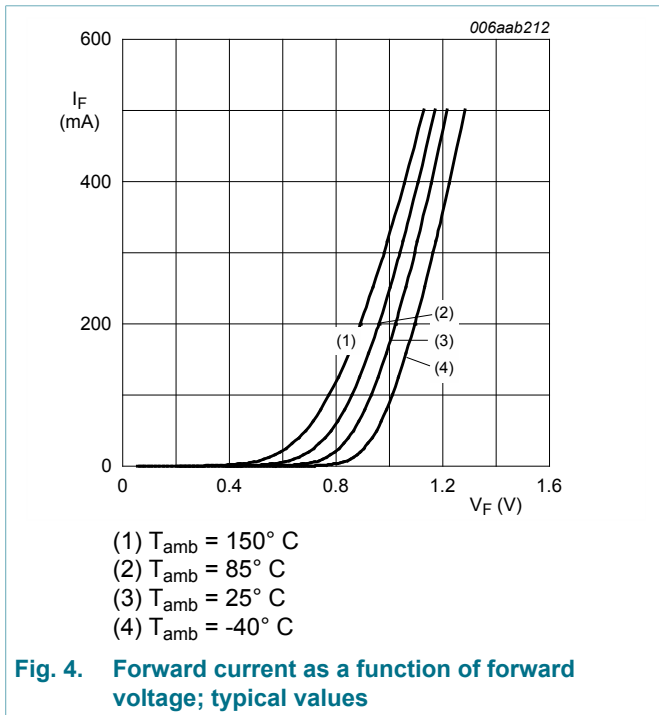
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>

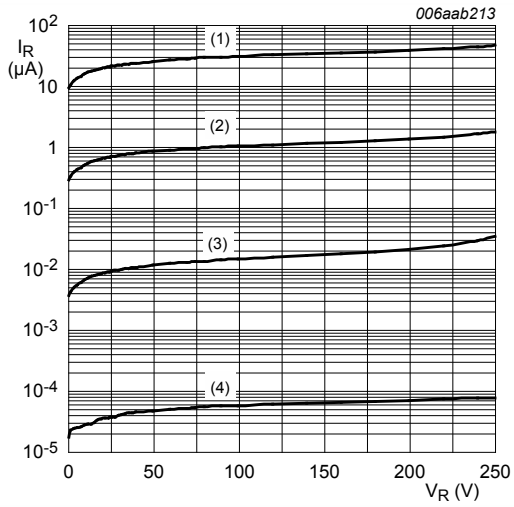
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

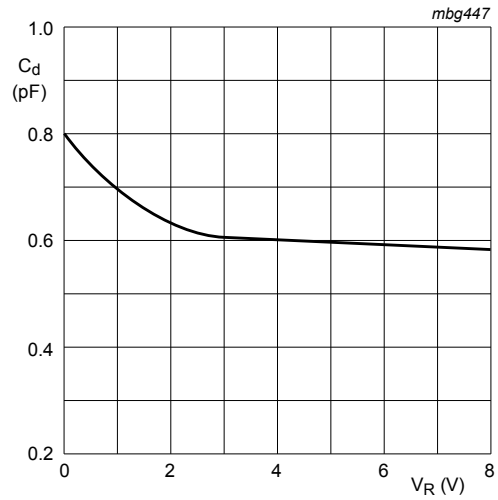
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 100 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ } ^\circ\text{C}$	-	-	1	V
		$I_F = 200 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ } ^\circ\text{C}$	-	-	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	$\mu\text{A}$
$C_d$	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





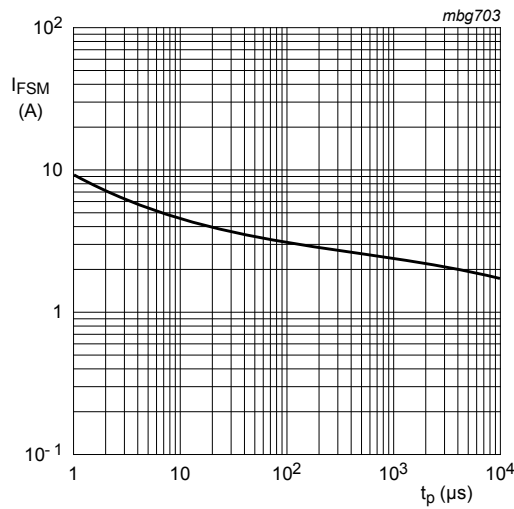
- (1)  $T_{\text{amb}} = 150^\circ\text{C}$
- (2)  $T_{\text{amb}} = 85^\circ\text{C}$
- (3)  $T_{\text{amb}} = 25^\circ\text{C}$
- (4)  $T_{\text{amb}} = -40^\circ\text{C}$

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



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

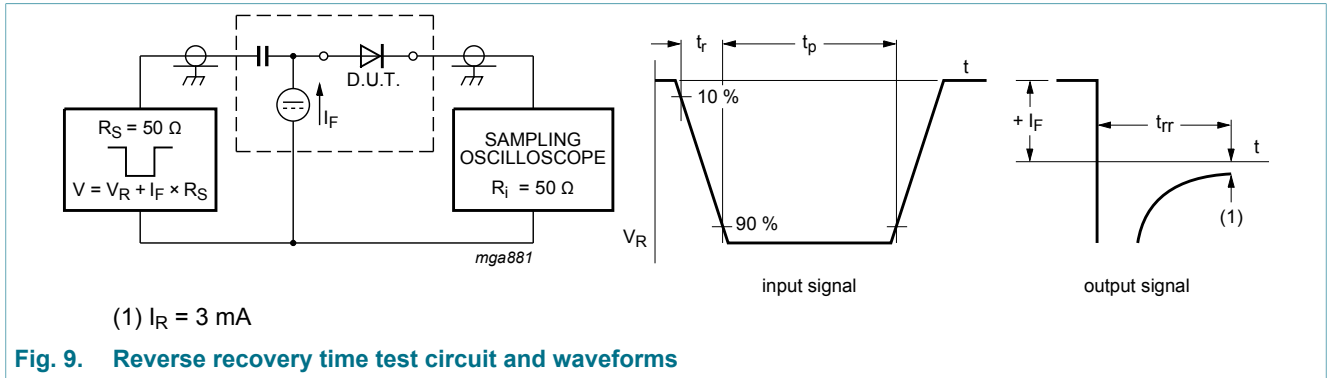
Fig. 7. Diode capacitance as a function of reverse voltage; typical values.



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

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

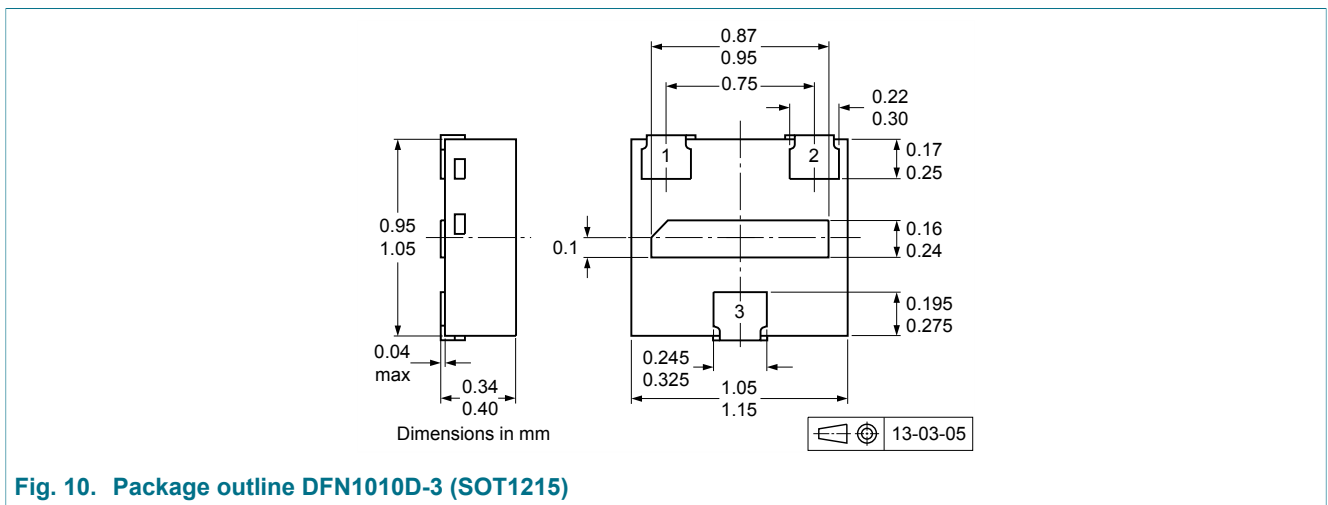
### 11. Test information



#### 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.

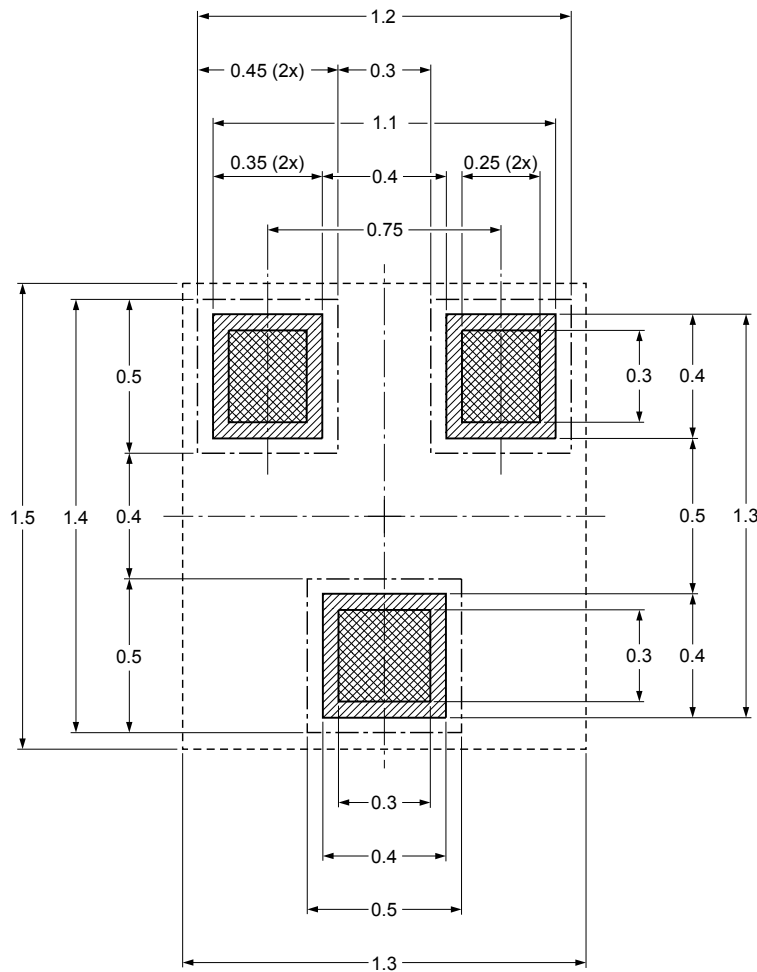
### 12. Package outline



### 13. Soldering

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. 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 v.1	20180409	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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