



# BAS21W series

## High-voltage switching diodes

Rev. 01 — 9 October 2009

Product data sheet

## 1. Product profile

### 1.1 General description

High-voltage switching diodes, encapsulated in a very small Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Configuration	Package		Package configuration
		Nexperia	JEDEC	
BAS21W	single	SOT323	SC-70	very small
BAS21AW	dual common anode			
BAS21SW	dual series			

### 1.2 Features

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current
- High reverse voltage:  $V_R \leq 250$  V
- Low capacitance:  $C_d \leq 2$  pF
- Very small SMD plastic package
- AEC-Q101 qualified

### 1.3 Applications

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

### 1.4 Quick reference data

Table 2. Quick reference data

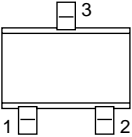
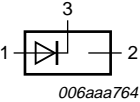
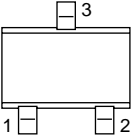
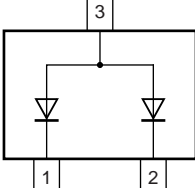
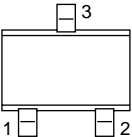
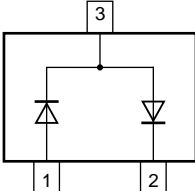
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_F$	forward current		[1] -	-	225	mA
$I_R$	reverse current	$V_R = 200$ V	-	-	100	nA
$V_R$	reverse voltage		-	-	250	V
$t_{rr}$	reverse recovery time		[2] -	-	50	ns

[1] Single diode loaded.

[2] When switched from  $I_F = 10$  mA to  $I_R = 10$  mA;  $R_L = 100$   $\Omega$ ; measured at  $I_R = 1$  mA.

## 2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BAS21W</b>			
1	anode		 006aaa764
2	not connected		
3	cathode		
<b>BAS21AW</b>			
1	cathode (diode 1)		 006aab099
2	cathode (diode 2)		
3	common anode		
<b>BAS21SW</b>			
1	anode (diode 1)		 006aaa763
2	cathode (diode 2)		
3	cathode (diode 1), anode (diode 2)		

## 3. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BAS21W	SC-70	plastic surface-mounted package; 3 leads	SOT323
BAS21AW			
BAS21SW			

## 4. Marking

**Table 5. Marking codes**

Type number	Marking code <sup>[1]</sup>
BAS21W	X4*
BAS21AW	X6*
BAS21SW	X5*

- [1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

## 5. Limiting values

**Table 6. 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		-	250	V
$I_F$	forward current		[1] -	225	mA
			[2] -	125	mA
$I_{FRM}$	repetitive peak forward current		-	625	mA
$I_{FSM}$	non-repetitive peak forward current	square wave	[3]		
		$t_p = 1 \mu\text{s}$	-	9	A
		$t_p = 100 \mu\text{s}$	-	3	A
		$t_p = 10 \text{ms}$	-	1.7	A
<b>Per device</b>					
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[4] -	200	mW
$T_j$	junction temperature		-	150	$^\circ\text{C}$
$T_{amb}$	ambient temperature		-55	+150	$^\circ\text{C}$
$T_{stg}$	storage temperature		-65	+150	$^\circ\text{C}$

[1] Single diode loaded.

[2] Double diode loaded.

[3]  $T_j = 25 \text{ }^\circ\text{C}$  prior to surge.

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

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per device</b>						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	625	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	300	K/W

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

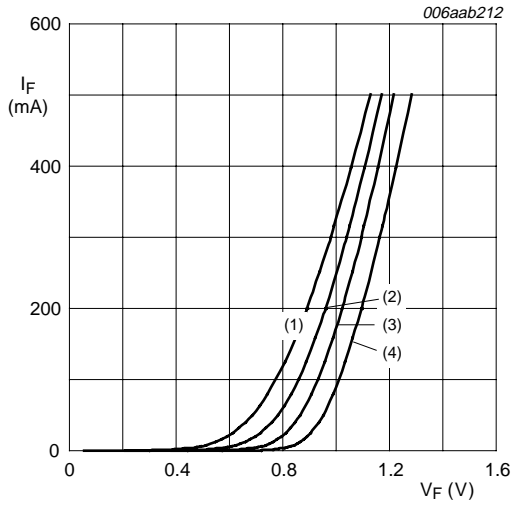
## 7. Characteristics

**Table 8. Characteristics**

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

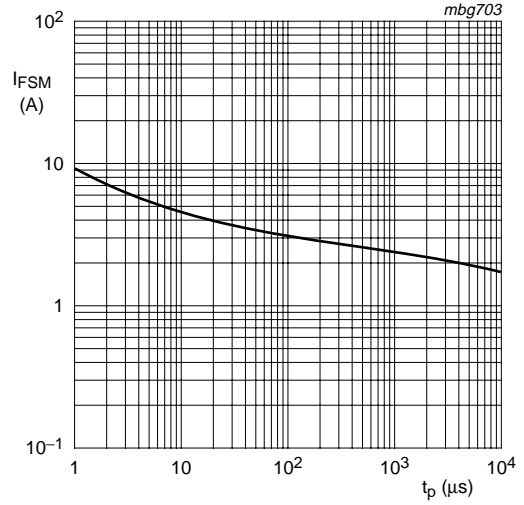
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_F$	forward voltage	$I_F = 100\text{ mA}$	-	-	1.0	V
		$I_F = 200\text{ mA}$	-	-	1.25	V
$I_R$	reverse current	$V_R = 200\text{ V}$	-	-	100	nA
		$V_R = 200\text{ V}; T_j = 150\text{ °C}$	-	-	100	$\mu\text{A}$
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}$	-	-	2	pF
$t_{rr}$	reverse recovery time		[1]	-	50	ns

[1] When switched from  $I_F = 10\text{ mA}$  to  $I_R = 10\text{ mA}$ ;  $R_L = 100\ \Omega$ ; measured at  $I_R = 1\text{ mA}$ .



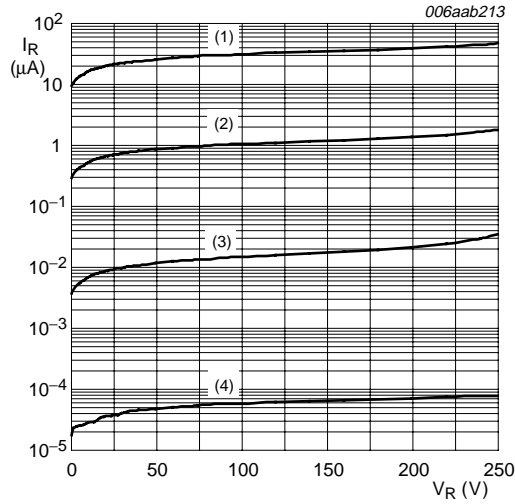
- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$
- (4)  $T_{amb} = -40\text{ °C}$

**Fig 1. Forward current as a function of forward voltage; typical values**



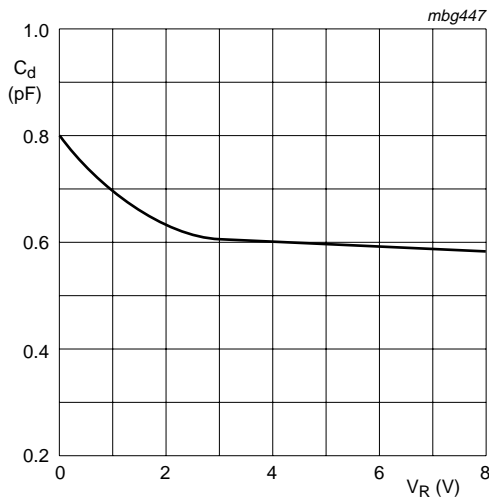
Based on square wave currents.  
 $T_j = 25\text{ °C}$ ; prior to surge

**Fig 2. Non-repetitive peak forward current as a function of pulse duration; maximum values**



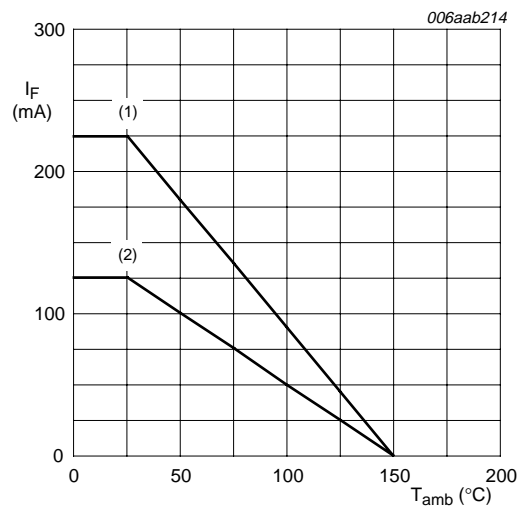
- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$
- (4)  $T_{amb} = -40\text{ °C}$

**Fig 3. Reverse current as a function of reverse voltage; typical values**



f = 1 MHz; T<sub>amb</sub> = 25 °C

**Fig 4. Diode capacitance as a function of reverse voltage; typical values**

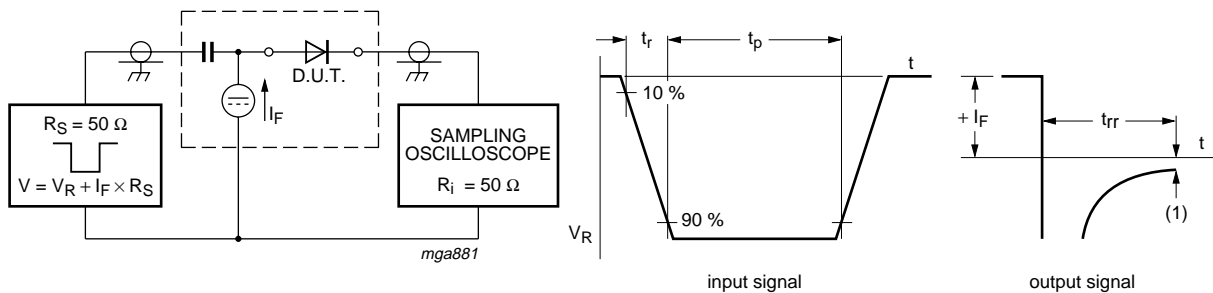


FR4 PCB, standard footprint

- (1) Single diode loaded.
- (2) Double diode loaded.

**Fig 5. Forward current as a function of ambient temperature; derating curve**

## 8. Test information



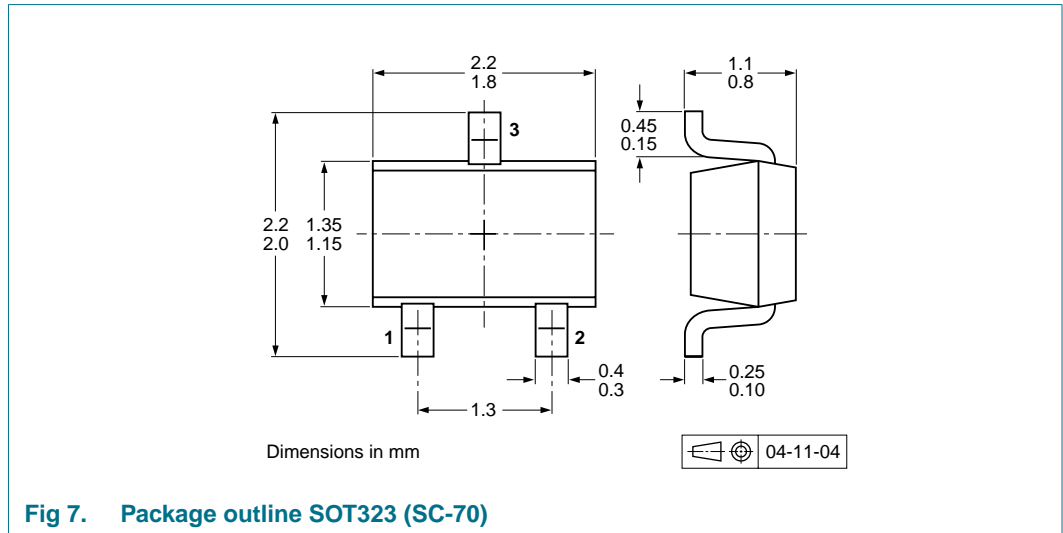
(1) I<sub>R</sub> = 1 mA

**Fig 6. Reverse recovery time test circuit and waveforms**

### 8.1 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.

## 9. Package outline



## 10. Packing information

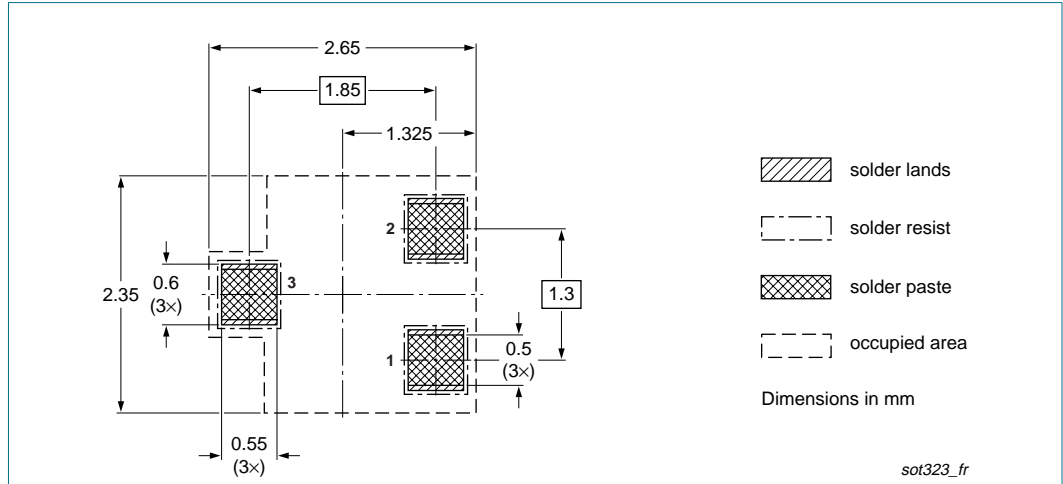
**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

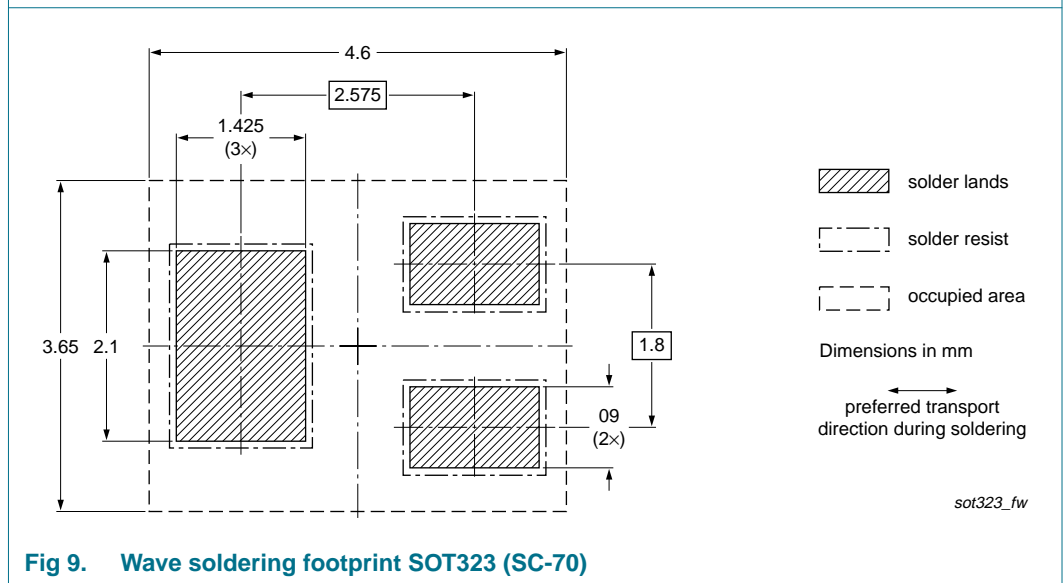
Type number	Package	Description	Packing quantity	
			3000	10000
BAS21W	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135
BAS21AW				
BAS21SW				

[1] For further information and the availability of packing methods, see [Section 14](#).

**11. Soldering**



**Fig 8. Reflow soldering footprint SOT323 (SC-70)**



**Fig 9. Wave soldering footprint SOT323 (SC-70)**



## 12. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAS21W_SER_1	20091009	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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