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Kind regards,

Team Nexperia



# 1PS301

## Dual high-speed switching diode

Rev. 5 — 6 March 2012

Product data sheet

## 1. Product profile

### 1.1 General description

Dual high-speed switching diode, encapsulated in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

### 1.2 Features and benefits

- High switching speed:  $t_{rr} \leq 4$  ns
- Repetitive peak reverse voltage:  $V_{RRM} \leq 85$  V
- Reverse voltage:  $V_R \leq 80$  V
- AEC-Q101 qualified
- Low capacitance:  $C_d \leq 1.5$  pF
- Repetitive peak forward current:  $I_{FRM} \leq 500$  mA
- Very small SMD plastic package

### 1.3 Applications

- High-speed switching
- General-purpose switching

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$I_F$	forward current		[1]			
			[2] -	-	250	mA
			[3] -	-	160	mA
$I_R$	reverse current	$V_R = 80$ V	-	-	0.5	$\mu$ A
$V_R$	reverse voltage		-	-	80	V
$t_{rr}$	reverse recovery time		[4] -	-	4	ns

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

[2] Single diode loaded.

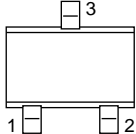
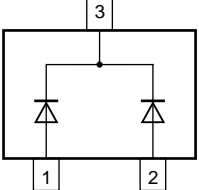
[3] Double diode loaded.

[4] 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 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	anode (diode 1)		
2	anode (diode 2)		
3	common cathode		

006aab034

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
1PS301	SC-70	plastic surface-mounted package; 3 leads	SOT323

## 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
1PS301	B*3

[1] \* = placeholder for manufacturing site code

## 5. 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>						
$V_{RRM}$	repetitive peak reverse voltage		-	85	V	
$V_R$	reverse voltage		-	80	V	
$I_F$	forward current		[1]			
			[2]	-	250	mA
			[3]	-	160	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 0.5 \mu s$ ; $\delta \leq 0.25$	-	500	mA	
$I_{FSM}$	non-repetitive peak forward current	square wave	[4]			
			$t_p = 1 \mu s$	-	4	A
			$t_p = 1 s$	-	0.5	A

**Table 5. Limiting values ...continued**

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

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per device</b>					
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$	[1] -	300	mW
$T_{\text{j}}$	junction temperature		-	150	$^\circ\text{C}$
$T_{\text{amb}}$	ambient temperature		-55	+150	$^\circ\text{C}$
$T_{\text{stg}}$	storage temperature		-65	+150	$^\circ\text{C}$

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

[2] Single diode loaded.

[3] Double diode loaded.

[4]  $T_{\text{j}} = 25 \text{ }^\circ\text{C}$  before surge.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per device</b>						
$R_{\text{th(j-a)}}$	thermal resistance from junction to ambient	in free air	[1] -	-	415	K/W
$R_{\text{th(j-sp)}}$	thermal resistance from junction to solder point		-	-	200	K/W

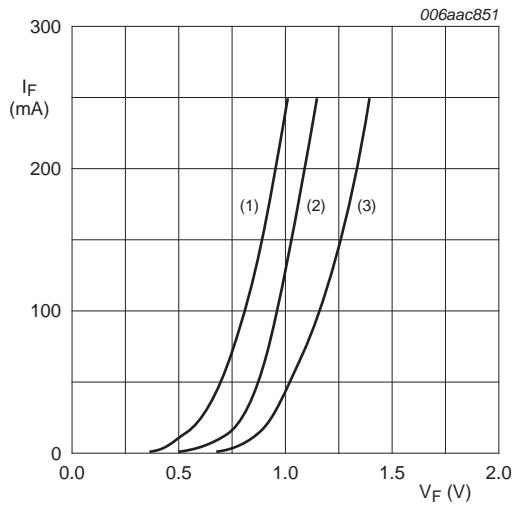
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

**Table 7. Characteristics** $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$  unless otherwise specified.

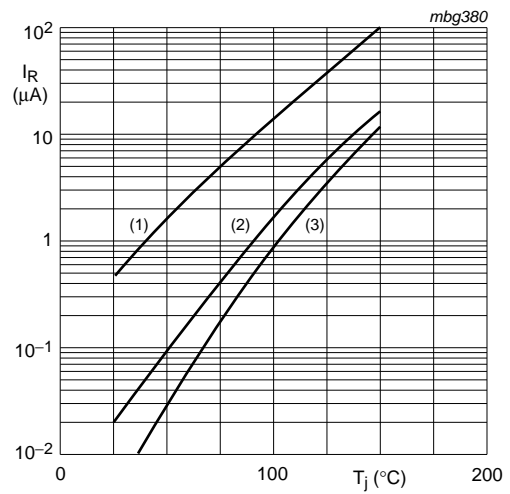
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_{\text{F}}$	forward voltage	$I_{\text{F}} = 1 \text{ mA}$	-	610	-	mV
		$I_{\text{F}} = 10 \text{ mA}$	-	740	-	mV
		$I_{\text{F}} = 50 \text{ mA}$	-	-	1.0	V
		$I_{\text{F}} = 100 \text{ mA}$	-	-	1.2	V
$I_{\text{R}}$	reverse current	$V_{\text{R}} = 25 \text{ V}$	-	-	30	nA
		$V_{\text{R}} = 80 \text{ V}$	-	-	0.5	$\mu\text{A}$
		$V_{\text{R}} = 25 \text{ V}; T_{\text{j}} = 150 \text{ }^\circ\text{C}$	-	-	30	$\mu\text{A}$
		$V_{\text{R}} = 80 \text{ V}; T_{\text{j}} = 150 \text{ }^\circ\text{C}$	-	-	100	$\mu\text{A}$
$C_{\text{d}}$	diode capacitance	$f = 1 \text{ MHz}; V_{\text{R}} = 0 \text{ V}$	-	-	1.5	pF
$t_{\text{rr}}$	reverse recovery time		[1] -	-	4	ns
$V_{\text{FR}}$	forward recovery voltage		[2] -	-	1.75	V

[1] When switched from  $I_{\text{F}} = 10 \text{ mA}$  to  $I_{\text{R}} = 10 \text{ mA}$ ;  $R_{\text{L}} = 100 \text{ } \Omega$ ; measured at  $I_{\text{R}} = 1 \text{ mA}$ .[2] When switched from  $I_{\text{F}} = 10 \text{ mA}$ ;  $t_{\text{r}} = 20 \text{ ns}$ .



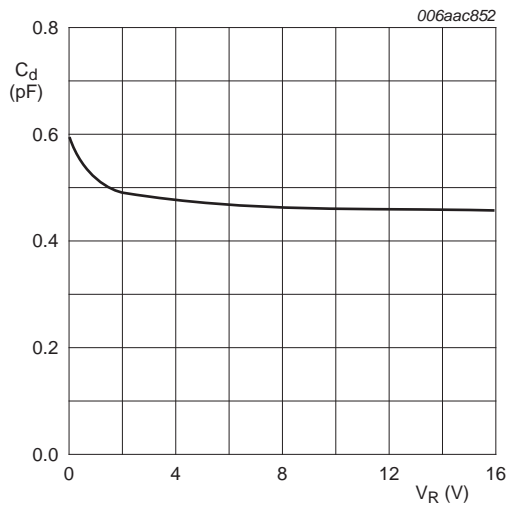
- (1)  $T_j = 150\text{ }^\circ\text{C}$ ; typical values
- (2)  $T_j = 25\text{ }^\circ\text{C}$ ; typical values
- (3)  $T_j = 25\text{ }^\circ\text{C}$ ; maximum values

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



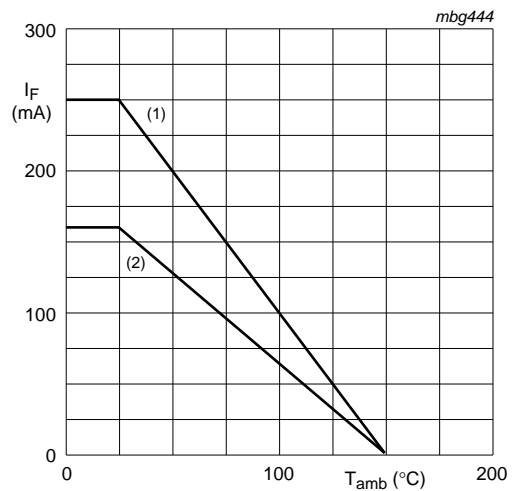
- (1)  $V_R = 80\text{ V}$ ; maximum values
- (2)  $V_R = 80\text{ V}$ ; typical values
- (3)  $V_R = 25\text{ V}$ ; typical values

**Fig 2. Reverse current as a function of junction temperature**



$f = 1\text{ MHz}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 3. Diode capacitance as a function of reverse voltage; typical values**



FR4 PCB, standard footprint

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

**Fig 4. Forward current as a function of ambient temperature; derating curves**

8. Test information

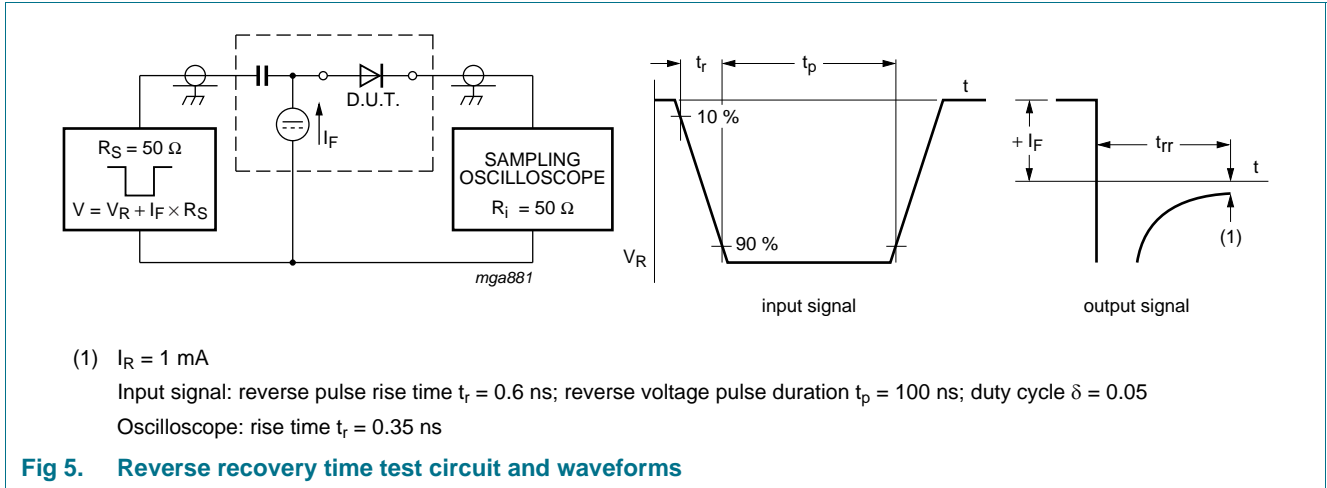


Fig 5. Reverse recovery time test circuit and waveforms

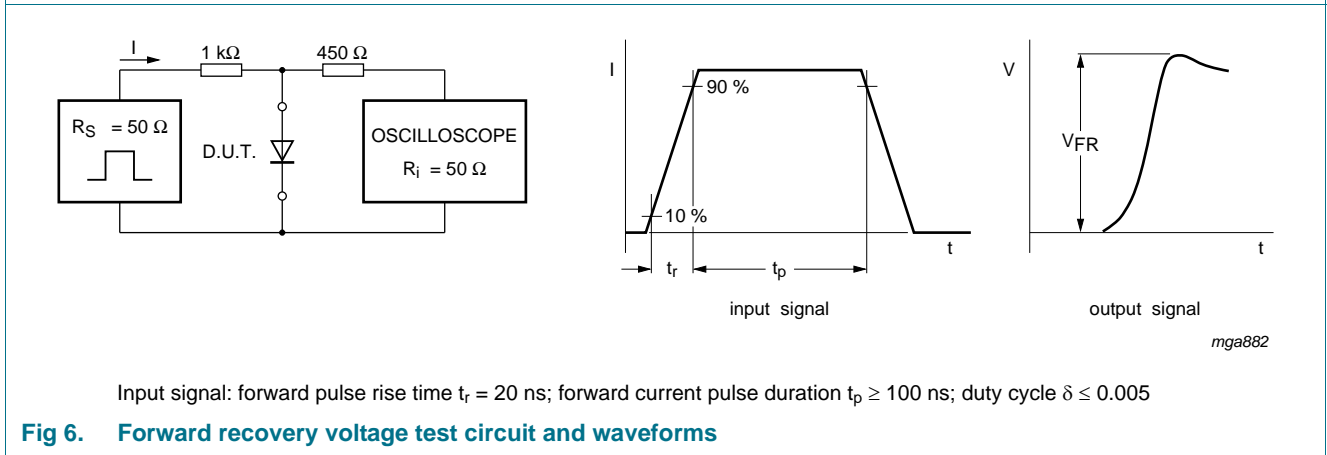
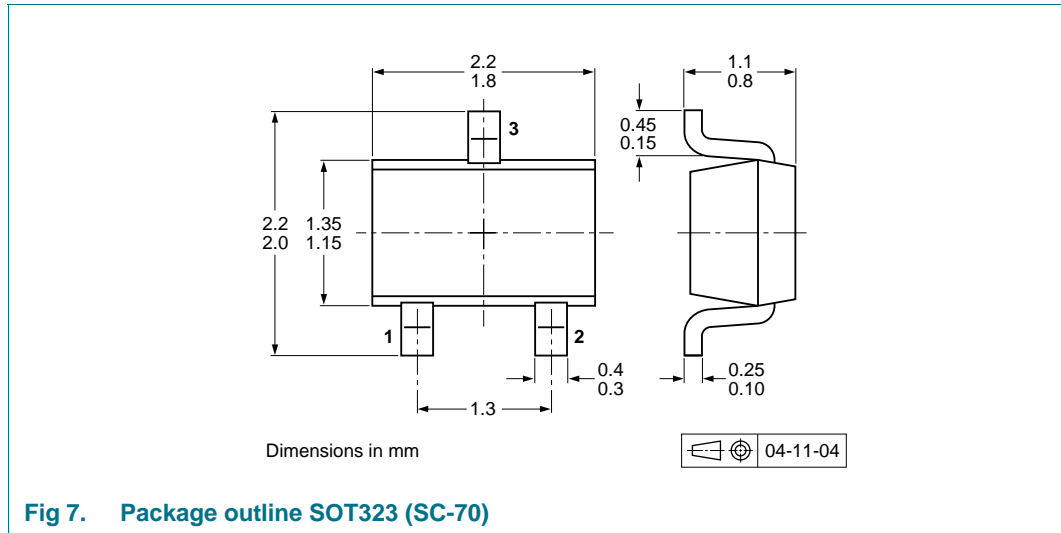


Fig 6. Forward recovery voltage test circuit and waveforms

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 8. 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
1PS301	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

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

11. Soldering

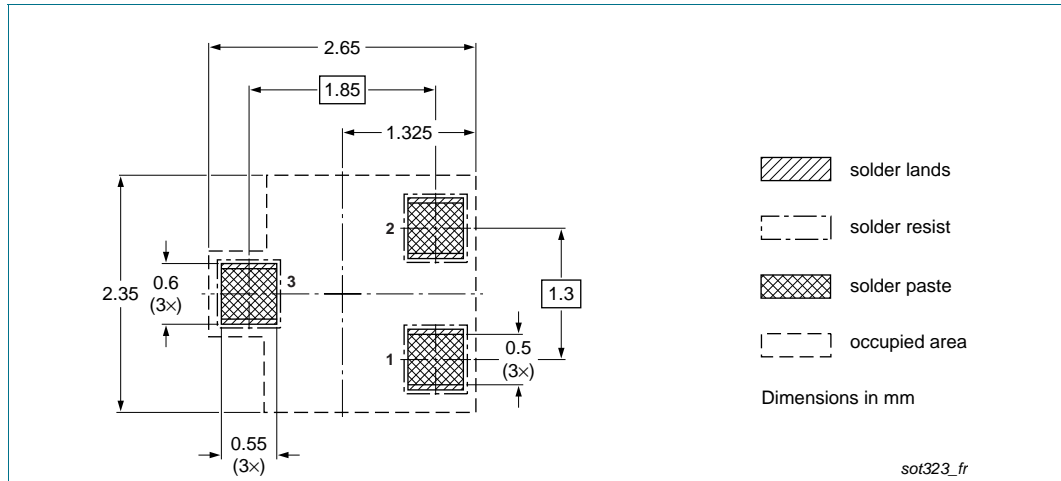


Fig 8. Reflow soldering footprint SOT323 (SC-70)

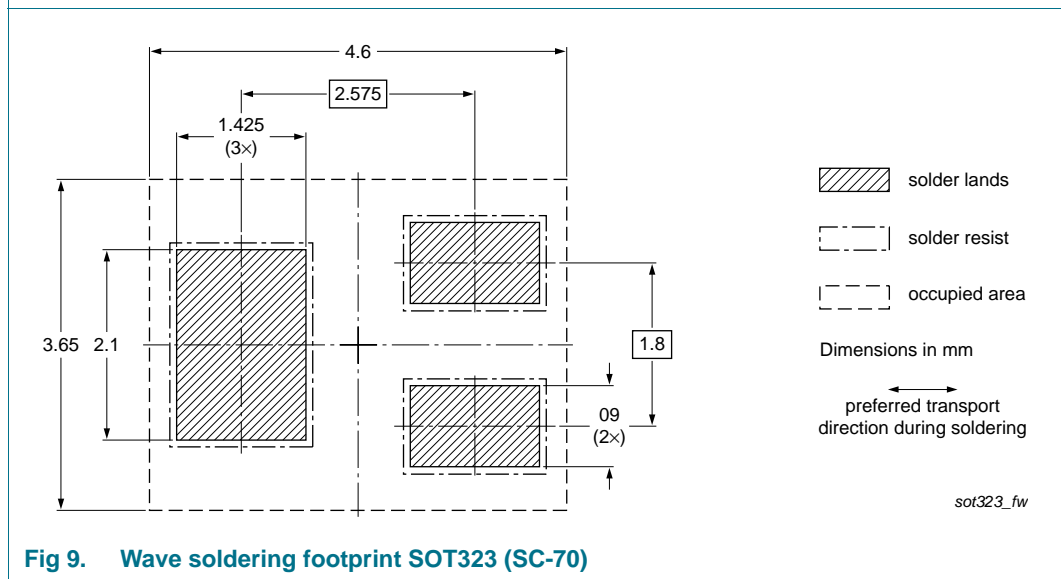


Fig 9. Wave soldering footprint SOT323 (SC-70)



## 12. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
1PS301 v.5	20120306	Product data sheet	-	1PS301 v.4
Modifications:	<ul style="list-style-type: none"> <li>• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• <a href="#">Section 1.1 “General description”</a>: amended</li> <li>• <a href="#">Table 1 “Quick reference data”</a>: added</li> <li>• <a href="#">Section 4 “Marking”</a>: updated</li> <li>• <a href="#">Section 8 “Test information”</a>: added</li> <li>• <a href="#">Figure 7</a>: superseded by minimized package outline drawing</li> <li>• <a href="#">Section 10 “Packing information”</a>: added</li> <li>• <a href="#">Section 11 “Soldering”</a>: added</li> <li>• <a href="#">Section 13 “Legal information”</a>: updated</li> </ul>			
1PS301 v.4	19990506	Product data sheet	-	1PS301 v.3
1PS301 v.3	19961004	Product specification	-	1PS301 v.2
1PS301 v.2	19960903	Product specification	-	1PS301 v.1
1PS301 v.1	19960403	Product specification	-	-

## 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".

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