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Kind regards,

Team Nexperia



# 1PS300

## Dual high-speed switching diode

Rev. 5 — 5 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:  $C_d \leq 2$  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] -	-	200	mA
			[3] -	-	170	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.

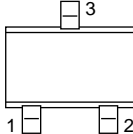
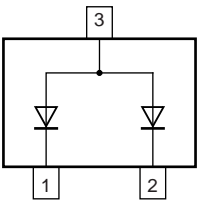
[3] Double diode loaded.

[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	cathode (diode 1)		
2	cathode (diode 2)		
3	common anode		

006aab099

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
1PS300	SC-70	plastic surface-mounted package; 3 leads	SOT323

## 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
1PS300	A*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	<sup>[1]</sup>			
		<sup>[2]</sup> -		200	mA
		<sup>[3]</sup> -		170	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	<sup>[4]</sup>		
		$t_p = 1 \mu s$	-	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	$T_{\text{amb}} \leq 25\text{ °C}$	[1] -	300	mW
$T_{\text{j}}$	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 PCB, single-sided copper, tin-plated and standard footprint.

[2] Single diode loaded.

[3] Double diode loaded.

[4]  $T_{\text{j}} = 25\text{ °C}$  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

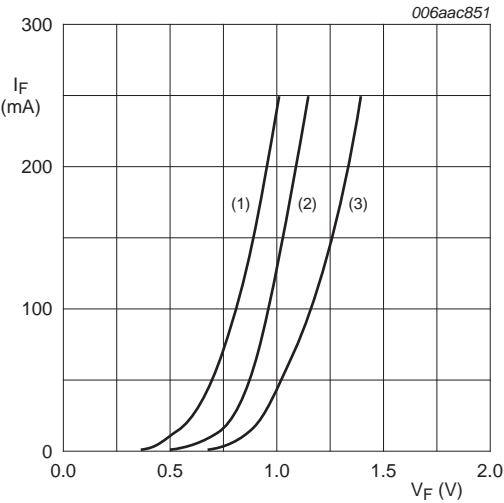
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

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

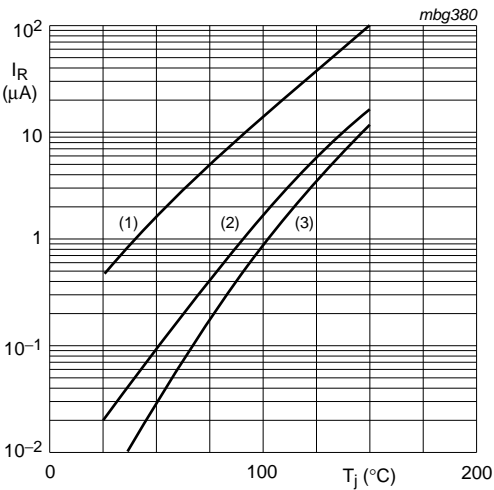
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_{\text{F}}$	forward voltage	$I_{\text{F}} = 1\text{ mA}$	-	610	-	mV
		$I_{\text{F}} = 10\text{ mA}$	-	740	-	mV
		$I_{\text{F}} = 50\text{ mA}$	-	-	1.0	V
		$I_{\text{F}} = 100\text{ mA}$	-	-	1.2	V
$I_{\text{R}}$	reverse current	$V_{\text{R}} = 25\text{ V}$	-	-	30	nA
		$V_{\text{R}} = 80\text{ V}$	-	-	0.5	μA
		$V_{\text{R}} = 25\text{ V}; T_{\text{j}} = 150\text{ °C}$	-	-	30	μA
		$V_{\text{R}} = 80\text{ V}; T_{\text{j}} = 150\text{ °C}$	-	-	100	μA
$C_{\text{d}}$	diode capacitance	$f = 1\text{ MHz}; V_{\text{R}} = 0\text{ V}$	-	-	2	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  $I_{\text{R}} = 10\text{ mA}$ ;  $R_{\text{L}} = 100\text{ Ω}$ ; measured at  $I_{\text{R}} = 1\text{ mA}$ .[2] When switched from  $I_{\text{F}} = 10\text{ mA}$ ;  $t_{\text{r}} = 20\text{ ns}$ .



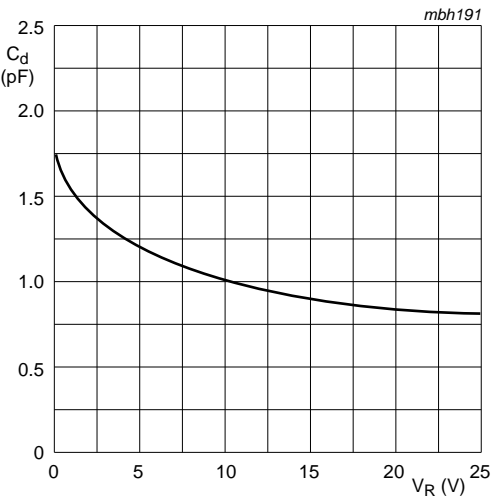
- (1)  $T_j = 150\text{ }^{\circ}\text{C}$ ; typical values
- (2)  $T_j = 25\text{ }^{\circ}\text{C}$ ; typical values
- (3)  $T_j = 25\text{ }^{\circ}\text{C}$ ; maximum values

Fig 1. Forward current as a function of forward voltage



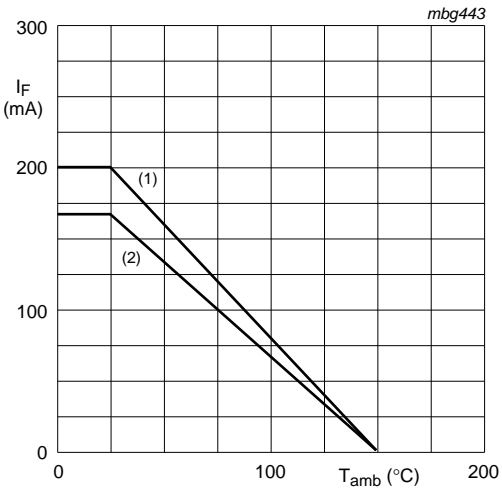
- (1)  $V_R = 80\text{ V}$ ; maximum values
- (2)  $V_R = 80\text{ V}$ ; typical values
- (3)  $V_R = 25\text{ V}$ ; typical values

Fig 2. Reverse current as a function of junction temperature



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

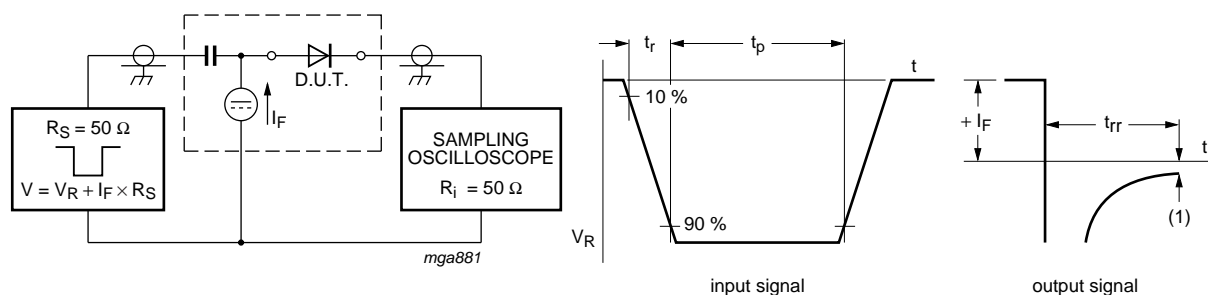
Fig 3. Diode capacitance as a function of reverse voltage; typical values



- 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

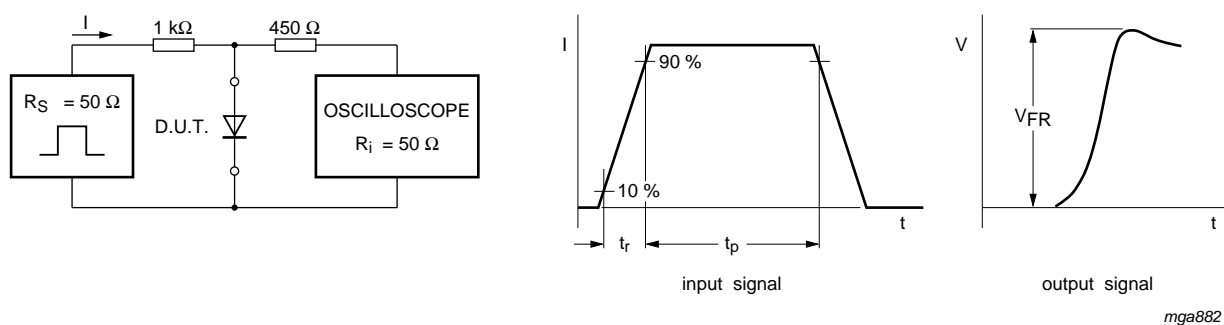


(1)  $I_R = 1 \text{ mA}$

Input signal: reverse pulse rise time  $t_r = 0.6 \text{ ns}$ ; reverse voltage pulse duration  $t_p = 100 \text{ ns}$ ; duty cycle  $\delta = 0.05$

Oscilloscope: rise time  $t_r = 0.35 \text{ ns}$

**Fig 5. Reverse recovery time test circuit and waveforms**



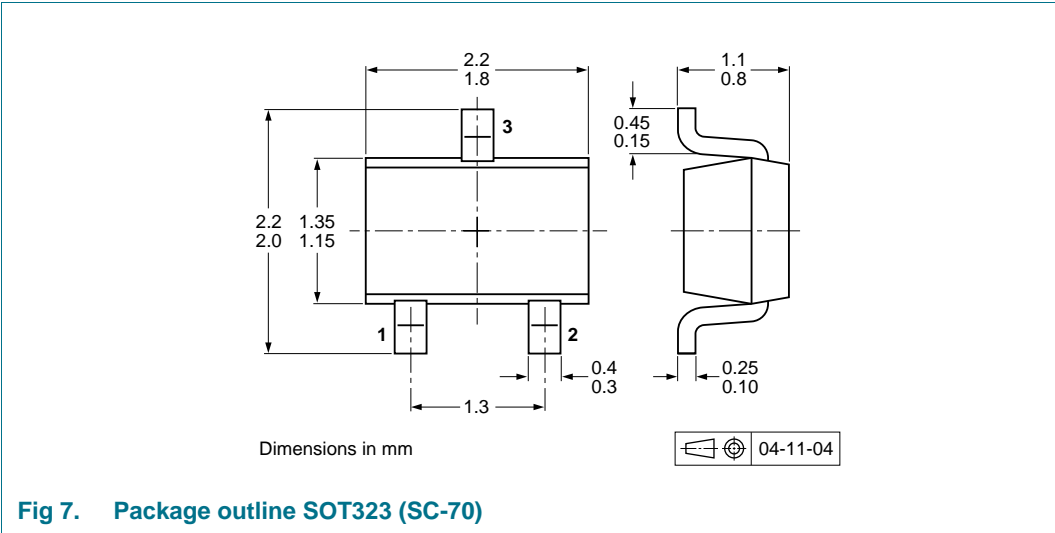
Input signal: forward pulse rise time  $t_r = 20 \text{ ns}$ ; forward current pulse duration  $t_p \geq 100 \text{ ns}$ ; duty cycle  $\delta \leq 0.005$

**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

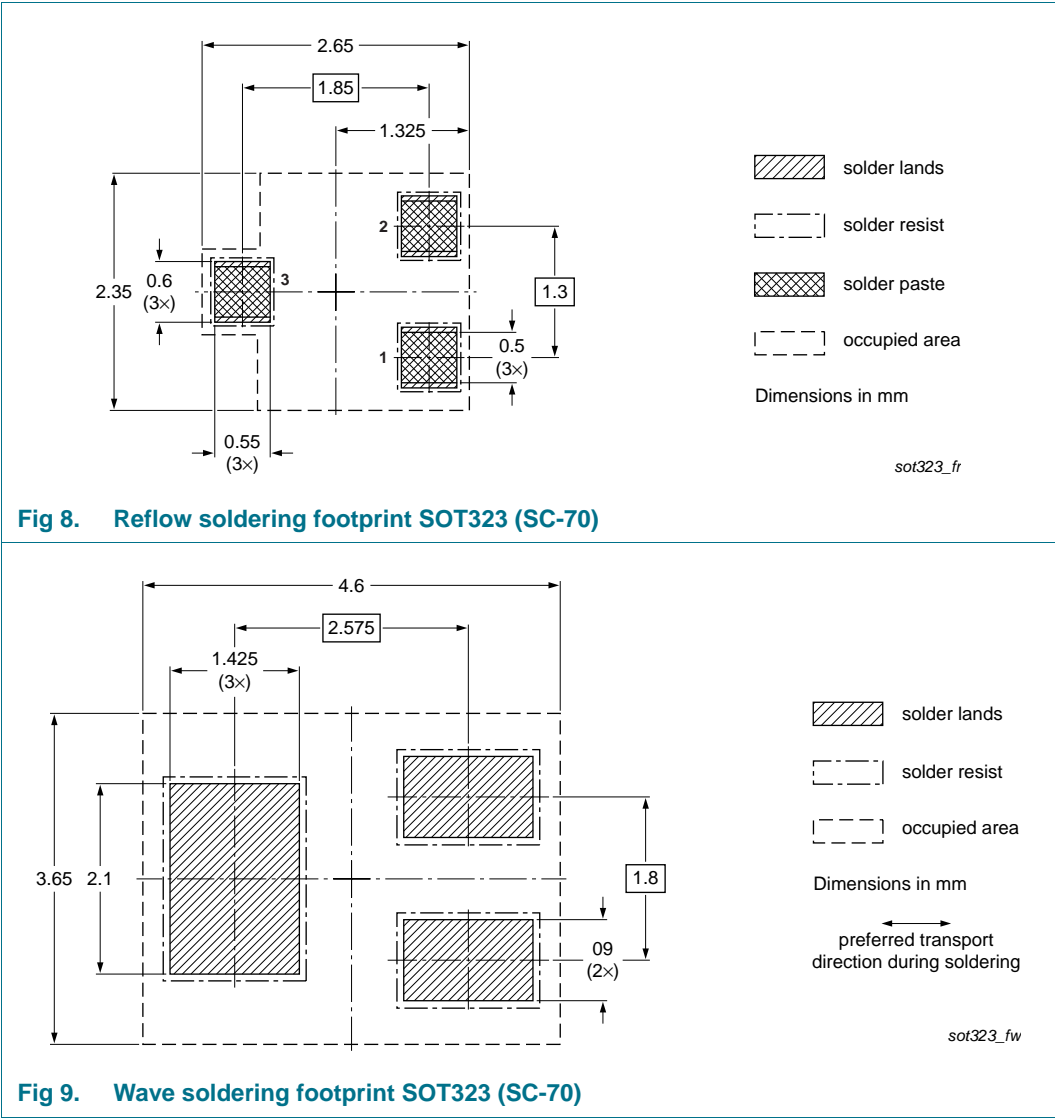
Table 8. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
1PS300	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





## 12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
1PS300 v.5	20120305	Product data sheet	-	1PS300 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>			
1PS300 v.4	19990526	Product data sheet	-	1PS300 v.3
1PS300 v.3	19961004	Product specification	-	1PS300 v.2
1PS300 v.2	19960903	Product specification	-	1PS300 v.1
1PS300 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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