



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
Per diode						
I_F	forward current		[1]			
			[2] -	-	250	mA
			[3] -	-	160	mA
I_R	reverse current	$V_R = 80$ V	-	-	0.5	μ 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.

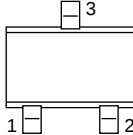
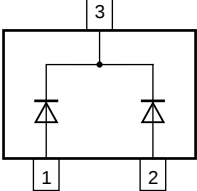
[2] Single diode loaded.

[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 ^[1]
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
Per diode					
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
Per device					
P_{tot}	total power dissipation	$T_{\text{amb}} \leq 25\text{ °C}$	[1] -	300	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 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
Per device						
$R_{\text{th(j-a)}}$	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

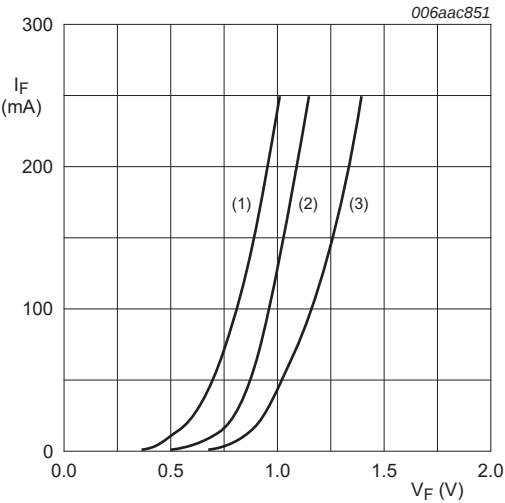
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

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

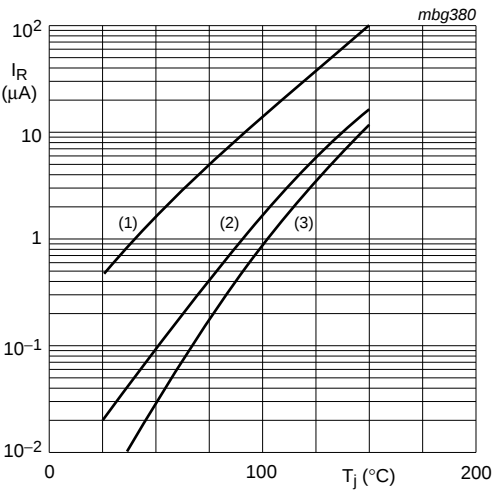
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{F}	forward voltage	$I_{\text{F}} = 1\text{ mA}$	-	610	-	mV
		$I_{\text{F}} = 10\text{ mA}$	-	740	-	mV
		$I_{\text{F}} = 50\text{ mA}$	-	-	1.0	V
		$I_{\text{F}} = 100\text{ mA}$	-	-	1.2	V
I_{R}	reverse current	$V_{\text{R}} = 25\text{ V}$	-	-	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_{d}	diode capacitance	$f = 1\text{ MHz}; V_{\text{R}} = 0\text{ V}$	-	-	1.5	pF
t_{rr}	reverse recovery time		[1] -	-	4	ns
V_{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 $I_{\text{F}} = 10\text{ mA}$; $t_{\text{r}} = 20\text{ ns}$.



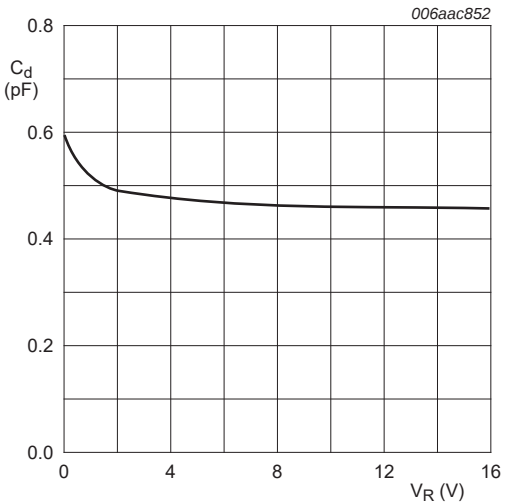
- (1) $T_j = 150\text{ }^{\circ}\text{C}$; typical values
- (2) $T_j = 25\text{ }^{\circ}\text{C}$; typical values
- (3) $T_j = 25\text{ }^{\circ}\text{C}$; maximum values

Fig 1. Forward current as a function of forward voltage



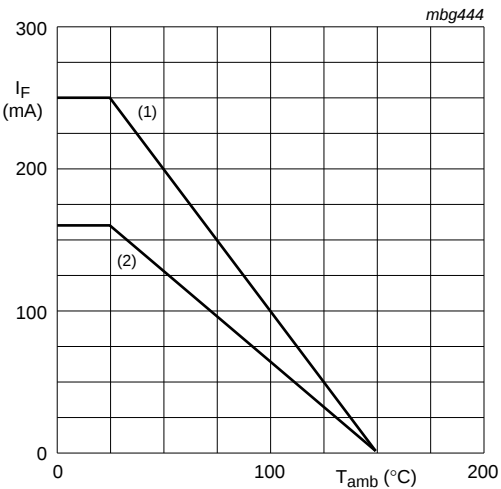
- (1) $V_R = 80\text{ V}$; maximum values
- (2) $V_R = 80\text{ V}$; typical values
- (3) $V_R = 25\text{ V}$; typical values

Fig 2. Reverse current as a function of junction temperature



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

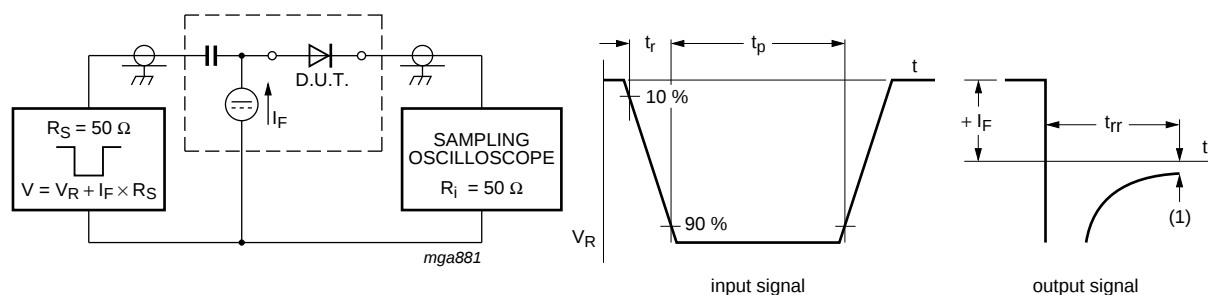
Fig 3. Diode capacitance as a function of reverse voltage; typical values



- 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

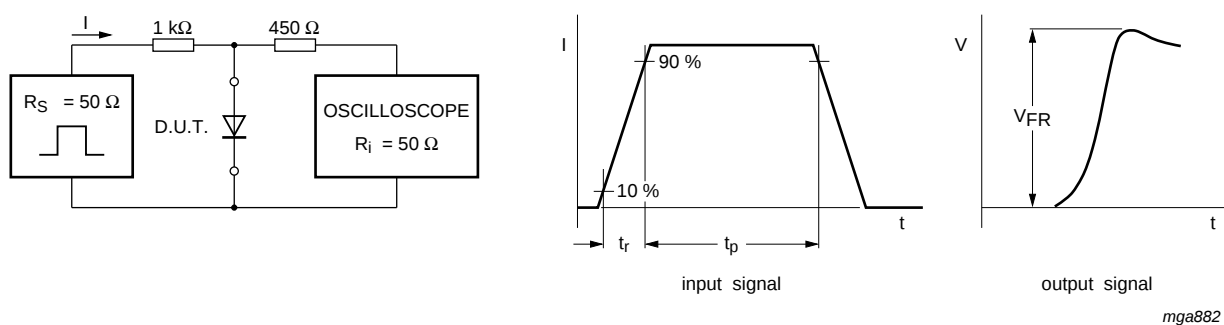


(1) $I_R = 1 \text{ mA}$

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



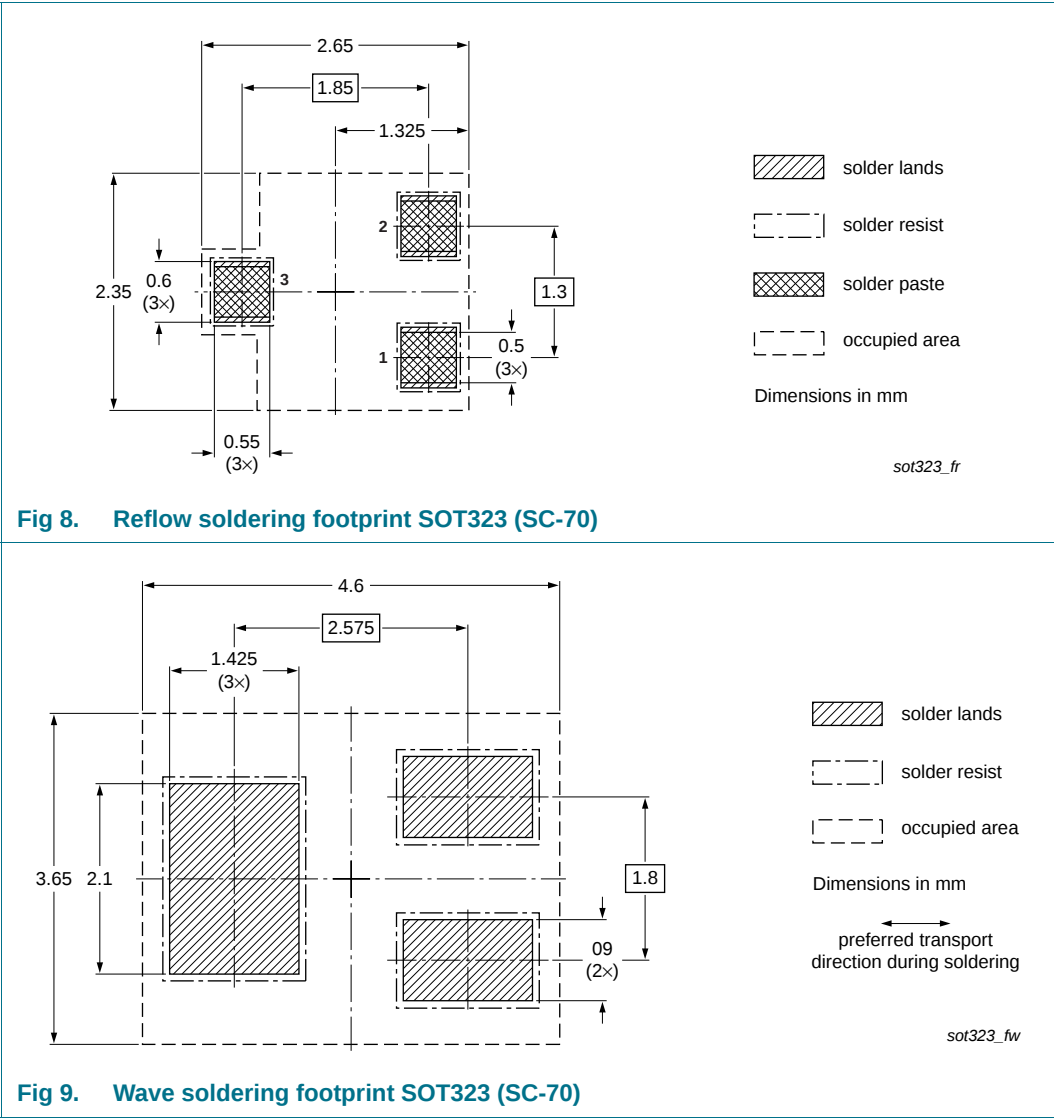
Input signal: forward pulse rise time $t_r = 20 \text{ ns}$; forward current pulse duration $t_p \geq 100 \text{ ns}$; duty cycle $\delta \leq 0.005$

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.

11. Soldering



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:	• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Section 1.1 “General description”: amended • Table 1 “Quick reference data”: added • Section 4 “Marking”: updated • Section 8 “Test information”: added • Figure 7: superseded by minimized package outline drawing • Section 10 “Packing information”: added • Section 11 “Soldering”: added • Section 13 “Legal information”: updated			
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 ^{[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".

[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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