



1PS302

Dual high-speed switching diode

Rev. 6 — 23 July 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] -	-	200	mA
			[3] -	-	170	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.

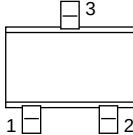
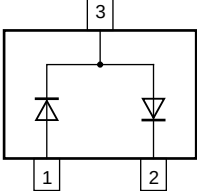
[3] Double diode loaded.

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

006aaa763

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
1PS302	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
1PS302	C*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] -		200	mA
		^[3] -		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 ^[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

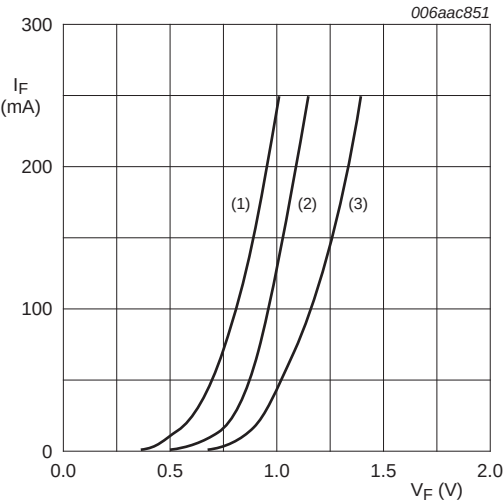
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

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

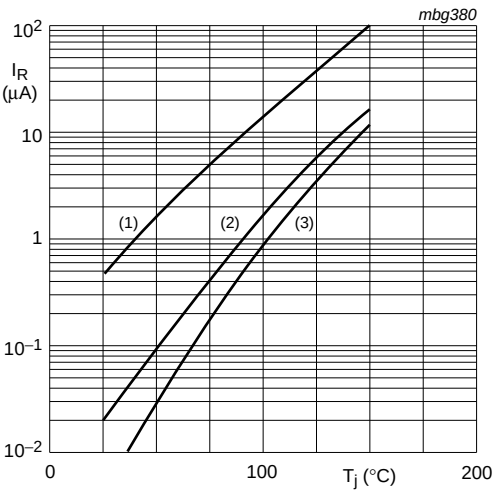
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{F}	forward voltage	$I_{\text{F}} = 1\text{ mA}$	-	610	-	mV
		$I_{\text{F}} = 10\text{ mA}$	-	740	-	mV
		$I_{\text{F}} = 50\text{ mA}$	-	-	1.0	V
		$I_{\text{F}} = 100\text{ mA}$	-	-	1.2	V
I_{R}	reverse current	$V_{\text{R}} = 25\text{ V}$	-	-	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 $I_{\text{F}} = 10\text{ mA}$; $t_{\text{r}} = 20\text{ ns}$.



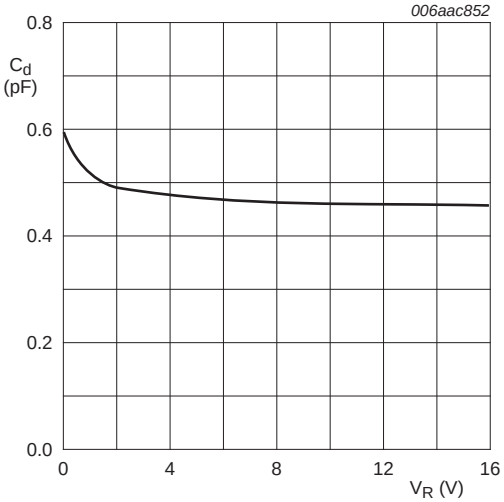
- (1) $T_j = 150\text{ }^{\circ}\text{C}$; typical values
- (2) $T_j = 25\text{ }^{\circ}\text{C}$; typical values
- (3) $T_j = 25\text{ }^{\circ}\text{C}$; maximum values

Fig 1. Forward current as a function of forward voltage



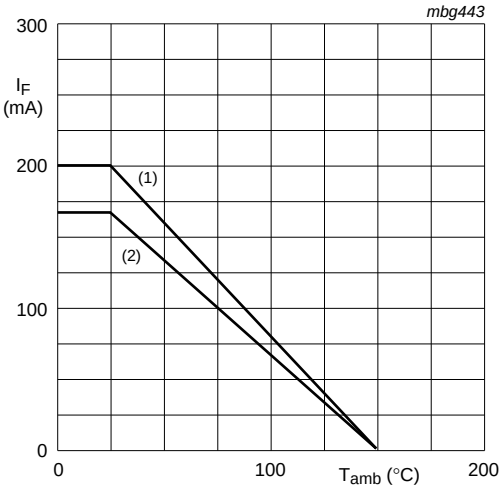
- (1) $V_R = 80\text{ V}$; maximum values
- (2) $V_R = 80\text{ V}$; typical values
- (3) $V_R = 25\text{ V}$; typical values

Fig 2. Reverse current as a function of junction temperature



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

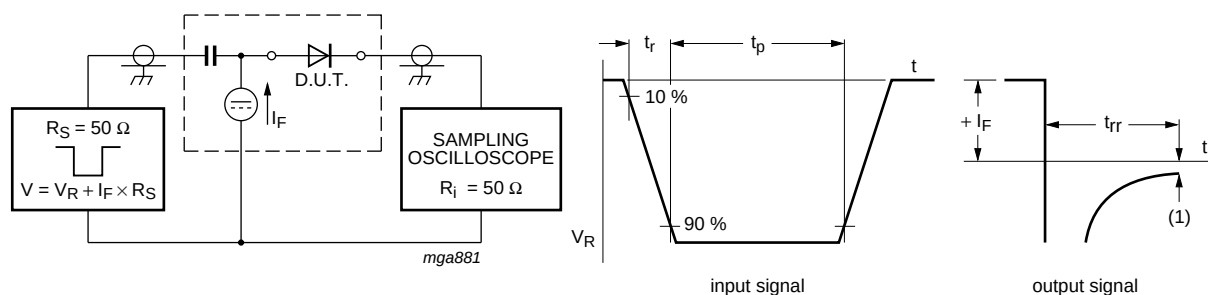
Fig 3. Diode capacitance as a function of reverse voltage; typical values



- 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

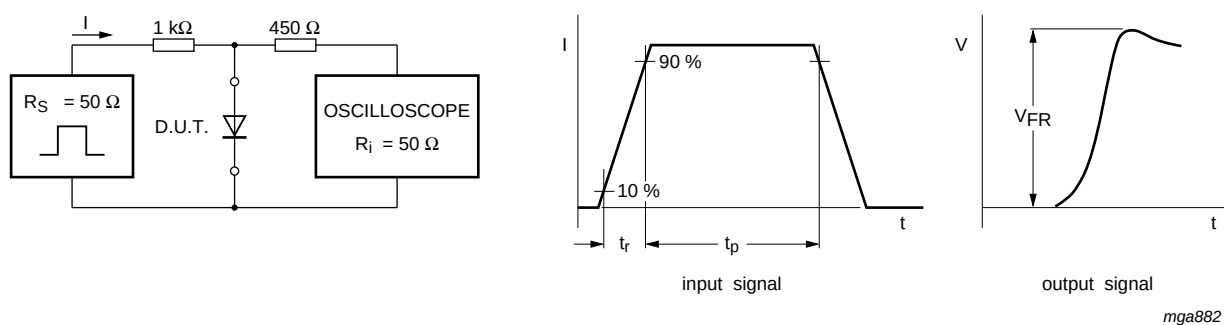


(1) $I_R = 1 \text{ mA}$

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



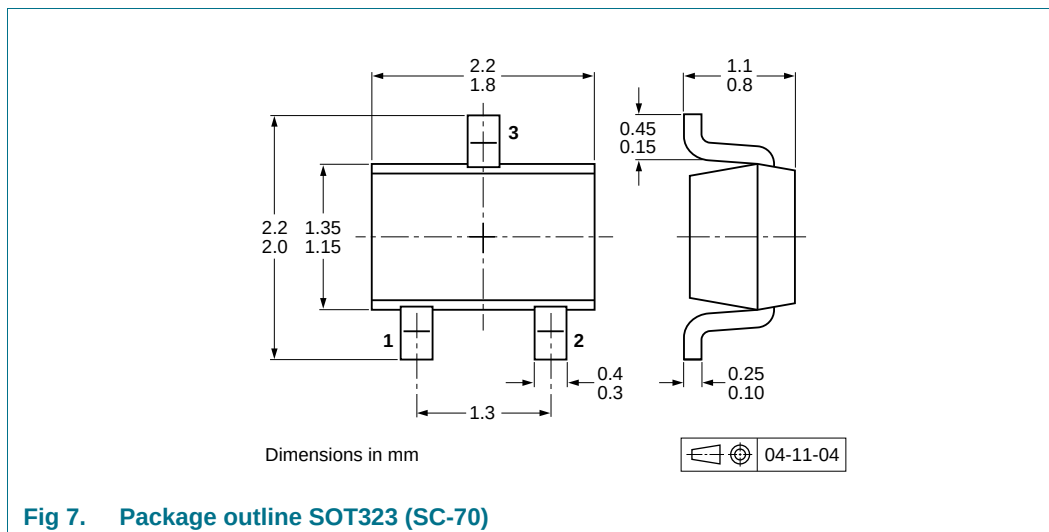
Input signal: forward pulse rise time $t_r = 20 \text{ ns}$; forward current pulse duration $t_p \geq 100 \text{ ns}$; duty cycle $\delta \leq 0.005$

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.

9. Package outline



10. Packing information

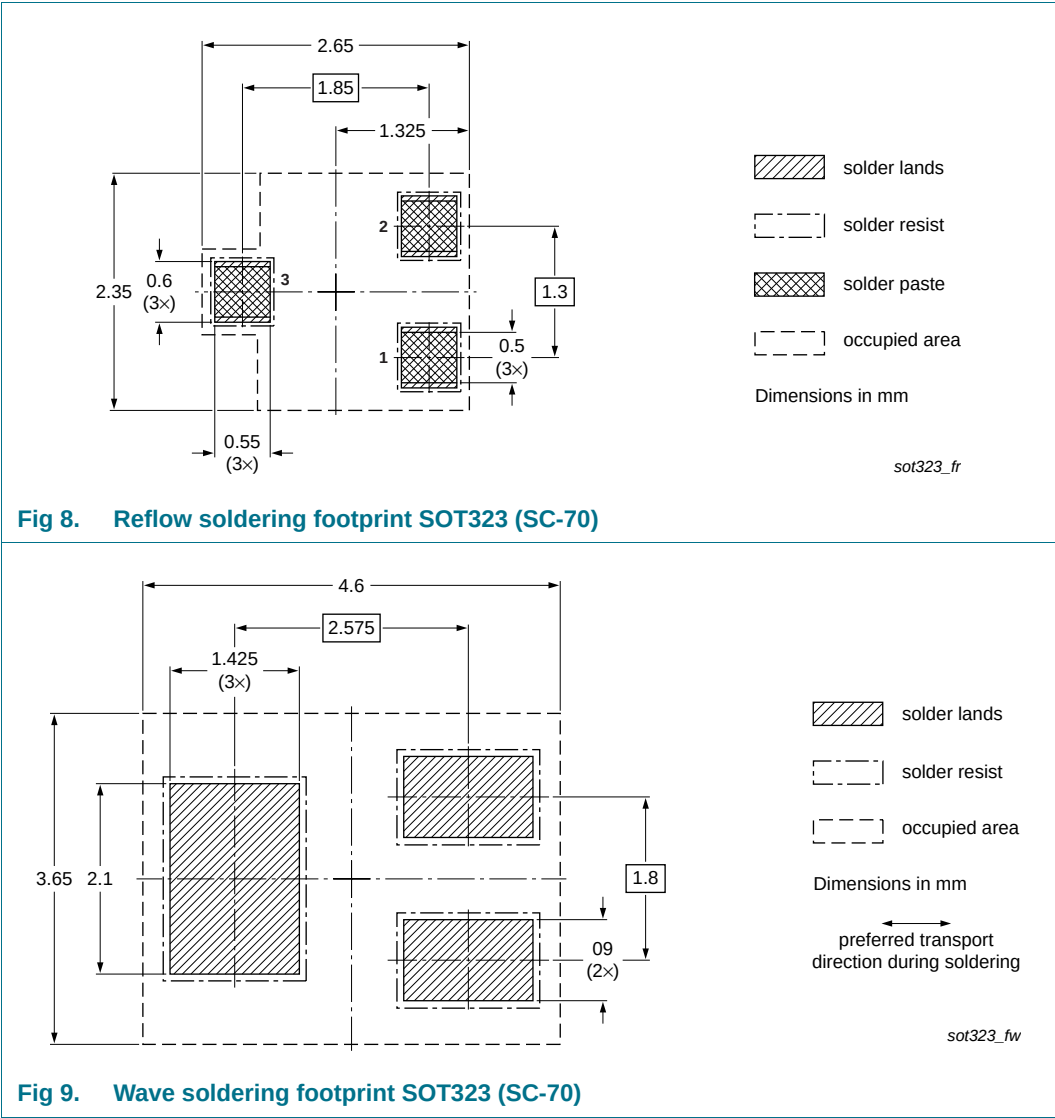
Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
1PS302	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
1PS302 v.6	20120723	Product data sheet	-	1PS302 v.5
Modifications:	• Section 2 "Pinning information" : corrected			
1PS302 v.5	20111116	Product data sheet	-	1PS302 v.4
1PS302 v.4	19990506	Product data sheet	-	1PS302 v.3
1PS302 v.3	19961004	Product specification	-	1PS302 v.2
1PS302 v.2	19960903	Product specification	-	1PS302 v.1
1PS302 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".

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