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	μA
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.

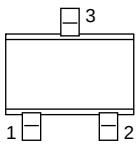
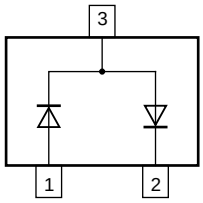
[2] Single diode loaded.

[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)		

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	$T_{amb} \leq 25$ °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_j = 25 °C before surge.

6. Thermal characteristics

Table 6. Thermal characteristics

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

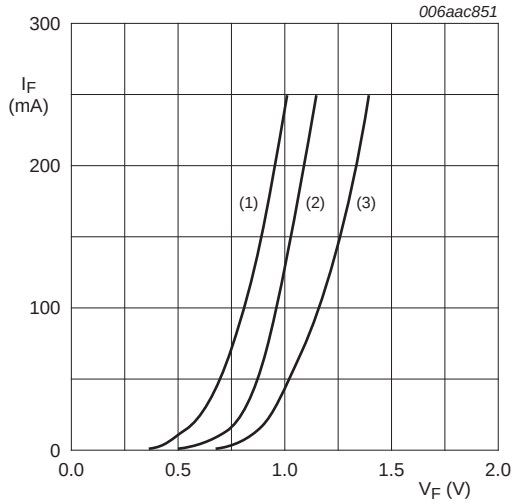
Table 7. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
V_F	forward voltage	I_F = 1 mA		-	610	-	mV
		I_F = 10 mA		-	740	-	mV
		I_F = 50 mA		-	-	1.0	V
		I_F = 100 mA		-	-	1.2	V
I_R	reverse current	V_R = 25 V		-	-	30	nA
		V_R = 80 V		-	-	0.5	µA
		V_R = 25 V; T_j = 150 °C		-	-	30	µA
		V_R = 80 V; T_j = 150 °C		-	-	100	µA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V		-	-	1.5	pF
t_{rr}	reverse recovery time		[1]	-	-	4	ns
V_{FR}	forward recovery voltage		[2]	-	-	1.75	V

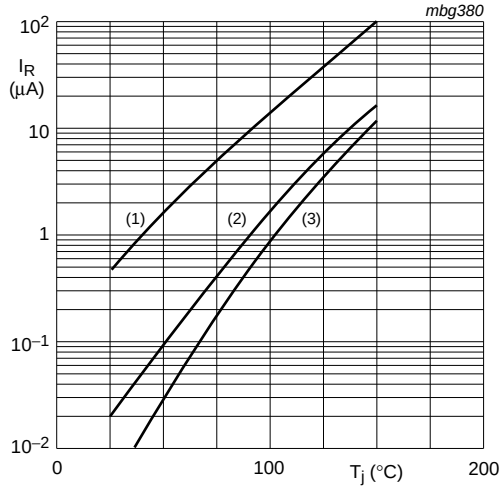
[1] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA.

[2] When switched from I_F = 10 mA; t_r = 20 ns.



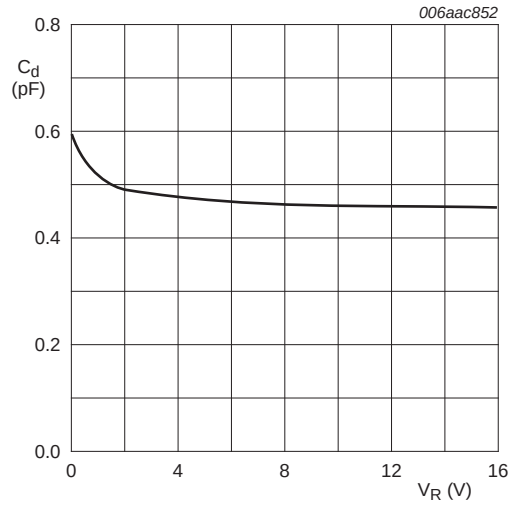
(1) T_j = 150 °C; typical values
(2) T_j = 25 °C; typical values
(3) T_j = 25 °C; maximum values

Fig 1. Forward current as a function of forward voltage



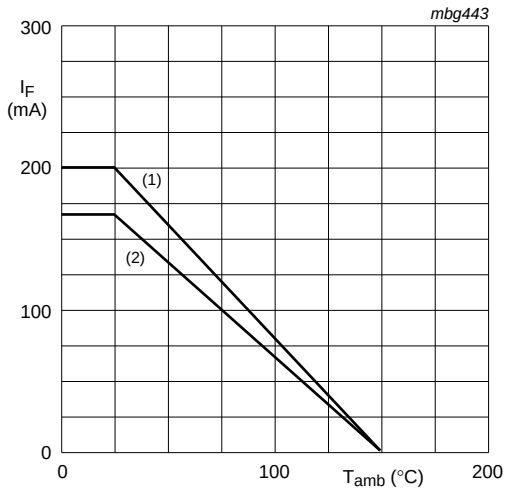
(1) V_R = 80 V; maximum values
(2) V_R = 80 V; typical values
(3) V_R = 25 V; typical values

Fig 2. Reverse current as a function of junction temperature



f = 1 MHz; T_{amb} = 25 °C

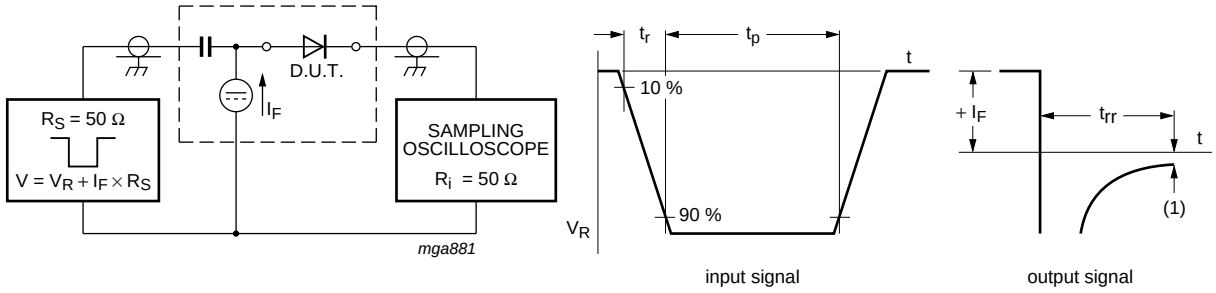
Fig 3. Diode capacitance as a function of reverse voltage; typical values



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

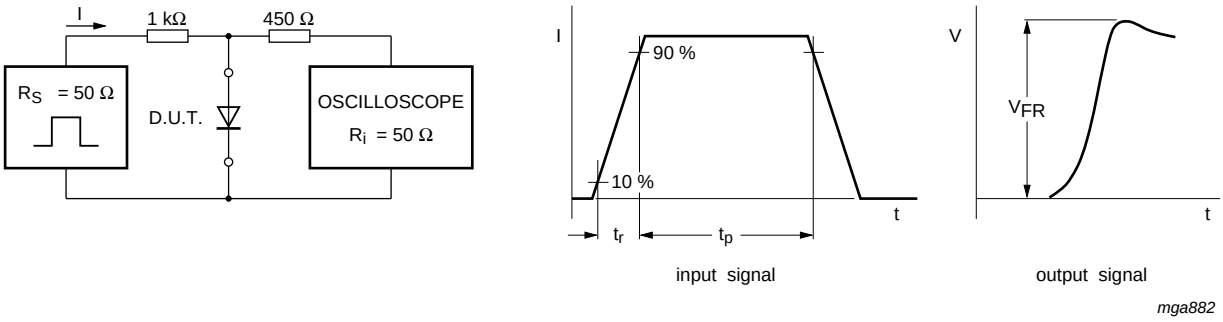


(1) I_R = 1 mA

Input signal: reverse pulse rise time t_r = 0.6 ns; reverse voltage pulse duration t_p = 100 ns; duty cycle δ = 0.05

Oscilloscope: rise time t_r = 0.35 ns

Fig 5. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time t_r = 20 ns; forward current pulse duration $t_p \geq$ 100 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

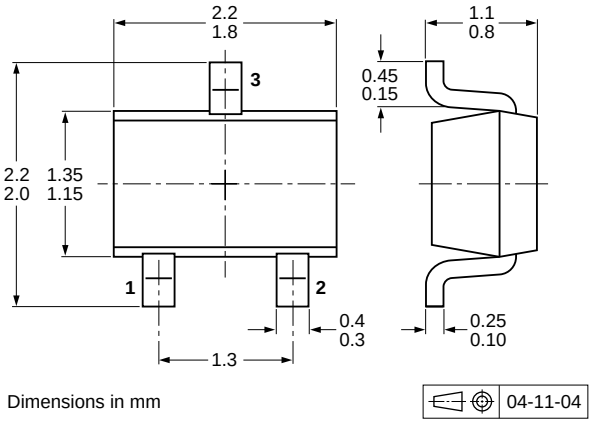


Fig 7. Package outline SOT323 (SC-70)

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

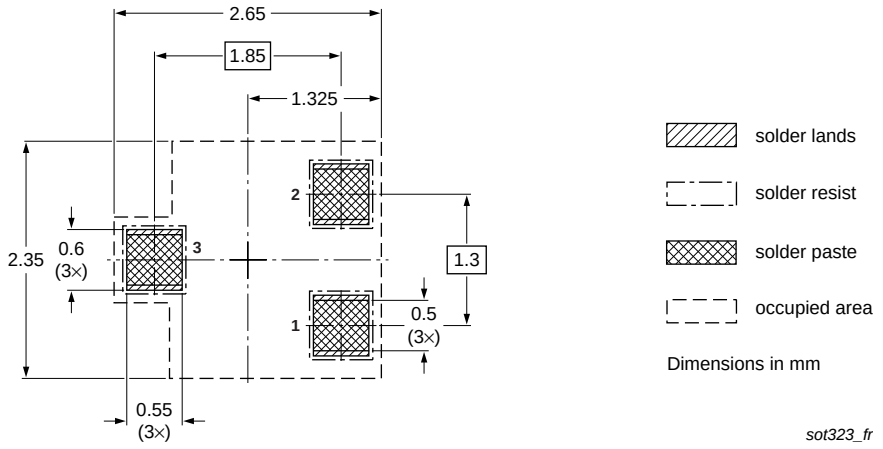


Fig 8. Reflow soldering footprint SOT323 (SC-70)

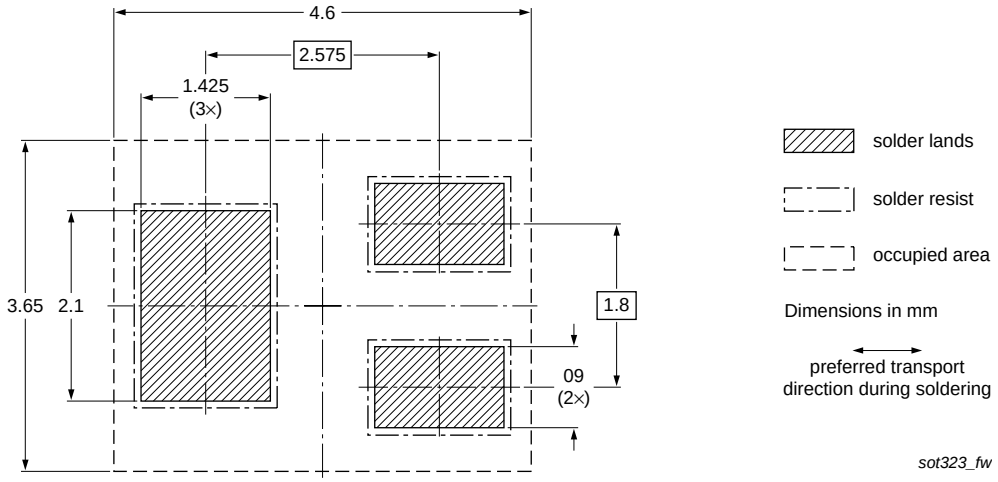


Fig 9. Wave soldering footprint SOT323 (SC-70)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
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".

[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.nxp.com.

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