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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 |
|------------------|-----------------------|--------------|-------|-----|-----|---------|
| 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.

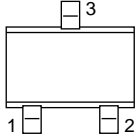
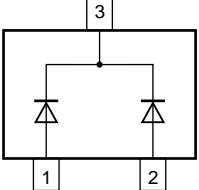
[3] Double diode loaded.

[4] When switched from $I_F = 10$ mA to $I_R = 10$ mA; $R_L = 100$ Ω ; 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 | $t_p \leq 0.5 \mu\text{s}$; $\delta \leq 0.25$ | - | 500 | mA | |
| I_{FSM} | non-repetitive peak forward current | square wave | [4] | | | |
| | | | $t_p = 1 \mu\text{s}$ | - | 4 | A |
| | | | $t_p = 1 \text{ s}$ | - | 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 |

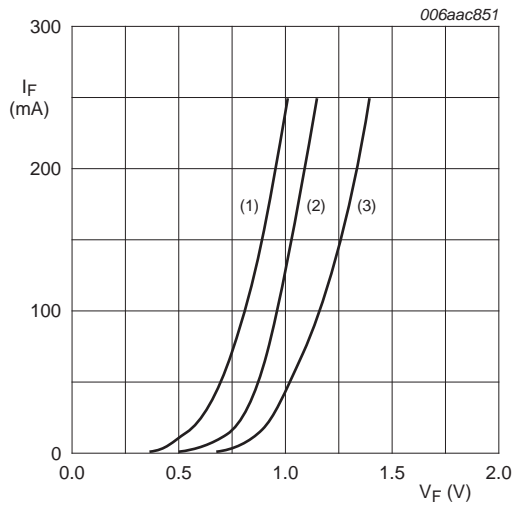
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

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

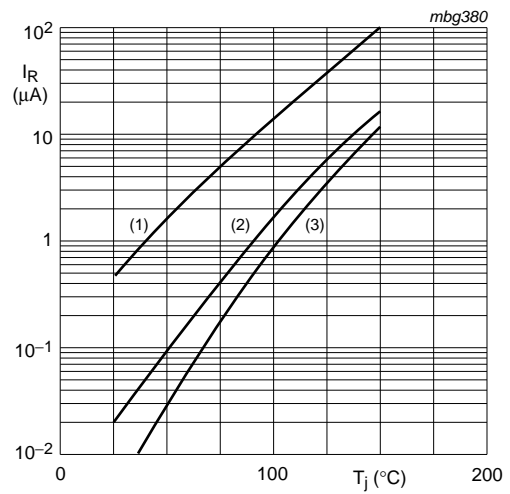
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|--------------------------|--|-------|-----|------|------|
| Per diode | | | | | | |
| V_{F} | forward voltage | $I_{\text{F}} = 1\text{ mA}$ | - | 610 | - | mV |
| | | $I_{\text{F}} = 10\text{ mA}$ | - | 740 | - | mV |
| | | $I_{\text{F}} = 50\text{ mA}$ | - | - | 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 $I_{\text{R}} = 10\text{ mA}$; $R_{\text{L}} = 100\text{ }\Omega$; measured at $I_{\text{R}} = 1\text{ mA}$.[2] When switched from $I_{\text{F}} = 10\text{ mA}$; $t_{\text{r}} = 20\text{ ns}$.



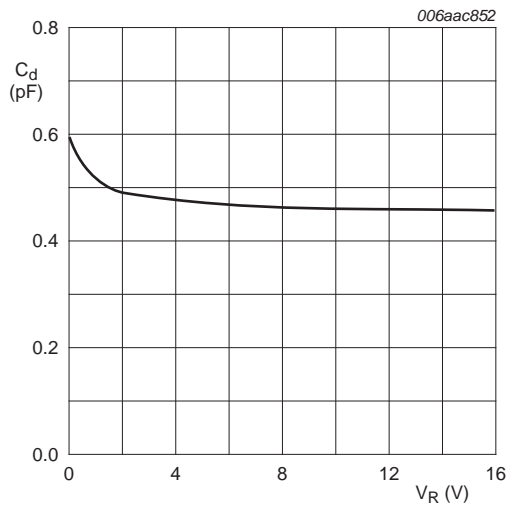
- (1) $T_j = 150\text{ °C}$; typical values
- (2) $T_j = 25\text{ °C}$; typical values
- (3) $T_j = 25\text{ °C}$; maximum values

Fig 1. Forward current as a function of forward voltage



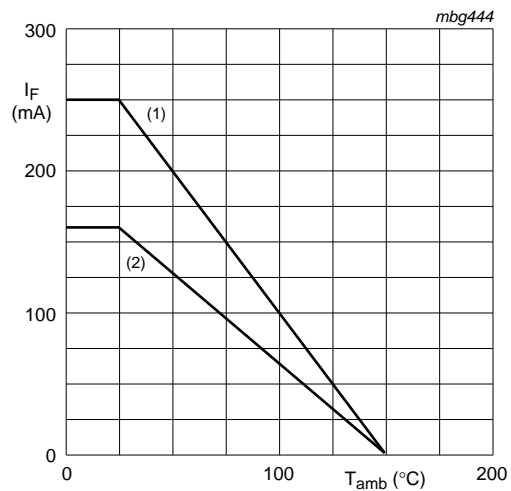
- (1) $V_R = 80\text{ V}$; maximum values
- (2) $V_R = 80\text{ V}$; typical values
- (3) $V_R = 25\text{ V}$; typical values

Fig 2. Reverse current as a function of junction temperature



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

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

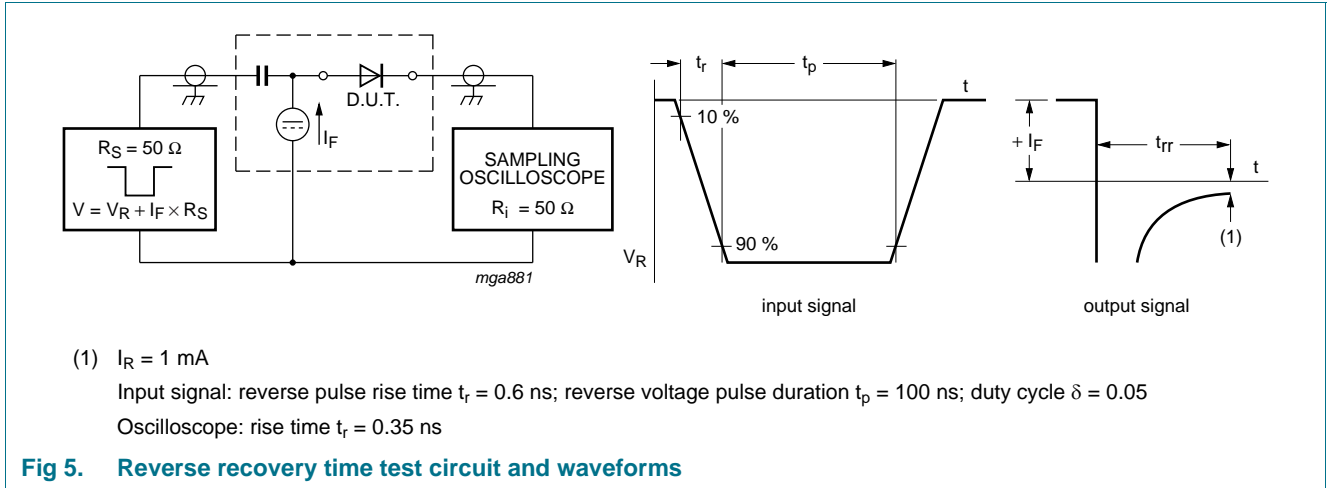


Fig 5. Reverse recovery time test circuit and waveforms

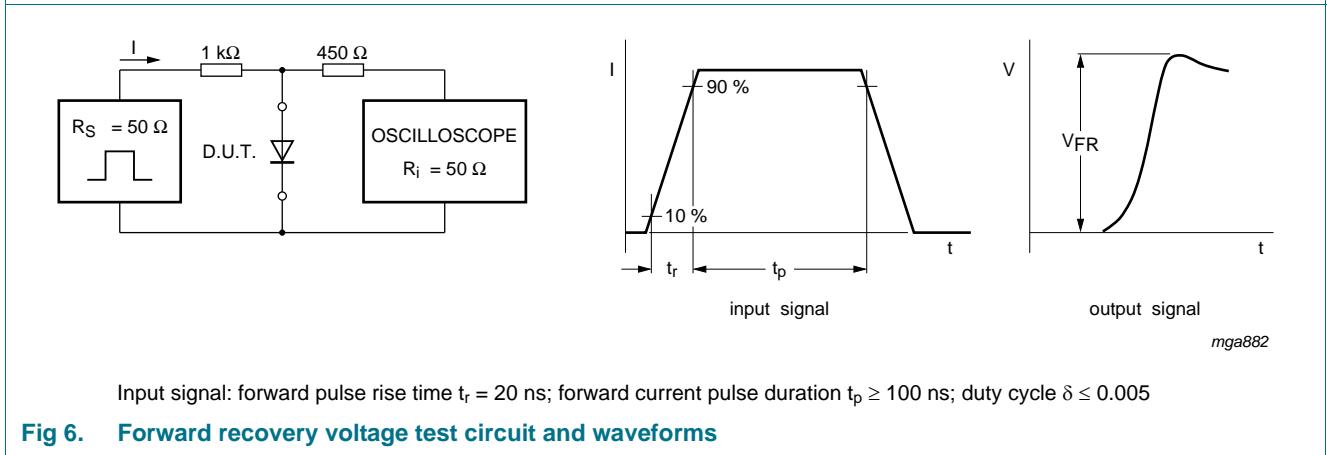
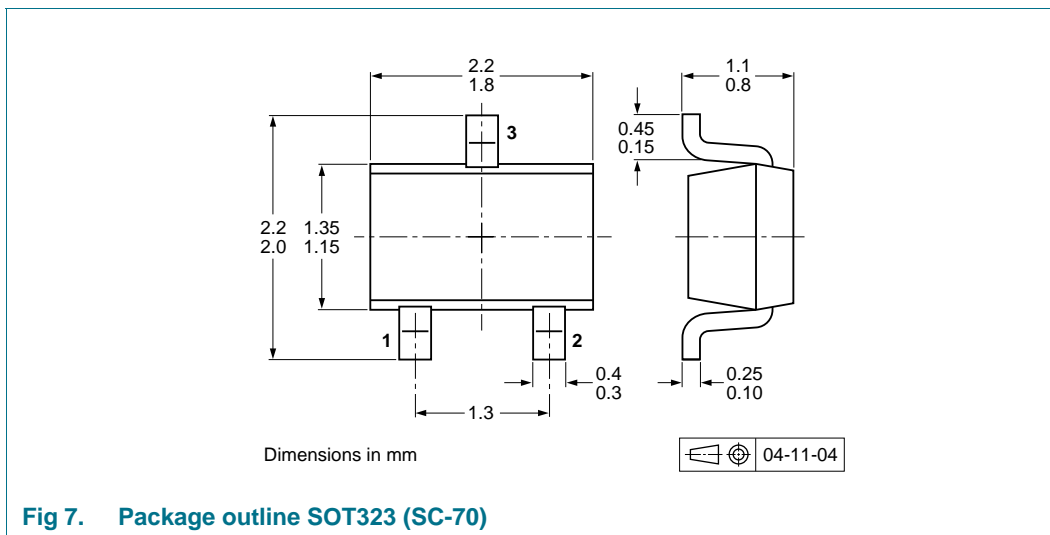


Fig 6. Forward recovery voltage test circuit and waveforms

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.^[1]

| 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

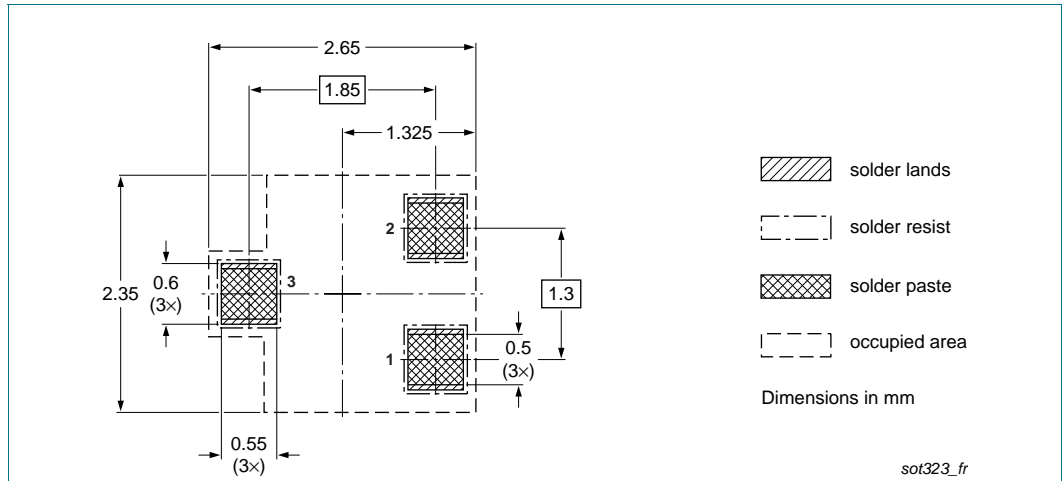


Fig 8. Reflow soldering footprint SOT323 (SC-70)

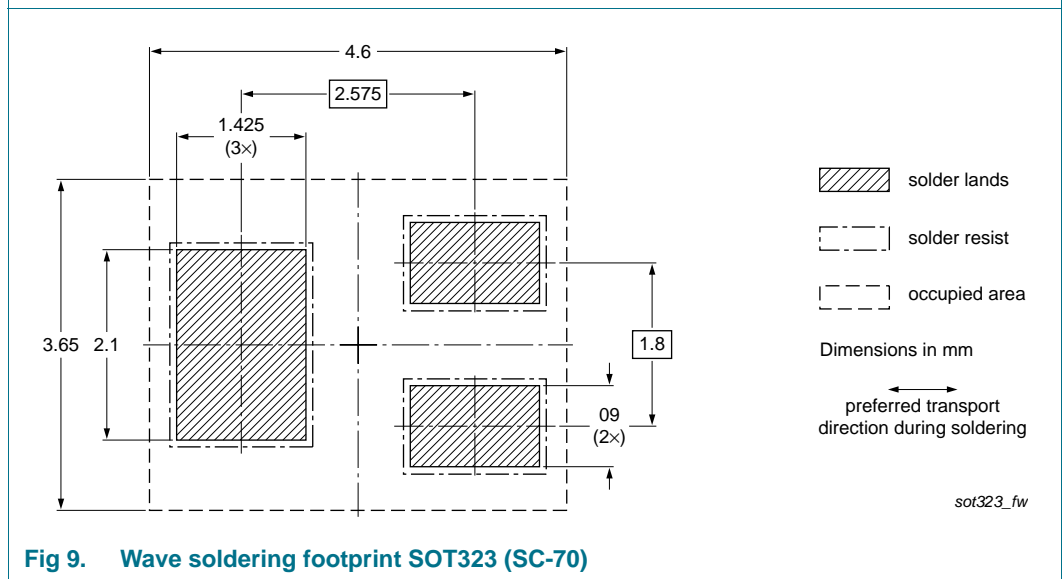


Fig 9. Wave soldering footprint SOT323 (SC-70)

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"> • 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".

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