
# 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 |
|---|---|---|---|---|---|---|---|
| **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.

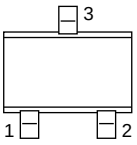
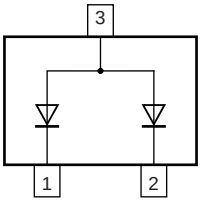
[2] Single diode loaded.

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



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## 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[1] |
|---|---|
| 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 |
|---|---|---|---|---|---|---|
| **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

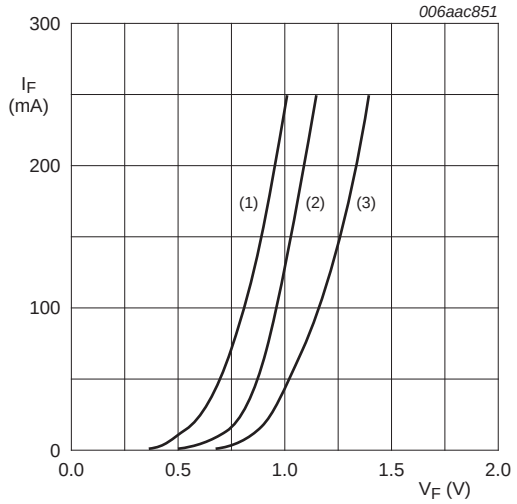
**Table 7. Characteristics**

*$T_{amb}$ = 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 | | - | - | 2 | pF |
| $t_{rr}$ | reverse recovery time | | [1] | - | - | 4 | ns |
| $V_{FR}$ | forward recovery voltage | | [2] | - | - | 1.75 | V |

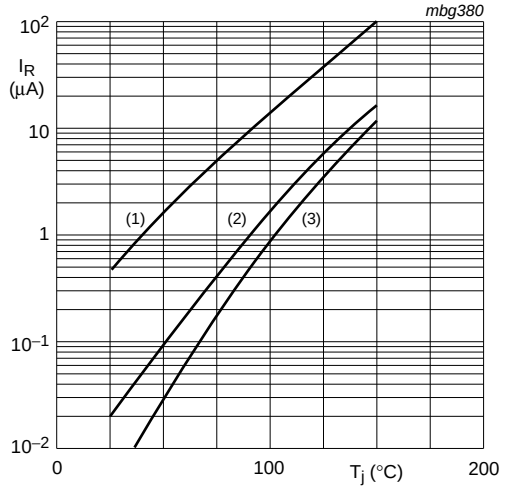
[1] When switched from $I_F$ = 10 mA to $I_R$ = 10 mA; $R_L$ = 100 Ω; measured at $I_R$ = 1 mA.

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



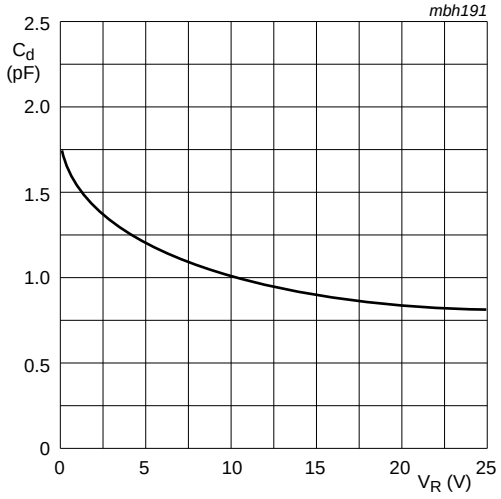

(1) $T_j$ = 150 °C; typical values
(2) $T_j$ = 25 °C; typical values
(3) $T_j$ = 25 °C; maximum values

**Fig 1. Forward current as a function of forward voltage**



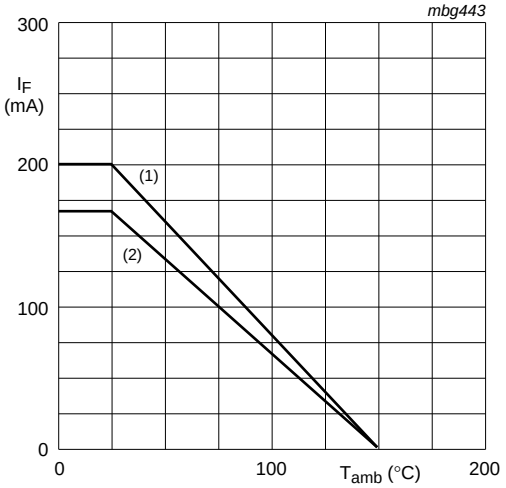

(1) $V_R$ = 80 V; maximum values
(2) $V_R$ = 80 V; typical values
(3) $V_R$ = 25 V; typical values

**Fig 2. Reverse current as a function of junction temperature**




f = 1 MHz; $T_{amb}$ = 25 °C

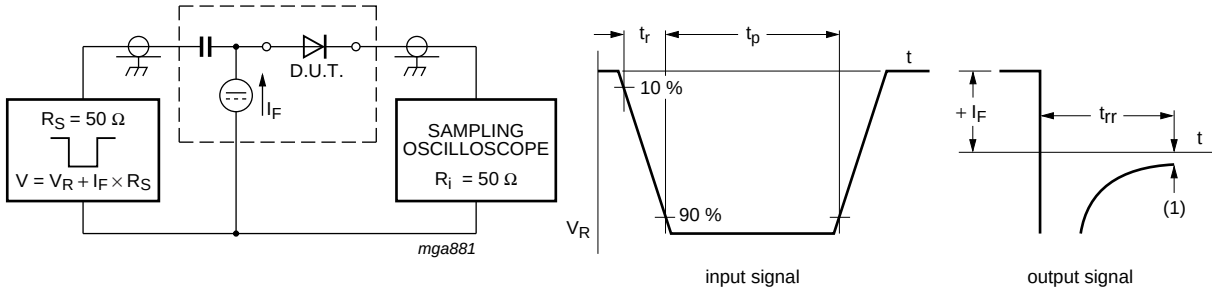
**Fig 3. Diode capacitance as a function of reverse voltage; typical values**




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

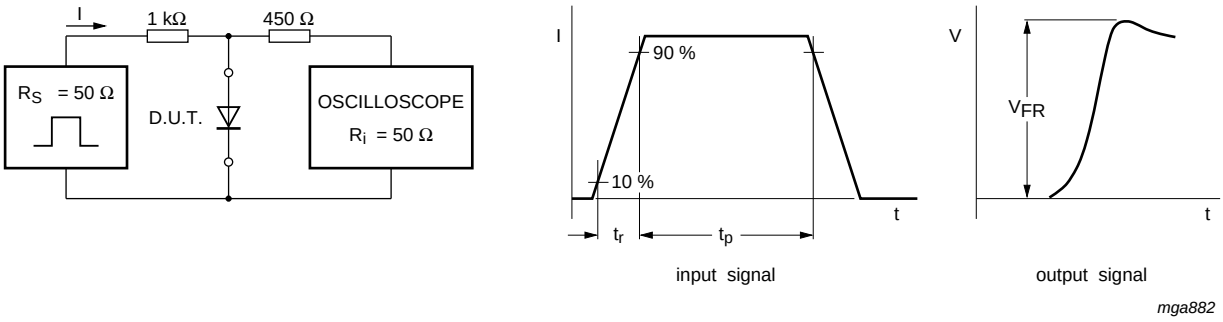



(1) $I_R$ = 1 mA

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

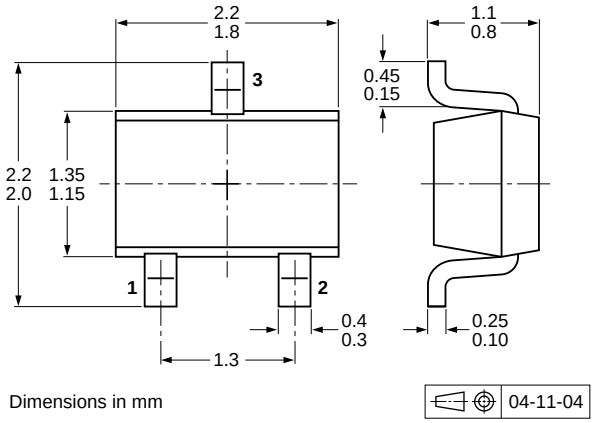



**Fig 7. Package outline SOT323 (SC-70)**

## 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 |
| 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

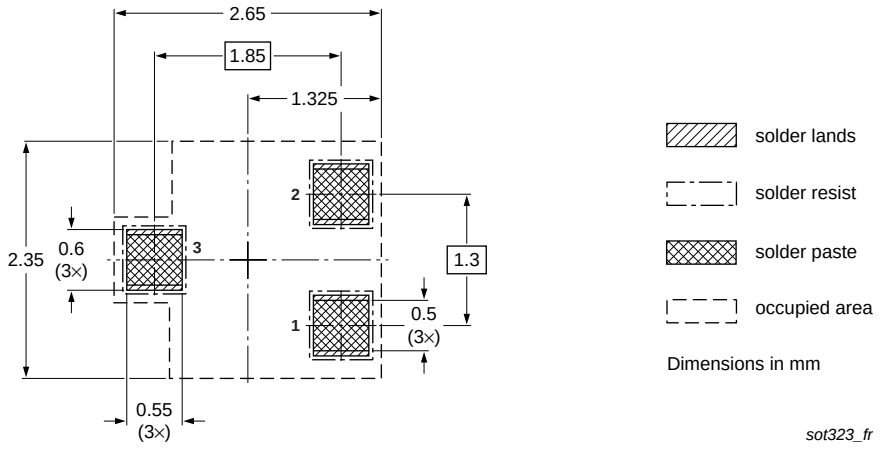



**Fig 8. Reflow soldering footprint SOT323 (SC-70)**

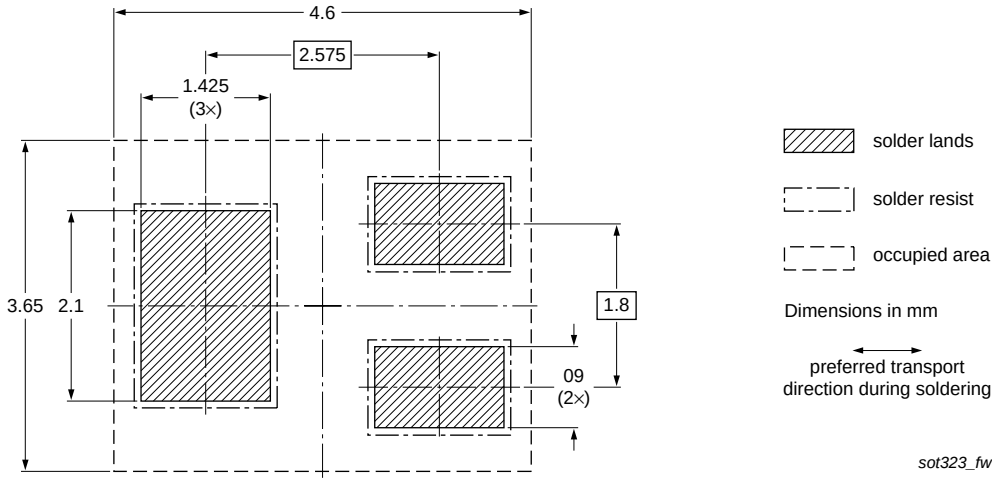



**Fig 9. Wave soldering footprint SOT323 (SC-70)**

## 12. Revision history

**Table 9. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 1PS300 v.5 | 20120305 | Product data sheet | - | 1PS300 v.4 |
| Modifications: | • The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.<br>• Legal texts have been adapted to the new company name where appropriate.<br>• Section 1.1 “General description”: amended<br>• Table 1 “Quick reference data”: added<br>• Section 4 “Marking”: updated<br>• Section 8 “Test information”: added<br>• Figure 7: superseded by minimized package outline drawing<br>• Section 10 “Packing information”: added<br>• Section 11 “Soldering”: added<br>• Section 13 “Legal information”: updated | | | |
| 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[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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