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Team Nexperia

PMLL4148L; PMLL4448

High-speed switching diodes

Rev. 8 — 1 February 2011

Product data sheet

1. Product profile

1.1 General description

Single high-speed switching diodes, fabricated in planar technology, and encapsulated in small hermetically sealed glass SOD80C Surface-Mounted Device (SMD) packages.

Table 1. Product overview

| Type number | Package | Configuration |
|-------------|---------|---------------|
| PMLL4148L | SOD80C | single |
| PMLL4448 | | |

1.2 Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Reverse voltage: $V_R \leq 75$ V
- Repetitive peak reverse voltage: $V_{RRM} \leq 100$ V
- Repetitive peak forward current: $I_{FRM} \leq 450$ mA
- Small hermetically sealed glass SMD package

1.3 Applications

- High-speed switching
- Reverse polarity protection

1.4 Quick reference data

Table 2. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------------|----------------|-----|-----|-----|------|
| I_F | forward current | | [1] | - | 200 | mA |
| I_{FRM} | repetitive peak forward current | | - | - | 450 | mA |
| V_R | reverse voltage | | - | - | 75 | V |
| V_F | forward voltage | | | | | |
| | PMLL4148L | $I_F = 50$ mA | - | - | 1 | V |
| | PMLL4448 | $I_F = 5$ mA | 620 | - | 720 | mV |
| | | $I_F = 100$ mA | - | - | 1 | V |
| t_{rr} | reverse recovery time | | [2] | - | 4 | ns |



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

[2] When switched from $I_F = 10$ mA to $I_R = 60$ mA; $R_L = 100$ Ω ; measured at $I_R = 1$ mA.



2. Pinning information

Table 3. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|---|---|
| 1 | cathode | [1] |  sym006 |
| 2 | anode |  | |

[1] The marking band indicates the cathode.

3. Ordering information

Table 4. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMLL4148L | - | hermetically sealed glass surface-mounted package; | SOD80C |
| PMLL4448 | - | 2 connectors | |

4. Marking

Table 5. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMLL4148L | marking band |
| PMLL4448 | marking band |

5. Limiting values

Table 6. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-----------|-------------------------------------|-----------------|-----|-----|------|---|
| V_{RRM} | repetitive peak reverse voltage | | - | 100 | V | |
| V_R | reverse voltage | | - | 75 | V | |
| I_F | forward current | [1] | - | 200 | mA | |
| I_{FRM} | repetitive peak forward current | | - | 450 | mA | |
| I_{FSM} | non-repetitive peak forward current | square wave | [2] | | | |
| | | $t_p = 1 \mu s$ | | - | 4 | A |
| | | $t_p = 1 ms$ | | - | 1 | A |
| | | $t_p = 1 s$ | | - | 0.5 | A |

Table 6. Limiting values ...continued

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|---------------------------------|-------|------|------|
| P_{tot} | total power dissipation | $T_{\text{amb}} = 25\text{ °C}$ | [1] - | 500 | mW |
| T_j | junction temperature | | - | 200 | °C |
| T_{amb} | ambient temperature | | -65 | +200 | °C |
| T_{stg} | storage temperature | | -65 | +200 | °C |

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

[2] $T_j = 25\text{ °C}$ prior to surge.

6. Thermal characteristics

Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|--|-------------|-------|-----|-----|------|
| $R_{\text{th}(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] - | - | 350 | K/W |
| $R_{\text{th}(j-sp)}$ | thermal resistance from junction to solder point | | - | - | 300 | K/W |

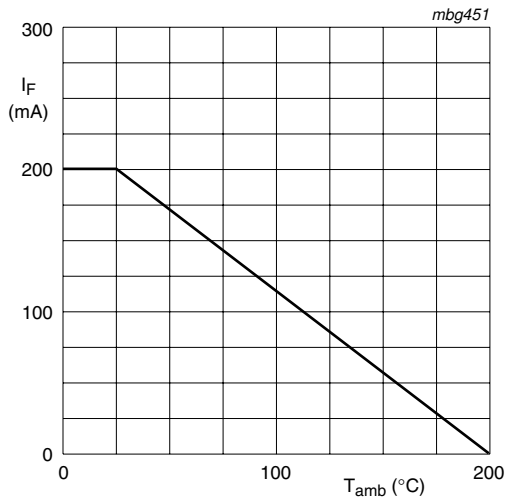
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

Table 8. Characteristics $T_{\text{amb}} = 25\text{ °C}$ unless otherwise specified.

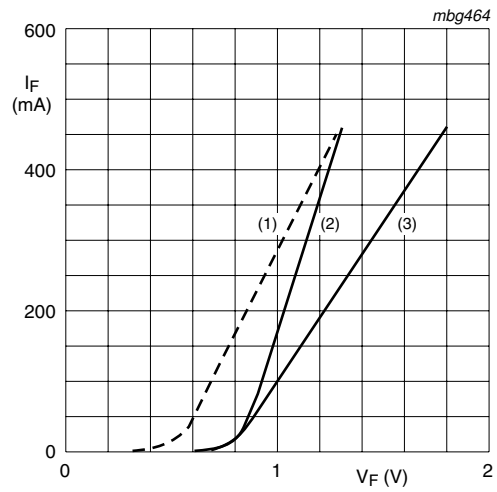
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|----------|--------------------------|--|--|-----|-----|------|----|
| V_F | forward voltage | | | | | | |
| | | PMLL4148L | $I_F = 50\text{ mA}$ | - | - | 1 | V |
| | | PMLL4448 | $I_F = 5\text{ mA}$ | 620 | - | 720 | mV |
| | | $I_F = 100\text{ mA}$ | - | - | 1 | V | |
| I_R | reverse current | $V_R = 20\text{ V}$ | - | - | 25 | nA | |
| | | $V_R = 20\text{ V}; T_j = 150\text{ °C}$ | - | - | 50 | μA | |
| I_R | reverse current | | | | | | |
| | | PMLL4448 | $V_R = 20\text{ V}; T_j = 100\text{ °C}$ | - | - | 3 | μA |
| C_d | diode capacitance | $V_R = 0\text{ V}; f = 1\text{ MHz}$ | - | - | 4 | pF | |
| t_{rr} | reverse recovery time | | [1] - | - | 4 | ns | |
| V_{FR} | forward recovery voltage | | [2] - | - | 2.5 | V | |

[1] When switched from $I_F = 10\text{ mA}$ to $I_R = 60\text{ mA}$; $R_L = 100\text{ Ω}$; measured at $I_R = 1\text{ mA}$.[2] When switched from $I_F = 50\text{ mA}$; $t_r = 20\text{ ns}$.



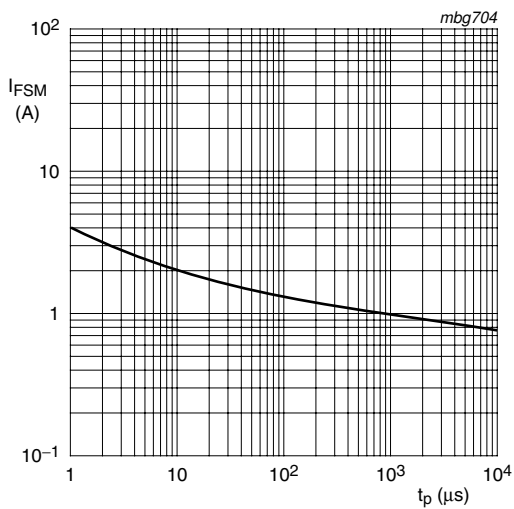
FR4 PCB, standard footprint

Fig 1. Forward current as a function of ambient temperature; derating curve



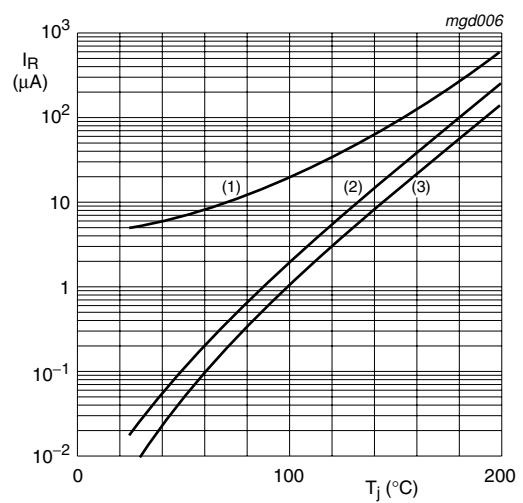
- (1) $T_j = 175\text{ }^\circ\text{C}$; typical values
- (2) $T_j = 25\text{ }^\circ\text{C}$; typical values
- (3) $T_j = 25\text{ }^\circ\text{C}$; maximum values

Fig 2. Forward current as a function of forward voltage



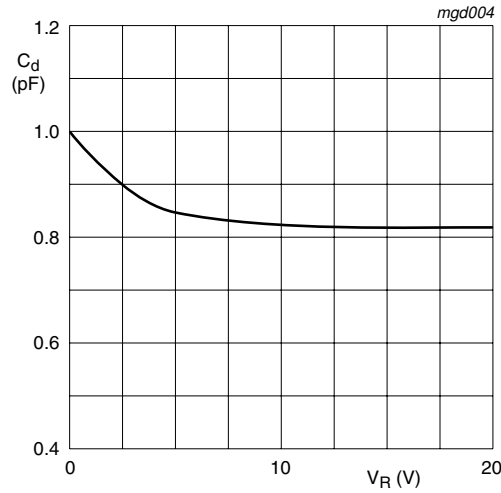
Based on square wave currents.
 $T_j = 25\text{ }^\circ\text{C}$; prior to surge

Fig 3. Non-repetitive peak forward current as a function of pulse duration; maximum values



- (1) $V_R = 75\text{ V}$; maximum values
- (2) $V_R = 75\text{ V}$; typical values
- (3) $V_R = 20\text{ V}$; typical values

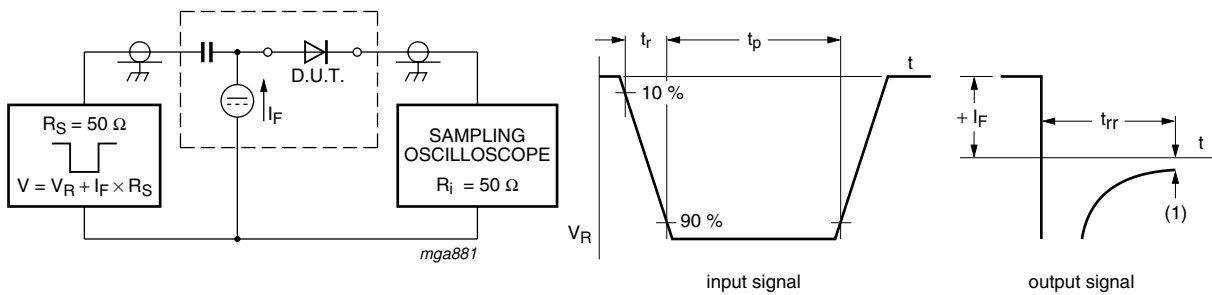
Fig 4. Reverse current as a function of junction temperature



f = 1 MHz; Tj = 25 °C

Fig 5. Diode capacitance as a function of reverse voltage; typical values

8. Test information

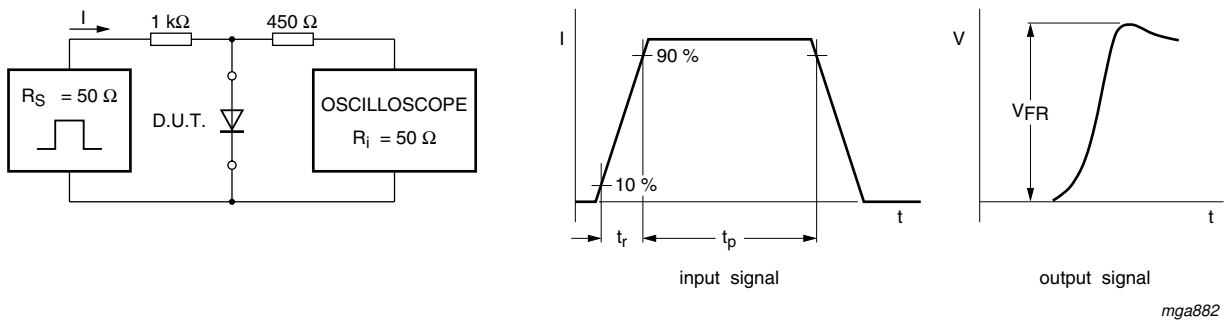


(1) IR = 1 mA

Input signal: reverse pulse rise time tr = 0.6 ns; reverse voltage pulse duration tp = 100 ns; duty cycle δ ≤ 0.05

Oscilloscope: rise time tr = 0.35 ns

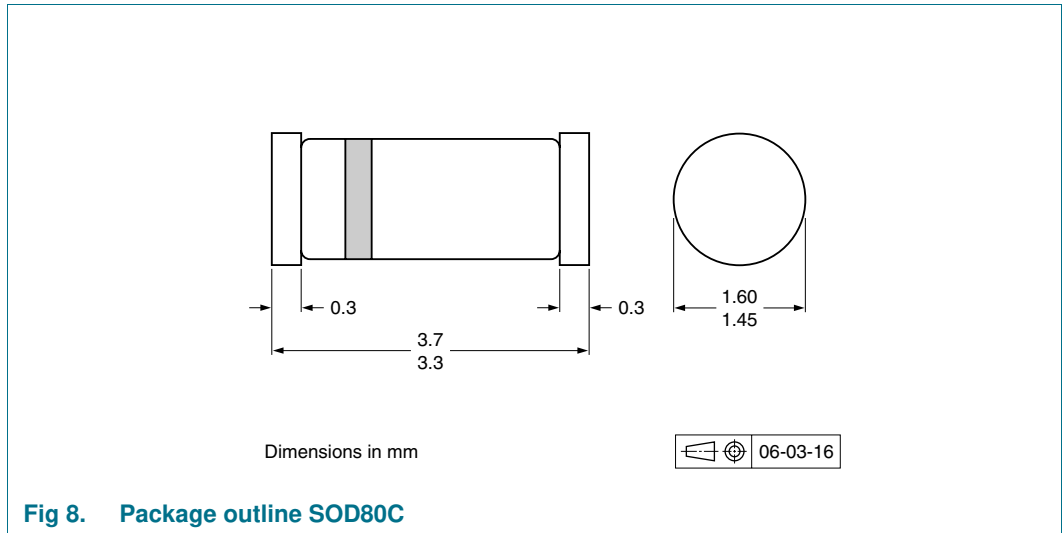
Fig 6. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time tr = 20 ns; forward current pulse duration tp ≥ 100 ns; duty cycle δ ≤ 0.005

Fig 7. Forward recovery voltage test circuit and waveforms

9. Package outline



10. Packing information

Table 9. Packing methods

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

| Type number | Package | Description | Packing quantity | |
|-------------|---------|--------------------------------|------------------|-------|
| | | | 2500 | 10000 |
| PMLL4148L | SOD80C | 4 mm pitch, 8 mm tape and reel | -115 | -135 |
| PMLL4448 | | | | |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

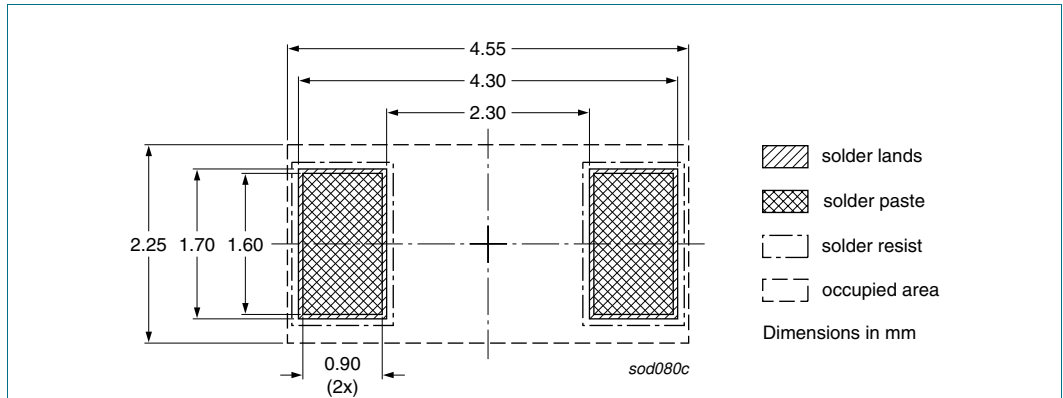


Fig 9. Reflow soldering footprint SOD80C

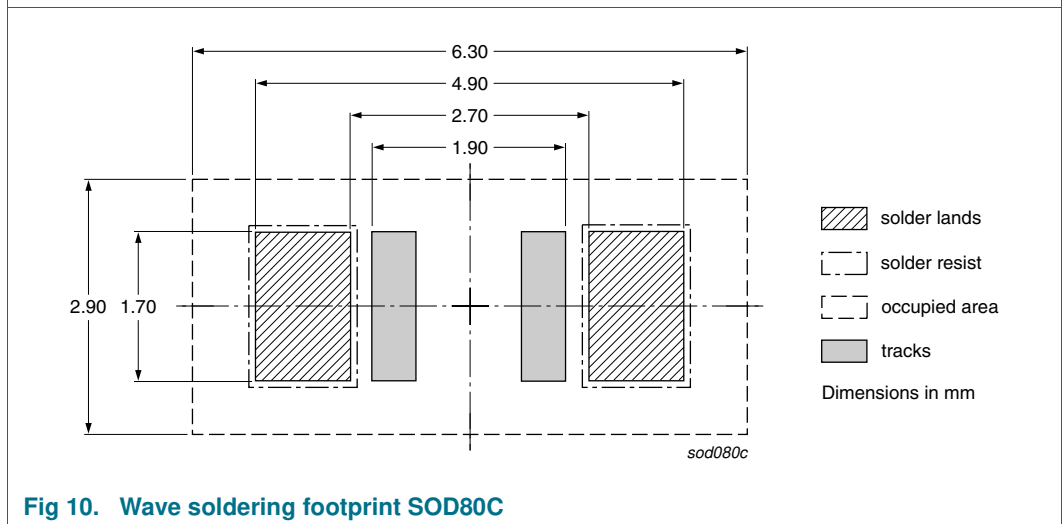


Fig 10. Wave soldering footprint SOD80C

12. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------------|--------------|---|---------------|------------------------|
| PMLL4148L_PMLL4448 v.8 | 20110201 | Product data sheet | - | PMLL4148L_PMLL4448 v.7 |
| Modifications: | | <ul style="list-style-type: none"> • Section 4 “Marking”: amended. • Figure 8: replaced by minimized outline drawing. • Section 13 “Legal information”: updated. | | |
| PMLL4148L_PMLL4448 v.7 | 20070131 | Product data sheet | - | PMLL4148L_PMLL4448 v.6 |
| PMLL4148L_PMLL4448 v.6 | 20050404 | Product data sheet | - | PMLL4148L_4448 v.5 |
| PMLL4148L_4448 v.5 | 20020123 | Product specification | - | PMLL4148L_4448 v.4 |
| PMLL4148L_4448 v.4 | 20001115 | Product specification | - | PMLL4148 v.3 |
| PMLL4148 v.3 | 19990527 | Product specification | - | PMLL4148 v.2 |
| PMLL4148 v.2 | 19960918 | Product specification | - | PMLL4148 v.1 |
| PMLL4148 v.1 | 19960423 | 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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Date of release: 1 February 2011
 Document identifier: PMLL4148L_PMLL4448