

# 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


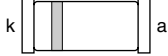
| Symbol    | Parameter                       | Conditions     | Min | Typ | Max | Unit |
|-----------|---------------------------------|----------------|-----|-----|-----|------|
| $I_F$     | forward current                 |                | [1] | -   | 200 | mA   |
| $I_{FRM}$ | repetitive peak forward 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;  $R_L = 100$   $\Omega$ ; measured at  $I_R = 1$  mA.

## 2. Pinning information

Table 3. Pinning

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

[1] The marking band indicates the cathode.

## 3. Ordering information

Table 4. Ordering information

| Type number | Package |  | Version |
|-------------|---------|--|---------|
|             | Name    | Description  |         |
| 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] |     |      |   |
|           |                                     | $t_p = 1 \mu\text{s}$ |     | -   | 4    | A |
|           |                                     | $t_p = 1 \text{ms}$   |     | -   | 1    | A |
|           |                                     | $t_p = 1 \text{s}$    |     | -   | 0.5  | A |

**Table 6. Limiting values ...continued**

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

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

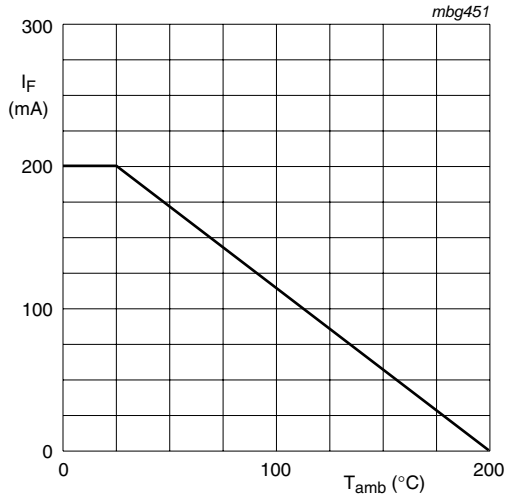
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

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

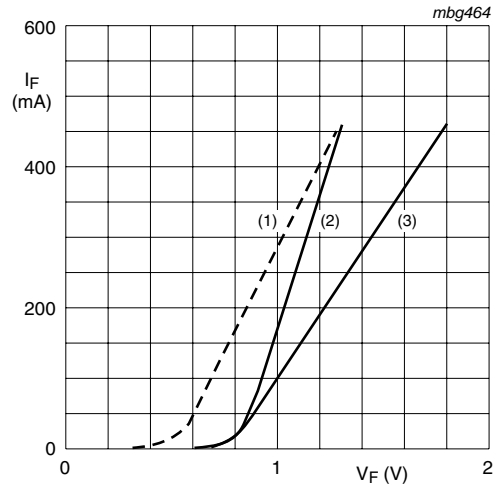
| Symbol   | Parameter                | Conditions                               | Min                                      | Typ | Max | Unit |    |
|----------|--------------------------|--|--|-----|-----|------|----|
| $V_F$    | forward voltage          |  |  |     |     |      |    |
|          |                          | 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  $I_F = 50\text{ mA}$ ;  $t_r = 20\text{ ns}$ .



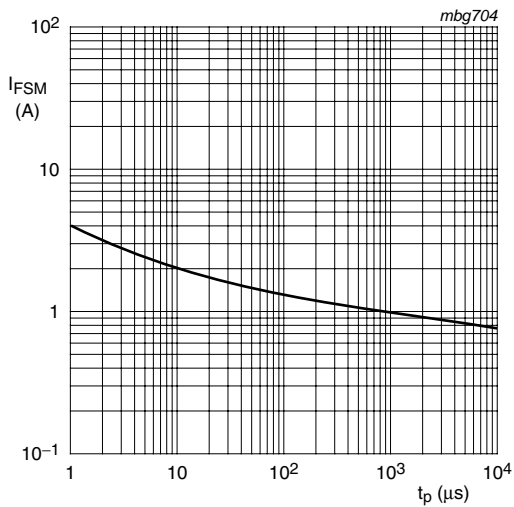
FR4 PCB, standard footprint

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



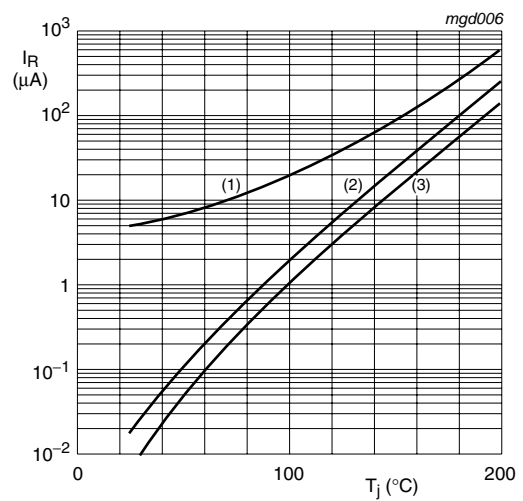
- (1) T<sub>j</sub> = 175 °C; typical values
- (2) T<sub>j</sub> = 25 °C; typical values
- (3) T<sub>j</sub> = 25 °C; maximum values

**Fig 2. Forward current as a function of forward voltage**



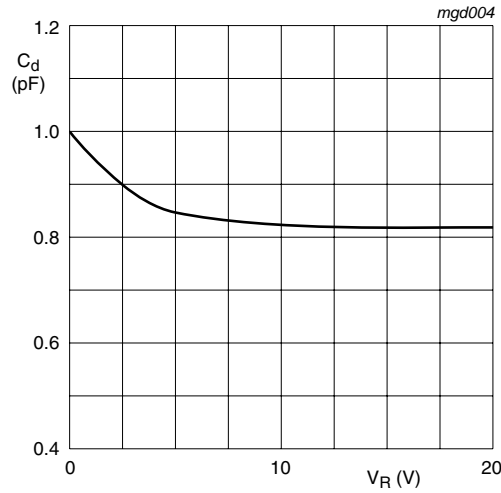
Based on square wave currents.  
T<sub>j</sub> = 25 °C; prior to surge

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



- (1) V<sub>R</sub> = 75 V; maximum values
- (2) V<sub>R</sub> = 75 V; typical values
- (3) V<sub>R</sub> = 20 V; typical values

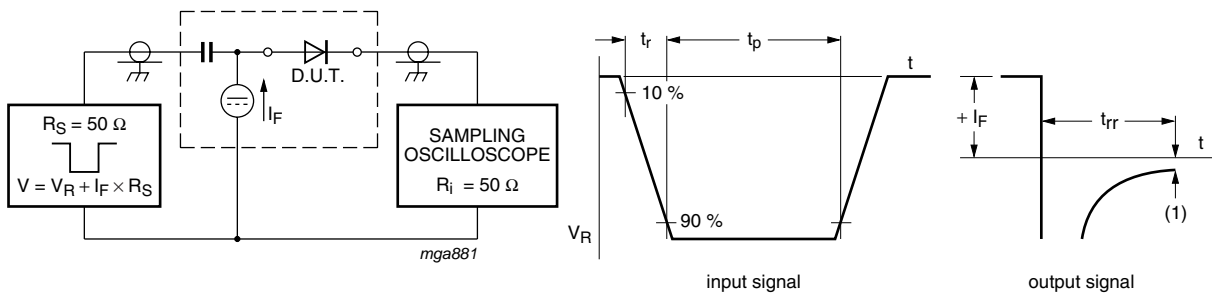
**Fig 4. Reverse current as a function of junction temperature**



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

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

### 8. Test information

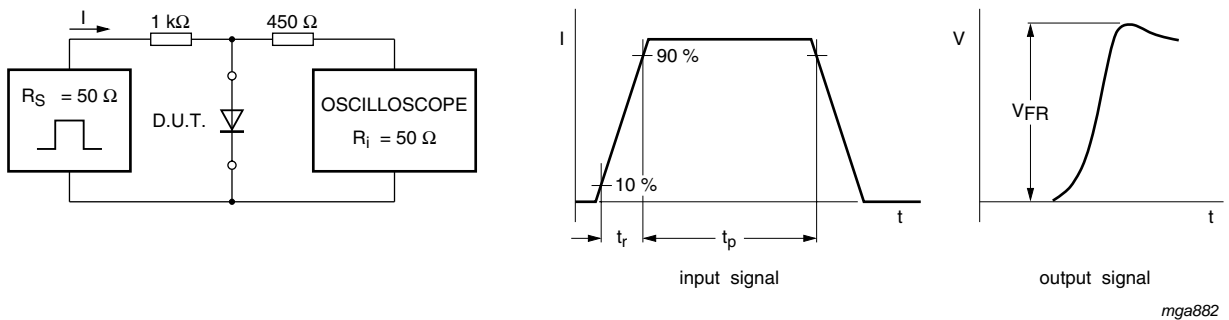


(1)  $I_R = 1 \text{ mA}$

Input signal: reverse pulse rise time  $t_r = 0.6 \text{ ns}$ ; reverse voltage pulse duration  $t_p = 100 \text{ ns}$ ; duty cycle  $\delta \leq 0.05$

Oscilloscope: rise time  $t_r = 0.35 \text{ ns}$

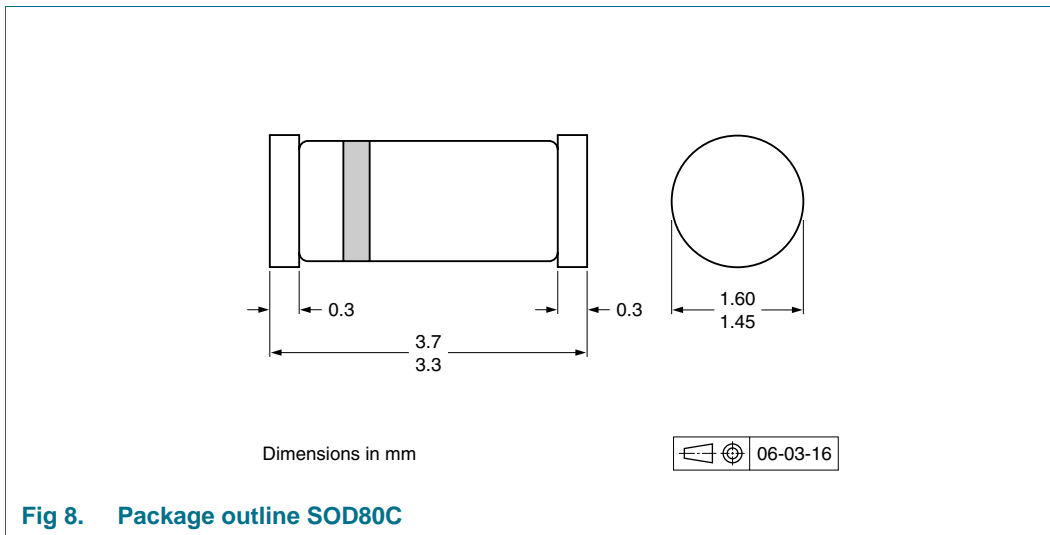
Fig 6. Reverse recovery time test circuit and waveforms



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 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.<sup>[1]</sup>

| 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

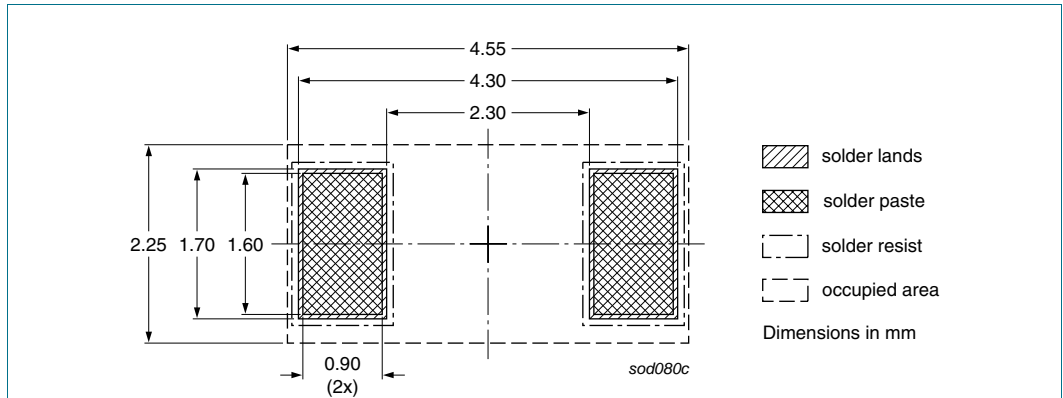


Fig 9. Reflow soldering footprint SOD80C

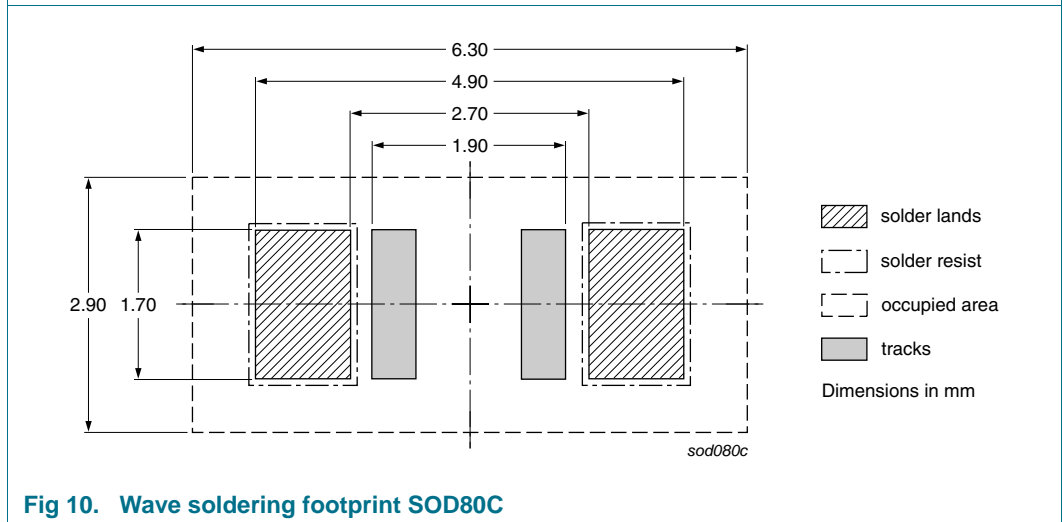


Fig 10. Wave soldering footprint SOD80C

## 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"> <li>• <a href="#">Section 4 “Marking”</a>: amended.</li> <li>• <a href="#">Figure 8</a>: replaced by minimized outline drawing.</li> <li>• <a href="#">Section 13 “Legal information”</a>: updated.</li> </ul> |               |                        |
| 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 <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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