

PMLL4148L; PMLL4448

High-speed switching diodes

Rev. 06 — 4 April 2005

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 SMD packages.

Table 1: Product overview

| Type number | Package | | Configuration |
|-------------|---------|-------|---------------|
| | Philips | JEITA | |
| PMLL4148L | SOD80C | - | single diode |
| PMLL4448 | SOD80C | - | single diode |

1.2 Features

- Small hermetically sealed glass SMD package
- High switching speed: ≤ 4 ns
- Continuous reverse voltage: ≤ 75 V
- Repetitive peak reverse voltage: ≤ 100 V
- Repetitive peak forward current: ≤ 450 mA

1.3 Applications

- High-speed switching
- Inverse-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 | $I_F = 100$ mA | - | - | 1000 | mV |
| | | PMLL4148L $I_F = 10$ mA | - | - | 1000 | mV |
| | | PMLL4448 $I_F = 5$ mA | 620 | - | 720 | mV |
| 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

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2. Pinning information

Table 3: Pinning

| Pin | Description | Simplified outline | Symbol |
|-----|-------------|---|---|
| 1 | cathode |  |  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; 2 connectors | SOD80C |
| PMLL4448 | - | hermetically sealed glass surface mounted package; 2 connectors | SOD80C |

4. Marking

Table 5: Marking codes

| Type number | Marking code [1] |
|-------------|------------------|
| PMLL4148L | marking band |
| PMLL4448 | marking band |

[1] black: made in Philippines
brown: made in China

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 |
| P_{tot} | total power dissipation | $T_{amb} = 25 \text{ }^\circ\text{C}$ | [1] | 500 | mW |

Table 6: Limiting values ...continued

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|----------------------|------------|-----|------|------|
| 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] $T_j = 25$ °C prior to surge

6. Thermal characteristics

Table 7: Thermal characteristics

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

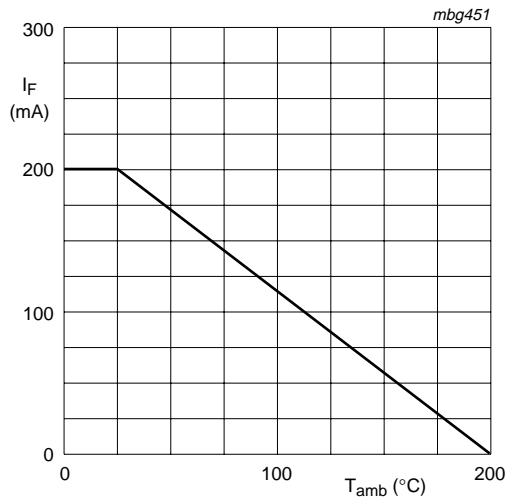
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

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

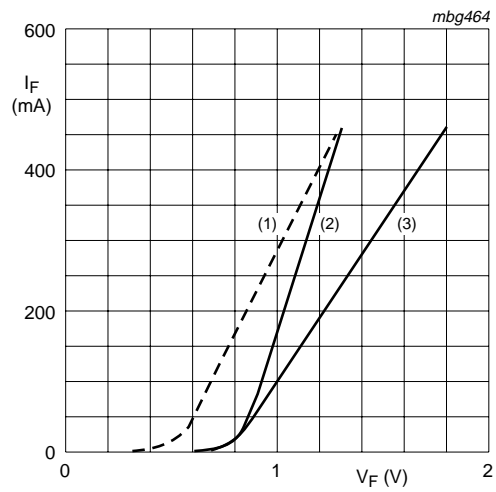
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------|--------------------------|---------------------------------------|-----|-----|------|------|
| V_F | forward voltage | $I_F = 100$ mA | - | - | 1000 | mV |
| | | PMLL4148L $I_F = 10$ mA | - | - | 1000 | mV |
| | | PMLL4448 $I_F = 5$ mA | 620 | - | 720 | mV |
| I_R | reverse current | $V_R = 20$ V | - | - | 25 | nA |
| | | $V_R = 20$ V; $T_j = 150$ °C | - | - | 50 | μA |
| | | PMLL4448 $V_R = 20$ V; $T_j = 100$ °C | - | - | 3 | μA |
| C_d | diode capacitance | $V_R = 0$ V; $f = 1$ MHz | - | - | 4 | pF |
| t_{rr} | reverse recovery time | | [1] | - | 4 | ns |
| V_{FR} | forward recovery voltage | | [2] | - | 2.5 | V |

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



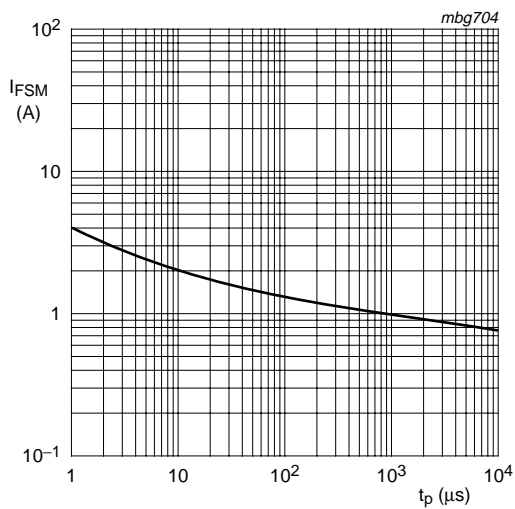
FR4 PCB; standard footprint

Fig 1. Maximum permissible forward current as a function of ambient temperature



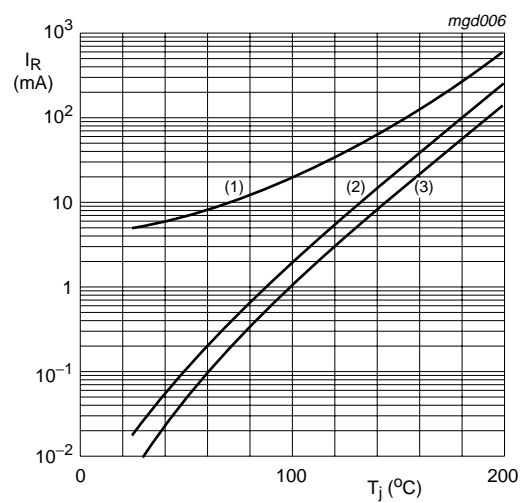
- (1) $T_j = 175\text{ }^\circ\text{C}$; typical values
- (2) $T_j = 25\text{ }^\circ\text{C}$; typical values
- (3) $T_j = 25\text{ }^\circ\text{C}$; maximum values

Fig 2. Forward current as a function of forward voltage



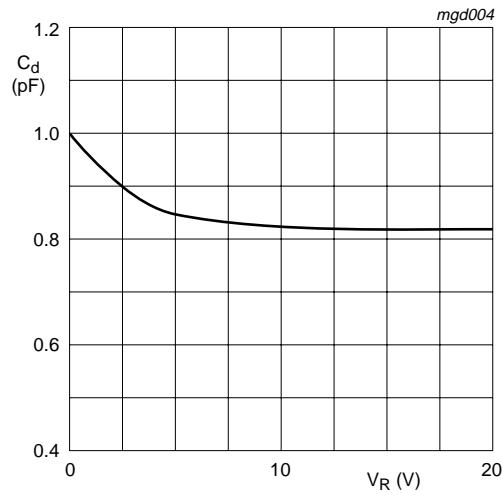
Based on square wave currents
 $T_j = 25\text{ }^\circ\text{C}$ prior to surge

Fig 3. Maximum permissible non-repetitive peak forward current as a function of pulse duration



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

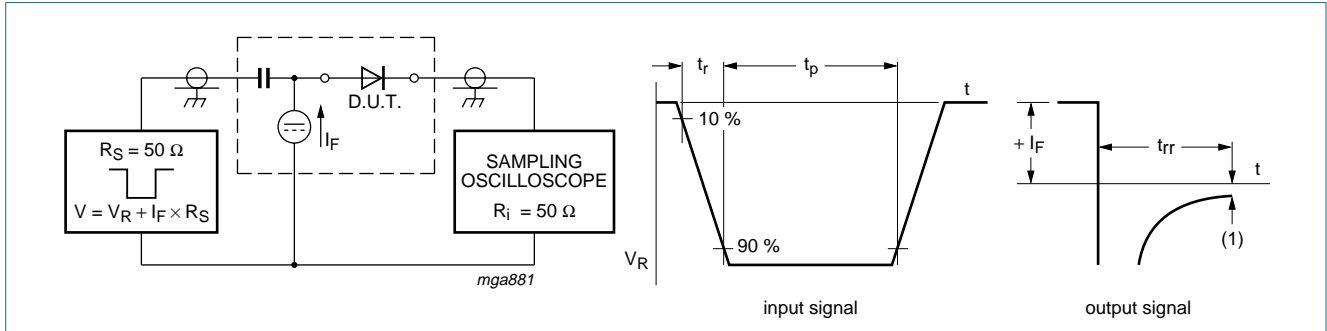
Fig 4. Reverse current as a function of junction temperature



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

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

8. Test information

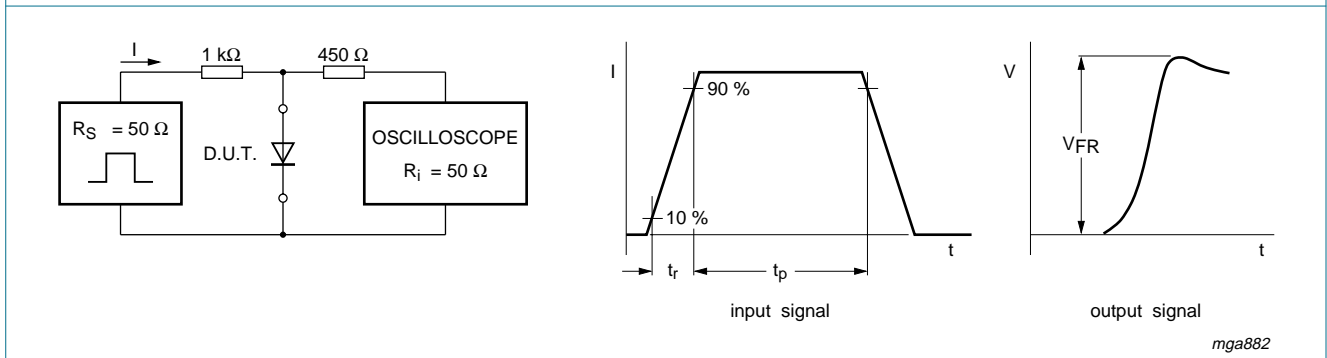


Input signal: Reverse pulse rise time $t_r = 0.6 \text{ ns}$; reverse voltage pulse duration $t_p = 100 \text{ ns}$; duty factor $\delta \leq 0.05$

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

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

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 factor $\delta \leq 0.005$

Fig 7. Forward recovery voltage test circuit and waveforms

9. Package outline

Hermetically sealed glass surface mounted package; 2 connectors

SOD80C

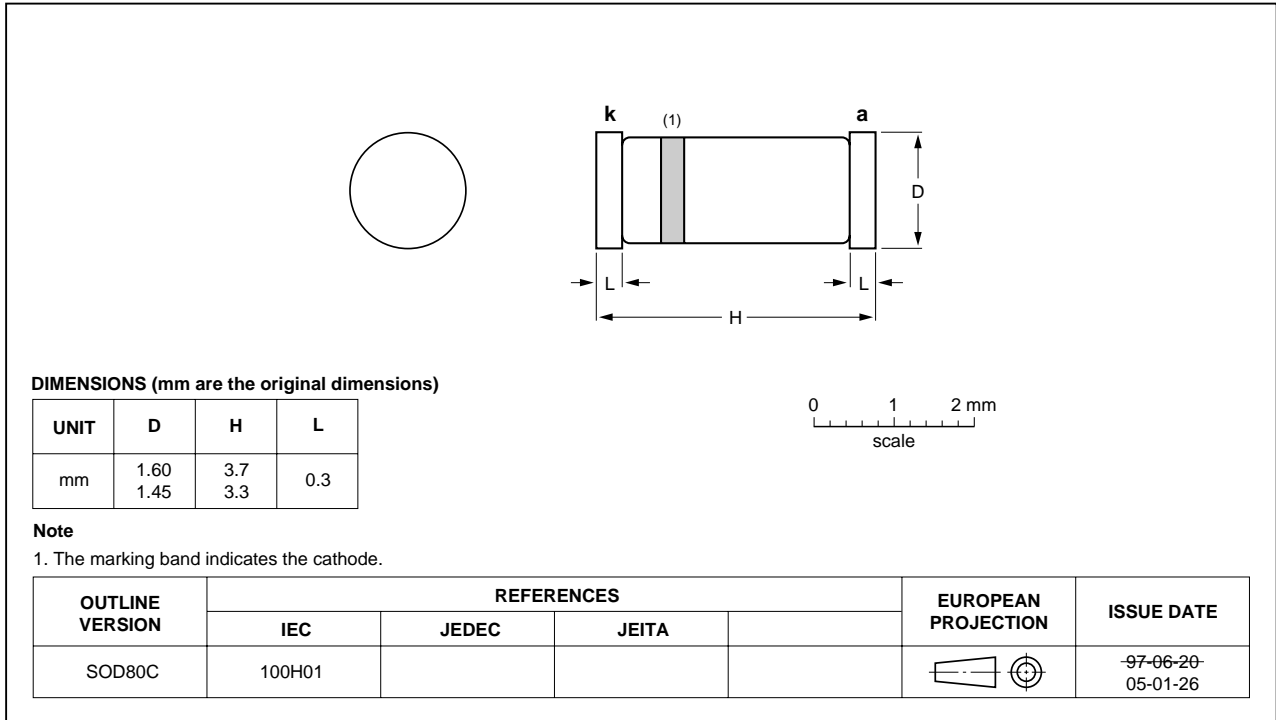


Fig 8. Package outline SOD80C

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 | SOD80C | 4 mm pitch, 8 mm tape and reel | -115 | -135 |

[1] For further information and the availability of packing methods, see [Section 16](#).

11. Soldering

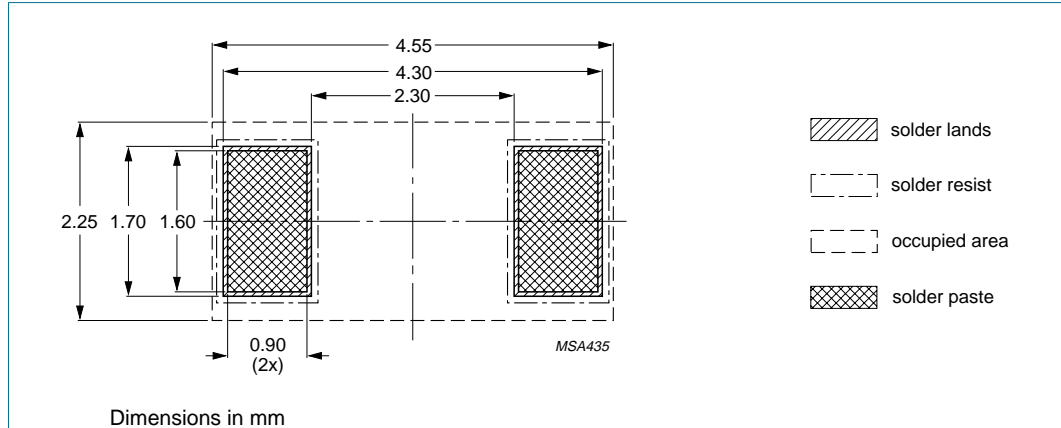


Fig 9. Reflow soldering footprint SOD80C

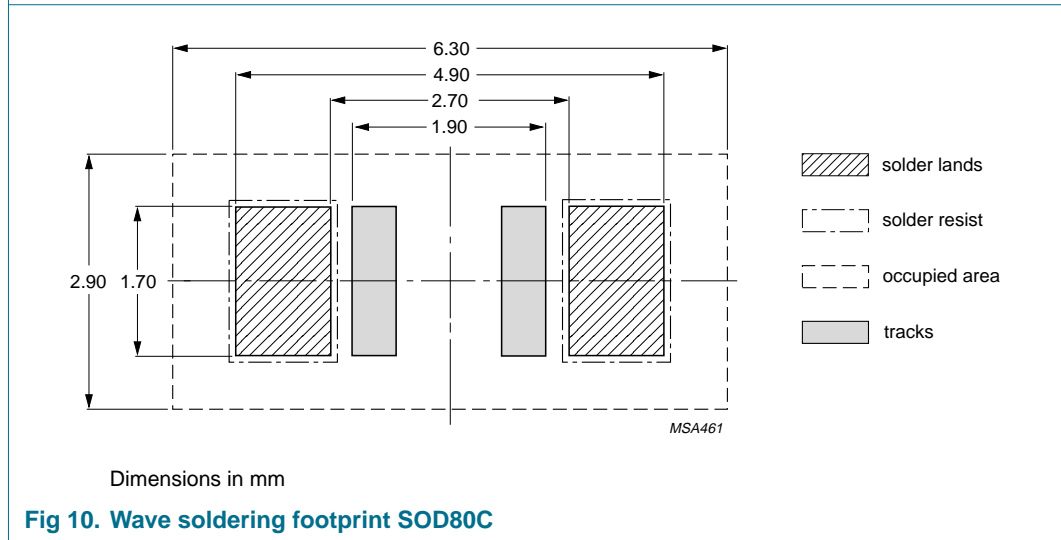


Fig 10. Wave soldering footprint SOD80C

12. Revision history

Table 10: Revision history

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|--------------------------|---|-----------------------|---------------|----------------|------------------|
| PMLL4148L_ PMLL4448_6 | 20050404 | Product data sheet | - | 9397 750 14606 | PMLL4148L_4448_5 |
| Modifications: | <ul style="list-style-type: none"> • The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • Table 1 “Product overview” added • Section 4 “Marking” added • Table 7 “Thermal characteristics” $R_{th(j-tp)}$ thermal resistance from junction to tie-point redefined to $R_{th(j-sp)}$ thermal resistance from junction to solder point • Section 10 “Packing information” added • Section 11 “Soldering” added | | | | |
| PMLL4148L_4448_5 | 20020123 | Product specification | - | 9397 750 09265 | PMLL4148_4448_4 |
| PMLL4148L_4448_4 | 20001115 | Product specification | - | 9397 750 07615 | PMLL4148_3 |
| PMLL4148_3 | 19990527 | Product specification | - | 9397 750 05889 | PMLL4148_2 |
| PMLL4148_2 | 19960918 | Product specification | - | 117021 | PMLL4148_1 |
| PMLL4148_1 | 19960423 | Product specification | - | 117011 | - |

13. Data sheet status

| Level | Data sheet status ^[1] | Product status ^{[2] [3]} | Definition |
|-------|----------------------------------|-----------------------------------|--|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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17. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| 2 | Pinning information | 2 |
| 3 | Ordering information | 2 |
| 4 | Marking | 2 |
| 5 | Limiting values | 2 |
| 6 | Thermal characteristics | 3 |
| 7 | Characteristics | 3 |
| 8 | Test information | 6 |
| 9 | Package outline | 7 |
| 10 | Packing information | 7 |
| 11 | Soldering | 8 |
| 12 | Revision history | 9 |
| 13 | Data sheet status | 10 |
| 14 | Definitions | 10 |
| 15 | Disclaimers | 10 |
| 16 | Contact information | 10 |



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