DISCRETE SEMICONDUCTORS

DATA SHEET

1N914; 1N914A; 1N914B
High-speed diodes

Product specification
Supersedes data of 1999 May 26

2003 Jun 06
High-speed diodes 1N914; 1N914A; 1N914B

FEATURES
• Hermetically sealed leaded glass SOD27 (DO-35) package
• High switching speed: max. 4 ns
• Continuous reverse voltage: max. 75 V
• Repetitive peak reverse voltage: max. 100 V
• Repetitive peak forward current: max. 225 mA.

APPLICATIONS
• High-speed switching.

DESCRIPTION
The 1N914, 1N914A and 1N914B are high-speed switching diodes fabricated in planar technology, and encapsulated in a hermetically sealed leaded glass SOD27 (DO-35) package.

Fig.1  Simplified outline (SOD27; DO-35) and symbol.

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{RRM}</td>
<td>repetitive peak reverse voltage</td>
<td>–</td>
<td>100</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>V_{R}</td>
<td>continuous reverse voltage</td>
<td>–</td>
<td>75</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I_{F}</td>
<td>continuous forward current</td>
<td>see Fig.2; note 1</td>
<td>–</td>
<td>75</td>
<td>mA</td>
</tr>
<tr>
<td>I_{FRM}</td>
<td>repetitive peak forward current</td>
<td>–</td>
<td>225</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>I_{FSM}</td>
<td>non-repetitive peak forward current</td>
<td>square wave; $T_j = 25 \degree C$ prior to surge; see Fig.4</td>
<td></td>
<td>–</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t = 1 \mu s$</td>
<td>–</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t = 1 ms$</td>
<td>–</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>$T_{amb} = 25 \degree C$; note 1</td>
<td>–</td>
<td>250</td>
<td>mW</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td>–65</td>
<td>+200</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T_{j}</td>
<td>junction temperature</td>
<td>–</td>
<td>175</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

Note
1. Device mounted on an FR4 printed-circuit board; lead length 10 mm.
Philips Semiconductors Product specification

High-speed diodes 1N914; 1N914A; 1N914B

ELECTRICAL CHARACTERISTICS

$T_j = 25 \, ^\circ C$; unless otherwise specified.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>see Fig.3</td>
<td>$I_F = 10 , mA$</td>
<td>$0.62$</td>
<td>$0.72$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1N914; 1N914A$</td>
<td></td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1N914B$</td>
<td>$I_F = 5 , mA$</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1N914B$</td>
<td>$I_F = 100 , mA$</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>see Fig.5</td>
<td>$V_R = 20 , V$</td>
<td>–</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 75 , V$</td>
<td>–</td>
<td>5</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 20 , V; T_j = 150 , ^\circ C$</td>
<td>–</td>
<td>50</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 , MHz; V_R = 0$; see Fig.6</td>
<td>–</td>
<td>4</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{fr}$</td>
<td>reverse recovery time</td>
<td>when switched from $I_F = 10 , mA$ to $I_R = 10 , mA$; measured at $I_R = 1 , mA$; see Fig.7</td>
<td>–</td>
<td>8</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>when switched from $I_F = 10 , mA$ to $I_R = 60 , mA$; $R_L = 100 , \Omega$; measured at $I_R = 1 , mA$; see Fig.7</td>
<td>–</td>
<td>4</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{fr}$</td>
<td>forward recovery voltage</td>
<td>when switched from $I_F = 50 , mA$; $t_{r} = 20 , ns$; see Fig.8</td>
<td>–</td>
<td>2.5</td>
<td>V</td>
</tr>
</tbody>
</table>

THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th,j-tp}$</td>
<td>thermal resistance from junction to tie-point</td>
<td>lead length 10 mm</td>
<td>240</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{th,j-a}$</td>
<td>thermal resistance from junction to ambient</td>
<td>lead length 10 mm; note 1</td>
<td>500</td>
<td>K/W</td>
</tr>
</tbody>
</table>

Note

1. Device mounted on a printed-circuit board without metallization pad.
High-speed diodes

1N914; 1N914A; 1N914B

GRAPHICAL DATA

Fig. 2 Maximum permissible continuous forward current as a function of ambient temperature.

Device mounted on an FR4 printed-circuit board; lead length 10 mm.

Fig. 3 Forward current as a function of forward voltage.

(1) $T_j = 175^\circ C$; typical values.
(2) $T_j = 25^\circ C$; typical values.
(3) $T_j = 25^\circ C$; maximum values.

Fig. 4 Maximum permissible non-repetitive peak forward current as a function of pulse duration.

Based on square wave currents.

$T_j = 25^\circ C$ prior to surge.
High-speed diodes

1N914; 1N914A; 1N914B

Fig. 5  Reverse current as a function of junction temperature.

(1) $V_R = 75$ V; maximum values.
(2) $V_R = 75$ V; typical values.
(3) $V_R = 20$ V; typical values.

Fig. 6  Diode capacitance as a function of reverse voltage; typical values.

$f = 1$ MHz; $T_j = 25$ °C.
High-speed diodes

Fig. 7 Reverse recovery voltage test circuit and waveforms.

\[ V_R = V + I_F \times R_S \]

R_S = 50 Ω

V = V_R + I_F \times R_S

D.U.T.

SAMPLING OSCILLOSCOPE

R_I = 50 Ω

MGA881

t_r

t_p

10%

90%

input signal

SAMPLING OSCILLOSCOPE

MGA882

OSCILLOSCOPE

R_I = 50 Ω

D.U.T.

\[ V = V + I_F \times R_S \]

R_S = 50 Ω

V = V_R + I_F \times R_S

D.U.T.

MGA881

MGA882

V_{fr}

t_r

t_p

10%

90%

input signal

output signal

(1) I_F = 1 mA.

Fig. 8 Forward recovery voltage test circuit and waveforms.
High-speed diodes
1N914; 1N914A; 1N914B

PACKAGE OUTLINE

Hermetically sealed glass package; axial leaded; 2 leads

SOD27

DIMENSIONS (mm are the original dimensions)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>b max.</th>
<th>D max.</th>
<th>G1 max.</th>
<th>L min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>0.56</td>
<td>1.85</td>
<td>4.25</td>
<td>25.4</td>
</tr>
</tbody>
</table>

Note
1. The marking band indicates the cathode.

<table>
<thead>
<tr>
<th>OUTLINE VERSION</th>
<th>REFERENCES</th>
<th>EUROPEAN PROJECTION</th>
<th>ISSUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOD27</td>
<td>IEC A24</td>
<td>JEDEC DO-35</td>
<td>EIAJ SC-40</td>
</tr>
</tbody>
</table>
# High-speed diodes

**1N914; 1N914A; 1N914B**

## DATA SHEET STATUS

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>DATA SHEET STATUS(^{(1)})</th>
<th>PRODUCT STATUS(^{(2)}(3))</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Objective data Development</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Preliminary data Qualification</td>
<td>This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Product data Production</td>
<td>This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).</td>
<td></td>
</tr>
</tbody>
</table>

### DEFINITIONS

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**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.

**Application information** — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

### DISCLAIMERS

**Life support applications** — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

**Right to make changes** — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.
High-speed diodes

1N914; 1N914A; 1N914B
<table>
<thead>
<tr>
<th>High-speed diodes</th>
<th>1N914; 1N914A; 1N914B</th>
</tr>
</thead>
</table>

NOTES
High-speed diodes

1N914; 1N914A; 1N914B