DATA SHEET

BAS116
Low-leakage diode

Product specification
Supersedes data of June 1994
File under Discrete Semiconductors, SC01
Philips Semiconductors

Low-leakage diode

FEATURES

- Plastic SMD package
- Low leakage current: typ. 3 pA
- Switching time: typ. 0.8 µs
- Continuous reverse voltage: max. 75 V
- Repetitive peak reverse voltage: max. 85 V
- Repetitive peak forward current: max. 500 mA.

APPLICATION

- Low leakage current applications in surface mounted circuits.

DESCRIPTION

Epitaxial medium-speed switching diode with a low leakage current in a small plastic SOT23 SMD package.

PINNING

<table>
<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>anode</td>
</tr>
<tr>
<td>2</td>
<td>not connected</td>
</tr>
<tr>
<td>3</td>
<td>cathode</td>
</tr>
</tbody>
</table>

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

<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>85 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_R$</td>
<td>continuous reverse voltage</td>
<td>–</td>
<td>75 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_F$</td>
<td>continuous forward current</td>
<td>see Fig.2; note 1</td>
<td>–</td>
<td>215 mA</td>
<td></td>
</tr>
<tr>
<td>$I_{FRM}$</td>
<td>repetitive peak forward current</td>
<td>–</td>
<td>500 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>square wave; $T_j = 25 , ^\circ C$ prior to surge; see Fig.4</td>
<td>–</td>
<td>4 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t_p = 1 , \mu s$</td>
<td>–</td>
<td>1 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t_p = 1 , ms$</td>
<td>–</td>
<td>0.5 A</td>
<td></td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>total power dissipation</td>
<td>$T_{amb} = 25 , ^\circ C$; note 1</td>
<td>–</td>
<td>250 mW</td>
<td></td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>storage temperature</td>
<td>–</td>
<td>–65 +150 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td>–</td>
<td>150 °C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note

1. Device mounted on a FR4 printed-circuit board.
Low-leakage diode

**ELECTRICAL CHARACTERISTICS**

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>TYP.</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>$I_F = 1 , mA$</td>
<td>$I_F = 10 , mA$</td>
<td>$I_F = 50 , mA$</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>see Fig.5</td>
<td>$V_R = 75 , V$</td>
<td>$V_R = 75 , V; T_j = 150 , ^\circ C$</td>
<td>$0.003 , nA$</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 , MHz; V_R = 0$; see Fig.6</td>
<td>$2 , \text{pF}$</td>
<td>$\text{pF}$</td>
<td></td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>when switched from $I_F = 10 , mA$ to $I_R = 10 , mA; R_L = 100 , \Omega$; measured at $I_R = 1 , mA$; see Fig.7</td>
<td>$0.8 , \mu s$</td>
<td>$3 , \mu s$</td>
<td></td>
</tr>
</tbody>
</table>

**THERMAL CHARACTERISTICS**

<table>
<thead>
<tr>
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<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></td>
<td>$330 , \text{K/W}$</td>
<td></td>
</tr>
<tr>
<td>$R_{th , j-a}$</td>
<td>thermal resistance from junction to ambient</td>
<td>note 1</td>
<td>$500 , \text{K/W}$</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

1. Device mounted on a FR4 printed-circuit board.
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GRAPHICAL DATA

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

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

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

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

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Device mounted on a FR4 printed-circuit board.

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

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

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

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

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

\[ I_R \text{ (nA)} \]

10^2

10

1

10^{-1}

10^{-2}

10^{-3}

0 50 100 150 200

\( T_J \text{ (°C)} \)

\( V_R = 75 \text{ V}. \)

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

\[ C_d \text{ (pF)} \]

0 1 2

0 5 10 15 20

\( V_R \text{ (V)} \)

\( f = 1 \text{ MHz}; T_J = 25 \text{ °C}. \)

Fig. 7  Reverse recovery time test circuit and waveforms.

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

\[ R_S = 50 \Omega \]

\[ R_I = 50 \Omega \]

input signal

output signal

D.U.T.

SAMPLING OSCILLOSCOPE

MGA881

10%

90%

\( I_F \)

\( I_{RR} \)
Low-leakage diode

PACKAGE OUTLINE

DEFINITIONS

Data Sheet Status

<table>
<thead>
<tr>
<th>Objective specification</th>
<th>This data sheet contains target or goal specifications for product development.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary specification</td>
<td>This data sheet contains preliminary data; supplementary data may be published later.</td>
</tr>
<tr>
<td>Product specification</td>
<td>This data sheet contains final product specifications.</td>
</tr>
</tbody>
</table>

Limiting values

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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

Where application information is given, it is advisory and does not form part of the specification.

LIFE SUPPORT APPLICATIONS

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