Silicon PIN Photodiode

DESCRIPTION

VBPW34S and VBPW34SR are high speed and high sensitive PIN photodiodes. It is a surface mount device (SMD) including the chip with a 7.5 mm² sensitive area detecting visible and near infrared radiation.

FEATURES

• Package type: surface mount
• Package form: GW, RGW
• Dimensions (L x W x H in mm): 6.4 x 3.9 x 1.2
• Radiant sensitive area (in mm²): 7.5
• High photo sensitivity
• High radiant sensitivity
• Suitable for visible and near infrared radiation
• Fast response times
• Angle of half sensitivity: $\varphi = \pm 65^\circ$
• Floor life: 168 h, MSL 3, acc. J-STD-020
• Lead (Pb)-free reflow soldering
• Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
• Halogen-free according to IEC 61249-2-21 definition

APPLICATIONS

• High speed photo detector

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>$I_{ir}$ (μA)</th>
<th>$\varphi$ (deg)</th>
<th>$\lambda_{0.1}$ (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VBPW34S</td>
<td>55</td>
<td>$\pm 65$</td>
<td>430 to 1100</td>
</tr>
<tr>
<td>VBPW34SR</td>
<td>55</td>
<td>$\pm 65$</td>
<td>430 to 1100</td>
</tr>
</tbody>
</table>

Note

• Test conditions see table “Basic Characteristics”

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>REMARKS</th>
<th>PACKAGE FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>VBPW34S</td>
<td>Tape and reel</td>
<td>MOQ: 1000 pcs, 1000 pcs/reel</td>
<td>Gullwing</td>
</tr>
<tr>
<td>VBPW34SR</td>
<td>Tape and reel</td>
<td>MOQ: 1000 pcs, 1000 pcs/reel</td>
<td>Reverse gullwing</td>
</tr>
</tbody>
</table>

Note

• MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25 ^\circ C$, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td></td>
<td>$V_R$</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$T_{amb} \leq 25 ^\circ C$</td>
<td>$P_V$</td>
<td>215</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td></td>
<td>$T_J$</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>$T_{amb}$ = -40 to +100 °C</td>
<td>$T_{stg}$</td>
<td>-40 to +100 °C</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>Acc. reflow solder profile fig. 8</td>
<td>$T_{sd}$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td></td>
<td>$R_{thJA}$</td>
<td>350</td>
<td>K/W</td>
</tr>
</tbody>
</table>

Rev. 1.2, 24-Aug-11

For technical questions, contact: detectortechsupport@vishay.com

This document is subject to change without notice. The products described herein and this document are subject to specific disclaimers, set forth at www.vishay.com/doc?91000
### BASIC CHARACTERISTICS (\(T_{amb} = 25\, ^\circ C\), unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward voltage</td>
<td>(I_F = 50, mA)</td>
<td>(V_F)</td>
<td>1</td>
<td>1.3</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>(I_R = 100, \mu A, E = 0)</td>
<td>(V(BR))</td>
<td>60</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Reverse dark current</td>
<td>(V_R = 10, V, E = 0)</td>
<td>(I_{ro})</td>
<td>2</td>
<td>30</td>
<td>nA</td>
<td></td>
</tr>
<tr>
<td>Diode capacitance</td>
<td>(V_R = 0, V, f = 1, MHz, E = 0)</td>
<td>(C_D)</td>
<td>70</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(V_R = 3, V, f = 1, MHz, E = 0)</td>
<td>(C_D)</td>
<td>25</td>
<td>40</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Open circuit voltage</td>
<td>(E_s = 1, mW/cm^2, \lambda = 950, nm)</td>
<td>(V_o)</td>
<td>350</td>
<td></td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient of (V_o)</td>
<td>(E_s = 1, mW/cm^2, \lambda = 950, nm)</td>
<td>(T_{Ko})</td>
<td>-2.6</td>
<td></td>
<td>mV/K</td>
<td></td>
</tr>
<tr>
<td>Short circuit current</td>
<td>(E_s = 1, mW/cm^2, \lambda = 950, nm)</td>
<td>(I_k)</td>
<td>50</td>
<td></td>
<td>(\mu A)</td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient of (I_k)</td>
<td>(E_s = 1, mW/cm^2, \lambda = 950, nm)</td>
<td>(T_{Kk})</td>
<td>0.1</td>
<td></td>
<td>(%/K)</td>
<td></td>
</tr>
<tr>
<td>Reverse light current</td>
<td>(E_s = 1, mW/cm^2, \lambda = 950, nm, \ V_R = 5, V)</td>
<td>(I_{ra})</td>
<td>45</td>
<td>55</td>
<td>(\mu A)</td>
<td></td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td>(\varphi)</td>
<td>± 65</td>
<td></td>
<td></td>
<td>deg</td>
<td></td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td>(\lambda_p)</td>
<td>940</td>
<td></td>
<td></td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td>(\lambda_{0,1})</td>
<td>430 to 1100</td>
<td></td>
<td></td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Noise equivalent power</td>
<td>(V_R = 10, V, \lambda = 950, nm)</td>
<td>(NEP)</td>
<td>(4 \times 10^{-14})</td>
<td>W/(\sqrt{Hz})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rise time</td>
<td>(V_R = 10, V, R_L = 1, k, \Omega, \lambda = 820, nm)</td>
<td>(t_r)</td>
<td>100</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Fall time</td>
<td>(V_R = 10, V, R_L = 1, k, \Omega, \lambda = 820, nm)</td>
<td>(t_f)</td>
<td>100</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

---

**Fig. 1 - Reverse Dark Current vs. Ambient Temperature**

**Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature**
**Fig. 3 - Reverse Light Current vs. Irradiance**

I_R - Reverse Light Current (µA)

V_R = 5 V

λ = 950 nm

E_I - Irradiance (mW/cm²)

**Fig. 4 - Reverse Light Current vs. Reverse Voltage**

I_R - Reverse Light Current (µA)

λ = 950 nm

V_R - Reverse Voltage (V)

**Fig. 5 - Diode Capacitance vs. Reverse Voltage**

C_D - Diode Capacitance (pF)

V_R - Reverse Voltage (V)

E = 0

f = 1 MHz

**Fig. 6 - Relative Spectral Sensitivity vs. Wavelength**

S(λ) - Relative Spectral Sensitivity

λ - Wavelength (nm)

**Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement**

S(ϕ) - Relative Radiant Sensitivity

ϕ - Angular Displacement
PACKAGE DIMENSIONS FOR VBPW34S in millimeters

Anode  Cathode

Recommended solder pad

technical drawings according to DIN specifications

Drawing-No.: 6.541-5086.01-4
Issue:  1  15.04.10
22105
PACKAGE DIMENSIONS FOR VBPW34SR in millimeters

![Diagram of VBPW34SR package dimensions]

Recommended solder pad

Drawing-No.: 6.541-5085.01-4
Issue: 1; 15.04.10
22104
TAPPING DIMENSIONS FOR VBPW34S in millimeters

TAPPING DIMENSIONS FOR VBPW34SR in millimeters
REEL DIMENSIONS FOR VBPW34S AND VBPW34SR in millimeters

Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

SOLDER PROFILE

DRYPACK
Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

FLOOR LIFE
Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:
Moisture sensitivity: level 3
Floor life: 168 h
Conditions: T_{amb} < 30 °C, RH < 60 %

DRYING
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or recommended conditions:
192 h at 40 °C (+ 5 °C), RH < 5 %
or
96 h at 60 °C (+ 5 °C), RH < 5 %.
Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.