

Distributed by:

**JAMECO**<sup>®</sup>  
ELECTRONICS

**www.Jameco.com ♦ 1-800-831-4242**

The content and copyrights of the attached  
material are the property of its owner.

Jameco Part Number 936141

## Silicon PIN Photodiode

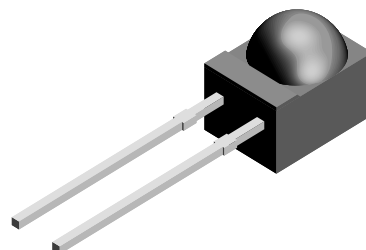
### Description

BPV22NF(L) is a high speed and high sensitive PIN photodiode in a plastic package with a spherical side view lens.

The epoxy package itself is an IR filter, spectrally matched to GaAs on GaAs and GaAlAs on GaAlAs IR emitters ( $\lambda_p = 950 \text{ nm}$ ,  $s_{rel}(\lambda = 875 \text{ nm}) > 90 \%$ ).

Lens radius and chip position are perfectly matched to the chip size, giving high sensitivity without compromising the viewing angle.

In comparison with flat packages the spherical lens package achieves a sensitivity improvement of 80 %.



94 8633

### Features

- Large radiant sensitive area ( $A = 7.5 \text{ mm}^2$ )
- Wide viewing angle  $\varphi = \pm 60^\circ$
- Improved sensitivity
- Fast response times
- Low junction capacitance
- Plastic package with universal IR filter
- Option "L": long lead package optional available with suffix "L"; e.g.: BPV23FL
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



### Applications

Infrared remote control and free air transmission systems in combination with IR emitter diodes (TSU.-, TSI.-, or TSH.-Series). High sensitivity detector for high data rate transmission systems.

The IR filter matches perfectly to the high speed infrared emitters in the 830 nm to 880 nm wavelength range.

### Absolute Maximum Ratings

$T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

| Parameter                           | Test condition                  | Symbol     | Value         | Unit             |
|-------------------------------------|---------------------------------|------------|---------------|------------------|
| Reverse Voltage                     |                                 | $V_R$      | 60            | V                |
| Power Dissipation                   | $T_{amb} \leq 25^\circ\text{C}$ | $P_V$      | 215           | mW               |
| Junction Temperature                |                                 | $T_j$      | 100           | $^\circ\text{C}$ |
| Operating Temperature Range         |                                 | $T_{amb}$  | - 55 to + 100 | $^\circ\text{C}$ |
| Storage Temperature Range           |                                 | $T_{stg}$  | - 55 to + 100 | $^\circ\text{C}$ |
| Soldering Temperature               | $t \leq 5 \text{ s}$            | $T_{sd}$   | 260           | $^\circ\text{C}$ |
| Thermal Resistance Junction/Ambient |                                 | $R_{thJA}$ | 350           | K/W              |

## Electrical Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter            | Test condition                                    | Symbol     | Min | Typ. | Max | Unit     |
|----------------------|---------------------------------------------------|------------|-----|------|-----|----------|
| Forward Voltage      | $I_F = 50\text{ mA}$                              | $V_F$      |     | 1    | 1.3 | V        |
| Breakdown Voltage    | $I_R = 100\text{ }\mu\text{A}$ , $E = 0$          | $V_{(BR)}$ | 60  |      |     | V        |
| Reverse Dark Current | $V_R = 10\text{ V}$ , $E = 0$                     | $I_{ro}$   |     | 2    | 30  | nA       |
| Diode capacitance    | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ | $C_D$      |     | 70   |     | pF       |
| Serial Resistance    | $V_R = 12\text{ V}$ , $f = 1\text{ MHz}$          | $R_S$      |     | 400  |     | $\Omega$ |

## Optical Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter                      | Test condition                                                                | Symbol          | Min | Typ.                | Max | Unit                      |
|--------------------------------|-------------------------------------------------------------------------------|-----------------|-----|---------------------|-----|---------------------------|
| Open Circuit Voltage           | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                          | $V_o$           |     | 370                 |     | mV                        |
| Temp. Coefficient of $V_o$     | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                          | $TK_{V_o}$      |     | - 2.6               |     | mV/K                      |
| Short Circuit Current          | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                          | $I_k$           |     | 80                  |     | $\mu\text{A}$             |
| Reverse Light Current          | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$ ,<br>$V_R = 5\text{ V}$  | $I_{ra}$        | 55  | 85                  |     | $\mu\text{A}$             |
| Temp. Coefficient of $I_{ra}$  | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ ,<br>$V_R = 10\text{ V}$ | $TK_{I_{ra}}$   |     | 0.1                 |     | %/K                       |
| Absolute Spectral Sensitivity  | $V_R = 5\text{ V}$ , $\lambda = 870\text{ nm}$                                | $s(\lambda)$    |     | 0.57                |     | A/W                       |
|                                | $V_R = 5\text{ V}$ , $\lambda = 950\text{ nm}$                                | $s(\lambda)$    |     | 0.6                 |     | A/W                       |
| Angle of Half Sensitivity      |                                                                               | $\phi$          |     | $\pm 60$            |     | deg                       |
| Wavelength of Peak Sensitivity |                                                                               | $\lambda_p$     |     | 940                 |     | nm                        |
| Range of Spectral Bandwidth    |                                                                               | $\lambda_{0.5}$ |     | 790 to 1050         |     | nm                        |
| Quantum Efficiency             | $\lambda = 950\text{ nm}$                                                     | $\eta$          |     | 90                  |     | %                         |
| Noise Equivalent Power         | $V_R = 10\text{ V}$ , $\lambda = 950\text{ nm}$                               | NEP             |     | $4 \times 10^{-14}$ |     | W/ $\sqrt{\text{Hz}}$     |
| Detectivity                    | $V_R = 10\text{ V}$ , $\lambda = 950\text{ nm}$                               | $D^*$           |     | $6 \times 10^{12}$  |     | $\text{cm}^2/\text{Hz/W}$ |
| Rise Time                      | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$    | $t_r$           |     | 100                 |     | ns                        |
| Fall Time                      | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$    | $t_f$           |     | 100                 |     | ns                        |
| Cut-Off Frequency              | $V_R = 12\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 870\text{ nm}$    | $f_c$           |     | 4                   |     | MHz                       |
|                                | $V_R = 12\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 950\text{ nm}$    | $f_c$           |     | 1                   |     | MHz                       |

## Typical Characteristics

$T_{amb} = 25^\circ\text{C}$  unless otherwise specified

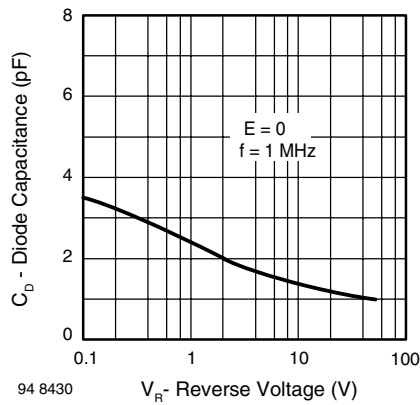


Figure 1. Reverse Dark Current vs. Ambient Temperature

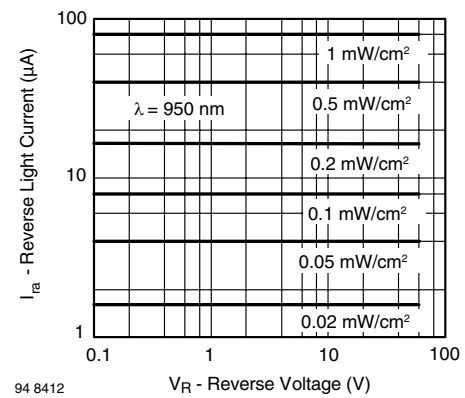


Figure 4. Reverse Light Current vs. Reverse Voltage

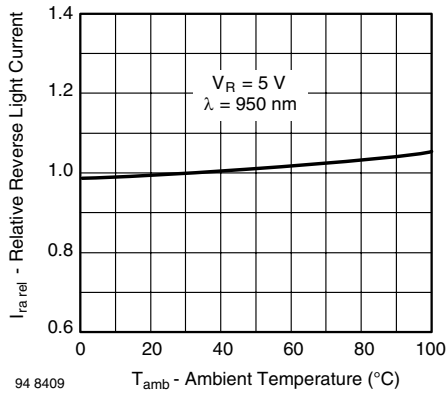


Figure 2. Relative Reverse Light Current vs. Ambient Temperature

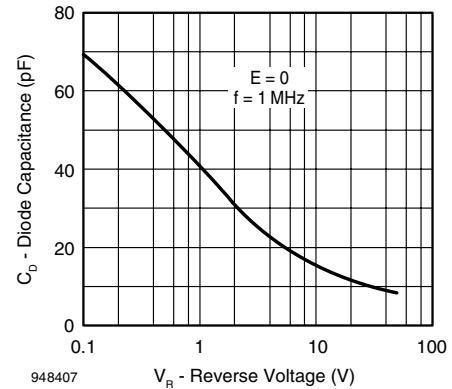


Figure 5. Diode Capacitance vs. Reverse Voltage

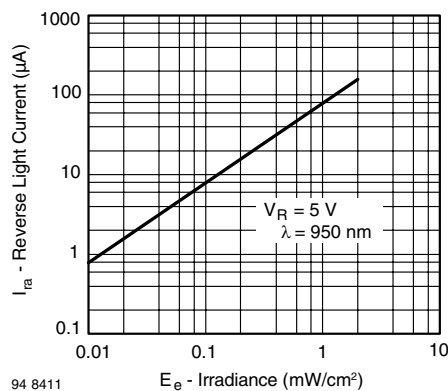


Figure 3. Reverse Light Current vs. Irradiance

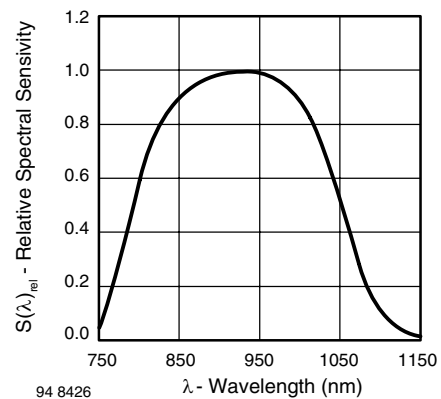
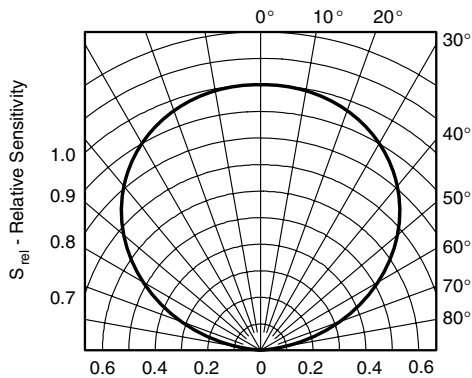


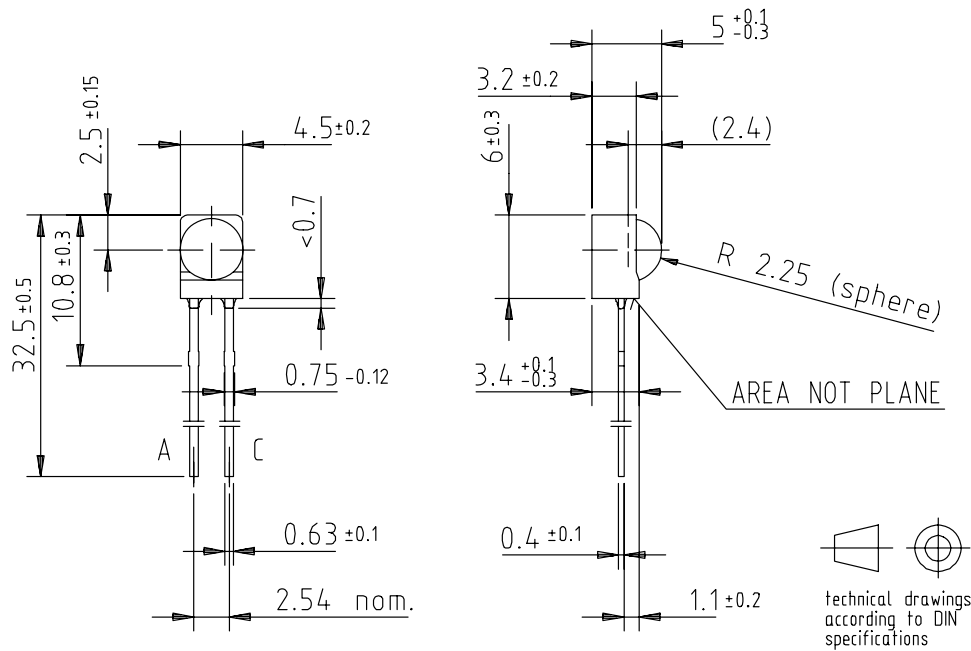
Figure 6. Relative Spectral Sensitivity vs. Wavelength



94 8413

Figure 7. Relative Radiant Sensitivity vs. Angular Displacement

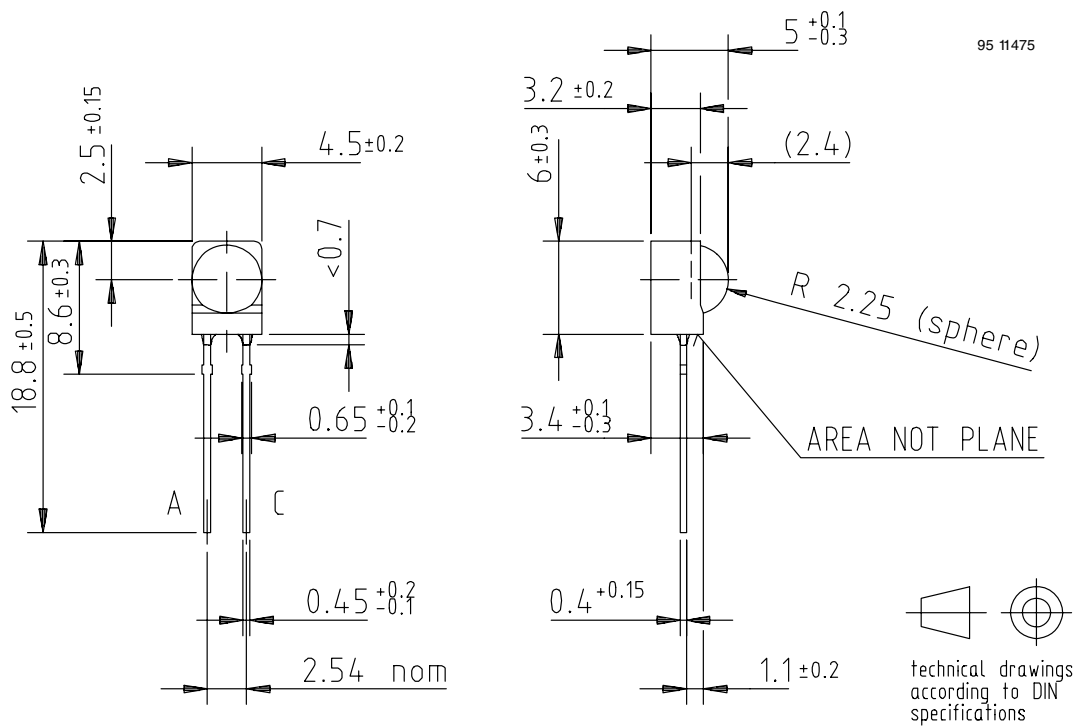
## Package Dimensions in mm



technical drawings  
according to DIN  
specifications

9612205

## Package Dimensions in mm



## Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



### Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.