

## Silicon PIN Photodiode



94 8633

### FEATURES

- Package type: leaded
- Package form: side view
- Dimensions (in mm): 4.5 x 5 x 6
- Radiant sensitive area (in mm<sup>2</sup>): 4.4
- High radiant sensitivity
- Daylight blocking filter matched with 870 nm to 950 nm emitters
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 60^\circ$
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



**RoHS**  
COMPLIANT  
**GREEN**  
(5-2008)\*\*

### Note

\*\* Please see document "Vishay Material Category Policy":  
[www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

### APPLICATIONS

- High speed detector for infrared radiation
- Infrared remote control and free air data transmission systems, e.g. in combination with TSFFxxxx series IR emitters

### DESCRIPTION

BPV23NF is a PIN photodiode with high speed and high radiant sensitivity in a black, plastic package with side view lens and daylight blocking filter. Filter bandwidth is matched with 870 nm to 950 nm IR emitters. The lens achieves 80 % of sensitivity improvement in comparison with flat package. BPV23NFL has long leads, other specifications like BPV23NF.

### PRODUCT SUMMARY

| COMPONENT | $I_{ra}$ (μA) | $\phi$ (deg) | $\lambda_{0.5}$ (nm) |
|-----------|---------------|--------------|----------------------|
| BPV23NF   | 65            | $\pm 60$     | 790 to 1050          |
| BPV23NFL  | 65            | $\pm 60$     | 790 to 1050          |

### Note

- Test condition see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS                      | PACKAGE FORM          |
|---------------|-----------|------------------------------|-----------------------|
| BPV23NF       | Bulk      | MOQ: 4000 pcs, 4000 pcs/bulk | Side view             |
| BPV23NFL      | Bulk      | MOQ: 4000 pcs, 4000 pcs/bulk | Side view, long leads |

### Note

- MOQ: minimum order quantity

### 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         |                                              | $T_{amb}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Storage temperature range           |                                              | $T_{stg}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Soldering temperature               | $t \leq 5$ s                                 | $T_{sd}$   | 260           | $^\circ\text{C}$ |
| Thermal resistance junction/ambient | Connected with Cu wire, 0.14 mm <sup>2</sup> | $R_{thJA}$ | 350           | K/W              |

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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                                                                                   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                             | $C_D$           |      | 48                  |      | pF                                     |
| Serial resistance                                                                                   | $V_R = 12\text{ V}$ , $f = 1\text{ MHz}$                                      | $R_S$           |      | 900                 |      | $\Omega$                               |
| Open circuit voltage                                                                                | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                          | $V_o$           |      | 390                 |      | mV                                     |
| Temperature 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                                                                               | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                          | $I_k$           |      | 65                  |      | $\mu\text{A}$                          |
| Reverse light current                                                                               | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ ,<br>$V_R = 5\text{ V}$  | $I_{ra}$        | 45   | 65                  |      | $\mu\text{A}$                          |
| Temperature 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                                    |
|                                                                                                     | $V_R = 5\text{ V}$ , $\lambda = 950\text{ nm}$                                | $s(\lambda)$    |      | 0.60                |      | 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                                                                                         | $V_R = 10\text{ V}$ , $\lambda = 950\text{ nm}$                               | $D^*$           |      | $5 \times 10^{12}$  |      | $\text{cm}^2\sqrt{\text{Hz}}/\text{W}$ |
| Rise time                                                                                           | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$    | $t_r$           |      | 70                  |      | ns                                     |
| Fall time                                                                                           | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$    | $t_f$           |      | 70                  |      | 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                                    |

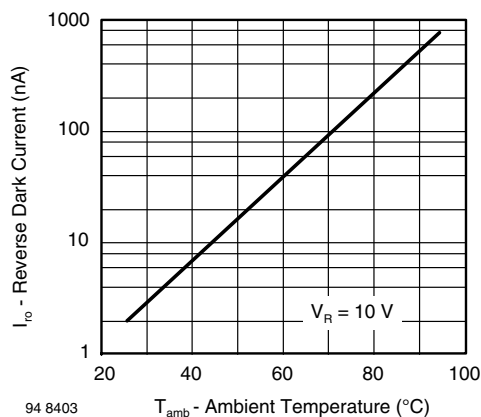
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

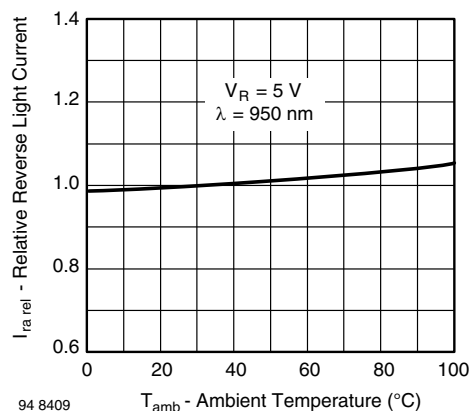


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

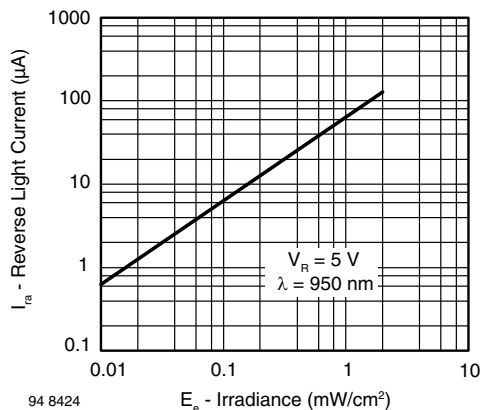


Fig. 3 - Reverse Light Current vs. Irradiance

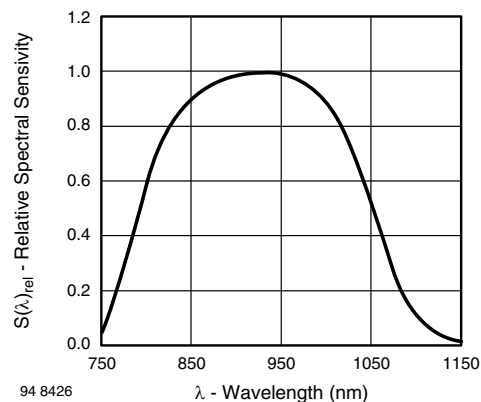


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

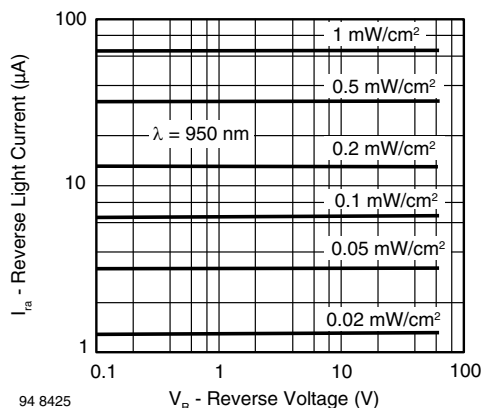


Fig. 4 - Reverse Light Current vs. Reverse Voltage

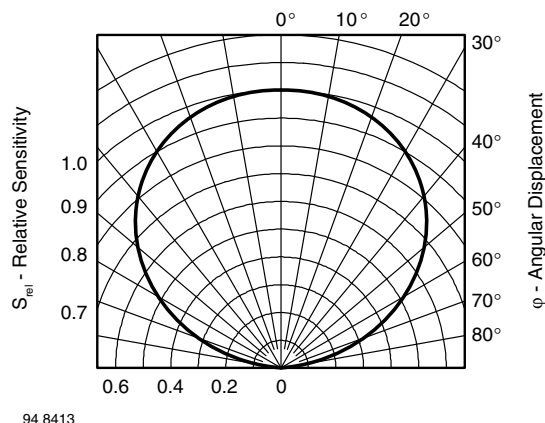


Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

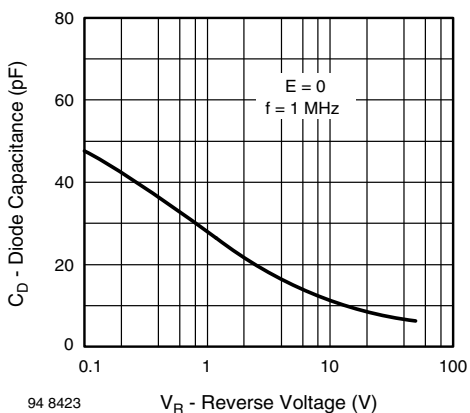
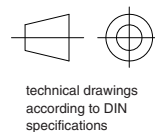
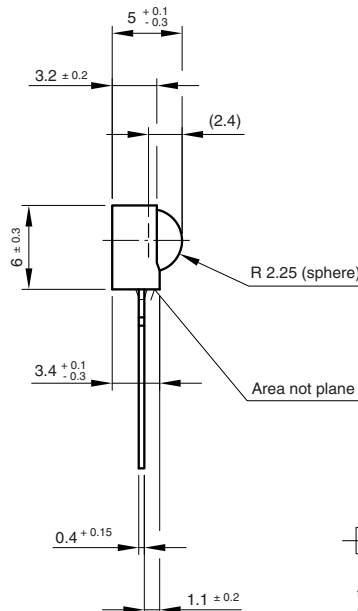
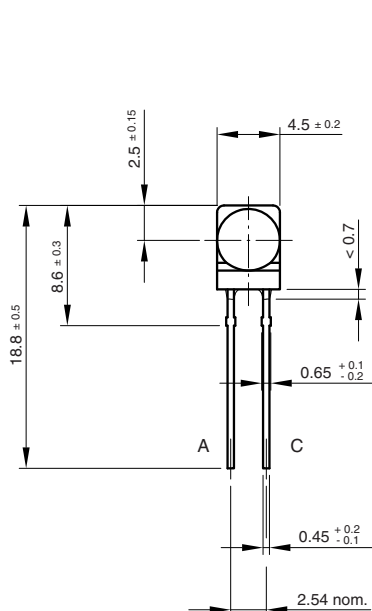


Fig. 5 - Diode Capacitance vs. Reverse Voltage

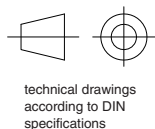
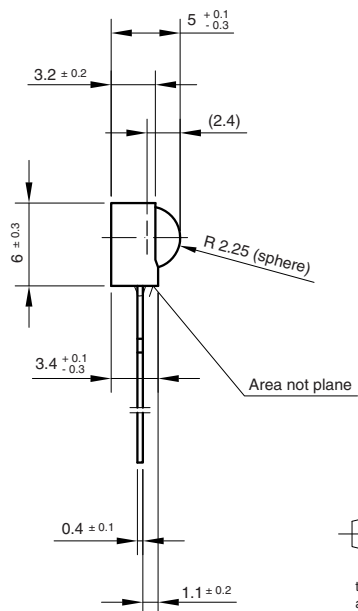
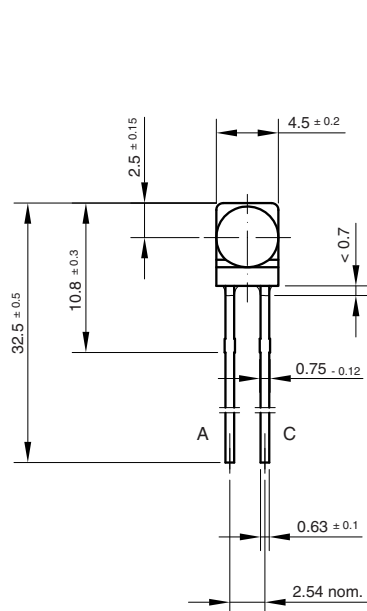


**PACKAGE DIMENSIONS** in millimeters: BPV23NF



Drawing-No.: 6.544-5199.01-4  
Issue: 2; 19.06.01  
95 11475

**PACKAGE DIMENSIONS** in millimeters: BPV23NFL



Drawing-No.: 6.544-5236.01-4  
Issue: 2; 07.07.97  
96 12205



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