

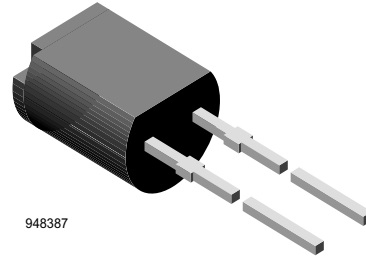
## Silicon PIN Photodiode

### Description

BPV20F is a high speed and high sensitive PIN photodiode in a plastic package with a cylindrical side view lens. The epoxy package itself is an IR filter, spectrally matched to GaAs or GaAs/GaAlAs IR emitters ( $\lambda_p = 950 \text{ nm}$ ).

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 cylindrical lens package achieves a sensitivity improvement of 20 %.



### Features

- Large radiant sensitive area ( $A = 7.5 \text{ mm}^2$ )
- Wide viewing angle  $\varphi = \pm 65^\circ$
- Improved sensitivity
- Fast response times
- TO-92 plastic package with IR filter
- Filter designed for 950 nm transmission
- 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...- or TSI...-Series).

### 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<sub>amb</sub> = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward Voltage	I <sub>F</sub> = 50 mA	V <sub>F</sub>		1	1.3	V
Breakdown Voltage	I <sub>R</sub> = 100 μA, E = 0	V <sub>(BR)</sub>	60			V
Reverse Dark Current	V <sub>R</sub> = 10 V, E = 0	I <sub>ro</sub>		2	30	nA
Diode capacitance	V <sub>R</sub> = 0 V, f = 1 MHz, E = 0	C <sub>D</sub>		70		pF
Serial Resistance	V <sub>R</sub> = 12 V, f = 1 MHz	R <sub>S</sub>		400		Ω

### Optical Characteristics

T<sub>amb</sub> = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Open Circuit Voltage	E <sub>e</sub> = 1 mW/cm <sup>2</sup> , λ = 950 nm	V <sub>o</sub>		360		mV
Temp. Coefficient of V <sub>o</sub>	E <sub>e</sub> = 1 mW/cm <sup>2</sup> , λ = 950 nm	TK <sub>V<sub>o</sub></sub>		- 2.6		mV/K
Short Circuit Current	E <sub>e</sub> = 1 mW/cm <sup>2</sup> , λ = 950 nm	I <sub>k</sub>		55		μA
Reverse Light Current	E <sub>e</sub> = 1 mW/cm <sup>2</sup> , λ = 950 nm, V <sub>R</sub> = 5 V	I <sub>ra</sub>	40	60		μA
Temp. Coefficient of I <sub>ra</sub>	E <sub>e</sub> = 1 mW/cm <sup>2</sup> , λ = 950 nm, V <sub>R</sub> = 10 V	TK <sub>I<sub>ra</sub></sub>		0.1		%/K
Absolute Spectral Sensitivity	V <sub>R</sub> = 5 V, λ = 870 nm	s(λ)		0.35		A/W
	V <sub>R</sub> = 5 V, λ = 950 nm	s(λ)		0.6		A/W
Angle of Half Sensitivity		φ		± 6.5		deg
Wavelength of Peak Sensitivity		λ <sub>p</sub>		950		nm
Range of Spectral Bandwidth		λ <sub>0.5</sub>		870 to 1050		nm
Quantum Efficiency	λ = 950 nm	η		90		%
Noise Equivalent Power	V <sub>R</sub> = 10 V, λ = 950 nm	NEP		4 x 10 <sup>-14</sup>		W/√ Hz
Detectivity	V <sub>R</sub> = 10 V, λ = 950 nm	D <sup>*</sup>		6 x 10 <sup>12</sup>		cm <sup>2</sup> /Hz/W
Rise Time	V <sub>R</sub> = 10 V, R <sub>L</sub> = 1 kΩ, λ = 820 nm	t <sub>r</sub>		100		ns
Fall Time	V <sub>R</sub> = 10 V, R <sub>L</sub> = 1 kΩ, λ = 820 nm	t <sub>f</sub>		100		ns
Cut-Off Frequency	V <sub>R</sub> = 12 V, R <sub>L</sub> = 1 kΩ, λ = 870 nm	f <sub>c</sub>		4		MHz
	V <sub>R</sub> = 12 V, R <sub>L</sub> = 1 kΩ, λ = 950 nm	f <sub>c</sub>		1		MHz

## Typical Characteristics

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

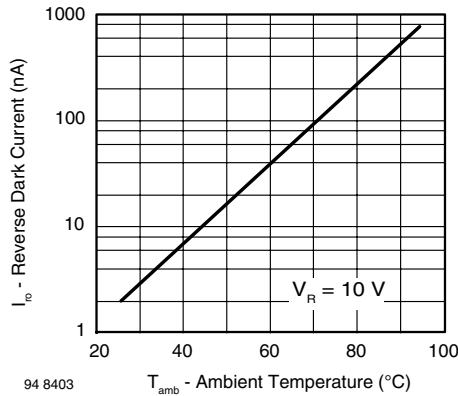


Figure 1. Reverse Dark Current vs. Ambient Temperature

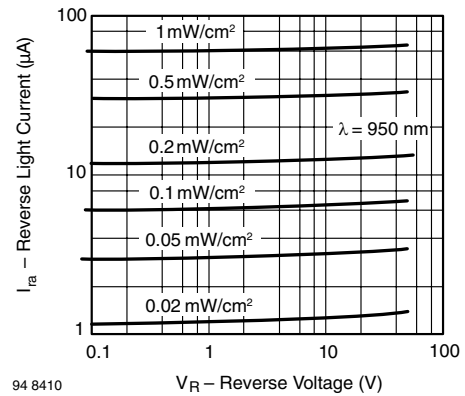


Figure 4. Reverse Light Current vs. Reverse Voltage

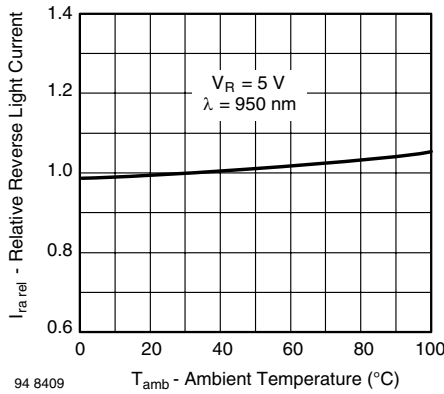


Figure 2. Relative Reverse Light Current vs. Ambient Temperature

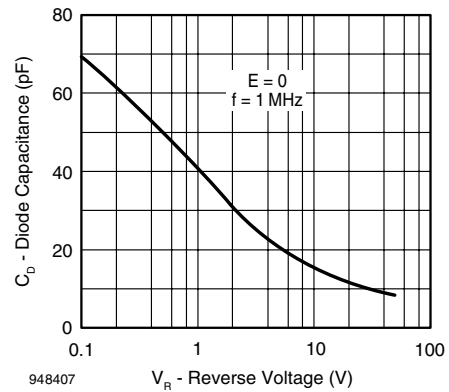


Figure 5. Diode Capacitance vs. Reverse Voltage

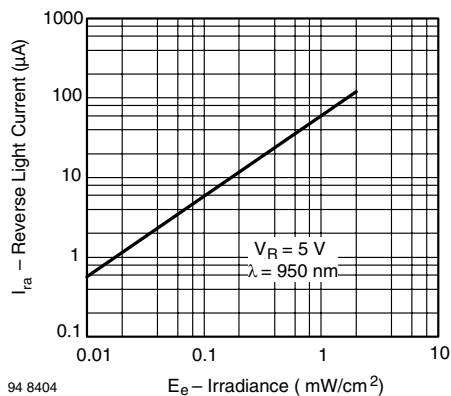


Figure 3. Reverse Light Current vs. Irradiance

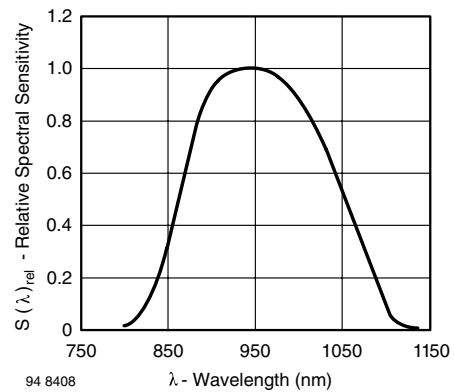
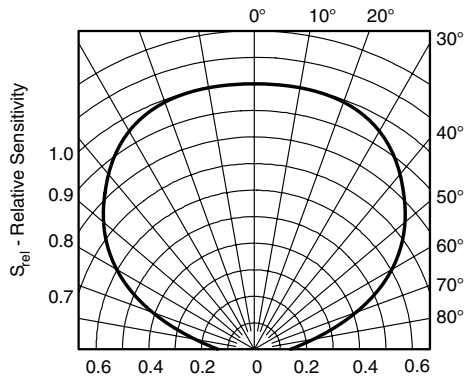


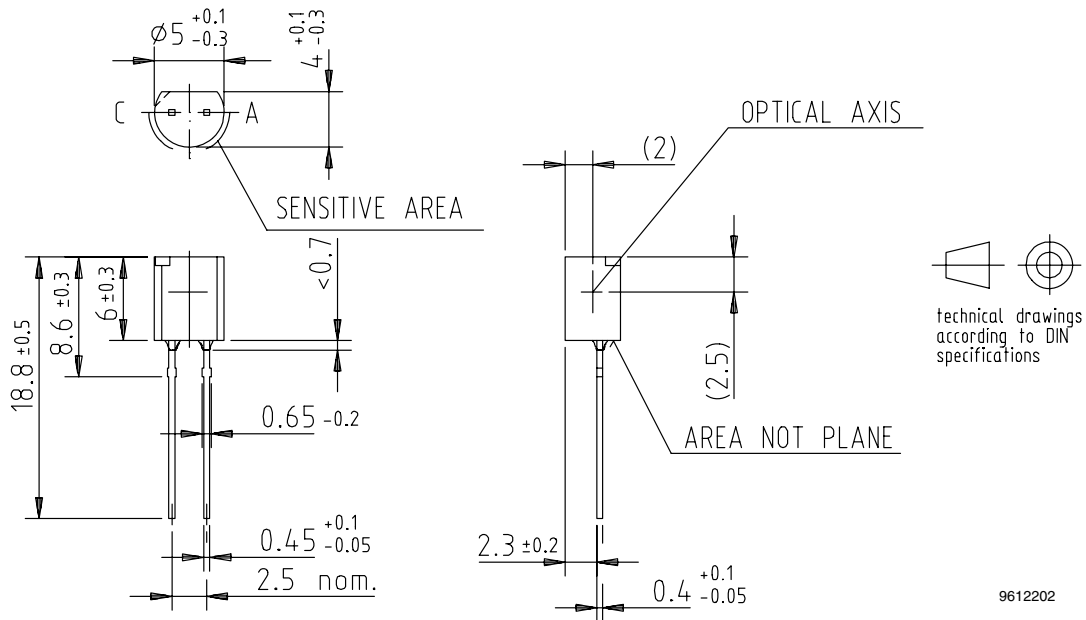
Figure 6. Relative Spectral Sensitivity vs. Wavelength



94 8406

Figure 7. Relative Radiant Sensitivity vs. Angular Displacement

## Package Dimensions in mm



9612202



## Ozone Depleting Substances Policy Statement

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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.

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