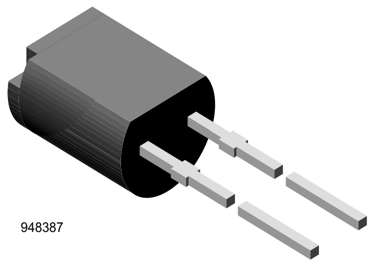
Silicon PIN Photodiode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Description

BPV21F(L) is a high speed and high sensitive PIN photodiode in a plasic package with a cylindrical side view lens. The epoxy package itself is an IR filter, spectrally matched to GaAs or GaAs/GaAlAs IR emitters (λ_p = 950 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 = 5.7 mm^2)
- Wide viewing angle φ = ± 65°
- Fast response times
- Low junction capacitance
- TO-92 plastic package with IR filter
- Filter designed for 950 nm transmission
- 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

Pb
Pb-free
e4

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 °C, unless otherwise specified

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

Electrical Characteristics

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward Voltage	I_F = 50 mA	V_F		1	1.3	V
Breakdown Voltage	I_R = 100 μA, E = 0	$V_{(BR)}$	60			V
Reverse Dark Current	V_R = 10 V, E = 0	I_{ro}		2	30	nA
Diode capacitance	V_R = 0 V, f = 1 MHz, E = 0	C_D		48		pF
Serial Resistance	V_R = 12 V, f = 1 MHz	R_S		900		Ω

Optical Characteristics

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Open Circuit Voltage	E_e = 1 mW/cm^2, λ = 950 nm	V_o		380		mV
Temp. Coefficient of V_o	E_e = 1 mW/cm^2, λ = 950 nm	TK_{Vo}		- 2.6		mV/K
Short Circuit Current	E_e = 1 mW/cm^2, λ = 950 nm	I_k		35		μA
Reverse Light Current	E_e = 1 mW/cm^2, λ = 950 nm, V_R = 5 V	I_{ra}	27	38		μA
Temp. Coefficient of I_{ra}	E_e = 1 mW/cm^2, λ = 950 nm, V_R = 10 V	TK_{Ira}		0.1		%/K
Absolute Spectral Sensitivity	V_R = 5 V, λ = 870 nm	s(λ)		0.35		A/W
	V_R = 5 V, λ = 950 nm	s(λ)		0.6		A/W
Angle of Half Sensitivity		φ		± 65		deg
Wavelength of Peak Sensitivity		$λ_p$		950		nm
Range of Spectral Bandwidth		$λ_{0.5}$		870 to 1050		nm
Quantum Efficiency	λ = 950 nm	η		90		%
Noise Equivalent Power	V_R = 10 V, λ = 950 nm	NEP		4 x 10^{-14}		W/√ Hz
Detectivity	V_R = 10 V, λ = 950 nm	D^*		5 x 10^{12}		cm√Hz/W
Rise Time	V_R = 10 V, R_L = 1 kΩ, λ = 820 nm	t_r		70		ns
Fall Time	V_R = 10 V, R_L = 1 kΩ, λ = 820 nm	t_f		70		ns
Cut-Off Frequency	V_R = 12 V, R_L = 1 kΩ, λ = 870 nm	f_c		4		MHz
	V_R = 12 V, R_L = 1 kΩ, λ = 950 nm	f_c		1		MHz

Typical Characteristics

T_{amb} = 25 °C unless otherwise specified

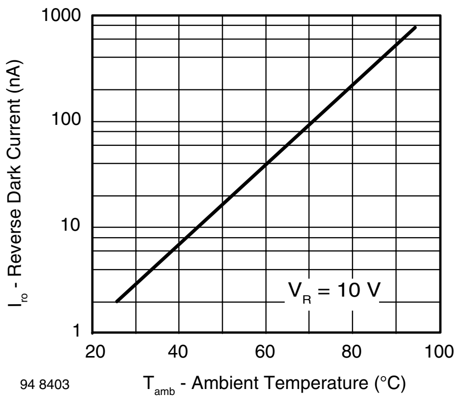


Figure 1. Reverse Dark Current vs. Ambient Temperature

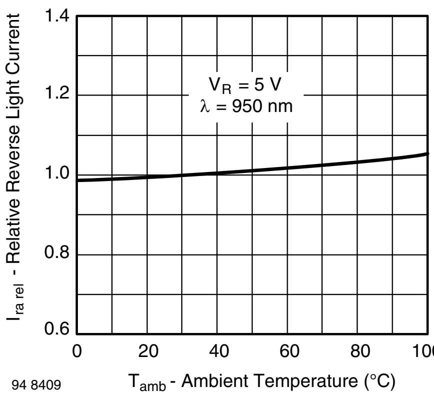


Figure 2. Relative Reverse Light Current vs. Ambient Temperature

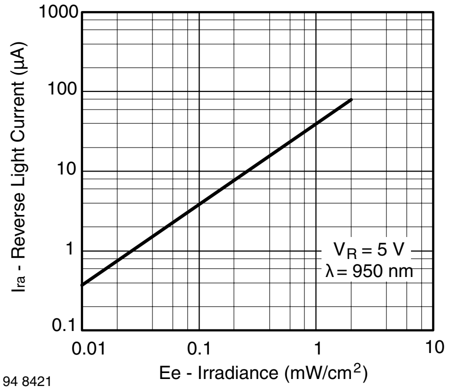


Figure 3. Reverse Light Current vs. Irradiance

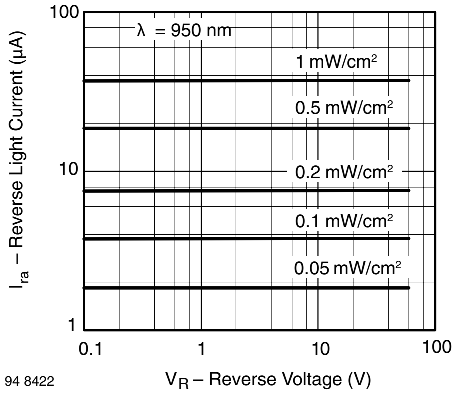


Figure 4. Reverse Light Current vs. Reverse Voltage

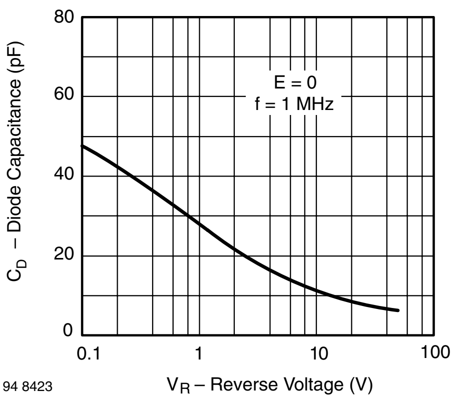


Figure 5. Diode Capacitance vs. Reverse Voltage

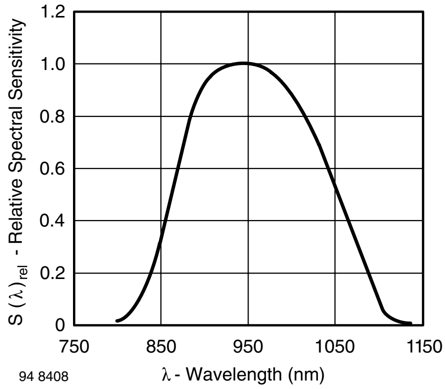


Figure 6. Relative Spectral Sensitivity vs. Wavelength

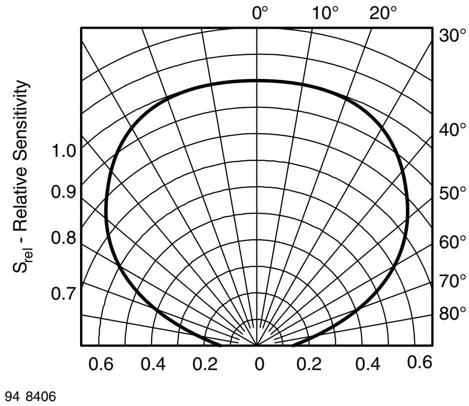
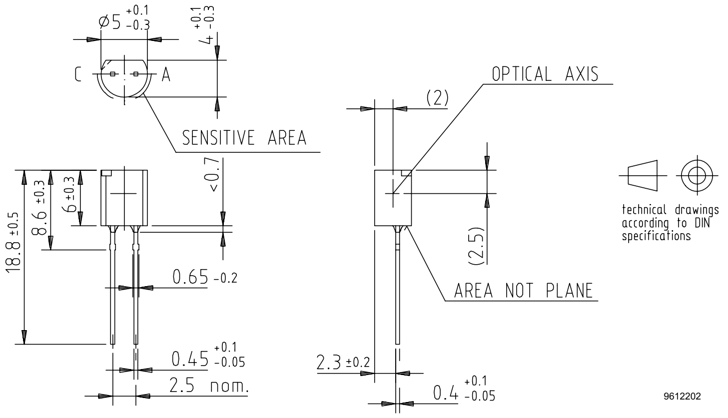
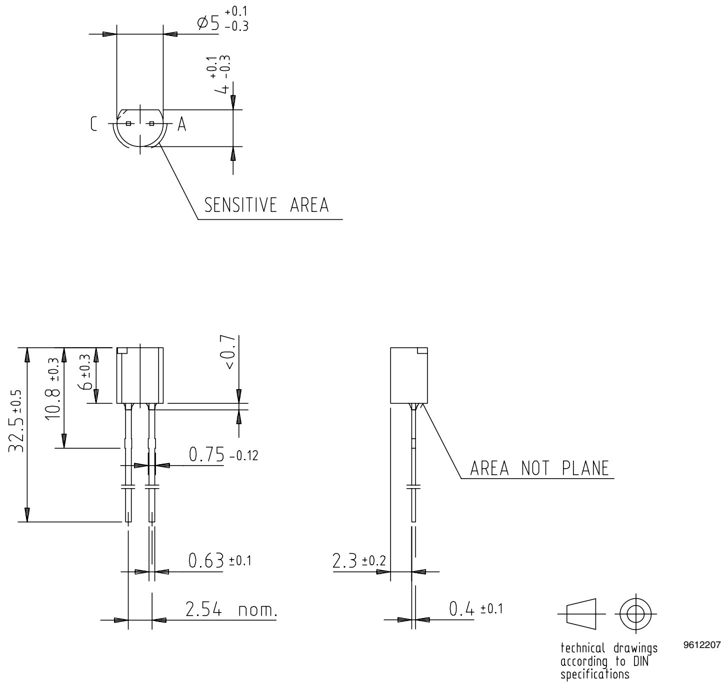


Figure 7. Relative Radiant Sensitivity vs. Angular Displacement

Package Dimensions in mm



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.

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