

High Speed Silicon PIN Photodiode

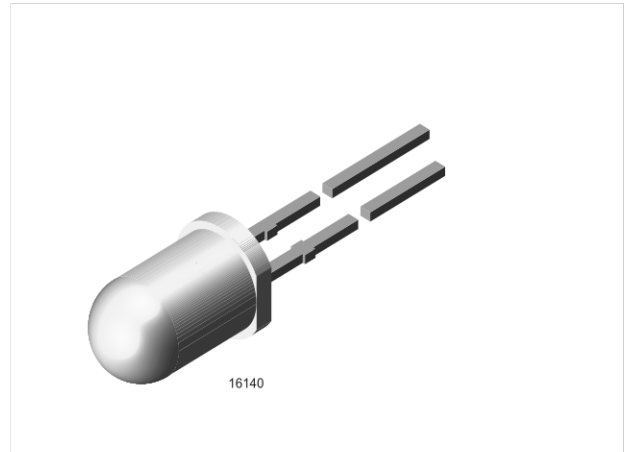
Description

BPV10NF is a high sensitive and wide bandwidth PIN photodiode in a standard T-1 $\frac{3}{4}$ plastic package. The black epoxy is an universal IR filter, spectrally matched to GaAs ($\lambda = 950$ nm) and GaAlAs ($\lambda = 870$ nm) IR emitters.

BPV10NF is optimized for serial infrared links according to the IrDA standard.

Features

- Extra fast response times
- High modulation bandwidth (>100 MHz)
- High radiant sensitivity
- Radiant sensitive area $A = 0.78 \text{ mm}^2$
- Low junction capacitance
- Standard T-1 $\frac{3}{4}$ ($\varnothing 5$ mm) package with universal IR filter
- Angle of half sensitivity $\phi = \pm 20^\circ$
- Lead-free device



Applications

Infrared high speed remote control and free air transmission systems with high modulation frequencies or high data transmission rate requirements, especially for direct point to point links.

BPV10NF is ideal for the design of transmission systems according to IrDA requirements and for carrier frequency based systems (e.g. ASK / FSK- coded, 450 kHz or 1.3 MHz). Recommended emitter diodes are TSHF 5...-series or TSSF 4500.

Absolute Maximum Ratings

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

Parameter	Test condition	Symbol	Value	Unit
Reverse Voltage		V_R	60	V
Power Dissipation	$T_{\text{amb}} \leq 25^\circ\text{C}$	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	2 mm from body, $t \leq 5$ s	T_{sd}	260	$^\circ\text{C}$
Thermal Resistance Junction/Ambient		R_{thJA}	350	K/W

Electrical Characteristics

$T_{\text{amb}} = 25^\circ\text{C}$, 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	$I_R = 100 \mu\text{A}$, $E = 0$	$V_{(\text{BR})}$	60			V
Reverse Dark Current	$V_R = 20 \text{ V}$, $E = 0$	I_{r0}		1	5	nA
Diode capacitance	$V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$, $E = 0$	C_D		11		pF

Optical Characteristics

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Open Circuit Voltage	$E_e = 1\text{ mW/cm}^2$, $\lambda = 870\text{ nm}$	V_o		450		mV
Short Circuit Current	$E_e = 1\text{ mW/cm}^2$, $\lambda = 870\text{ nm}$	I_k		50		μA
Reverse Light Current	$E_e = 1\text{ mW/cm}^2$, $\lambda = 870\text{ nm}$, $V_R = 5\text{ V}$	I_{ra}		55		μA
	$E_e = 1\text{ mW/cm}^2$, $\lambda = 950\text{ nm}$, $V_R = 5\text{ V}$	I_{ra}	30	60		μA
Temp. Coefficient of I_{ra}	$E_e = 1\text{ mW/cm}^2$, $\lambda = 870\text{ nm}$, $V_R = 5\text{ V}$	$TK_{I_{ra}}$		-0.1		%/K
Absolute Spectral Sensitivity	$V_R = 5\text{ V}$, $\lambda = 870\text{ nm}$	$s(\lambda)$		0.55		A/W
Angle of Half Sensitivity		ϕ		± 20		deg
Wavelength of Peak Sensitivity		λ_p		940		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		790 to 1050		nm
Quantum Efficiency	$\lambda = 950\text{ nm}$	η		70		%
Noise Equivalent Power	$V_R = 20\text{ V}$, $\lambda = 950\text{ nm}$	NEP		3×10^{-14}		$\text{W}/\sqrt{\text{Hz}}$
Detectivity	$V_R = 20\text{ V}$, $\lambda = 950\text{ nm}$	D^*		3×10^{12}		$\text{cm}^2/\sqrt{\text{Hz}}/\text{W}$
Rise Time	$V_R = 50\text{ V}$, $R_L = 50\text{ }\Omega$, $\lambda = 820\text{ nm}$	t_r		2.5		ns
Fall Time	$V_R = 50\text{ V}$, $R_L = 50\text{ }\Omega$, $\lambda = 820\text{ nm}$	t_f		2.5		ns

Typical Characteristics ($T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

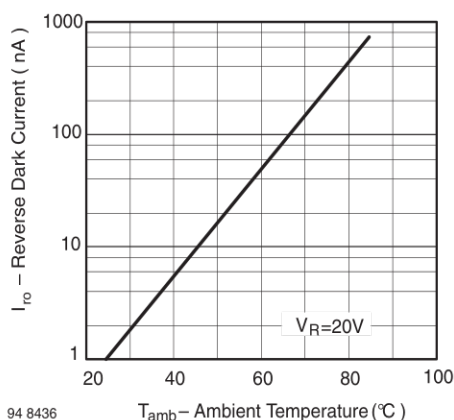


Fig. 1 Reverse Dark Current vs. Ambient Temperature

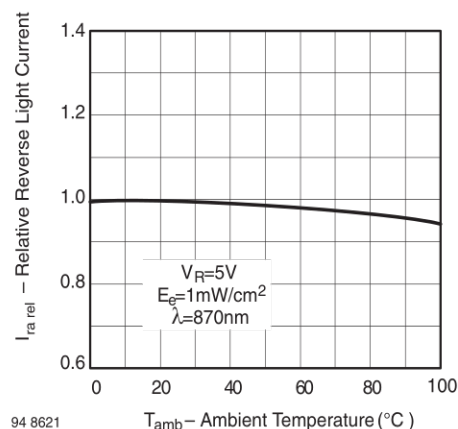


Fig. 2 Relative Reverse Light Current vs. Ambient Temperature

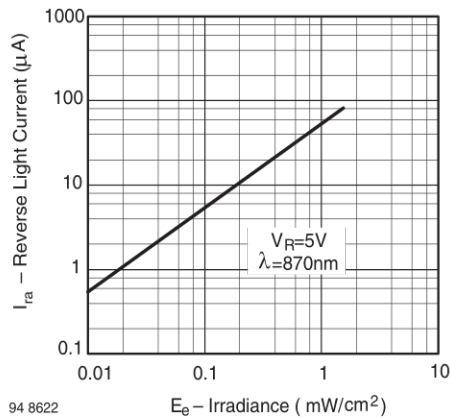


Fig. 3 Reverse Light Current vs. Irradiance

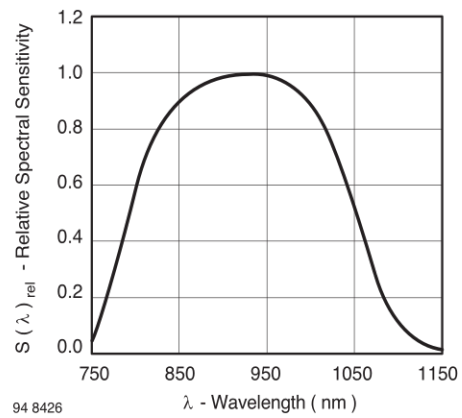


Fig. 6 Relative Spectral Sensitivity vs. Wavelength

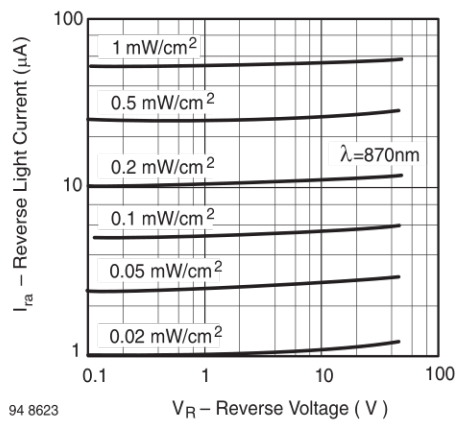


Fig. 4 Reverse Light Current vs. Reverse Voltage

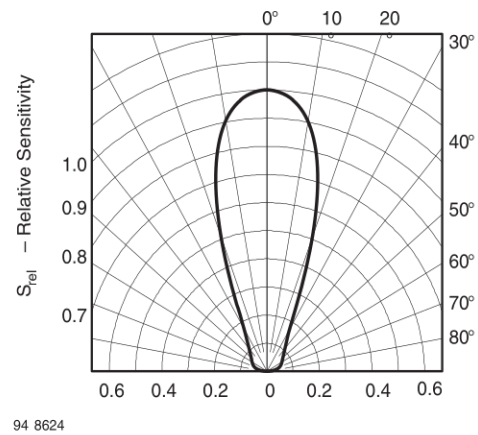


Fig. 7 Relative Radiant Sensitivity vs. Angular Displacement

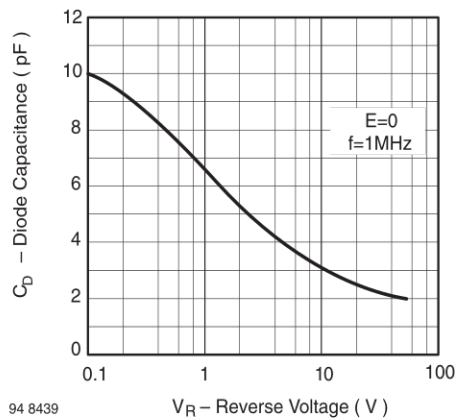
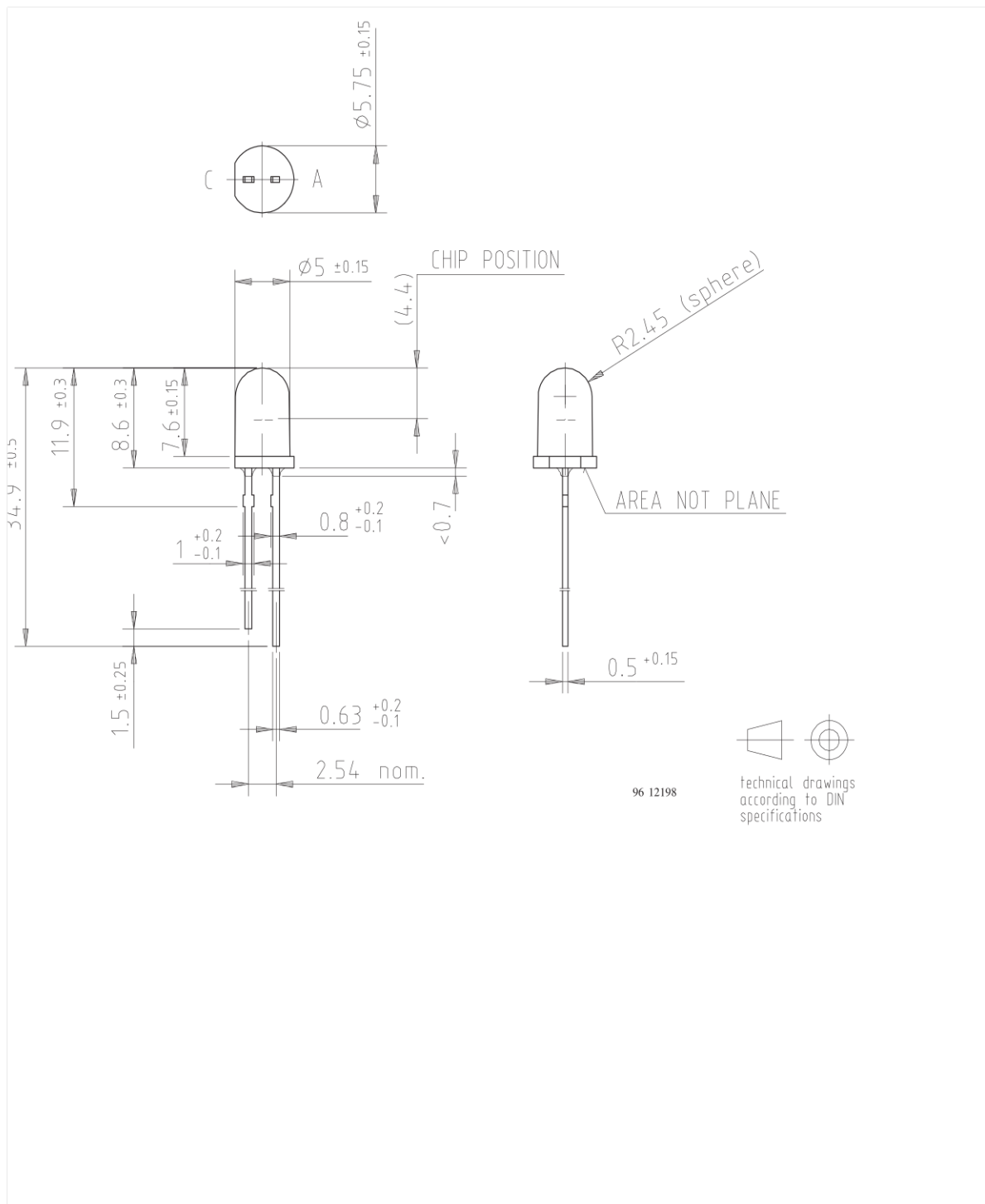


Fig. 5 Diode Capacitance vs. Reverse Voltage

Package Dimensions in 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
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423