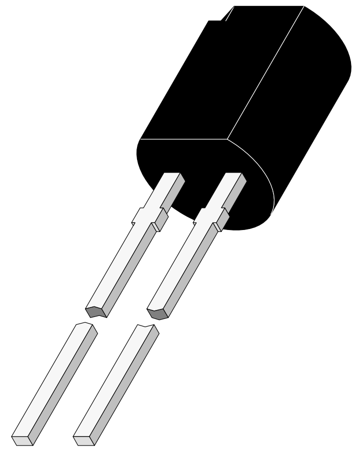
Silicon PIN Photodiode

Description

BPV20NFL is a high speed and high sensitive PIN photodiode in a plastic package with a cylindrical side view lens and extra long leads.

The epoxy package itself is an IR filter, spectrally matched to GaAs on GaAs and GaAlAs on GaAlAs IR emitters (λ_p = 950 nm, s_{rel}(λ = 875 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 cylindrical lens package achieves a sensitivity improvement of 20 %.



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Features

- Large radiant sensitive area (A=7.5 mm^2)
- Wide viewing angle $\varphi = \pm 65\,^\circ$
- Improved sensitivity
- Fast response times
- Low junction capacitance
- TO–92 plastic package with universal IR filter
- Long leads for special design requirements

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. This detector is optimized for infrared locking systems in automotive applications. Recommended infrared emitters are TSHA 5...–series.

Absolute Maximum Ratings

T_{amb} = 25°C

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

Basic Characteristics

T_{amb} = 25°C

Parameter	Test Conditions	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		70		pF
Serial Resistance	V_R = 12 V, f = 1 MHz	R_S		400		Ω
Open Circuit Voltage	E_e = 1 mW/cm^2, λ = 950 nm	V_o		360		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		55		μA
Reverse Light Current	E_e = 1 mW/cm^2, λ = 870 nm, V_R = 5 V	I_{ra}	40	60		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)		0.57		A/W
Absolute Spectral Sensitivity	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		940		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		790...1050		nm
Quantum Efficiency	λ = 950 nm	η		90		%
Noise Equivalent Power	V_R=10V, λ=950nm	NEP		$4x10^{-14}$		W/√ Hz
Detectivity	V_R=10V, λ=950nm	D^*		$6x10^{12}$		cm√Hz/ W
Rise Time	V_R=10V, R_L=1kΩ, λ=820nm	t_r		100		ns
Fall Time	V_R=10V, R_L=1kΩ, λ=820nm	t_f		100		ns
Cut–Off Frequency	V_R=12V, R_L=1kΩ, λ=870nm	f_c		4		MHz
Cut–Off Frequency	V_R=12V, R_L=1kΩ, λ=950nm	f_c		1		MHz

Typical Characteristics (T_{amb} = 25°C unless otherwise specified)

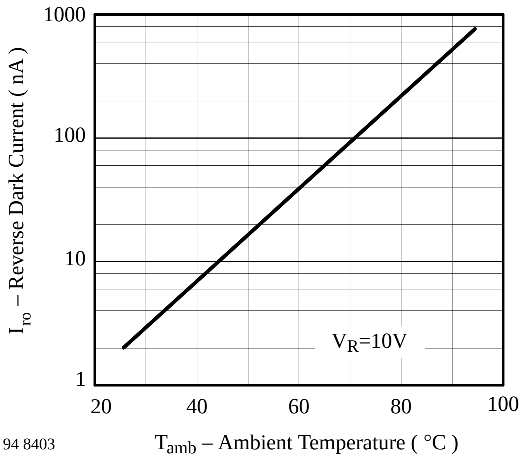


Figure 1 : Reverse Dark Current vs. Ambient Temperature

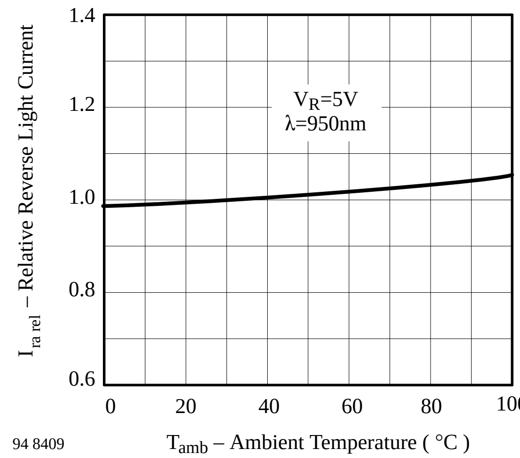


Figure 2 : Relative Reverse Light Current vs. Ambient Temperature

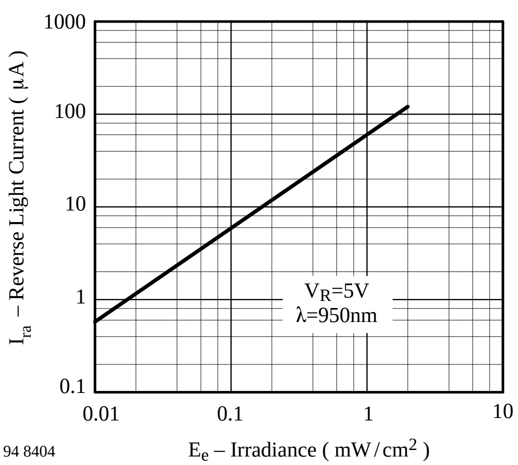


Figure 3 : Reverse Light Current vs. Irradiance

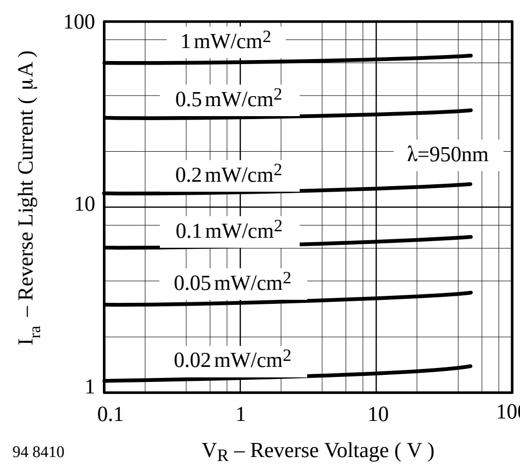


Figure 4 : Reverse Light Current vs. Reverse Voltage

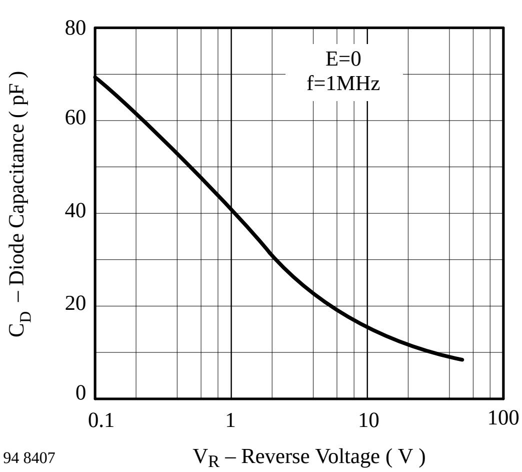


Figure 5 : Diode Capacitance vs. Reverse Voltage

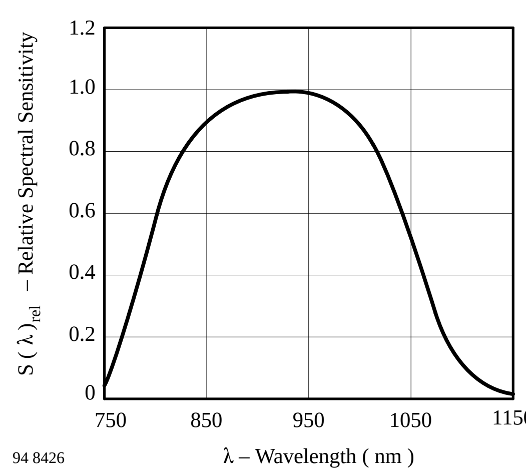


Figure 6 : Relative Spectral Sensitivity vs. Wavelength

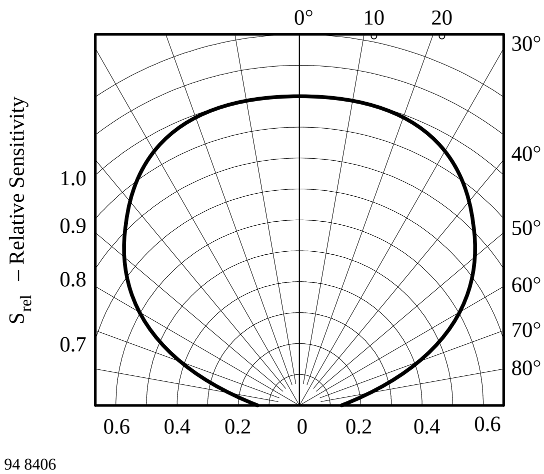
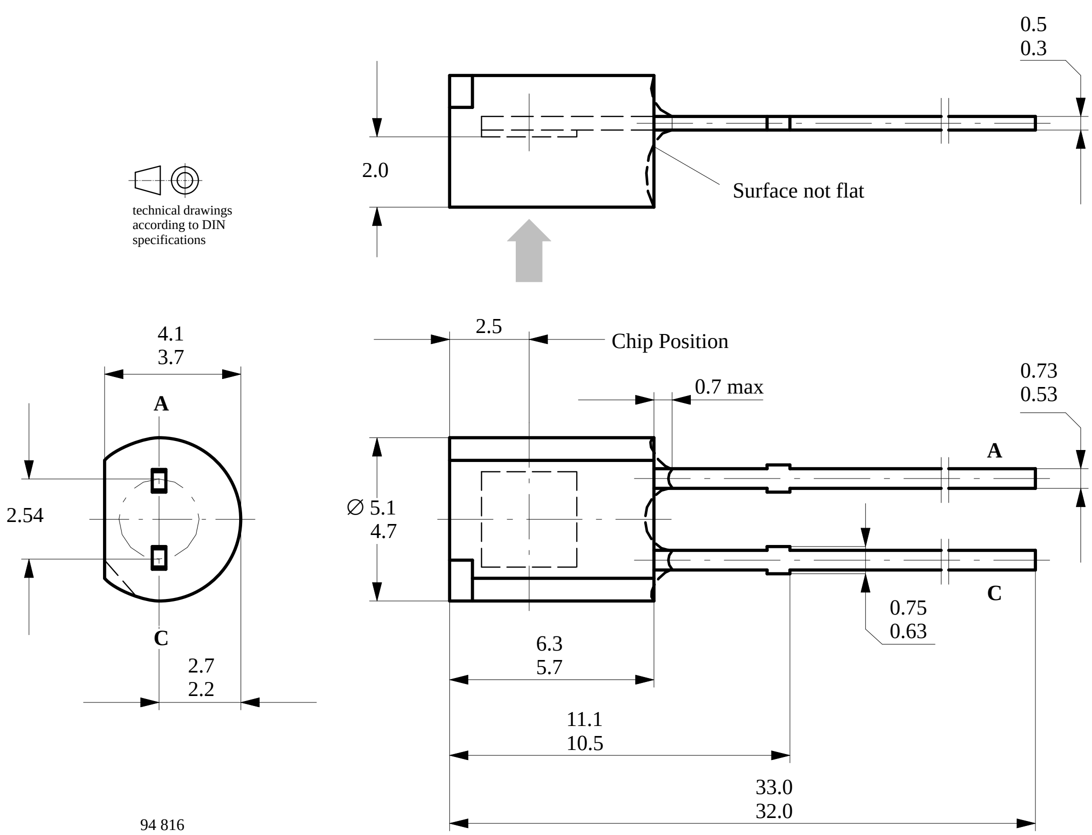


Figure 7 : Relative Radiant Sensitivity vs. Angular Displacement

Dimensions in mm



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