

## Silicon NPN Phototransistor

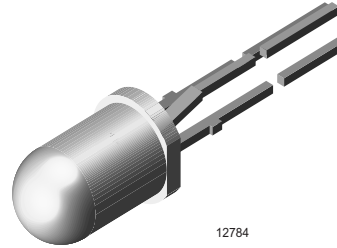
### Description

BPV11F is a very high sensitive silicon NPN epitaxial planar phototransistor in a standard T-1 $\frac{3}{4}$  plastic package.

The epoxy package itself is an IR filter, spectrally matched to GaAs IR emitters ( $\lambda_p \geq 900$  nm).

The viewing angle of  $\pm 15^\circ$  makes it insensible to ambient straylight.

A base terminal is available to enable biasing and sensitivity control.



### Features

- Very high radiant sensitivity
- Standard T-1 $\frac{3}{4}$  ( $\varnothing$  5 mm) package
- IR filter for GaAs emitters (950 nm)
- Angle of half sensitivity  $\varphi = \pm 15^\circ$
- Base terminal available
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Applications

Detector for industrial electronic circuitry, measurement and control

### Absolute Maximum Ratings

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

Parameter	Test condition	Symbol	Value	Unit
Collector Base Voltage		$V_{CBO}$	80	V
Collector Emitter Voltage		$V_{CEO}$	70	V
Emitter Base Voltage		$V_{EBO}$	5	V
Collector current		$I_C$	50	mA
Collector peak current	$t_p/T = 0.5$ , $t_p \leq 10$ ms	$I_{CM}$	100	mA
Total Power Dissipation	$T_{amb} \leq 47^\circ\text{C}$	$P_{tot}$	150	mW
Junction Temperature		$T_j$	100	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	- 55 to + 100	$^\circ\text{C}$
Soldering Temperature	$t \leq 5$ s, 2 mm from body	$T_{sd}$	260	$^\circ\text{C}$
Thermal Resistance Junction/ Ambient		$R_{thJA}$	350	K/W

### Electrical Characteristics

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector Emitter Breakdown Voltage	$I_C = 1\text{ mA}$	$V_{(BR)CEO}$	70			V
Collector-emitter dark current	$V_{CE} = 10\text{ V}, E = 0$	$I_{CEO}$		1	50	nA
DC Current Gain	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, E = 0$	$h_{FE}$		450		
Collector-emitter capacitance	$V_{CE} = 0\text{ V}, f = 1\text{ MHz}, E = 0$	$C_{CEO}$		15		pF
Collector - base capacitance	$V_{CB} = 0\text{ V}, f = 1\text{ MHz}, E = 0$	$C_{CBO}$		19		pF

### Optical Characteristics

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector Light Current	$E_e = 1\text{ mW/cm}^2, \lambda = 950\text{ nm}, V_{CE} = 5\text{ V}$	$I_{ca}$	3	9		mA
Angle of Half Sensitivity		$\phi$		$\pm 15$		deg
Wavelength of Peak Sensitivity		$\lambda_p$		930		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		900 to 980		nm
Collector Emitter Saturation Voltage	$E_e = 1\text{ mW/cm}^2, \lambda = 950\text{ nm}, I_C = 1\text{ mA}$	$V_{CEsat}$		130	300	mV
Turn-On Time	$V_S = 5\text{ V}, I_C = 5\text{ mA}, R_L = 100\text{ }\Omega$	$t_{on}$		6		$\mu\text{s}$
Turn-Off Time	$V_S = 5\text{ V}, I_C = 5\text{ mA}, R_L = 100\text{ }\Omega$	$t_{off}$		5		$\mu\text{s}$
Cut-Off Frequency	$V_S = 5\text{ V}, I_C = 5\text{ mA}, R_L = 100\text{ }\Omega$	$f_c$		110		kHz

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

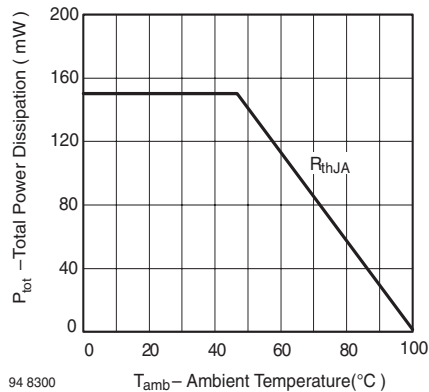


Figure 1. Total Power Dissipation vs. Ambient Temperature

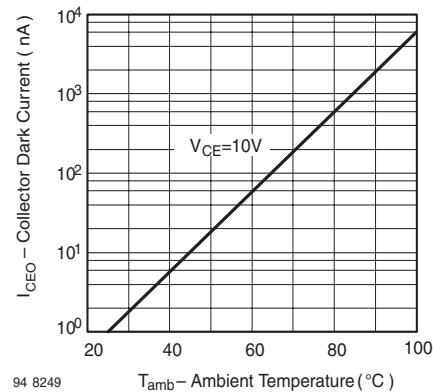


Figure 2. Collector Dark Current vs. Ambient Temperature

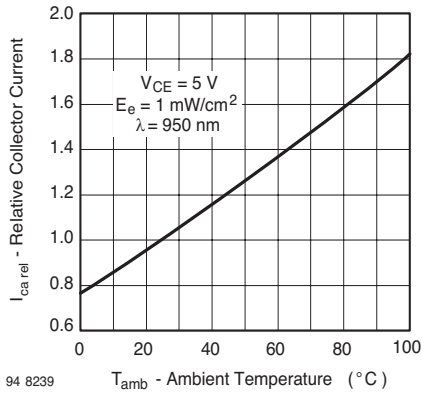


Figure 3. Relative Collector Current vs. Ambient Temperature

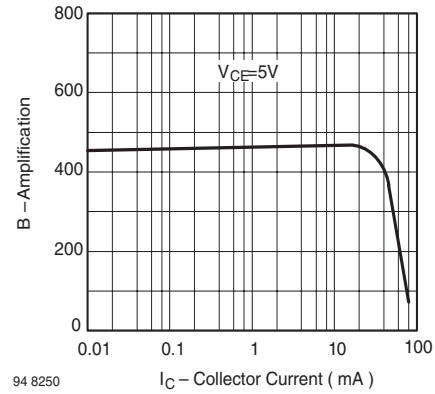


Figure 6. Amplification vs. Collector Current

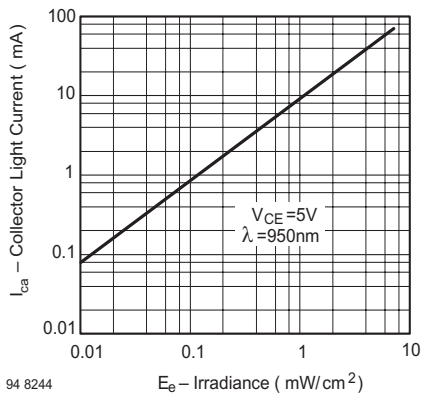


Figure 4. Collector Light Current vs. Irradiance

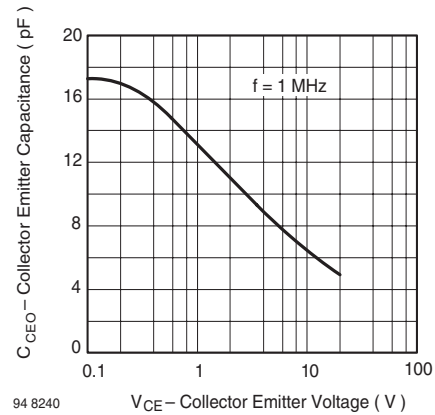


Figure 7. Collector Base Capacitance vs. Collector Base Voltage

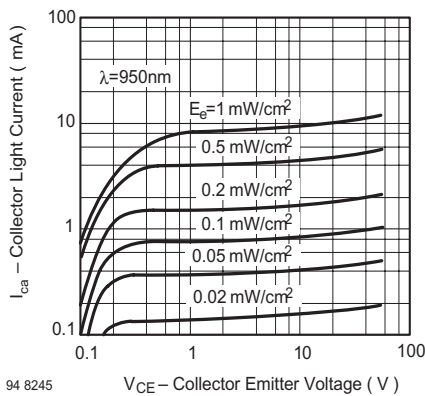


Figure 5. Collector Light Current vs. Collector Emitter Voltage

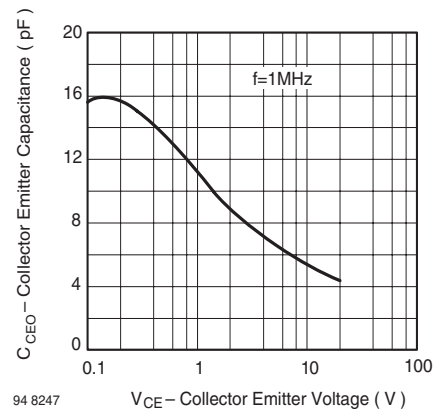


Figure 8. Collector Emitter Capacitance vs. Collector Emitter Voltage

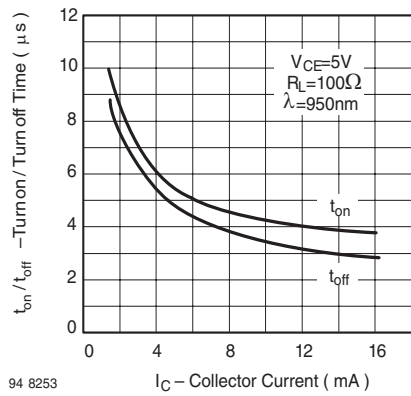


Figure 9. Turn On/Turn Off Time vs. Collector Current

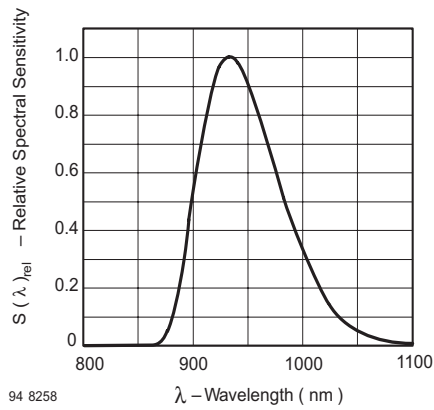


Figure 10. Relative Spectral Sensitivity vs. Wavelength

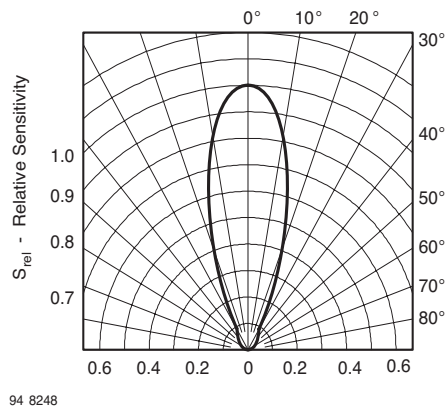
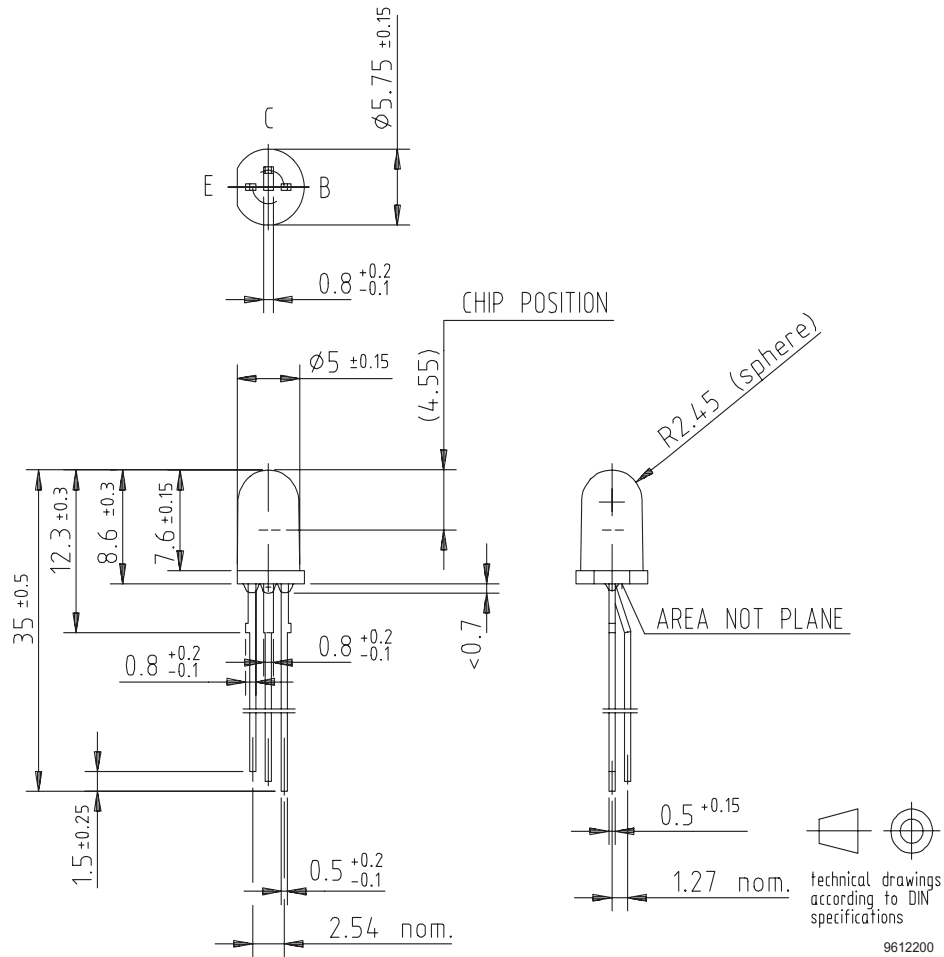


Figure 11. Relative Radiant Sensitivity vs. Angular Displacement

## Package Dimensions in mm



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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.

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