

## Silicon NPN Phototransistor, RoHS Compliant



94 8401

### DESCRIPTION

BPW77 is a silicon NPN phototransistor with high radiant sensitivity in hermetically sealed TO-18 package with base terminal and glass lens. It is sensitive to visible and near infrared radiation.

### FEATURES

- Package type: leaded
- Package form: TO-18
- Dimensions (in mm): Ø 4.7
- High photo sensitivity
- High radiant sensitivity
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity:  $\varphi = \pm 10^\circ$
- Base terminal connected
- Hermetically sealed package
- Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC



RoHS  
COMPLIANT

### APPLICATIONS

- Detector in electronic control and drive circuits

PRODUCT SUMMARY			
COMPONENT	$I_{ca}$ (mA)	$\varphi$ (deg)	$\lambda_{0.1}$ (nm)
BPW77NA	7.5 to 15	$\pm 10$	450 to 1080
BPW77NB	> 10	$\pm 10$	450 to 1080

**Note**

Test condition see table "Basic Characteristics"

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
BPW77NA	Bulk	MOQ: 1000 pcs, 1000 pcs/bulk	TO-18
BPW77NB	Bulk	MOQ: 1000 pcs, 1000 pcs/bulk	TO-18

**Note**

MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS				
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	$T_{amb} \leq 25$ °C	$P_V$	250	mW
Junction temperature		$T_j$	125	°C
Operating temperature range		$T_{amb}$	- 40 to + 125	°C
Storage temperature range		$T_{stg}$	- 40 to + 125	°C
Soldering temperature	$t \leq 5$ s	$T_{sd}$	260	°C
Thermal resistance junction/ambient	Connected with Cu wire, 0.14 mm <sup>2</sup>	$R_{thJA}$	400	K/W
Thermal resistance junction/gase		$R_{thJC}$	150	K/W

**Note**

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



Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS						
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	$V_{CE} = 20 \text{ V}, E = 0$	$I_{CEO}$		1	100	nA
Collector emitter capacitance	$V_{CE} = 5 \text{ V}, f = 1 \text{ MHz}, E = 0$	$C_{CEO}$		6		pF
Angle of half sensitivity		$\phi$		$\pm 10$		deg
Wavelength of peak sensitivity		$\lambda_p$		850		nm
Range of spectral bandwidth		$\lambda_{0.1}$		450 to 1080		nm
Collector emitter saturation voltage	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}, I_C = 1 \text{ mA}$	$V_{CEsat}$		0.15	0.3	V
Turn-on time	$V_S = 5 \text{ V}, I_C = 5 \text{ mA}, R_L = 100 \Omega$	$t_{on}$		6		$\mu\text{s}$
Turn-off time	$V_S = 5 \text{ V}, I_C = 5 \text{ mA}, R_L = 100 \Omega$	$t_{off}$		5		$\mu\text{s}$
Cut-off frequency	$V_S = 5 \text{ V}, I_C = 5 \text{ mA}, R_L = 100 \Omega$	$f_c$		110		kHz

**Note**

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

TYPE DEDICATED CHARACTERISTICS							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Collector light current	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}, V_{CE} = 5 \text{ V}$	BPW77NA	$I_{ca}$	7.5		15	mA
		BPW77NB	$I_{ca}$	10			mA

**BASIC CHARACTERISTICS**

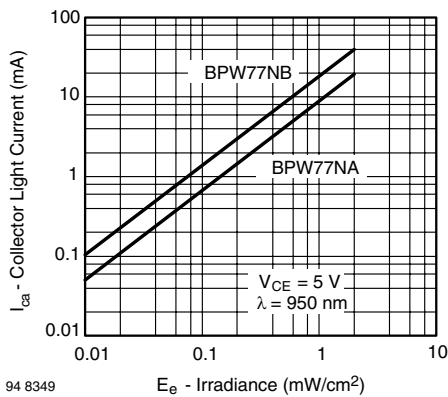
T<sub>amb</sub> = 25 °C, unless otherwise specified



Fig. 2 - Collector Dark Current vs. Ambient Temperature

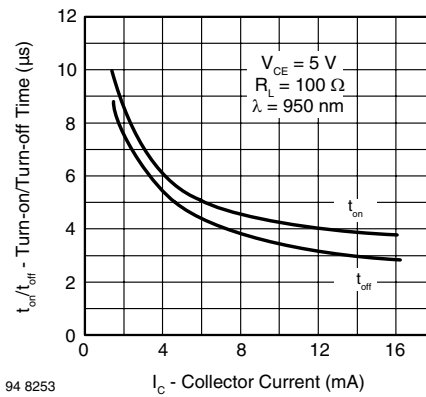


Fig. 3 - Relative Collector Current vs. Ambient Temperature



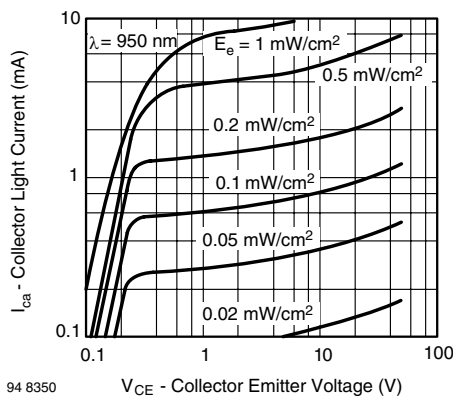
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Fig. 4 - Collector Light Current vs. Irradiance



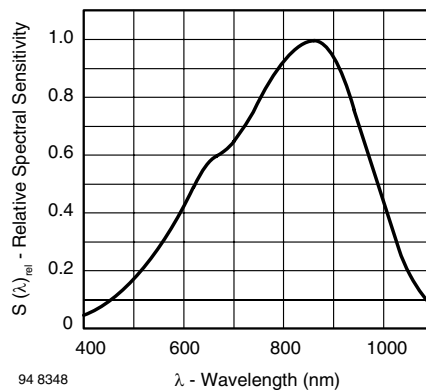
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Fig. 7 - Turn-on/Turn-off Time vs. Collector Current



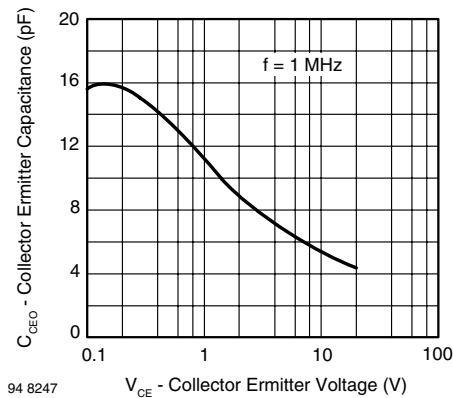
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Fig. 5 - Collector Light Current vs. Collector Emitter Voltage



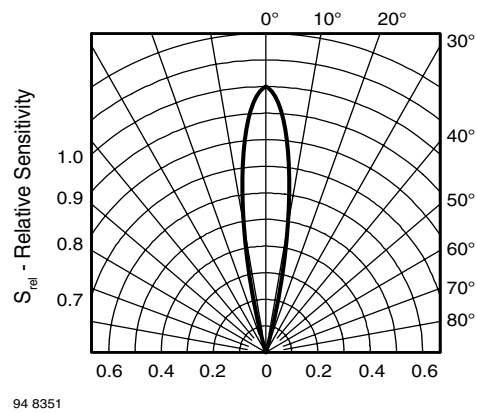
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Fig. 8 - Relative Spectral Sensitivity vs. Wavelength



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Fig. 6 - Collector Emitter Capacitance vs. Collector Emitter Voltage



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Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement



# BPW77NA, BPW77NB

Silicon NPN Phototransistor, RoHS Compliant Vishay Semiconductors

## PACKAGE DIMENSIONS in millimeters



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96 12180



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