

## 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



Fig. 4 - Collector Light Current vs. Irradiance

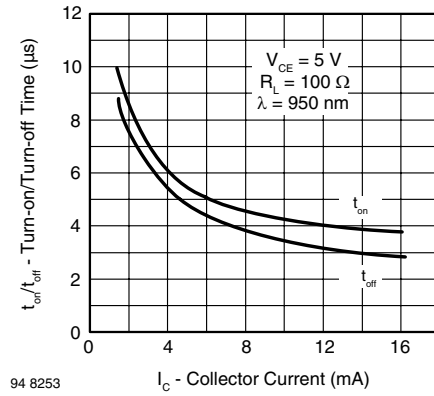


Fig. 7 - Turn-on/Turn-off Time vs. Collector Current

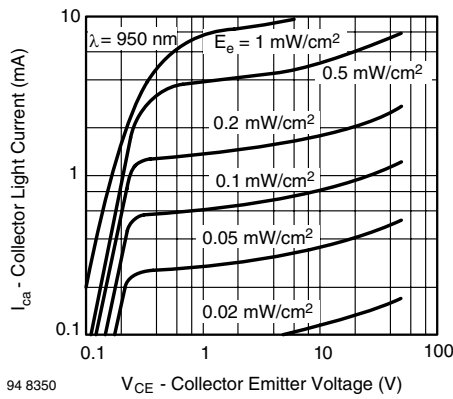


Fig. 5 - Collector Light Current vs. Collector Emitter Voltage

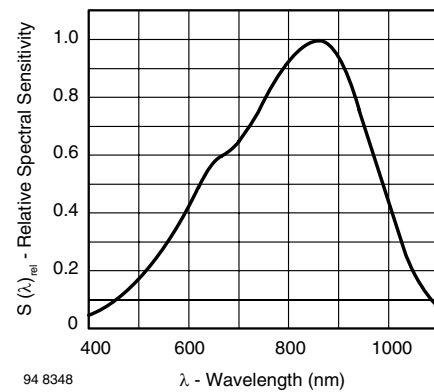


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

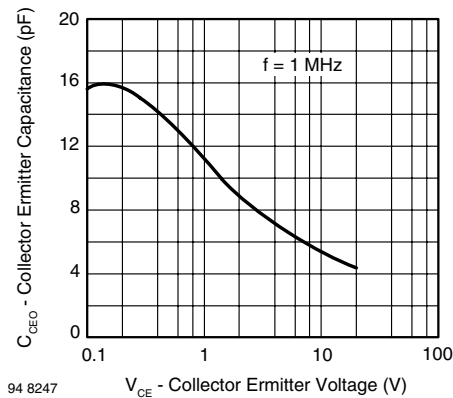


Fig. 6 - Collector Emitter Capacitance vs. Collector Emitter Voltage

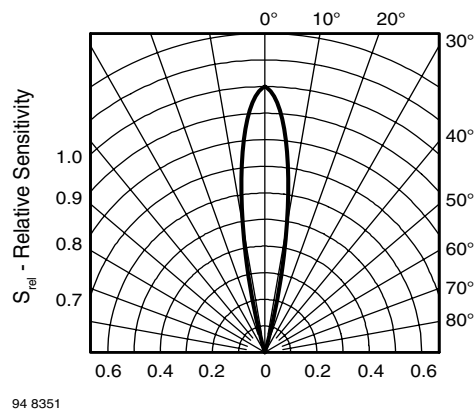


Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement



# BPW77NA, BPW77NB

Silicon NPN Phototransistor, RoHS Compliant Vishay Semiconductors

## PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.503-5023.01-4  
Issue: 1; 01.07.96  
96 12180



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.