

## 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

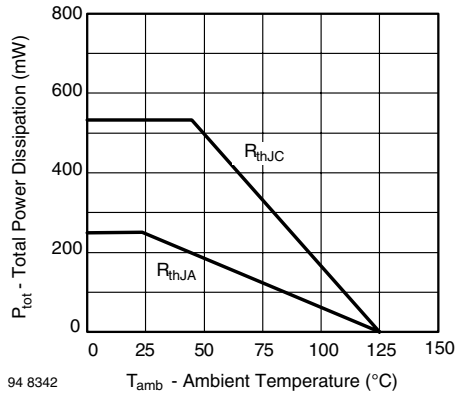


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

| 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**

$T_{amb} = 25 \text{ }^\circ\text{C}$ , 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**

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

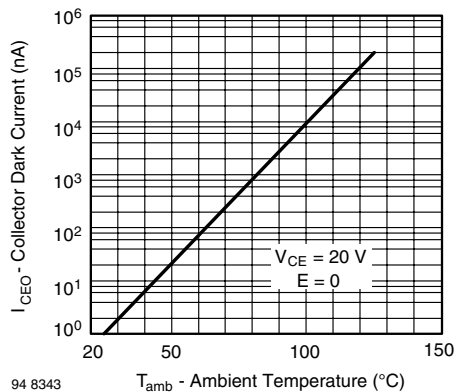


Fig. 2 - Collector Dark Current vs. Ambient Temperature

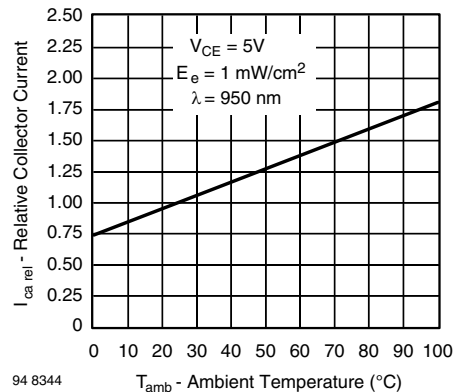


Fig. 3 - Relative Collector Current vs. Ambient Temperature

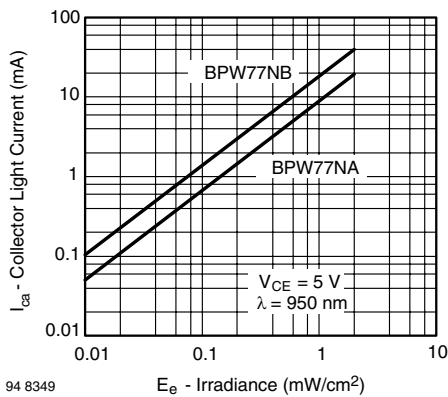


Fig. 4 - Collector Light Current vs. Irradiance

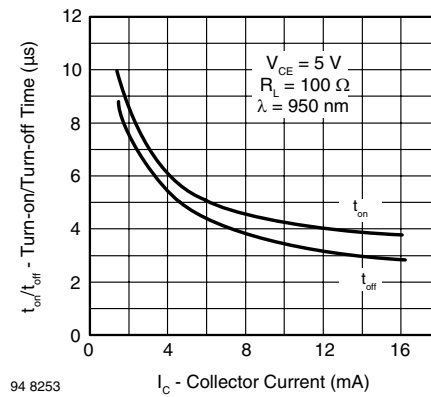


Fig. 7 - Turn-on/Turn-off Time vs. Collector Current

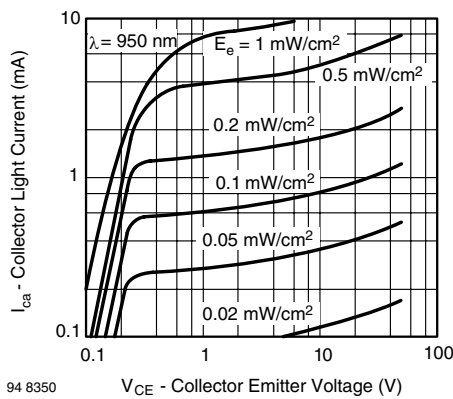


Fig. 5 - Collector Light Current vs. Collector Emitter Voltage

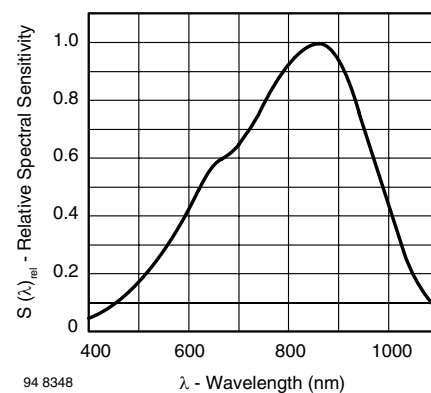


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

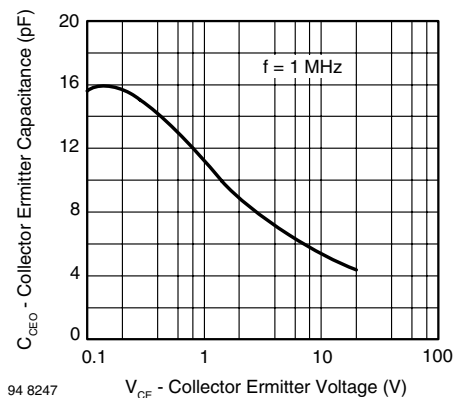


Fig. 6 - Collector Emitter Capacitance vs. Collector Emitter Voltage

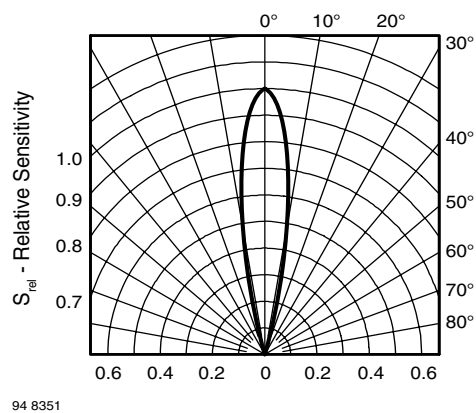


Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement



# BPW77NA, BPW77NB

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## PACKAGE DIMENSIONS in millimeters



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