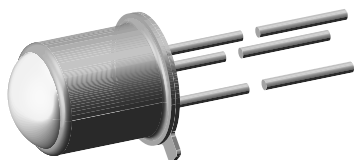


## Silicon NPN Phototransistor, RoHS Compliant



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):  $\varnothing$  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             | $T_{amb} \leq 25^\circ\text{C}$              | $P_V$      | 250           | mW               |
| Junction temperature                |                                              | $T_j$      | 125           | $^\circ\text{C}$ |
| Operating temperature range         |                                              | $T_{amb}$  | - 40 to + 125 | $^\circ\text{C}$ |
| Storage temperature range           |                                              | $T_{stg}$  | - 40 to + 125 | $^\circ\text{C}$ |
| Soldering temperature               | $t \leq 5$ s                                 | $T_{sd}$   | 260           | $^\circ\text{C}$ |
| 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

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

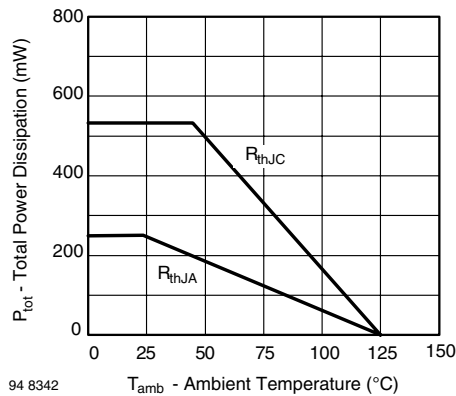


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

| 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

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

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

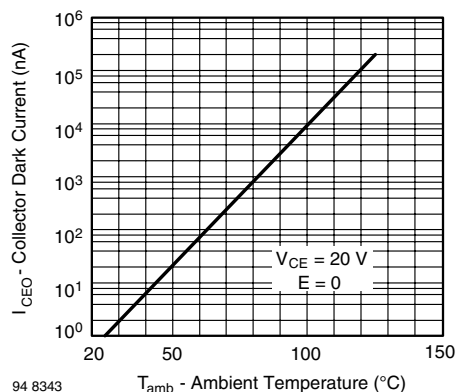


Fig. 2 - Collector Dark Current vs. Ambient Temperature

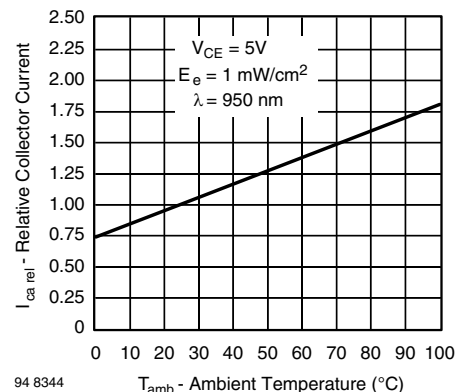


Fig. 3 - Relative Collector Current vs. Ambient Temperature

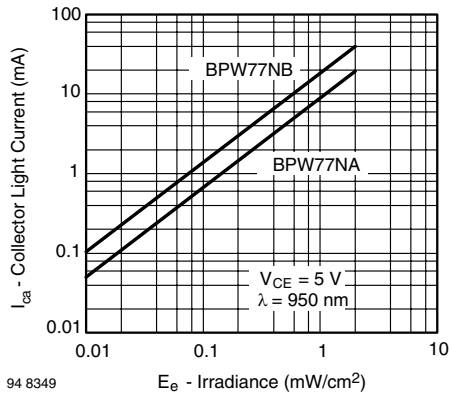


Fig. 4 - Collector Light Current vs. Irradiance

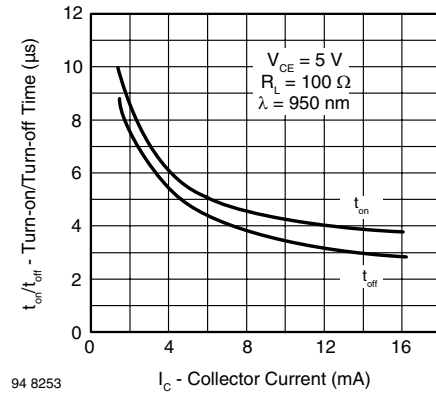


Fig. 7 - Turn-on/Turn-off Time vs. Collector Current

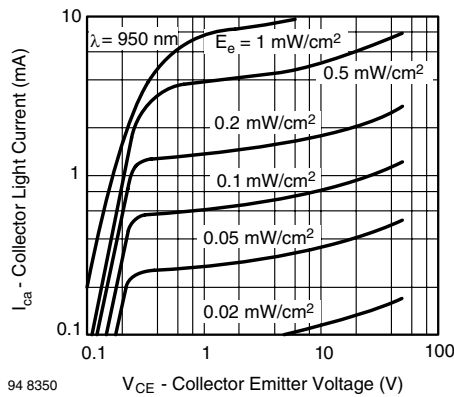


Fig. 5 - Collector Light Current vs. Collector Emitter Voltage

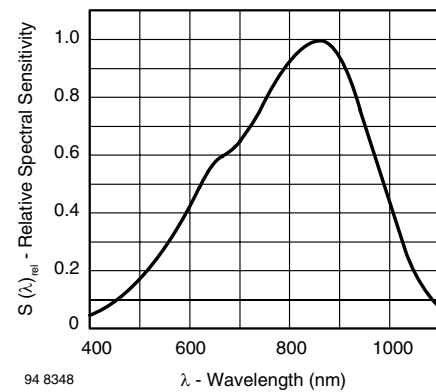


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

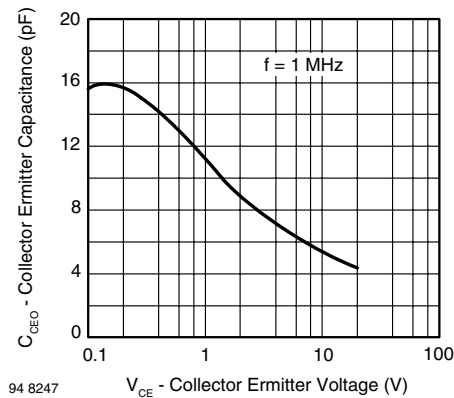


Fig. 6 - Collector Emitter Capacitance vs. Collector Emitter Voltage

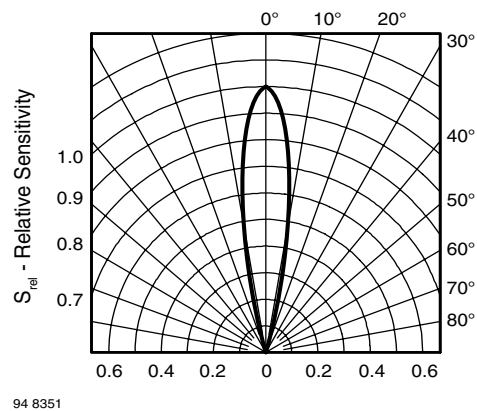
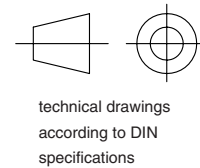
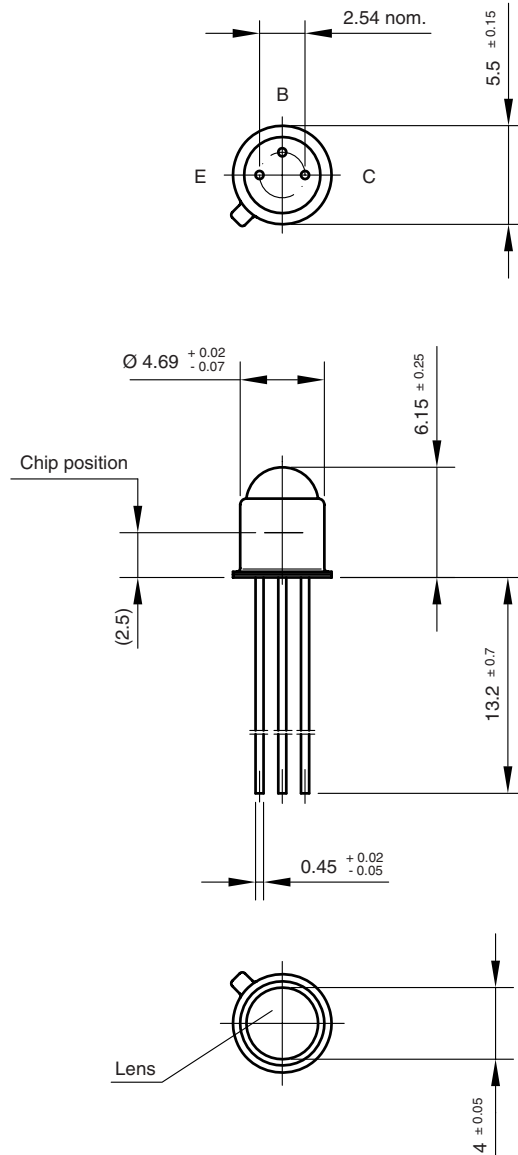


Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement



### PACKAGE DIMENSIONS in millimeters



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



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