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Should be replaced with:

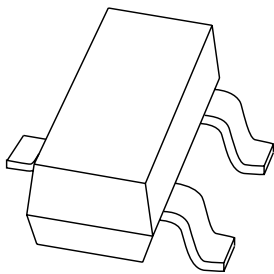
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Kind regards,

Team Nexperia

# DATA SHEET



## **BCW31; BCW32; BCW33** NPN general purpose transistors

Product data sheet  
Supersedes data of 2000 Jul 04

2004 Feb 06

# NPN general purpose transistors

## BCW31; BCW32; BCW33

### FEATURES

- Low current (100 mA)
- Low voltage (32 V).

### APPLICATIONS

- General purpose switching and amplification.

### DESCRIPTION

NPN transistors in a plastic SOT23 package.  
PNP complements: BCW29 and BCW30.

### MARKING

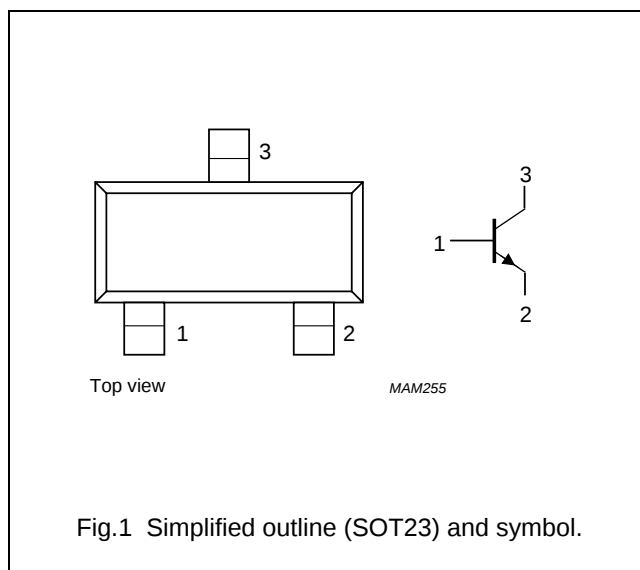
| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| BCW31       | D1*                         |
| BCW32       | D2*                         |
| BCW33       | D3*                         |

### Note

- \* = p : Made in Hong Kong.  
\* = t : Made in Malaysia.  
\* = W : Made in China.

### PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | base        |
| 2   | emitter     |
| 3   | collector   |



### ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | NAME    | DESCRIPTION                              | VERSION |
| BCW31       | —       | plastic surface mounted package; 3 leads | SOT23   |
| BCW32       |         |                                          |         |
| BCW33       |         |                                          |         |

### LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL    | PARAMETER                     | CONDITIONS                     | MIN. | MAX. | UNIT |
|-----------|-------------------------------|--------------------------------|------|------|------|
| $V_{CB0}$ | collector-base voltage        | open emitter                   | —    | 32   | V    |
| $V_{CEO}$ | collector-emitter voltage     | open base; $I_C = 2\text{ mA}$ | —    | 32   | V    |
| $V_{EBO}$ | emitter-base voltage          | open collector                 | —    | 5    | V    |
| $I_C$     | collector current (DC)        |                                | —    | 100  | mA   |
| $I_{CM}$  | peak collector current        |                                | —    | 200  | mA   |
| $I_{BM}$  | peak base current             |                                | —    | 200  | mA   |
| $P_{tot}$ | total power dissipation       | $T_{amb} \leq 25\text{ °C}$    | —    | 250  | mW   |
| $T_{stg}$ | storage temperature           |                                | −65  | +150 | °C   |
| $T_j$     | junction temperature          |                                | —    | 150  | °C   |
| $T_{amb}$ | operating ambient temperature |                                | −65  | +150 | °C   |

## NPN general purpose transistors

## BCW31; BCW32; BCW33

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---------------------------------------------|------------|-------|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | note 1     | 500   | K/W  |

## Note

1. Transistor mounted on an FR4 printed-circuit board.

## CHARACTERISTICS

$T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| SYMBOL      | PARAMETER                            | CONDITIONS                                                                                                       | MIN. | TYP. | MAX. | UNIT          |
|-------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{CBO}$   | collector cut-off current            | $I_E = 0; V_{CB} = 32\text{ V}$                                                                                  | –    | –    | 100  | nA            |
|             |                                      | $I_E = 0; V_{CB} = 32\text{ V}; T_j = 100\text{ }^{\circ}\text{C}$                                               | –    | –    | 10   | $\mu\text{A}$ |
| $I_{EBO}$   | emitter cut-off current              | $I_C = 0; V_{EB} = 5\text{ V}$                                                                                   | –    | –    | 100  | nA            |
| $h_{FE}$    | DC current gain                      | $I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$                                                               |      |      |      |               |
|             | BCW31                                |                                                                                                                  | –    | 190  | –    |               |
|             | BCW32                                |                                                                                                                  | –    | 330  | –    |               |
|             | BCW33                                |                                                                                                                  | –    | 600  | –    |               |
|             | DC current gain                      | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$                                                                         |      |      |      |               |
|             | BCW31                                |                                                                                                                  | 110  | –    | 220  |               |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$                                                                        | –    | 120  | 250  | mV            |
|             |                                      | $I_C = 50\text{ mA}; I_B = 2.5\text{ mA}$                                                                        | –    | 210  | –    | mV            |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$                                                                        | –    | 750  | –    | mV            |
|             |                                      | $I_C = 50\text{ mA}; I_B = 2.5\text{ mA}$                                                                        | –    | 850  | –    | mV            |
| $V_{BE}$    | base-emitter voltage                 | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$                                                                         | 550  | –    | 700  | mV            |
| $C_c$       | collector capacitance                | $I_E = I_c = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$                                                          | –    | 2.5  | –    | pF            |
| $f_T$       | transition frequency                 | $I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$                                                    | 100  | –    | –    | MHz           |
| F           | noise figure                         | $I_C = 200\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 2\text{ k}\Omega; f = 1\text{ kHz}; B = 200\text{ Hz}$ | –    | –    | 10   | dB            |

NPN general purpose transistors

BCW31; BCW32; BCW33

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23

0 1 2 mm  
scale

DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max. | b <sub>p</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   |
|------|------------|------------------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm   | 1.1<br>0.9 | 0.1                    | 0.48<br>0.38   | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 0.95           | 2.5<br>2.1     | 0.45<br>0.15   | 0.55<br>0.45 | 0.2 | 0.1 |

| OUTLINE<br>VERSION | REFERENCES |          |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|----------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC    | JEITA |  |                        |                      |
| SOT23              |            | TO-236AB |       |  |                        | 04-11-04<br>06-03-16 |

## NPN general purpose transistors

## BCW31; BCW32; BCW33

## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION                                                                            |
|--------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

## Notes

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# ***NXP Semiconductors***

## **Customer notification**

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## **Contact information**

For additional information please visit: <http://www.nxp.com>

For sales offices addresses send e-mail to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

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