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Should be replaced with:

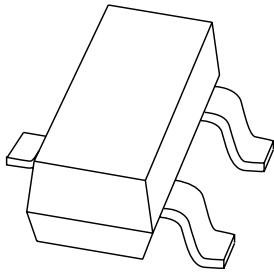
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If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)). Thank you for your cooperation and understanding,

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

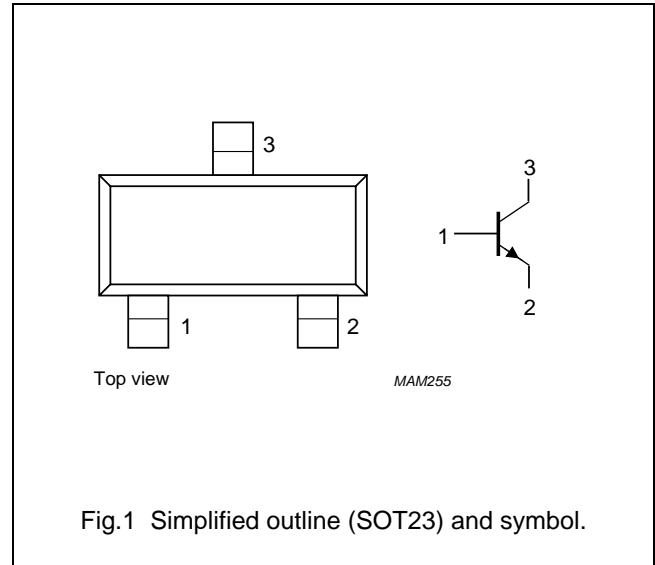
| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| BCW31       | D1*                         |
| BCW32       | D2*                         |
| BCW33       | D3*                         |

### 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       | $T_{amb} \leq 25 \text{ }^\circ\text{C}$ | –    | 250  | mW               |
| $T_{stg}$ | storage temperature           |  | –65  | +150 | $^\circ\text{C}$ |
| $T_j$     | junction temperature          |  | –    | 150  | $^\circ\text{C}$ |
| $T_{amb}$ | operating ambient temperature |  | –65  | +150 | $^\circ\text{C}$ |

## 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

$T_j = 25\text{ °C}$  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            |
|             |  | $I_E = 0; V_{CB} = 32\text{ V}; T_j = 100\text{ °C}$   | –    | –    | 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<br>BCW31<br>BCW32<br>BCW33 | $I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$   | –    | 190  | –    |               |
|             |  |  | –    | 330  | –    |               |
|             |  |  | –    | 600  | –    |               |
|             | DC current gain<br>BCW31<br>BCW32<br>BCW33 | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$   | 110  | –    | 220  |               |
| 200         |  |  | –    | 450  |      |               |
| 420         |  |  | –    | 800  |      |               |
| $V_{CEsat}$ | 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                      | $I_E = I_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$  | –    | 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            |

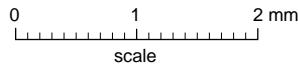
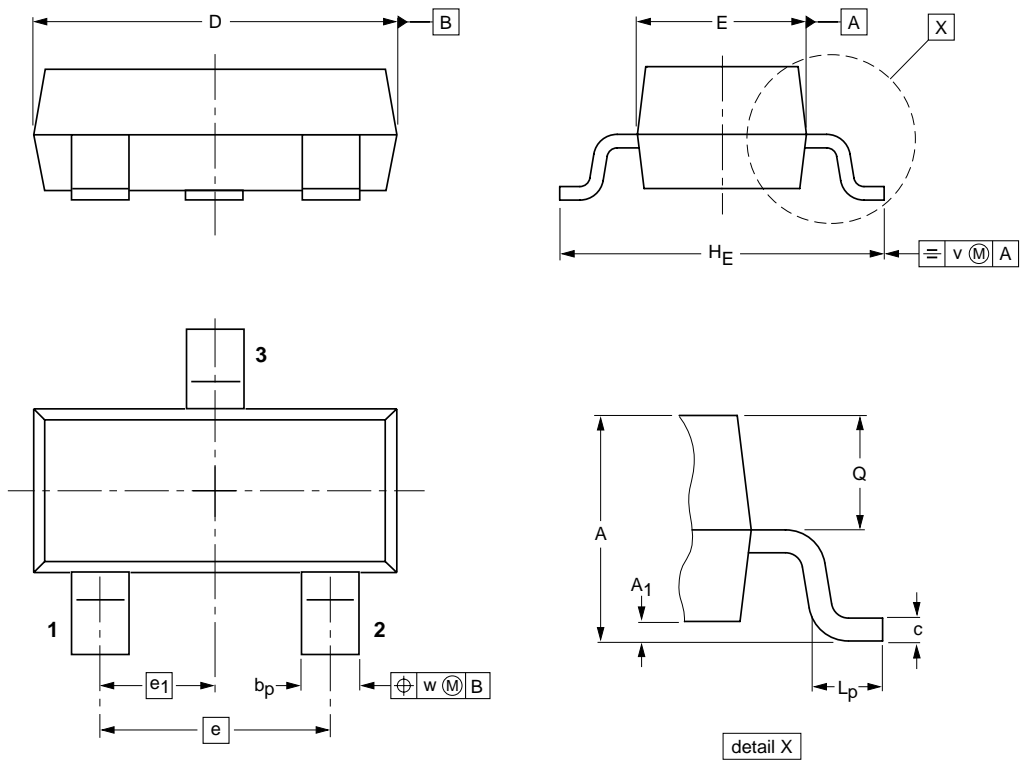
NPN general purpose transistors

BCW31; BCW32; BCW33

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



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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2. The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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# ***NXP Semiconductors***

## **Customer notification**

This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

## **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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