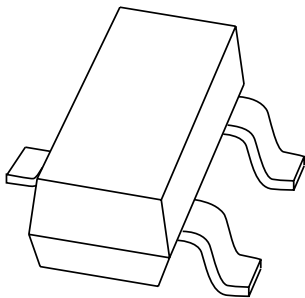


# DATA SHEET



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

Product specification  
Supersedes data of 1999 Apr 13

2000 Jul 04

# 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

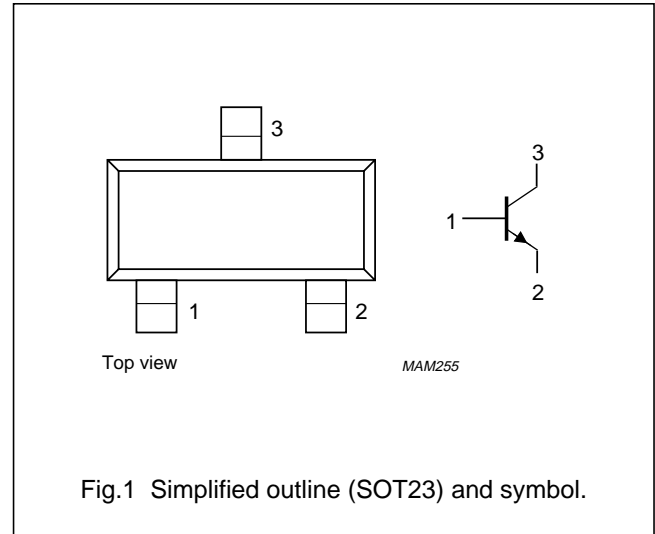
TYPE NUMBER	MARKING CODE <sup>(1)</sup>
BCW31	D1*
BCW32	D2*
BCW33	D3*

### Note

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

### PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



### LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	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

$T_j = 25\text{ °C}$  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	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	BCW31	–	190	–	
			BCW32	–	330	–	
			BCW33	–	600	–	
	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	BCW31	110	–	220	
			BCW32	200	–	450	
			BCW33	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	

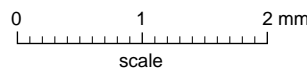
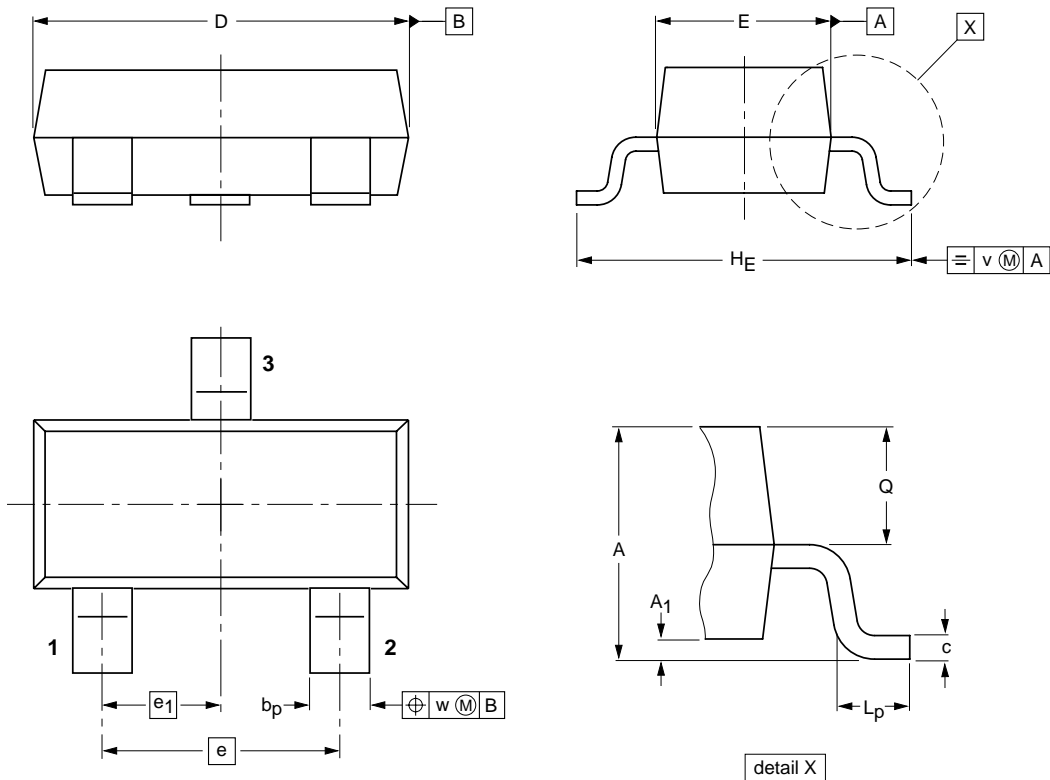
NPN general purpose transistors

BCW31; BCW32; BCW33

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> 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 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23		TO-236AB				97-02-28- 99-09-13

## NPN general purpose transistors

## BCW31; BCW32; BCW33

## DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS <sup>(1)</sup>
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

**Note**

1. Please consult the most recently issued data sheet before initiating or completing a design.

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NPN general purpose transistors

BCW31; BCW32; BCW33

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**NOTES**

NPN general purpose transistors

BCW31; BCW32; BCW33

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**NOTES**

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Printed in The Netherlands

613514/04/pp8

Date of release: 2000 Jul 04

Document order number: 9397 750 07205

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