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Should be replaced with:

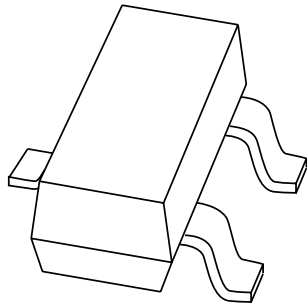
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If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia

# DATA SHEET



## **BCW60 series** NPN general purpose transistors

Product data sheet  
Supersedes data of 1997 Mar 10

1999 Apr 22

# NPN general purpose transistors

# BCW60 series

### FEATURES

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

### APPLICATIONS

- General purpose switching and amplification.

### DESCRIPTION

NPN transistor in a SOT23 plastic package.  
PNP complements: BCW61 series.

### MARKING

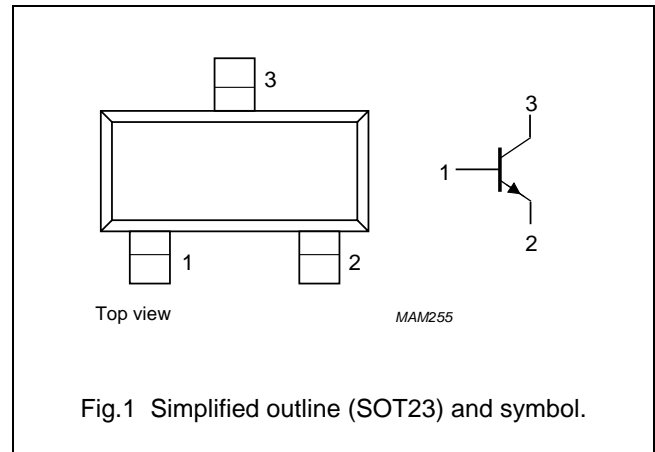
TYPE NUMBER	MARKING CODE <sup>(1)</sup>
BCW60B	AB*
BCW60C	AC*
BCW60D	AD*

### Note

1. \* = 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 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	-	32	V
$V_{CEO}$	collector-emitter voltage	open base	-	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

## BCW60 series

## 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

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = 32\text{ V}$	–	–	20	nA	
		$I_E = 0; V_{CB} = 32\text{ V}; T_{amb} = 150\text{ °C}$	–	–	20	$\mu\text{A}$	
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 4\text{ V}$	–	–	20	nA	
$h_{FE}$	DC current gain	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	BCW60B	20	–	–	
			BCW60C	40	–	–	
			BCW60D	100	–	–	
	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	BCW60B	180	–	310	
			BCW60C	250	–	460	
			BCW60D	380	–	630	
	DC current gain	$I_C = 50\text{ mA}; V_{CE} = 1\text{ V}$	BCW60B	70	–	–	
			BCW60C	90	–	–	
			BCW60D	100	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.25\text{ mA}$	50	–	350	mV	
		$I_C = 50\text{ mA}; I_B = 1.25\text{ mA}$	100	–	550	mV	
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.25\text{ mA}$	600	–	850	mV	
		$I_C = 50\text{ mA}; I_B = 1.25\text{ mA}$	0.7	–	1.05	V	
$V_{BE}$	base-emitter voltage	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	–	520	–	mV	
		$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	550	650	750	mV	
		$I_C = 50\text{ mA}; V_{CE} = 1\text{ V}$	–	780	–	mV	
$C_c$	collector capacitance	$I_E = I_E = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	1.7	–	pF	
$C_e$	emitter capacitance	$I_C = I_C = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	11	–	pF	
$f_T$	transition frequency	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}; \text{note 1}$	100	250	–	MHz	
F	noise figure	$I_C = 200\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 2\text{ k}\Omega; f = 1\text{ kHz}; B = 200\text{ Hz}$	–	2	6	dB	

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .

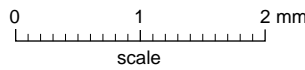
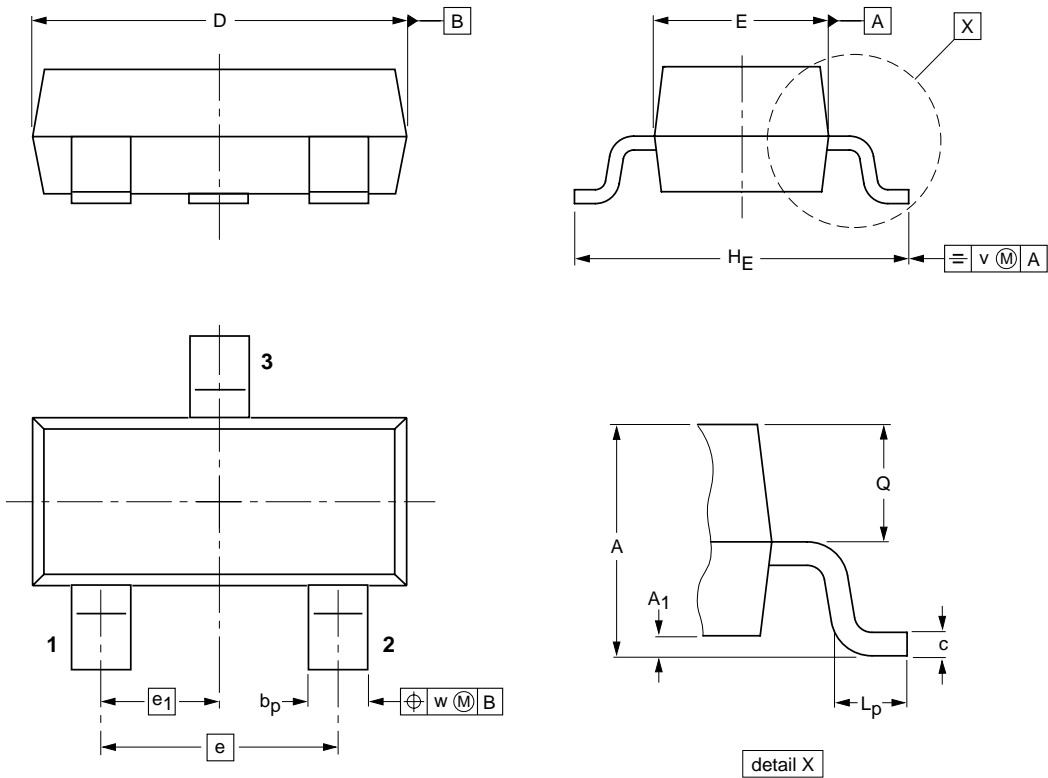
NPN general purpose transistors

BCW60 series

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

## BCW60 series

## 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**

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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