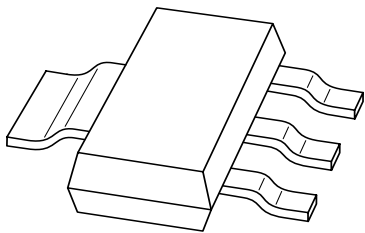


# DATA SHEET



## **BSP31; BSP32; BSP33** PNP medium power transistors

Product data sheet  
Supersedes data of 1997 Apr 08

1999 Apr 26

# PNP medium power transistors

# BSP31; BSP32; BSP33

## FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V).

## APPLICATIONS

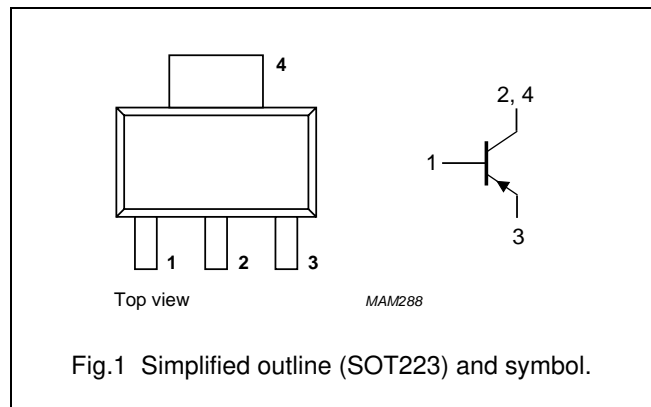
- Telephony and general industrial applications.

## DESCRIPTION

PNP medium power transistor in a SOT223 plastic package. NPN complements: BSP41 and BSP43.

## PINNING

PIN	DESCRIPTION
1	base
2, 4	collector
3	emitter



## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	BSP31		–	–70	V
	BSP32; BSP33		–	–90	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BSP31		–	–60	V
	BSP32; BSP33		–	–80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	–5	V
I <sub>C</sub>	collector current (DC)		–	–1	A
I <sub>CM</sub>	peak collector current		–	–2	A
I <sub>BM</sub>	peak base current		–	–200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = 25 °C; note 1	–	1.3	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	150	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

## Note

1. Device mounted on a printed-circuit board, single sided copper, tinplated, mounting pad for collector 1 cm<sup>2</sup>. For other mounting conditions, see “Thermal considerations for SOT223 in the General Part of associated Handbook”.

## PNP medium power transistors

## BSP31; BSP32; BSP33

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	93	K/W
$R_{th\ j-s}$	thermal resistance from junction to soldering point		12	K/W

## Note

- Device mounted on a printed-circuit board, single sided copper, tinplated, mounting pad for collector 1 cm<sup>2</sup>. For other mounting conditions, see "Thermal considerations for SOT223 in the General Part of associated Handbook".

## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = -60\text{ V}$	–	–100	nA
		$I_E = 0; V_{CB} = -60\text{ V}; T_j = 150\text{ °C}$	–	–50	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -5\text{ V}$	–	–100	nA
$h_{FE}$	DC current gain BSP32	$I_C = -100\ \mu\text{A}; V_{CE} = -5\text{ V}; \text{note 1}$	10	–	
		$I_C = -100\ \text{mA}; V_{CE} = -5\text{ V}; \text{note 1}$	40	120	
		$I_C = -500\ \text{mA}; V_{CE} = -5\text{ V}; \text{note 1}$	30	–	
	DC current gain BSP31; BSP33	$I_C = -100\ \mu\text{A}; V_{CE} = -5\text{ V}; \text{note 1}$	30	–	
		$I_C = -100\ \text{mA}; V_{CE} = -5\text{ V}; \text{note 1}$	100	300	
		$I_C = -500\ \text{mA}; V_{CE} = -5\text{ V}; \text{note 1}$	50	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -150\ \text{mA}; I_B = -15\ \text{mA}; \text{note 1}$	–	–250	mV
		$I_C = -500\ \text{mA}; I_B = -50\ \text{mA}; \text{note 1}$	–	–500	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -150\ \text{mA}; I_B = -15\ \text{mA}; \text{note 1}$	–	–1	V
		$I_C = -500\ \text{mA}; I_B = -50\ \text{mA}; \text{note 1}$	–	–1.2	V
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$	–	20	pF
$C_e$	emitter capacitance	$I_C = i_c = 0; V_{EB} = -0.5\text{ V}; f = 1\text{ MHz}$	–	120	pF
$f_T$	transition frequency	$I_C = -50\ \text{mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$	100	–	MHz
<b>Switching times (between 10% and 90% levels)</b>					
$t_{on}$	turn-on time	$I_{Con} = -100\ \text{mA}; I_{Bon} = -5\ \text{mA}; I_{Boff} = 5\ \text{mA}$	–	500	ns
$t_{off}$	turn-off time		–	650	ns

## Note

- Pulse test:  $t_p \leq 300\ \mu\text{s}$ ;  $\delta \leq 0.01$ .

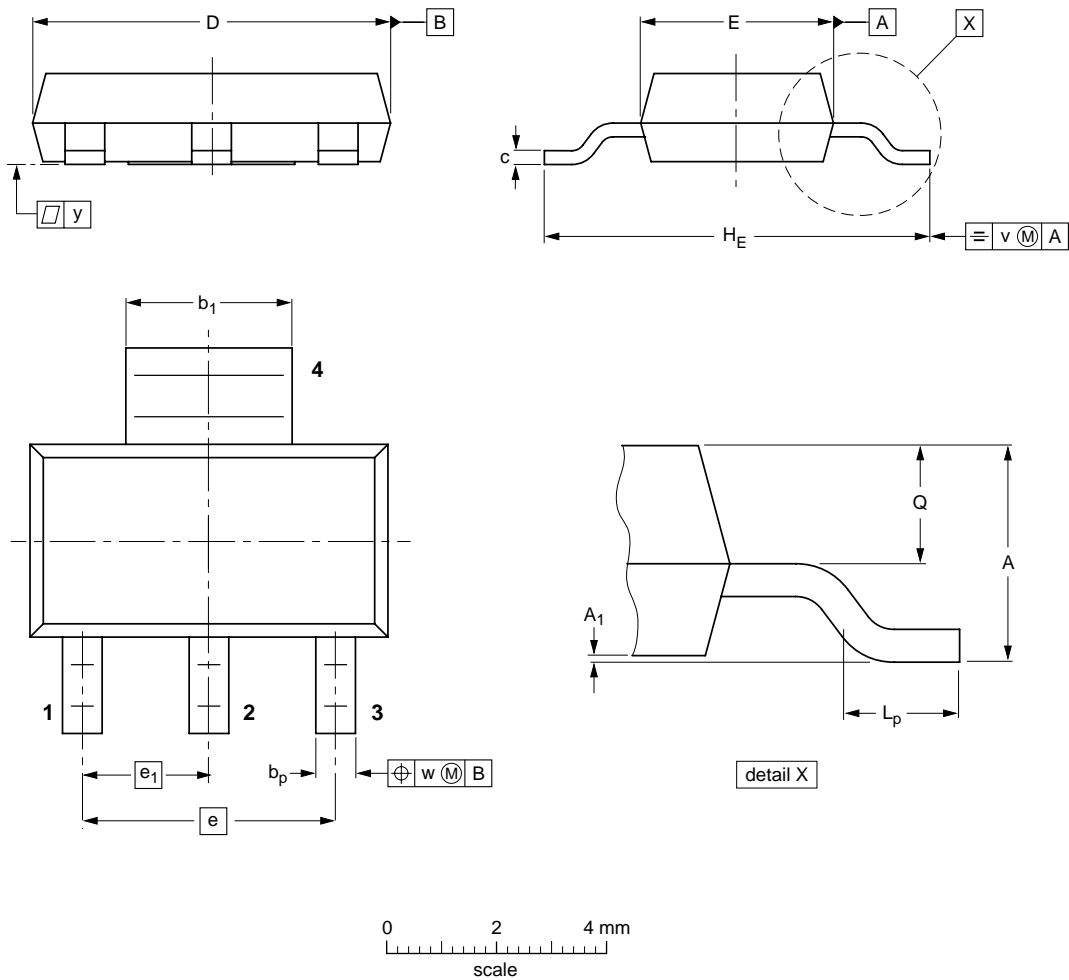
PNP medium power transistors

BSP31; BSP32; BSP33

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads

SOT223



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b <sub>p</sub>	b <sub>1</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT223			SC-73			97-02-28 99-09-13

**PNP medium power transistors**

**BSP31; BSP32; BSP33**

**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.

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## **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**

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