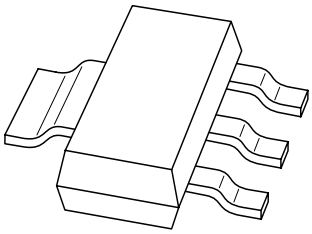
DATA SHEET



BSP50; BSP51; BSP52
NPN Darlington transistors

Product data sheet
Supersedes data of 1997 Apr 22

1999 Apr 23

NXP founded by Philips

NPN Darlington transistors BSP50; BSP51; BSP52

FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V)
- Integrated diode and resistor.

APPLICATIONS

- Industrial high gain amplification.

DESCRIPTION

NPN Darlington transistor in a SOT223 plastic package.
PNP complements: BSP60, BSP61 and BSP62.

PINNING

PIN	DESCRIPTION
1	base
2,4	collector
3	emitter

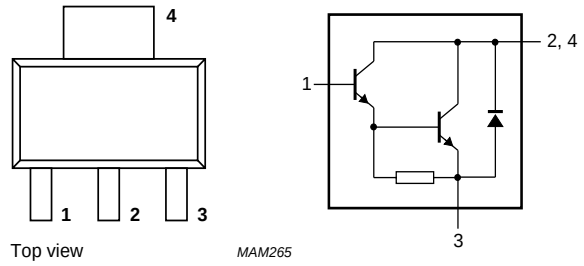


Fig.1 Simplified outline (SOT223) and symbol.

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			
	BSP50		–	60	V
	BSP51		–	80	V
	BSP52		–	90	V
V_{CES}	collector-emitter voltage	V_{BE} = 0			
	BSP50		–	45	V
	BSP51		–	60	V
	BSP52		–	80	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)		–	1	A
I_{CM}	peak collector current		–	2	A
I_B	base current (DC)		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	1.25	W
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	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^2. For other mounting conditions, see *"Thermal considerations for the SOT223 in the General Part of associated Handbook"*.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	96	K/W
$R_{th\ j\text{-}s}$	thermal resistance from junction to solder point		17	K/W

Note

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

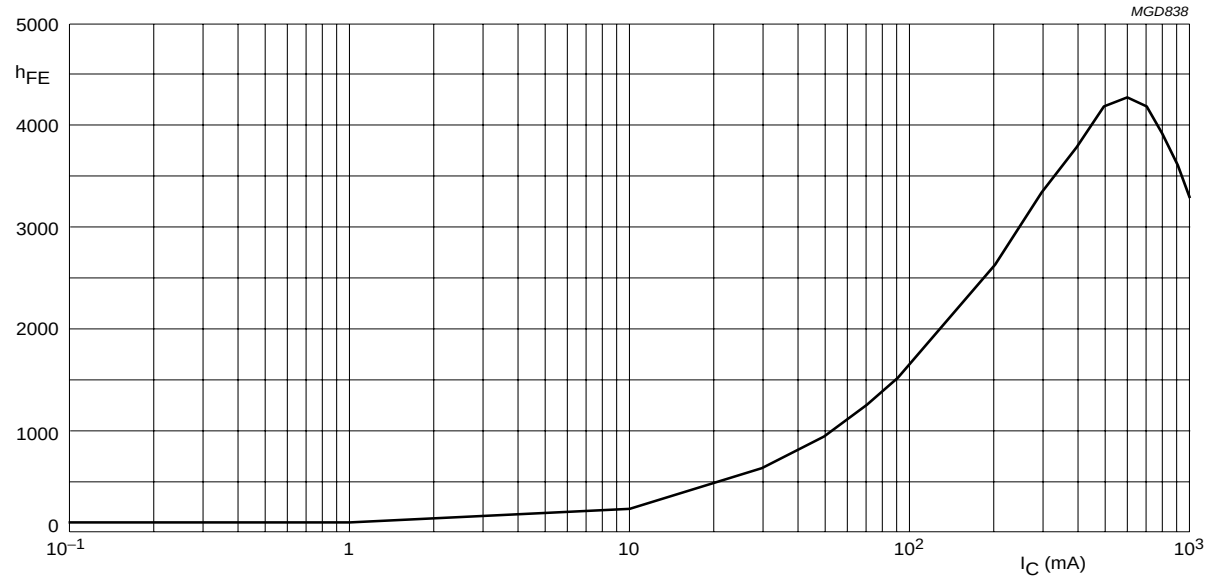
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	collector cut-off current					
	BSP50	V_{BE} = 0; V_{CE} = 45 V	–	–	50	nA
	BSP51	V_{BE} = 0; V_{CE} = 60 V	–	–	50	nA
	BSP52	V_{BE} = 0; V_{CE} = 80 V	–	–	50	nA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 4 V	–	–	50	nA
h_{FE}	DC current gain	V_{CE} = 10 V; note 1; see Fig.2				
		I_C = 150 mA	1000	–	–	
		I_C = 500 mA	2000	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 0.5 mA	–	–	1.3	V
		I_C = 500 mA; I_B = 0.5 mA; T_j = 150 °C	–	–	1.3	V
V_{BEsat}	base-emitter saturation voltage	I_C = 500 mA; I_B = 0.5 mA	–	–	1.9	V
f_T	transition frequency	I_C = 500 mA; V_{CE} = 5 V; f = 100 MHz	–	200	–	MHz
Switching times (between 10% and 90% levels); see Fig.3						
t_{on}	turn-on time	I_{Con} = 500 mA; I_{Bon} = 0.5 mA; I_{Boff} = −0.5 mA	–	500	–	ns
t_{off}	turn-off time		–	1300	–	ns

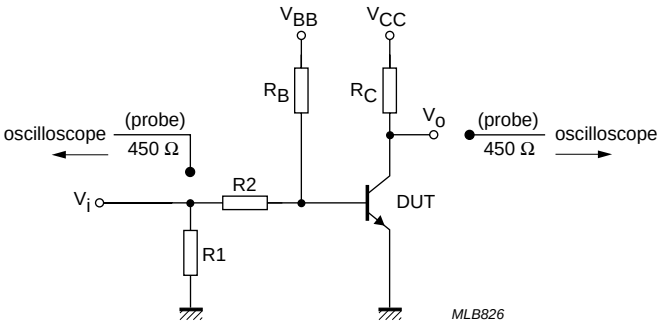
Note

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



V_{CE} = 10 V.

Fig.2 DC current gain; typical values.

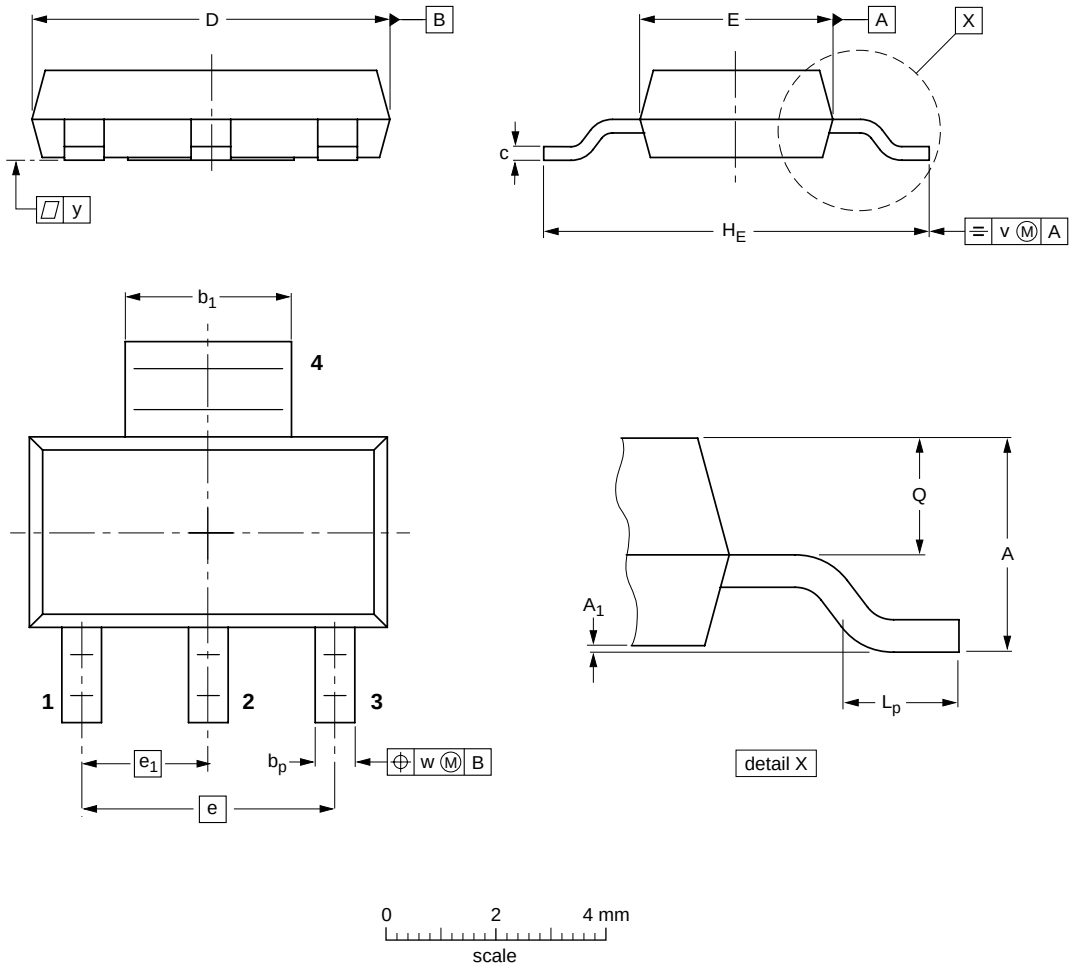


V_i = 10 V; T = 200 μs; t_p = 6 μs; $t_r = t_f \leq 3$ ns.
R1 = 56 Ω; R2 = 10 kΩ; R_B = 10 kΩ; R_C = 18 Ω.
V_{BB} = −1.8 V; V_{CC} = 10.7 V.
Oscilloscope: input impedance Z_i = 50 Ω.

Fig.3 Test circuit for switching times.

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	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

DATA SHEET STATUS

DOCUMENT STATUS[1]	PRODUCT STATUS[2]	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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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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