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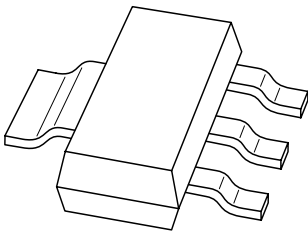
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Kind regards,

Team Nexperia

DATA SHEET



BSP50; BSP51; BSP52 NPN Darlington transistors

Product data sheet
Supersedes data of 1997 Apr 22

1999 Apr 23

NPN Darlington transistors

BSP50; BSP51; BSP52

FEATURES

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

APPLICATIONS

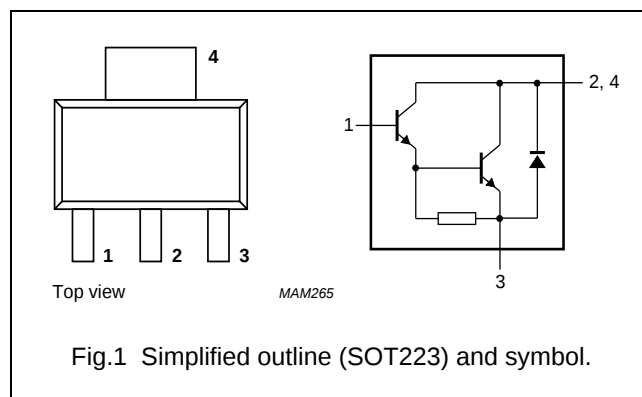
- Industrial high gain amplification.

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



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	$T_{amb} \leq 25\text{ °C}$; 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 cm². For other mounting conditions, see "Thermal considerations for the SOT223 in the General Part of associated Handbook".

NPN Darlington transistors

BSP50; BSP51; BSP52

THERMAL CHARACTERISTICS

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

Note

- Device mounted on a printed-circuit board, single sided copper, tinplated, mounting pad for collector 1 cm².
For other mounting conditions, see "Thermal considerations for the SOT223 in the General Part of associated Handbook".

CHARACTERISTICS

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

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

Note

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

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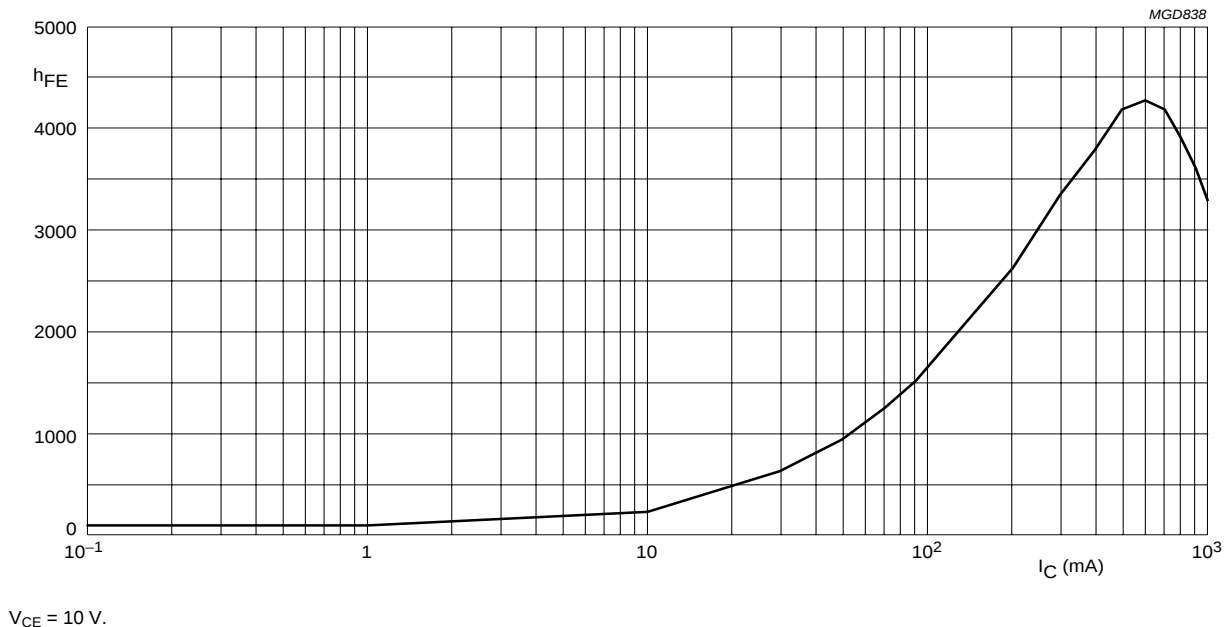
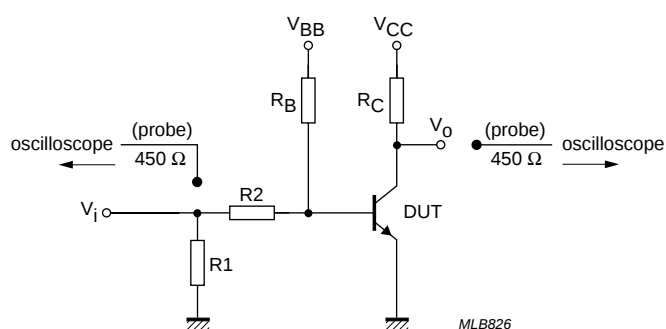


Fig.2 DC current gain; typical values.



$V_i = 10$ V; $T = 200$ μ s; $t_p = 6$ μ s; $t_r = t_f \leq 3$ ns.
 $R_1 = 56$ Ω ; $R_2 = 10$ k Ω ; $R_B = 10$ k Ω ; $R_C = 18$ 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.

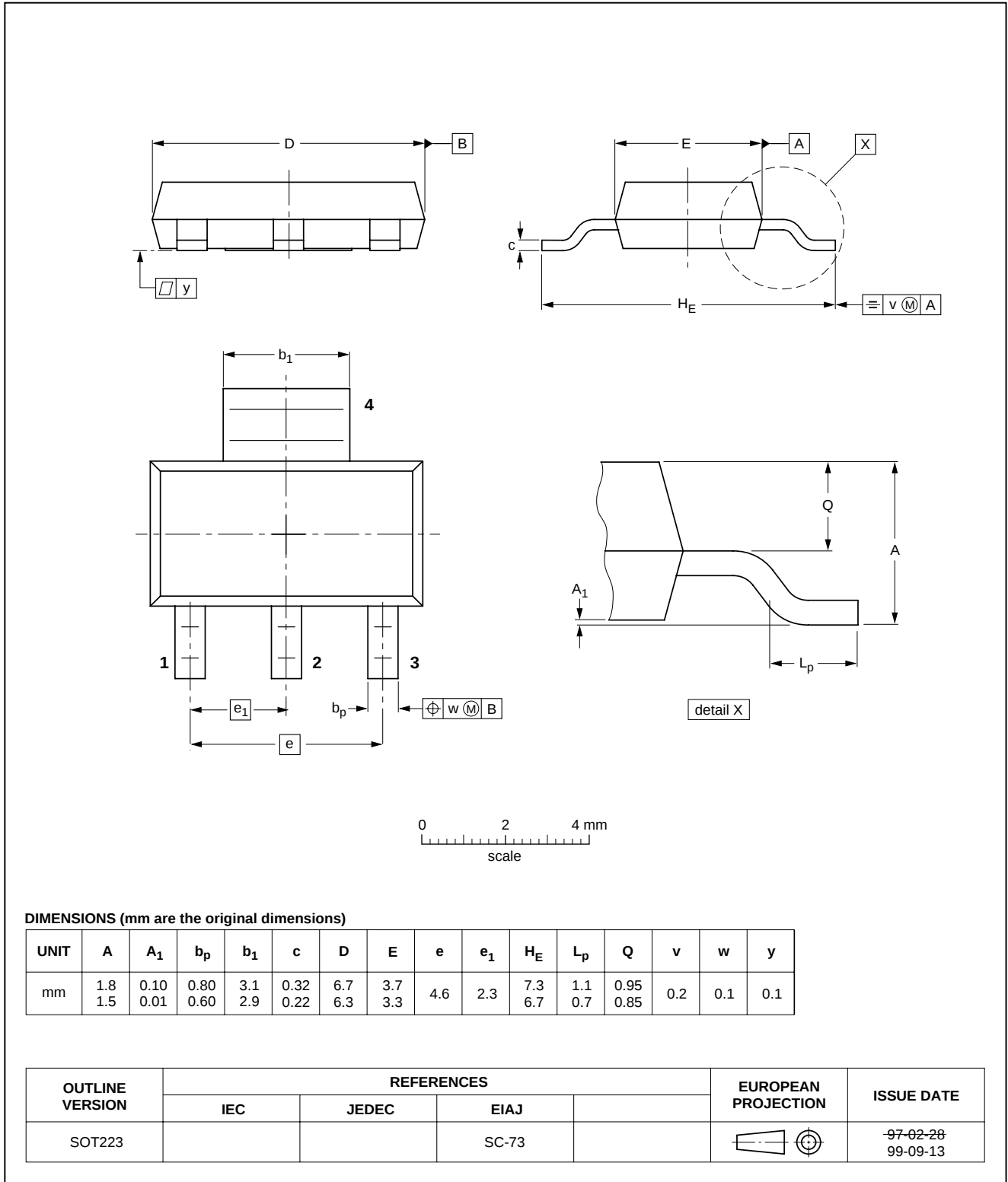
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PACKAGE OUTLINE

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

SOT223



NPN Darlington transistors

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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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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>

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