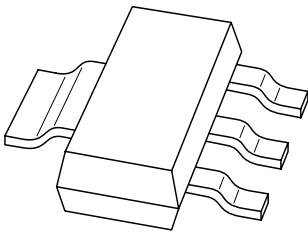


DATA SHEET



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

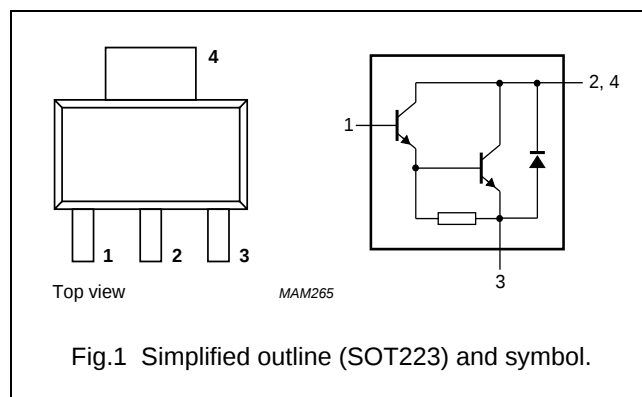
- Industrial high gain amplification.

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

NPN Darlington transistors

BSP50; BSP51; BSP52

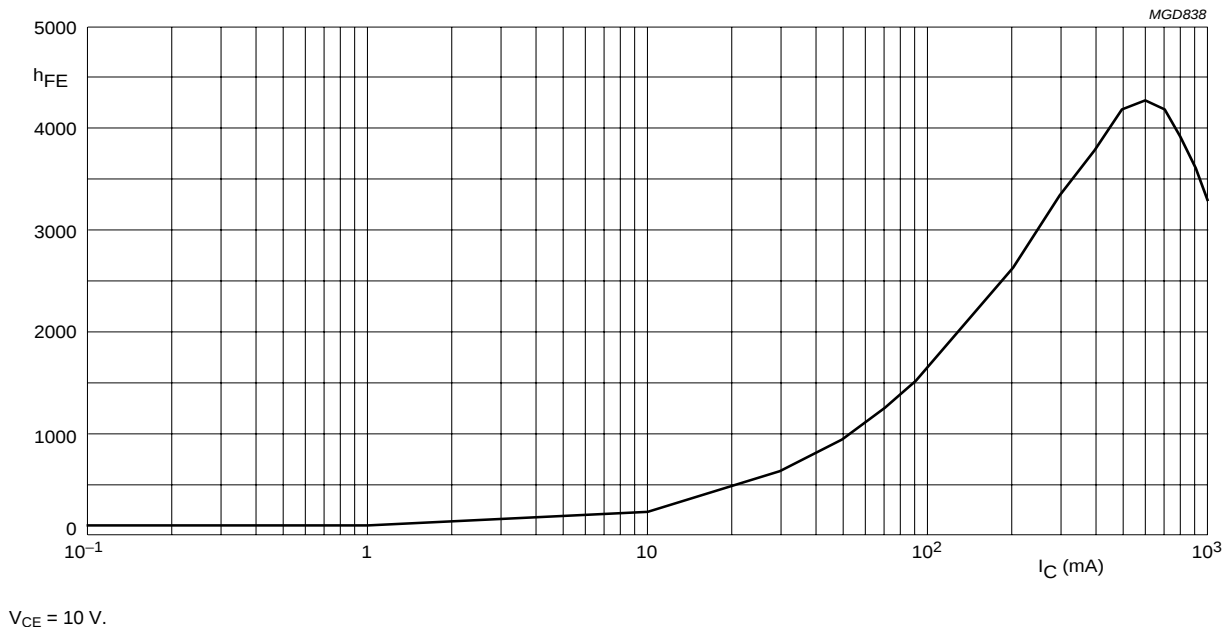
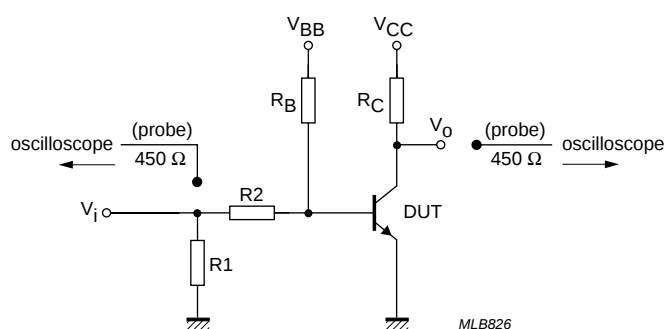


Fig.2 DC current gain; typical values.



$V_i = 10$ 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.

NPN Darlington transistors

BSP50; BSP51; BSP52

PACKAGE OUTLINE

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

SOT223

