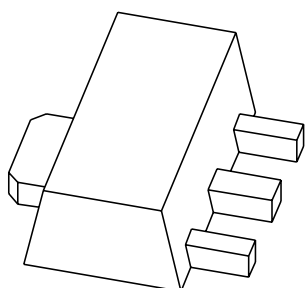


DATA SHEET



BST50; BST51; BST52 NPN Darlington transistors

Product specification
Supersedes data of 1997 Apr 16

1999 Apr 26

NPN Darlington transistors

BST50; BST51; BST52

FEATURES

- High current (max. 0.5 A)
- Low voltage (max. 80 V)
- Integrated diode and resistor.

APPLICATIONS

- Industrial switching applications such as:
 - Print hammer
 - Solenoid
 - Relay and lamp driving.

DESCRIPTION

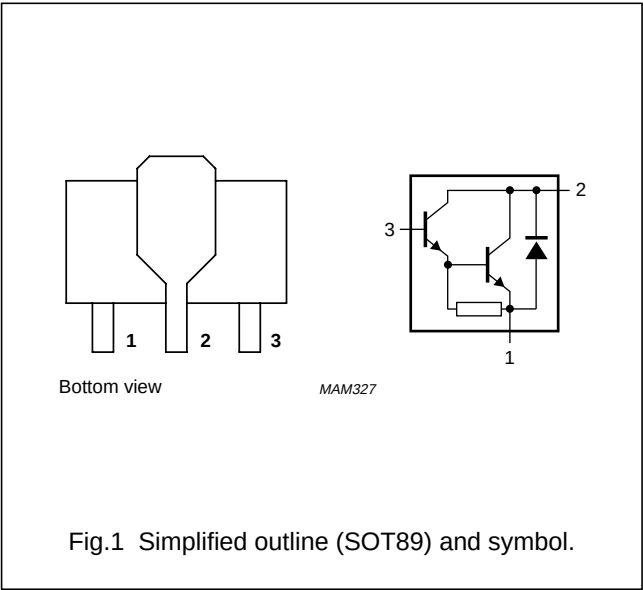
NPN Darlington transistor in a SOT89 plastic package.
PNP complements: BST60, BST61 and BST62.

MARKING

TYPE NUMBER	MARKING CODE
BST50	AS1
BST51	AS2
BST52	AS3

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



NPN Darlington transistors

BST50; BST51; BST52

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			
	BST50		–	60	V
	BST51		–	80	V
	BST52		–	90	V
V_{CES}	collector-emitter voltage	$V_{BE} = 0$			
	BST50		–	45	V
	BST51		–	60	V
	BST52		–	80	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)		–	0.5	A
I_{CM}	peak collector current		–	1.5	A
I_B	base current (DC)		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$; note 1	–	1.3	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 6 cm².
For other mounting conditions, see “*Thermal considerations for SOT89 in the General Part of associated Handbook*”.

NPN Darlington transistors

BST50; BST51; BST52

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 soldering point		16	K/W

Note

- Device mounted on a printed-circuit board, single sided copper, tinplated, mounting pad for collector 6 cm².
For other mounting conditions, see "Thermal considerations for SOT89 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					
	BST50	$V_{BE} = 0; V_{CE} = 45\text{ V}$	–	–	50	nA
	BST51	$V_{BE} = 0; V_{CE} = 60\text{ V}$	–	–	50	nA
	BST52	$V_{BE} = 0; V_{CE} = 80\text{ V}$	–	–	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)				
		$I_C = 150\text{ mA}$	1000	–	–	
		$I_C = 500\text{ mA}$	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	$I_{Con} = 500\text{ mA}; I_{Bon} = 0.5\text{ mA}; I_{Boff} = -0.5\text{ mA}$	–	400	–	ns
t_{off}	turn-off time		–	1500	–	ns

Note

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

NPN Darlington transistors

BST50; BST51; BST52

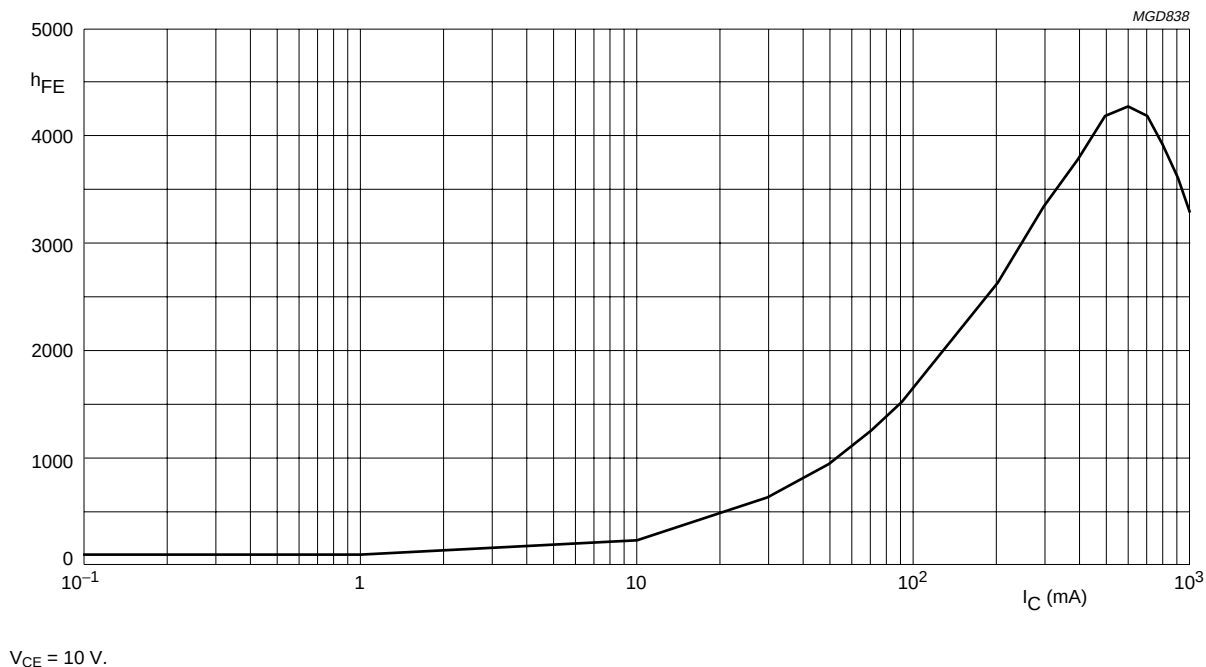
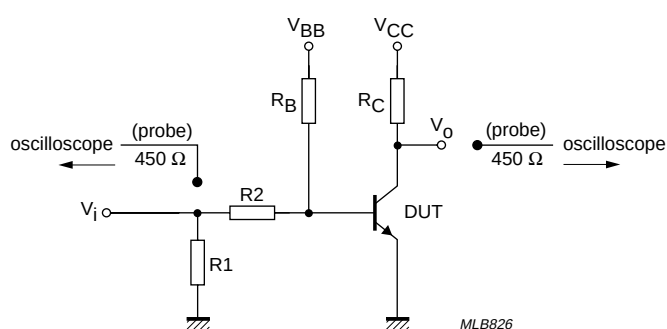


Fig.2 DC current gain; typical values.



$V_i = 10$ 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.

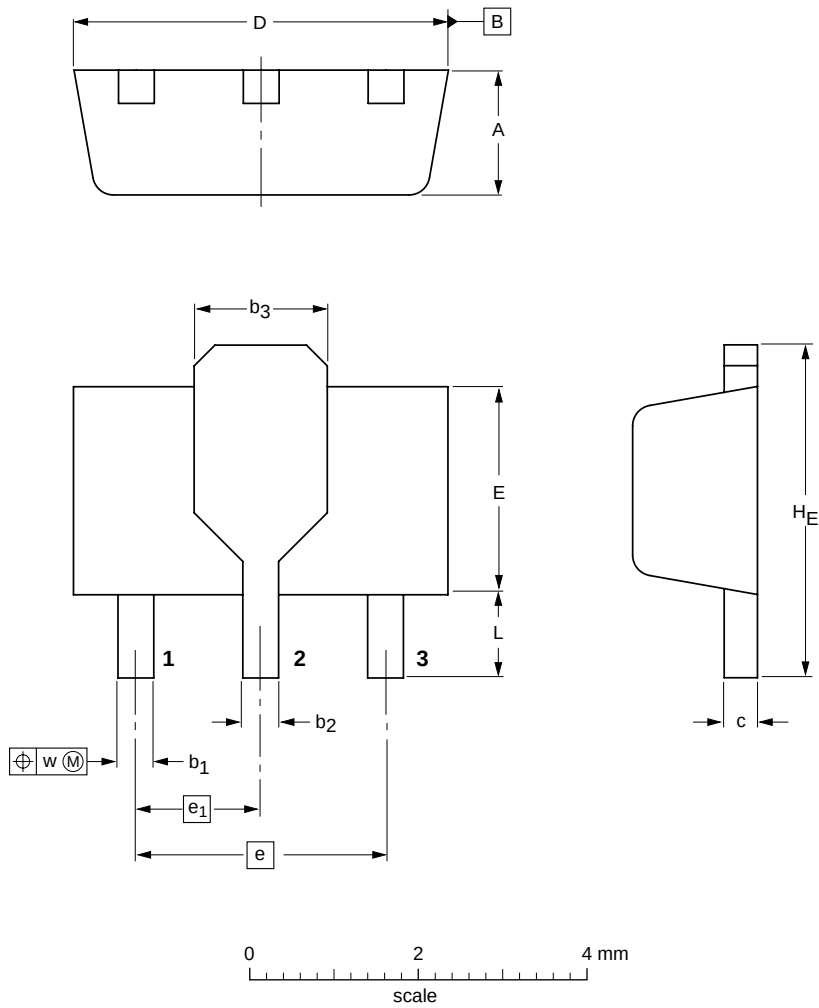
NPN Darlington transistors

BST50; BST51; BST52

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b ₁	b ₂	b ₃	c	D	E	e	e ₁	H _E	L min.	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.37	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	0.8	0.13

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT89						97-02-28

NPN Darlington transistors**BST50; BST51; BST52**

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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