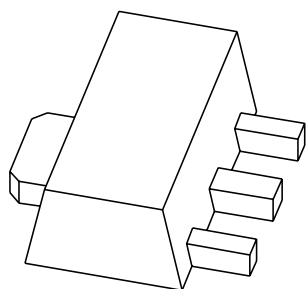


# DATA SHEET



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

Product specification  
Supersedes data of September 1994  
File under Discrete Semiconductors, SC04

1997 Apr 16

## 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

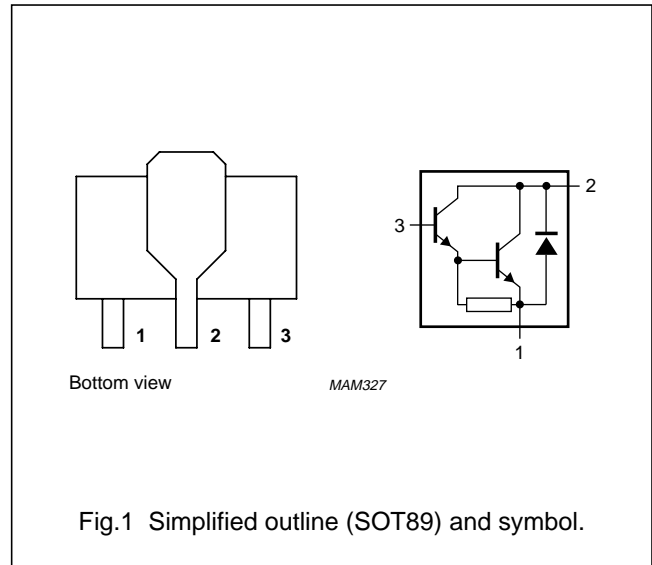
NPN Darlington transistor in a SOT89 plastic package.  
PNP complements: BST60, BST61 and BST62.

## MARKING

TYPE NUMBER	MARKING CODE
BST50	AS1
BST51	AS2
BST52	AS3

## PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter				
	BST50		–	–	60	V
	BST51		–	–	80	V
$V_{CES}$	collector-emitter voltage	$V_{BE} = 0$				
	BST50		–	–	45	V
	BST51		–	–	60	V
	BST52		–	–	80	V
$I_C$	collector current (DC)		–	–	0.5	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	–	1.35	W
$h_{FE}$	DC current gain	$I_C = 500\text{ mA}; V_{CE} = 10\text{ V}$	2000	–	–	
$f_T$	transition frequency	$I_C = 500\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$	–	200	–	MHz

## 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 <sub>CBO</sub>	collector-base voltage	open emitter			
	BST50		–	60	V
	BST51		–	80	V
	BST52		–	90	V
V <sub>CES</sub>	collector-emitter voltage	V <sub>BE</sub> = 0			
	BST50		–	45	V
	BST51		–	60	V
	BST52		–	80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	5	V
I <sub>C</sub>	collector current (DC)		–	0.5	A
I <sub>CM</sub>	peak collector current		–	1.5	A
I <sub>B</sub>	base current (DC)		–	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C; note 1	–	1.35	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**

- Device mounted on a printed-circuit board, single sided copper, tinned, mounting pad for collector 1 cm<sup>2</sup>.  
For other mounting conditions, see “*Thermal considerations for the SOT89 in the General part of handbook SC04*”.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	note 1	92	K/W
R <sub>th j-s</sub>	thermal resistance from junction to soldering point		11	K/W

**Note**

- Device mounted on a printed-circuit board, single sided copper, tinned, mounting pad for collector 1 cm<sup>2</sup>.  
For other mounting conditions, see “*Thermal considerations for the SOT89 in the General part of handbook SC04*”.

## NPN Darlington transistors

## BST50; BST51; BST52

**CHARACTERISTICS**

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

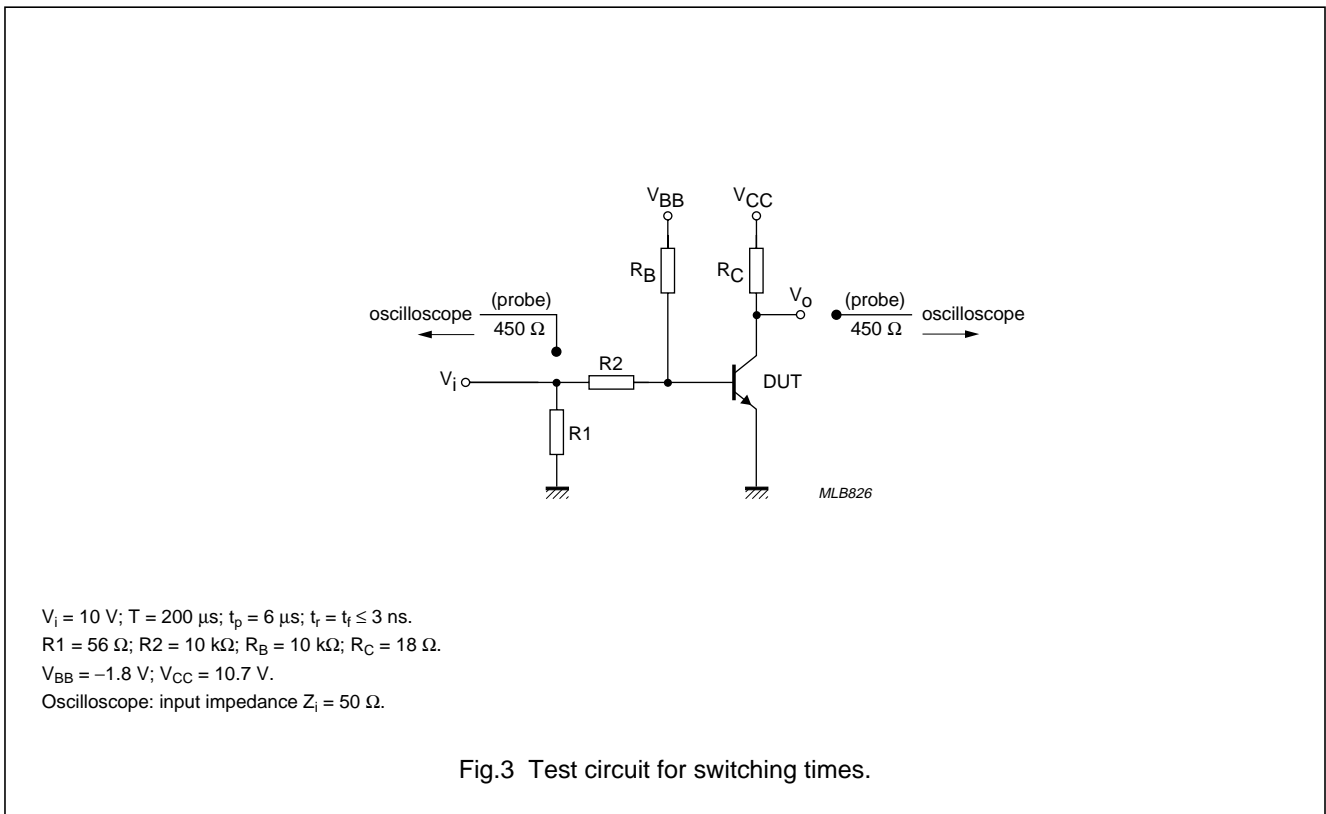
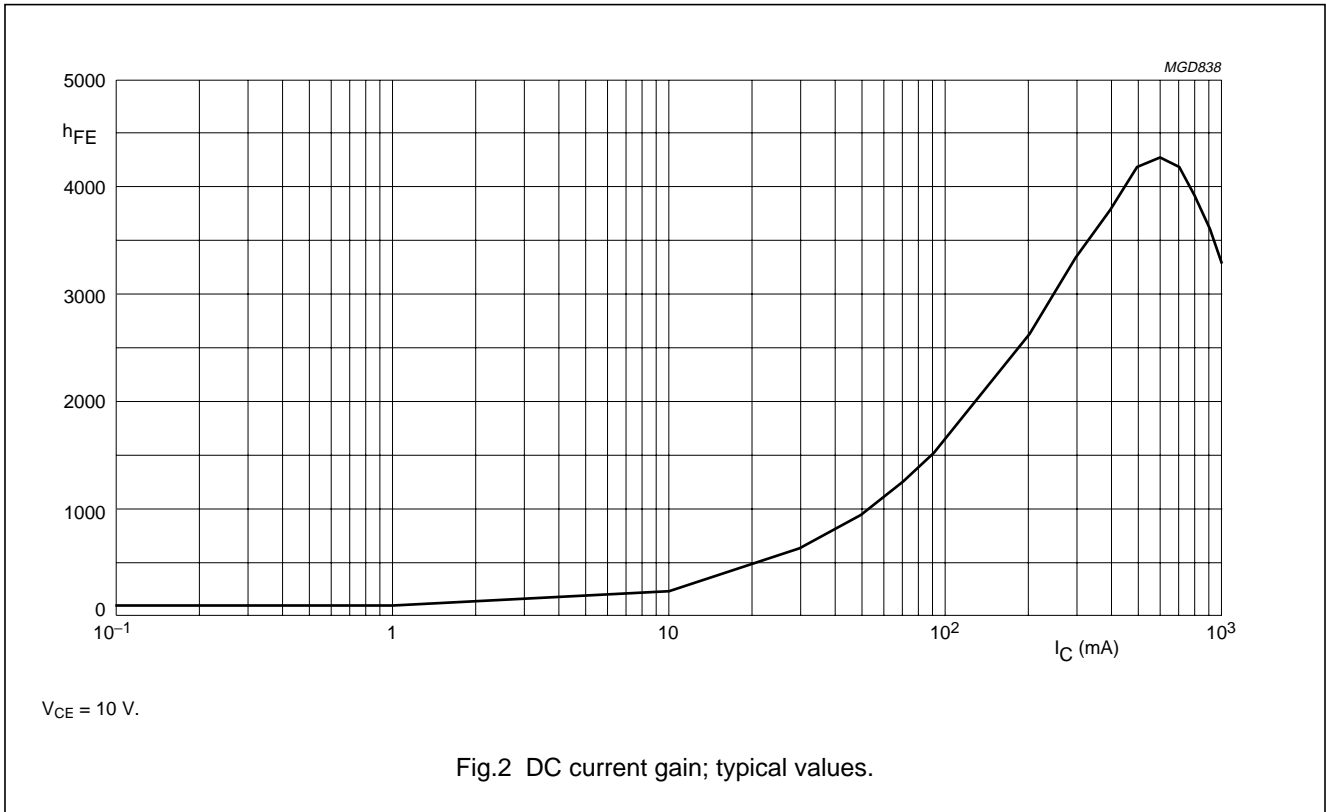
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CES}$	collector cut-off current					
	BST50	$V_{BE} = 0; V_{CE} = 45\text{ V}$	–	–	50	nA
	BST51	$V_{BE} = 0; V_{CE} = 60\text{ V}$	–	–	50	nA
	BST52	$V_{BE} = 0; V_{CE} = 80\text{ V}$	–	–	50	nA
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 4\text{ V}$	–	–	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
<b>Switching times (between 10% and 90% levels); see Fig.3</b>						
$t_{on}$	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**

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

NPN Darlington transistors

BST50; BST51; BST52



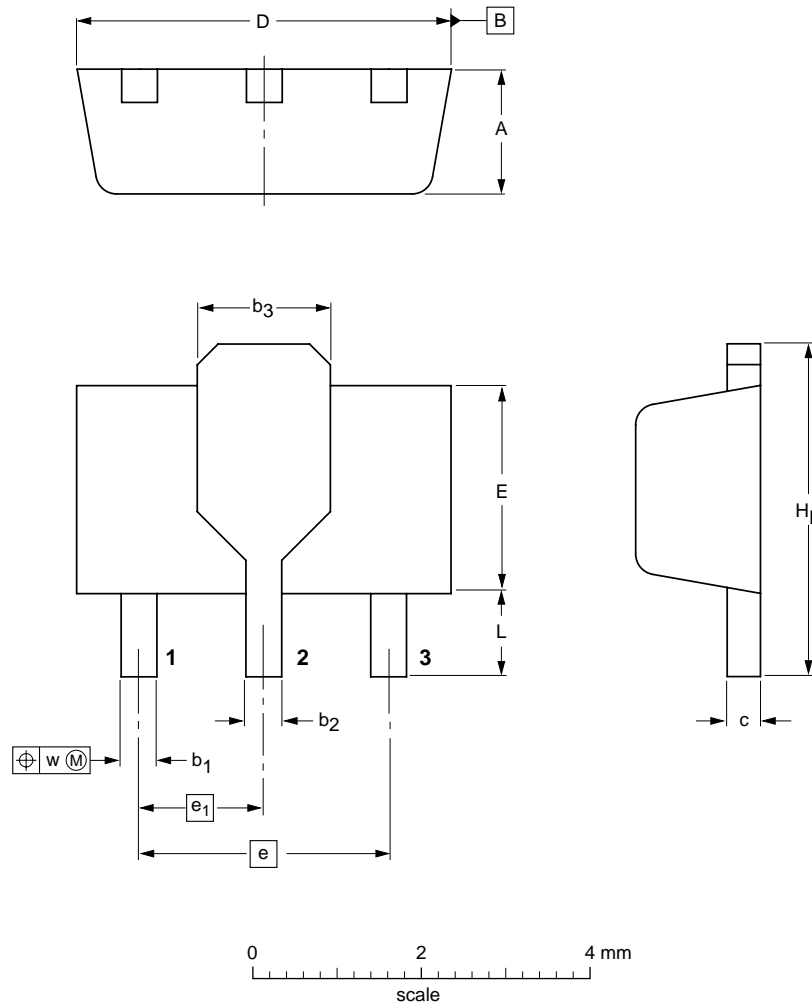
NPN Darlington transistors

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 <sub>1</sub>	b <sub>2</sub>	b <sub>3</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	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

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**DEFINITIONS**

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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