



# BST50

NPN Darlington transistor

30 September 2025

Product data sheet

## 1. General description

NPN Darlington transistor in a SOT89 (SC-62) flat lead Surface-Mounted Device (SMD) plastic package.

PNP complement: BST60

## 2. Features and benefits

- Integrated diode and resistor

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	45	V
$I_C$	collector current		-	-	1	A
$h_{FE}$	DC current gain	$V_{CE} = 10 \text{ V}$ ; $I_C = 150 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25^\circ\text{C}$	1000	-	-	

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter		
2	C	collector		
3	B	base		

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## 6. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BST50	SOT89	plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body	<a href="#">SOT89</a>

## 7. Marking

**Table 4. Marking codes**

Type number	Marking code
BST50	AS1

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter		-	60	V
$V_{CEO}$	collector-emitter voltage	open base		-	45	V
$V_{EBO}$	emitter-base voltage	open collector		-	5	V
$I_C$	collector current			-	1	A
$I_{CM}$	peak collector current			-	2	A
$I_B$	base current			-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	[1]	-	1.3	W
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-65	150	°C
$T_{stg}$	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	96	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	16	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = 45 \text{ V}$ ; $V_{BE} = 0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	50	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 4 \text{ V}$ ; $I_C = 0 \text{ A}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	50	nA
$h_{FE}$	DC current gain	$V_{CE} = 10 \text{ V}$ ; $I_C = 150 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		1000	-	-	
		$V_{CE} = 10 \text{ V}$ ; $I_C = 500 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		2000	-	-	
$V_{CESat}$	collector-emitter saturation voltage	$I_C = 500 \text{ mA}$ ; $I_B = 0.5 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	1.3	V
		$I_C = 500 \text{ mA}$ ; $I_B = 0.5 \text{ mA}$ ; $T_j = 150 \text{ }^{\circ}\text{C}$		-	-	1.3	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 500 \text{ mA}$ ; $I_B = 0.5 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	1.9	V
$f_T$	transition frequency	$V_{CE} = 5 \text{ V}$ ; $I_C = 500 \text{ mA}$ ; $f = 100 \text{ MHz}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	200	-	MHz

Switching times (between 10% and 90% levels)

$t_{on}$	turn-on time	$I_{Bon} = 0.5 \text{ mA}$ ; $I_{Boff} = -0.5 \text{ mA}$ ; $I_{Con} = 500 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	400	-	ns
$t_{off}$	turn-off time			-	1500	-	ns

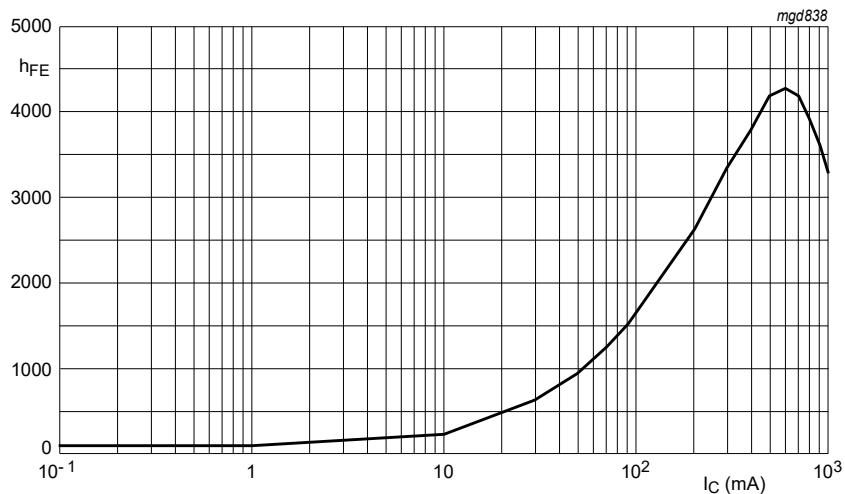


Fig. 1. DC current gain; typical values

## 11. Test information

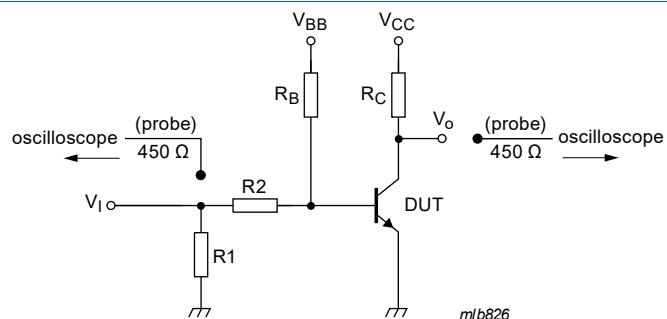


Fig. 2. Test circuit for switching times

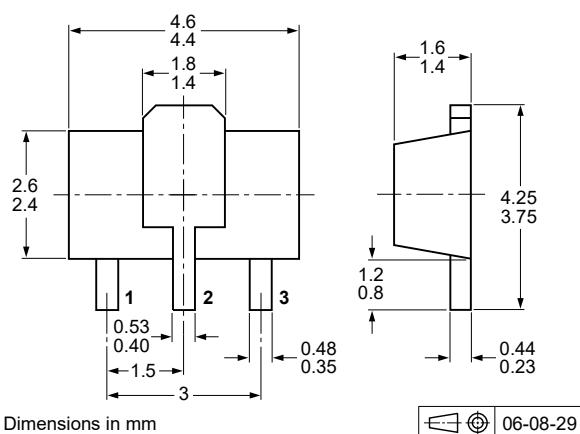
$$V_i = 10 \text{ V}; T = 200 \text{ } \mu\text{s}; t_p = 6 \text{ } \mu\text{s}; t_r = t_f \leq 3 \text{ ns}$$

$$R_1 = 56 \Omega; R_2 = 10 \text{ k}\Omega; R_B = 10 \text{ k}\Omega; R_C = 18 \Omega$$

$$V_{BB} = -1.8 \text{ V}; V_{CC} = 10.7 \text{ V}$$

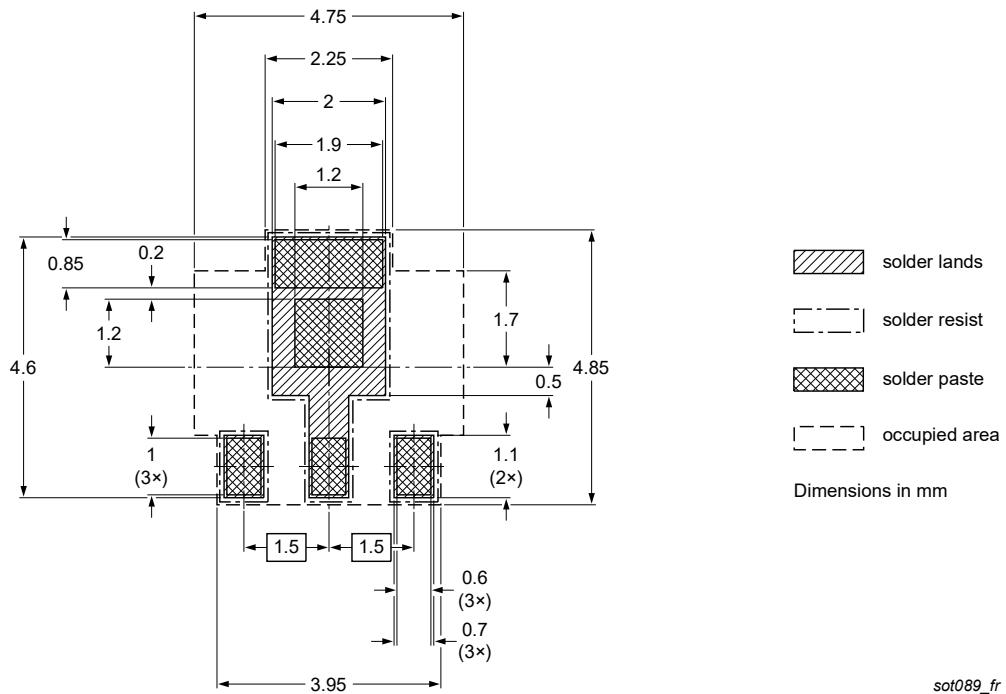
Oscilloscope: input impedance  $Z_i = 50 \Omega$

## 12. Package outline

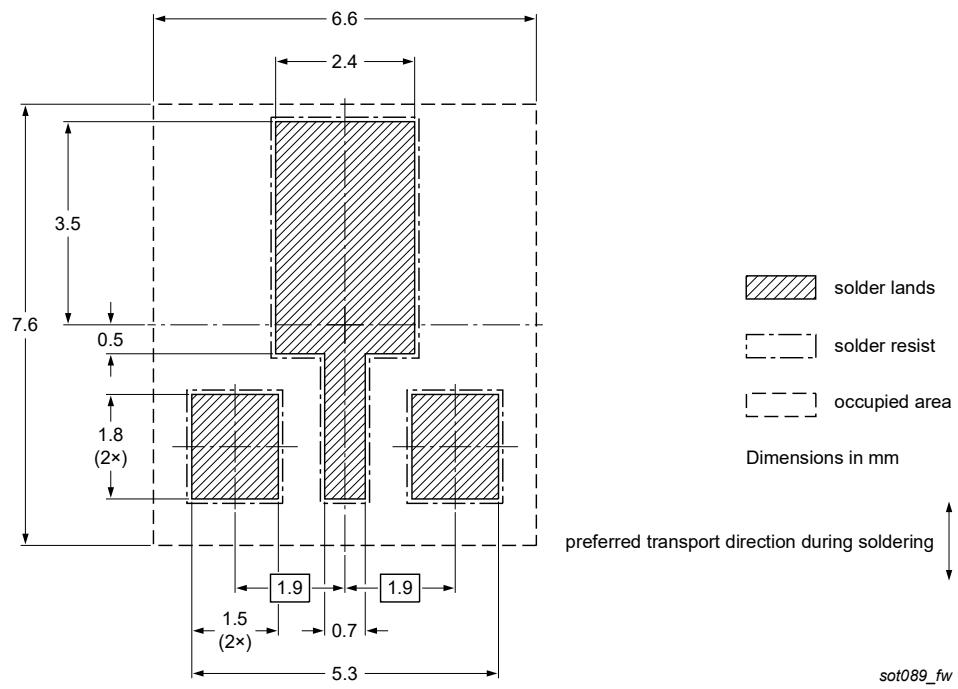


**Fig. 3. Package outline SOT89**

## 13. Soldering



**Fig. 4.** Reflow soldering footprint for SOT89



**Fig. 5. Wave soldering footprint for SOT89**

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BST50 v.4	20250930	Product data sheet	-	BST50 v.3
Modifications:	<ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li></ul>			
BST50 v.3	20230905	Product data sheet	-	BST50_51_52 v.2
BST50_51_52 v.2	20041209	Product data sheet	-	BST50_51_52 v.1
BST50_51_52 v.1	20010220	Product specification	-	-

## 15. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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