



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; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_{amb} = 25\text{ }^\circ\text{C}$	1000	-	-	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter	 SOT89	 sym080
2	C	collector		
3	B	base		

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	SOT89

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} ≤ 25 °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 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

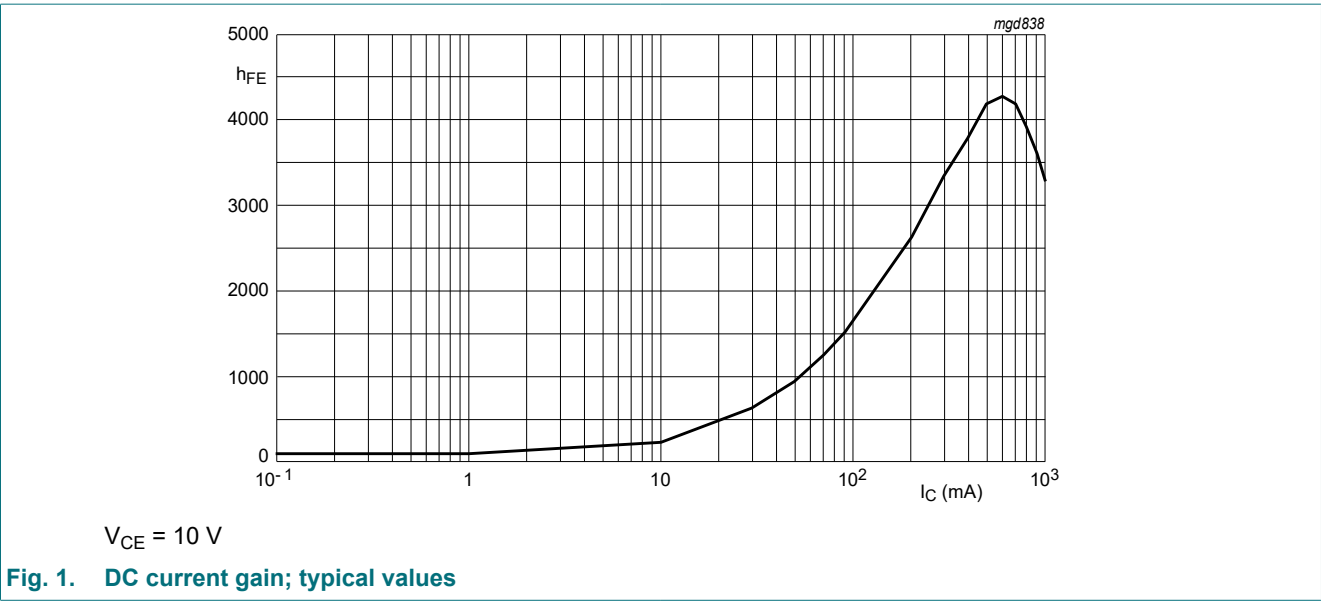
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	96	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point			-	-	16	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm².

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	$V_{CE} = 10\text{ V}; I_C = 150\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$	1000	-	-	
		$V_{CE} = 10\text{ V}; I_C = 500\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$	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



11. Test information

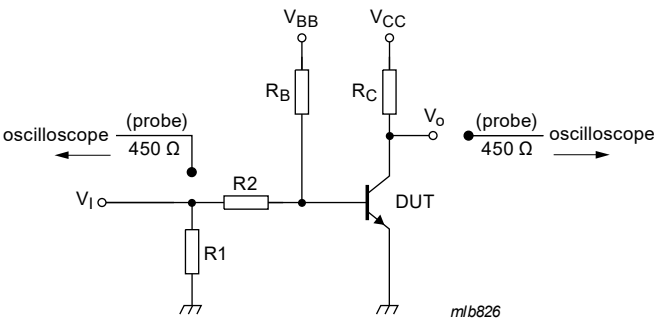


Fig. 2. Test circuit for switching times

$V_i = 10\text{ V}$; $T = 200\text{ }\mu\text{s}$; $t_p = 6\text{ }\mu\text{s}$; $t_r = t_f \leq 3\text{ ns}$
 $R_1 = 56\text{ }\Omega$; $R_2 = 10\text{ k}\Omega$; $R_B = 10\text{ k}\Omega$; $R_C = 18\text{ }\Omega$
 $V_{BB} = -1.8\text{ V}$; $V_{CC} = 10.7\text{ V}$
 Oscilloscope: input impedance $Z_i = 50\text{ }\Omega$

12. Package outline

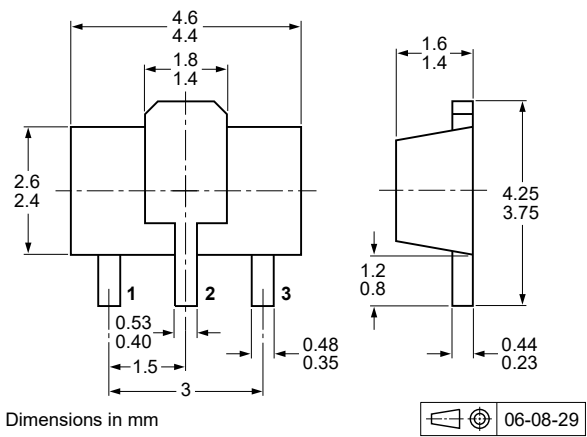


Fig. 3. Package outline SOT89

13. Soldering

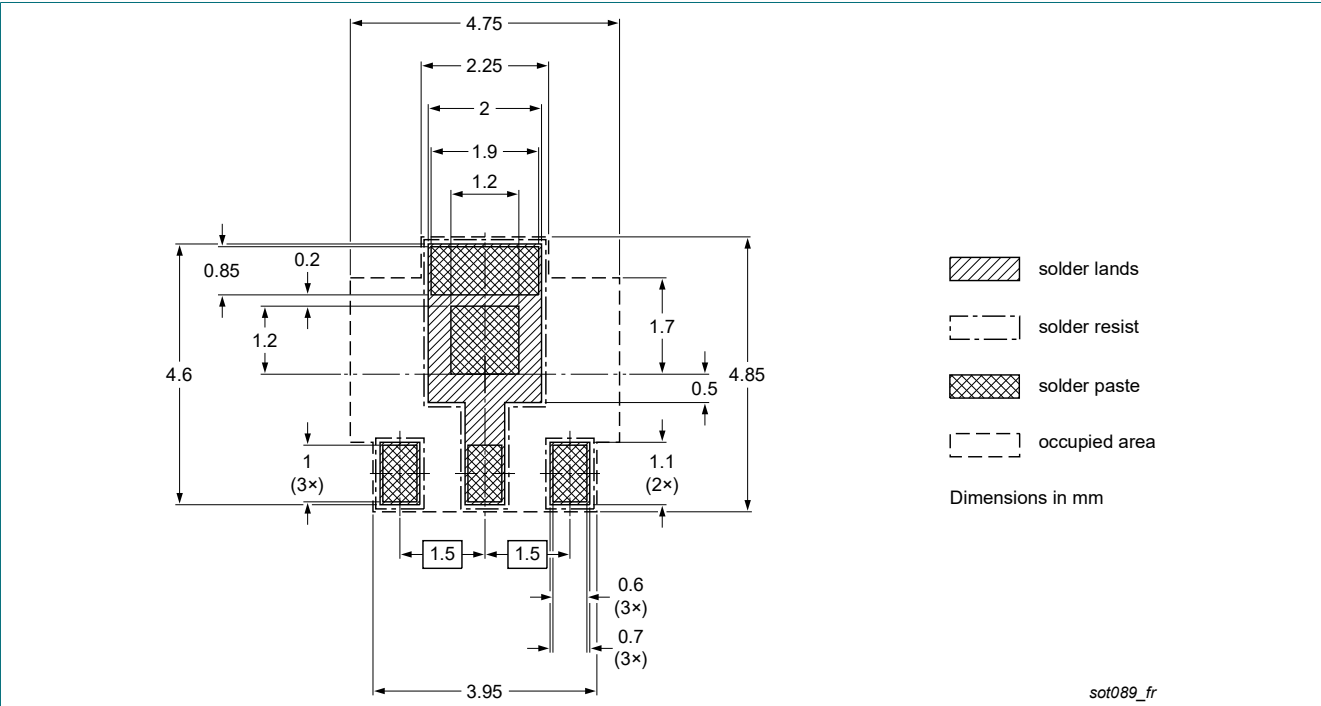


Fig. 4. Reflow soldering footprint for SOT89

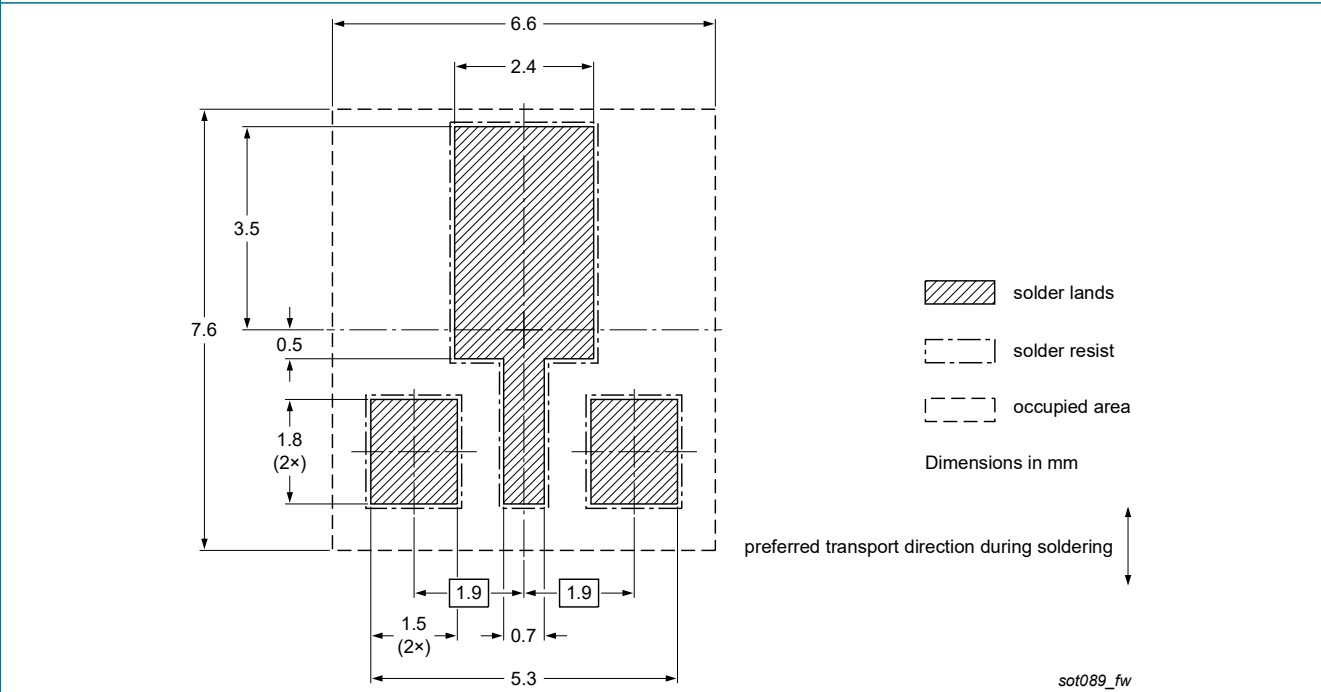


Fig. 5. Wave soldering footprint for SOT89

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">Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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