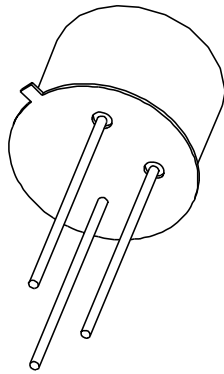


# DATA SHEET



## **BSS50; BSS51; BSS52** NPN Darlington transistors

Product specification  
Supersedes data of 1997 May 13  
File under Discrete Semiconductors, SC04

1997 Sep 03

# NPN Darlington transistors

# BSS50; BSS51; BSS52

### 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 TO-39 metal package.  
 PNP complements: BSS61 and BSS62.

### PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	collector, connected to case

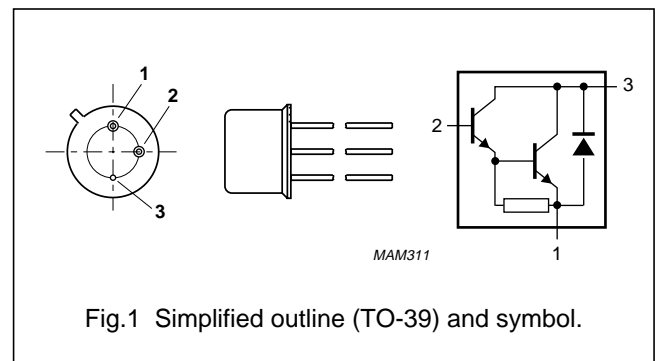


Fig.1 Simplified outline (TO-39) and symbol.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter				
	BSS50		–	–	60	V
	BSS51		–	–	80	V
	BSS52		–	–	90	V
$V_{CES}$	collector-emitter voltage	$V_{BE} = 0$				
	BSS50		–	–	45	V
	BSS51		–	–	60	V
	BSS52		–	–	80	V
$I_C$	collector current		–	–	1	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	–	0.8	W
		$T_{case} \leq 25\text{ °C}$	–	–	5	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

## BSS50; BSS51; BSS52

**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			
	BSS50		–	60	V
	BSS51		–	80	V
	BSS52		–	90	V
V <sub>CES</sub>	collector-emitter voltage	V <sub>BE</sub> = 0			
	BSS50		–	45	V
	BSS51		–	60	V
	BSS52		–	80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	5	V
I <sub>C</sub>	collector current (DC)		–	1	A
I <sub>CM</sub>	peak collector current		–	2	A
I <sub>B</sub>	base current (DC)		–	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	0.8	W
		T <sub>case</sub> ≤ 25 °C	–	5	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	200	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	in free air	220	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		35	K/W

## NPN Darlington transistors

## BSS50; BSS51; BSS52

## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CES}$	collector cut-off current BSS50 BSS51 BSS52	$V_{BE} = 0; V_{CE} = 45\text{ V}$	–	–	50	nA
		$V_{BE} = 0; V_{CE} = 60\text{ V}$	–	–	50	nA
		$V_{BE} = 0; V_{CE} = 80\text{ V}$	–	–	50	nA
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 4\text{ V}$	–	–	50	nA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$	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
		$I_C = 500\text{ mA}; I_B = 0.5\text{ mA}; T_j = 200\text{ }^\circ\text{C}$	–	–	1.3	V
$V_{CEsat}$	collector-emitter saturation voltage BSS51	$I_C = 1\text{ A}; I_B = 1\text{ mA}$	–	–	1.6	V
		$I_C = 1\text{ A}; I_B = 1\text{ mA}; T_j = 200\text{ }^\circ\text{C}$	–	–	2.3	V
$V_{CEsat}$	collector-emitter saturation voltage BSS50; BSS52	$I_C = 1\text{ A}; I_B = 4\text{ mA}$	–	–	1.6	V
		$I_C = 1\text{ A}; I_B = 4\text{ mA}; T_j = 200\text{ }^\circ\text{C}$	–	–	1.6	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 0.5\text{ mA}$	–	–	1.9	V
$V_{BEsat}$	base-emitter saturation voltage BSS51 BSS50; BSS52	$I_C = 1\text{ A}; I_B = 1\text{ mA}$	–	–	2.2	V
		$I_C = 1\text{ A}; I_B = 4\text{ mA}$	–	–	2.2	V
$V_{BEon}$	base-emitter on-state voltage	$I_C = 150\text{ mA}; V_{CE} = 10\text{ V}$	1.3	–	1.65	V
		$I_C = 500\text{ mA}; V_{CE} = 10\text{ V}$	1.4	–	1.75	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)</b>						
$t_{on}$	turn-on time	$I_{Con} = 500\text{ mA}; I_{Bon} = 0.5\text{ mA}; I_{Boff} = -0.5\text{ mA}$	–	0.5	–	$\mu\text{s}$
		$I_{Con} = 1\text{ A}; I_{Bon} = 1\text{ mA}; I_{Boff} = -1\text{ mA}$	–	0.4	–	$\mu\text{s}$
$t_{off}$	turn-off time	$I_{Con} = 500\text{ mA}; I_{Bon} = 0.5\text{ mA}; I_{Boff} = -0.5\text{ mA}$	–	1.3	–	$\mu\text{s}$
		$I_{Con} = 1\text{ A}; I_{Bon} = 1\text{ mA}; I_{Boff} = -1\text{ mA}$	–	1.5	–	$\mu\text{s}$

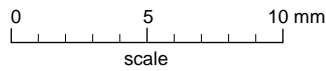
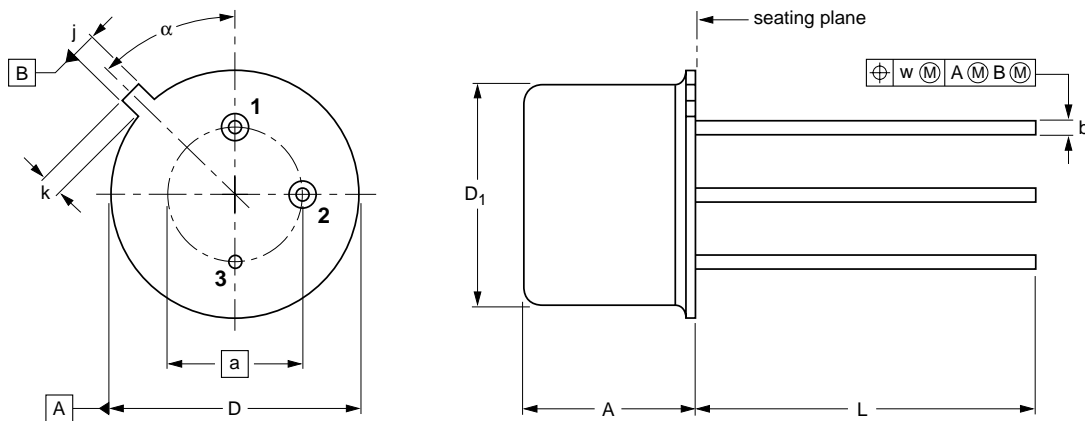
NPN Darlington transistors

BSS50; BSS51; BSS52

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT5/11



DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D <sub>1</sub>	j	k	L	w	α
mm	6.60 6.35	5.08	0.48 0.41	9.39 9.08	8.33 8.18	0.85 0.75	0.95 0.75	14.2 12.7	0.2	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT5/11		TO-39				97-04-11

## NPN Darlington transistors

## BSS50; BSS51; BSS52

**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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NPN Darlington transistors

BSS50; BSS51; BSS52

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Printed in The Netherlands

117047/00/03/pp8

Date of release: 1997 Sep 03

Document order number: 9397 750 02815

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