

# DATA SHEET



## **BSR40; BSR41; BSR42; BSR43** NPN medium power transistors

Product data sheet  
Supersedes data of 1999 Apr 28

2004 Dec 13

# NPN medium power transistors

**BSR40; BSR41;  
BSR42; BSR43**

### FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V).

### APPLICATIONS

- Thick and thin-film circuits
- Telephony and general industrial applications.

### DESCRIPTION

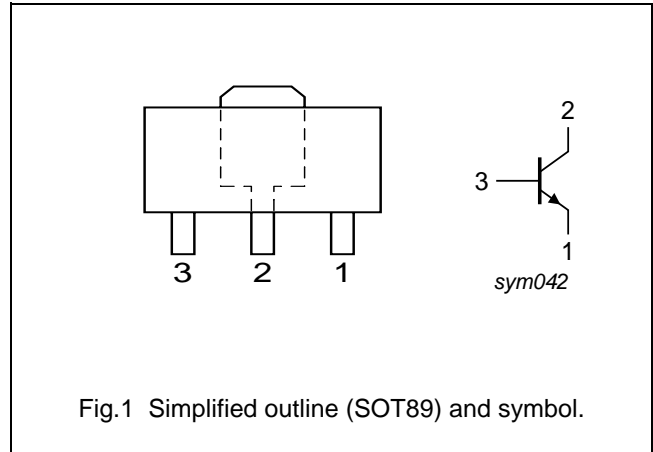
NPN medium power transistor in a SOT89 plastic package. PNP complements: BSR30; BSR31 and BSR33.

### MARKING

TYPE NUMBER	MARKING CODE	TYPE NUMBER	MARKING CODE
BSR40	AR1	BSR42	AR3
BSR41	AR2	BSR43	AR4

### PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



### ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
BSR40	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89
BSR41			
BSR42			
BSR43			

## NPN medium power transistors

BSR40; BSR41; BSR42;  
BSR43**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	BSR40; BSR41		–	70	V
	BSR42; BSR43		–	90	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BSR40; BSR41		–	60	V
	BSR42; BSR43		–	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>BM</sub>	peak base current		–	0.2	A
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>	ambient temperature		–65	+150	°C

**Note**

- Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.  
For other mounting conditions, see *“Thermal considerations for SOT89 in the General Part of associated Handbook”*.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	note 1	93	K/W
R <sub>th(j-s)</sub>	thermal resistance from junction to soldering point		13	K/W

**Note**

- Device mounted on a printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.  
For other mounting conditions, see *“Thermal considerations for SOT89 in the General Part of associated Handbook”*.

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BSR43**CHARACTERISTICS**T<sub>amb</sub> = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I <sub>CBO</sub>	collector-base cut-off current	I <sub>E</sub> = 0 A; V <sub>CB</sub> = 60 V	–	100	nA
		I <sub>E</sub> = 0 A; V <sub>CB</sub> = 60 V; T <sub>j</sub> = 150 °C	–	50	μA
I <sub>EBO</sub>	emitter-base cut-off current	I <sub>C</sub> = 0 A; V <sub>EB</sub> = 5 V	–	100	nA
h <sub>FE</sub>	DC current gain BSR40; BSR42 BSR41; BSR43	I <sub>C</sub> = 100 μA; V <sub>CE</sub> = 5 V; note 1	10 30	– –	
	DC current gain BSR40; BSR42 BSR41; BSR43	I <sub>C</sub> = 100 mA; V <sub>CE</sub> = 5 V; note 1	40 100	120 300	
	DC current gain BSR40; BSR42 BSR41; BSR43	I <sub>C</sub> = 500 mA; V <sub>CE</sub> = 5 V; note 1	30 50	– –	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 150 mA; I <sub>B</sub> = 15 mA; note 1	–	250	mV
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; note 1	–	500	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 150 mA; I <sub>B</sub> = 15 mA; note 1	–	1	V
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; note 1	–	1.2	V
C <sub>c</sub>	collector capacitance	I <sub>E</sub> = i <sub>e</sub> = 0 A; V <sub>CB</sub> = 10 V; f = 1 MHz	–	12	pF
C <sub>e</sub>	emitter capacitance	I <sub>C</sub> = i <sub>c</sub> = 0 A; V <sub>EB</sub> = 0.5 V; f = 1 MHz	–	90	pF
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 50 mA; V <sub>CE</sub> = 10 V; f = 100 MHz	100	–	MHz
<b>Switching times (between 10% and 90% levels)</b>					
t <sub>on</sub>	turn-on time	I <sub>Con</sub> = 100 mA; I <sub>Bon</sub> = 5 mA; I <sub>Boff</sub> = –5 mA	–	250	ns
t <sub>off</sub>	turn-off time		–	1	μs

**Note**

1. Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.01.

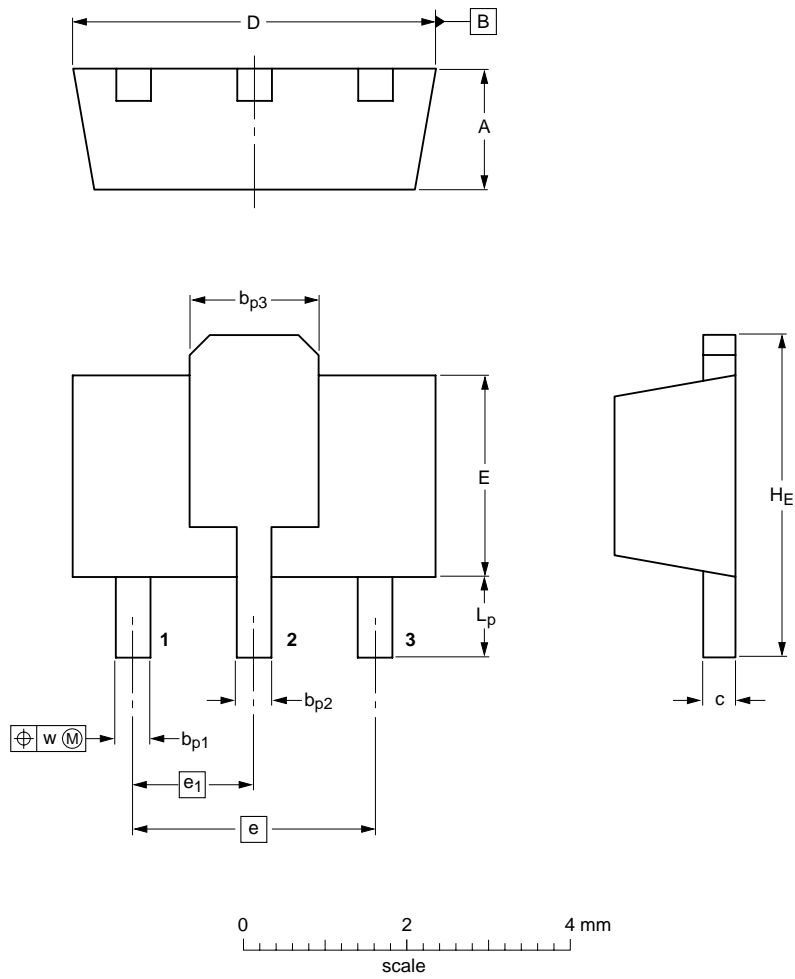
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BSR43

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>p1</sub>	b <sub>p2</sub>	b <sub>p3</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.23	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	1.2 0.8	0.13

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT89		TO-243	SC-62		04-08-03 06-03-16

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DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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# ***NXP Semiconductors***

## **Customer notification**

This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

## **Contact information**

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