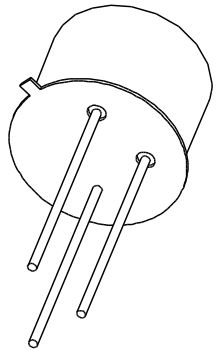


# DATA SHEET



## **BSX45; BSX46; BSX47** NPN medium power transistors

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

1997 Apr 23

## NPN medium power transistors

## BSX45; BSX46; BSX47

## FEATURES

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

## APPLICATIONS

- General industrial applications.

## DESCRIPTION

NPN medium power transistor in a TO-39 metal package.

## PINNING

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

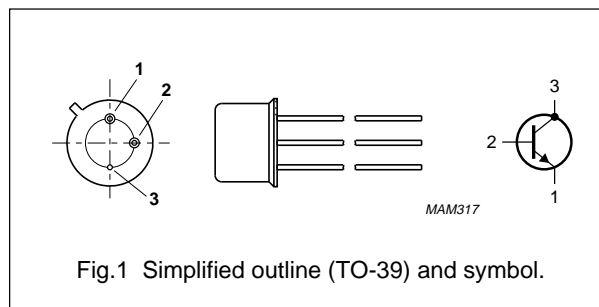


Fig.1 Simplified outline (TO-39) and symbol.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter				
	BSX45		–	–	80	V
	BSX46		–	–	100	V
	BSX47		–	–	120	V
$V_{CEO}$	collector-emitter voltage	open base				
	BSX45		–	–	40	V
	BSX46		–	–	60	V
	BSX47		–	–	80	V
$I_{CM}$	peak collector current		–	–	1.5	A
$P_{tot}$	total power dissipation	$T_{case} \leq 25\text{ }^{\circ}\text{C}$	–	–	6.25	W
$h_{FE}$	DC current gain	$I_C = 100\text{ mA}; V_{CE} = 1\text{ V}$				
	BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16; BSX47-16		63 100	100 160	160 250	
$f_T$	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$	50	–	–	MHz

## NPN medium power transistors

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**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			
	BSX45		–	80	V
	BSX46		–	100	V
	BSX47		–	120	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BSX45		–	40	V
	BSX46		–	60	V
	BSX47		–	80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	7	V
I <sub>C</sub>	collector current (DC)		–	1	A
I <sub>CM</sub>	peak collector current		–	1.5	A
I <sub>BM</sub>	peak base current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>case</sub> ≤ 25 °C	–	6.25	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	200	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		28	K/W

## NPN medium power transistors

## BSX45; BSX46; BSX47

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I <sub>CBO</sub>	collector cut-off current BSX45; BSX46	I <sub>E</sub> = 0; V <sub>CB</sub> = 60 V	–	–	30	nA
		I <sub>E</sub> = 0; V <sub>CB</sub> = 60 V; T <sub>amb</sub> = 150 °C	–	–	10	μA
I <sub>CBO</sub>	collector cut-off current BSX47	I <sub>E</sub> = 0; V <sub>CB</sub> = 80 V	–	–	30	nA
		I <sub>E</sub> = 0; V <sub>CB</sub> = 80 V; T <sub>amb</sub> = 150 °	–	–	10	μA
I <sub>EBO</sub>	emitter cut-off current	I <sub>C</sub> = 0; V <sub>EB</sub> = 5 V	–	–	10	nA
h <sub>FE</sub>	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16	I <sub>C</sub> = 100 μA; V <sub>CE</sub> = 1 V	15	40	–	
			25	90	–	
h <sub>FE</sub>	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16; BSX47-16	I <sub>C</sub> = 100 mA; V <sub>CE</sub> = 1 V	63	100	160	
			100	160	250	
h <sub>FE</sub>	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16	I <sub>C</sub> = 500 mA; V <sub>CE</sub> = 1 V	25	40	–	
			35	60	–	
h <sub>FE</sub>	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16	I <sub>C</sub> = 1 A; V <sub>CE</sub> = 1 V	–	20	–	
			–	30	–	
V <sub>CEsat</sub>	collector-emitter saturation voltage BSX45; BSX46	I <sub>C</sub> = 1 A; I <sub>B</sub> = 100 mA	–	–	1	V
V <sub>CEsat</sub>	collector-emitter saturation voltage BSX47	I <sub>C</sub> = 500 mA; I <sub>B</sub> = 25 mA	–	–	900	mV
V <sub>BE</sub>	base-emitter voltage	I <sub>C</sub> = 100 mA; V <sub>CE</sub> = 1 V	–	–	1	V
		I <sub>C</sub> = 500 mA; V <sub>CE</sub> = 1 V	0.75	–	1.5	V
		I <sub>C</sub> = 1 A; V <sub>CE</sub> = 1 V	–	–	2	V
C <sub>c</sub>	collector capacitance BSX45 BSX46 BSX47	I <sub>E</sub> = i <sub>e</sub> = 0; V <sub>CB</sub> = 10 V; f = 1 MHz	–	–	25	pF
			–	–	20	pF
			–	–	15	pF
C <sub>e</sub>	emitter capacitance	I <sub>C</sub> = i <sub>c</sub> = 0; V <sub>EB</sub> = 0.5 V; f = 1 MHz	–	–	80	pF
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 50 mA; V <sub>CE</sub> = 10 V; f = 100 MHz	50	–	–	MHz
F	noise figure	I <sub>C</sub> = 100 μA; V <sub>CE</sub> = 5 V; R <sub>S</sub> = 1 kΩ; f = 1 kHz; B = 200 Hz	–	3.5	–	dB
<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	–	–	200	ns
t <sub>off</sub>	turn-off time		–	–	850	ns

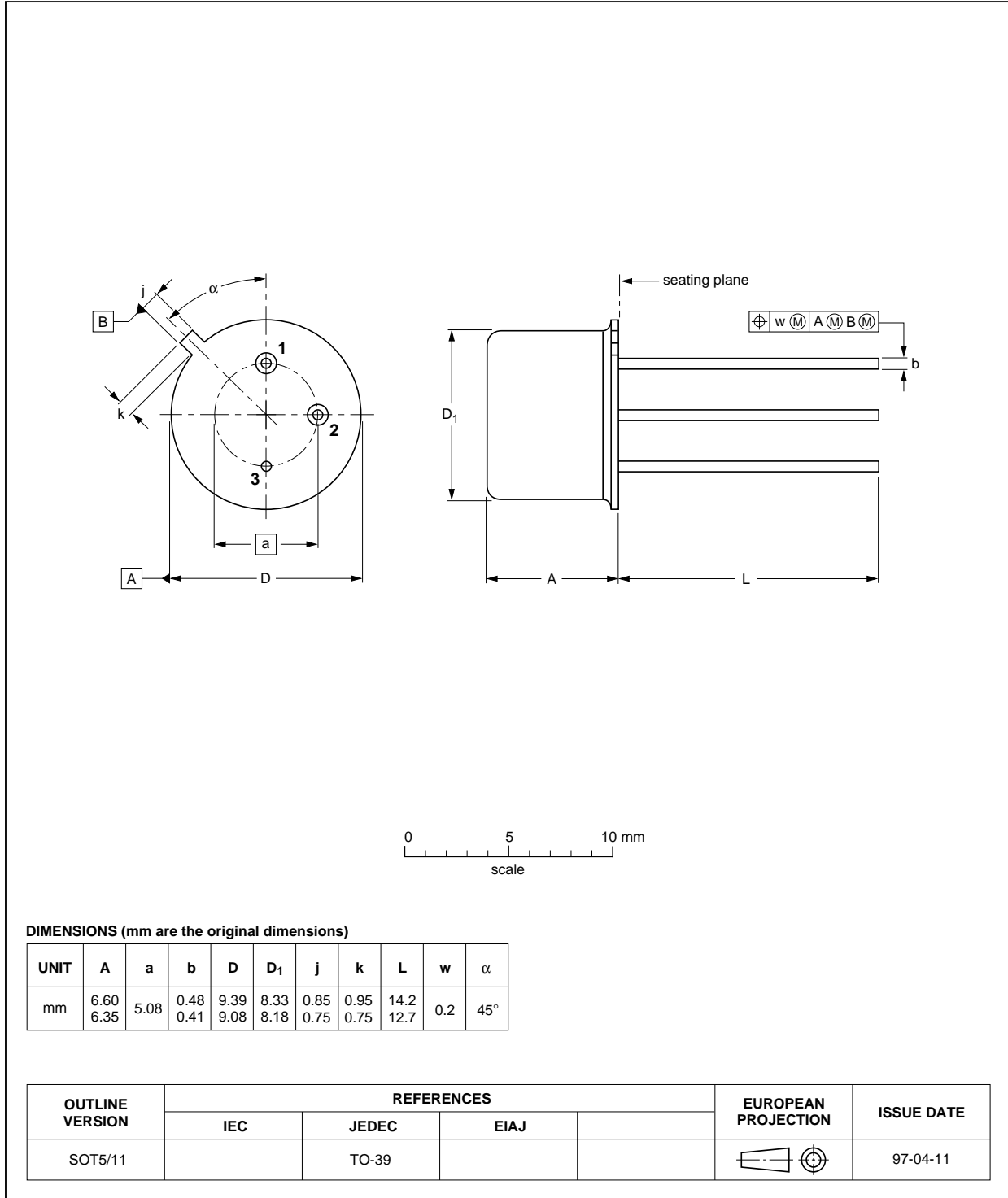
NPN medium power transistors

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PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT5/11



## NPN medium power 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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NPN medium power transistors

BSX45; BSX46; BSX47

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