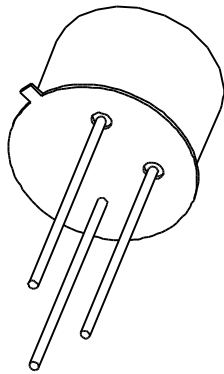


DATA SHEET



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

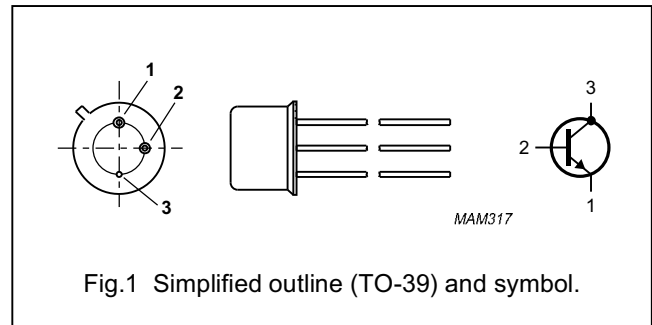


Fig.1 Simplified outline (TO-39) and symbol.

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		63	100	160	
	BSX45-16; BSX46-16; BSX47-16		100	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

BSX45; BSX46; BSX47

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	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
V _{EBO}	emitter-base voltage	open collector	–	7	V
I _C	collector current (DC)		–	1	A
I _{CM}	peak collector current		–	1.5	A
I _{BM}	peak base current		–	200	mA
P _{tot}	total power dissipation	T _{case} ≤ 25 °C	–	6.25	W
T _{stg}	storage temperature		–65	+150	°C
T _j	junction temperature		–	200	°C
T _{amb}	operating ambient temperature		–65	+150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-a}	thermal resistance from junction to ambient	in free air	200	K/W
R _{th j-c}	thermal resistance from junction to case		28	K/W

NPN medium power transistors

BSX45; BSX46; BSX47

CHARACTERISTICS

$T_{amb} = 25\text{ °C}$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current BSX45; BSX46	$I_E = 0; V_{CB} = 60\text{ V}$	–	–	30	nA
		$I_E = 0; V_{CB} = 60\text{ V}; T_{amb} = 150\text{ °C}$	–	–	10	μA
I_{CBO}	collector cut-off current BSX47	$I_E = 0; V_{CB} = 80\text{ V}$	–	–	30	nA
		$I_E = 0; V_{CB} = 80\text{ V}; T_{amb} = 150\text{ °}$	–	–	10	μA
I_{EBO}	emitter cut-off current	$I_C = 0; V_{EB} = 5\text{ V}$	–	–	10	nA
h_{FE}	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16	$I_C = 100\text{ }\mu\text{A}; V_{CE} = 1\text{ V}$	15	40	–	
			25	90	–	
h_{FE}	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16; BSX47-16	$I_C = 100\text{ mA}; V_{CE} = 1\text{ V}$	63	100	160	
			100	160	250	
h_{FE}	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16	$I_C = 500\text{ mA}; V_{CE} = 1\text{ V}$	25	40	–	
			35	60	–	
h_{FE}	DC current gain BSX45-10; BSX46-10; BSX47-10 BSX45-16; BSX46-16	$I_C = 1\text{ A}; V_{CE} = 1\text{ V}$	–	20	–	
			–	30	–	
V_{CEsat}	collector-emitter saturation voltage BSX45; BSX46	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	1	V
V_{CEsat}	collector-emitter saturation voltage BSX47	$I_C = 500\text{ mA}; I_B = 25\text{ mA}$	–	–	900	mV
V_{BE}	base-emitter voltage	$I_C = 100\text{ mA}; V_{CE} = 1\text{ V}$	–	–	1	V
		$I_C = 500\text{ mA}; V_{CE} = 1\text{ V}$	0.75	–	1.5	V
		$I_C = 1\text{ A}; V_{CE} = 1\text{ V}$	–	–	2	V
C_c	collector capacitance BSX45 BSX46 BSX47	$I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	–	25	pF
			–	–	20	pF
			–	–	15	pF
C_e	emitter capacitance	$I_C = i_c = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	–	80	pF
f_T	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$	50	–	–	MHz
F	noise figure	$I_C = 100\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 1\text{ k}\Omega;$ $f = 1\text{ kHz}; B = 200\text{ Hz}$	–	3.5	–	dB
Switching times (between 10% and 90% levels)						
t_{on}	turn-on time	$I_{Con} = 100\text{ mA}; I_{Bon} = 5\text{ mA};$ $I_{Boff} = -5\text{ mA}$	–	–	200	ns
t_{off}	turn-off time		–	–	850	ns

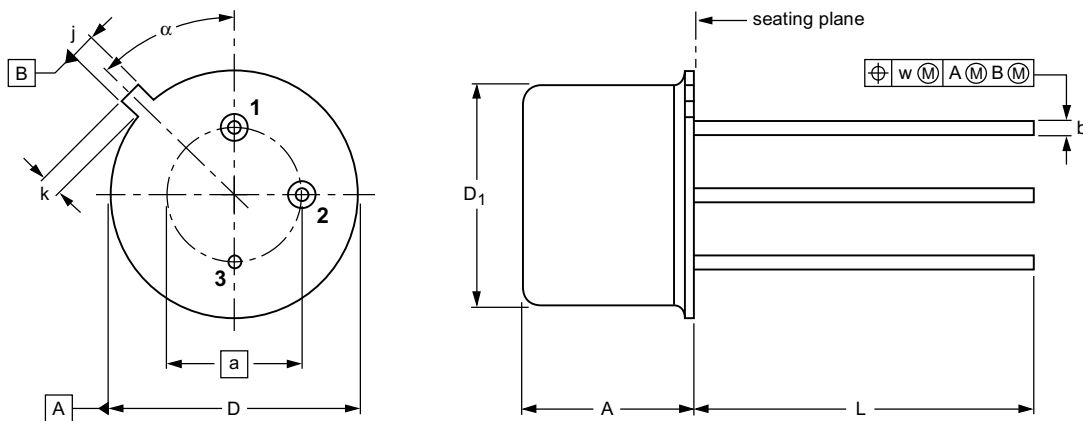
NPN medium power transistors

BSX45; BSX46; BSX47

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT5/11



DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D ₁	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 medium power transistors**BSX45; BSX46; BSX47**

DEFINITIONS

Data Sheet Status	
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.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

NPN medium power transistors

BSX45; BSX46; BSX47

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