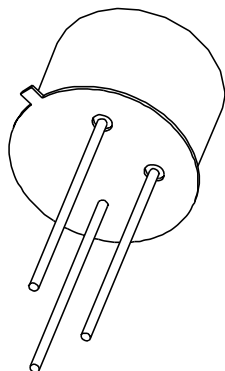


# DATA SHEET



## **BSW66A; BSW67A; BSW68A** NPN switching transistors

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

1997 May 05

## NPN switching transistors

## BSW66A; BSW67A; BSW68A

## FEATURES

- High current (max. 1 A)
- High voltage (max. 150 V).

## APPLICATIONS

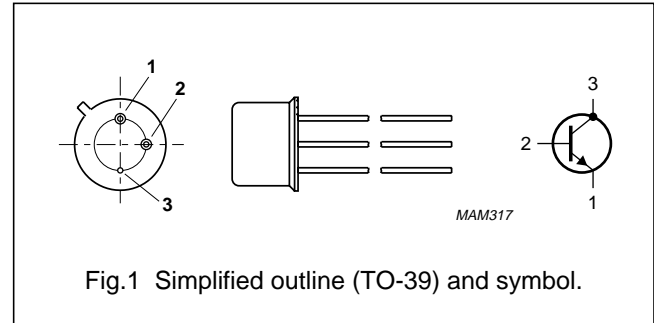
- General purpose switching and amplification
- Industrial applications.

## DESCRIPTION

NPN transistor in a TO-39 metal package.

## PINNING

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



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter				
	BSW66A		–	–	100	V
	BSW67A		–	–	120	V
$V_{CEO}$	collector-emitter voltage	open base				
	BSW66A		–	–	100	V
	BSW67A		–	–	120	V
	BSW68A		–	–	150	V
$I_C$	collector current (DC)		–	–	1	A
$P_{tot}$	total power dissipation	$T_{case} \leq 25\text{ }^\circ\text{C}$	–	–	5	W
$h_{FE}$	DC current gain	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$	30	–	–	
		$I_C = 500\text{ mA}; V_{CE} = 5\text{ V}$	30	–	–	
$f_T$	transition frequency	$I_C = 100\text{ mA}; V_{CE} = 20\text{ V}; f = 100\text{ MHz}$	–	130	–	MHz
$t_{off}$	turn-off time	$I_{Con} = 500\text{ mA}; I_{Bon} = 50\text{ mA}; I_{Boff} = -50\text{ mA}$	–	900	–	ns

## NPN switching transistors

## BSW66A; BSW67A; BSW68A

**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			
	BSW66A		–	100	V
	BSW67A		–	120	V
	BSW68A		–	150	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BSW66A		–	100	V
	BSW67A		–	120	V
	BSW68A		–	150	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	6	V
I <sub>C</sub>	collector current (DC)		–	1	A
I <sub>CM</sub>	peak collector current	t <sub>p</sub> ≤ 20 ms	–	2	A
I <sub>BM</sub>	peak base current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	800	mW
		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	free air	220	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		35	K/W

## NPN switching transistors

## BSW66A; BSW67A; BSW68A

**CHARACTERISTICS** $T_j = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current BSW66A	$I_E = 0; V_{CB} = 50\text{ V}$	–	–	100	nA
		$I_E = 0; V_{CB} = 50\text{ V}; T_j = 150\text{ °C}$	–	–	50	$\mu\text{A}$
		$I_E = 0; V_{CB} = 100\text{ V}$	–	–	100	$\mu\text{A}$
$I_{CBO}$	collector cut-off current BSW67A	$I_E = 0; V_{CB} = 60\text{ V}$	–	–	100	nA
		$I_E = 0; V_{CB} = 60\text{ V}; T_j = 150\text{ °C}$	–	–	50	$\mu\text{A}$
		$I_E = 0; V_{CB} = 120\text{ V}$	–	–	100	$\mu\text{A}$
$I_{CBO}$	collector cut-off current BSW68A	$I_E = 0; V_{CB} = 75\text{ V}$	–	–	100	nA
		$I_E = 0; V_{CB} = 75\text{ V}; T_j = 150\text{ °C}$	–	–	50	$\mu\text{A}$
		$I_E = 0; V_{CB} = 150\text{ V}$	–	–	100	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 3\text{ V}$	–	–	100	nA
		$I_C = 0; V_{EB} = 6\text{ V}$	–	–	100	$\mu\text{A}$
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}$				
		$I_C = 10\text{ mA}$	30	–	–	
		$I_C = 100\text{ mA}$	40	–	–	
		$I_C = 500\text{ mA}$	30	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 10\text{ mA}$	–	–	150	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	–	400	mV
		$I_C = 1\text{ A}; I_B = 150\text{ mA}$	–	–	1	V
			–	–	–	–
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 10\text{ mA}$	–	–	900	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	–	1.1	V
		$I_C = 1\text{ A}; I_B = 150\text{ mA}$	–	–	1.4	V
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	–	20	pF
$C_e$	emitter capacitance	$I_C = i_c = 0; V_{EB} = 0; f = 1\text{ MHz}$	–	–	300	pF
$f_T$	transition frequency	$I_C = 100\text{ mA}; V_{CE} = 20\text{ V}; f = 100\text{ MHz}$	–	130	–	MHz
<b>Switching times (between 10% and 90% levels)</b>						
$t_{on}$	turn-on time	$I_{Con} = 500\text{ mA}; I_{Bon} = 50\text{ mA};$ $I_{Boff} = -50\text{ mA}$	–	500	–	ns
$t_{off}$	turn-off time		–	900	–	ns

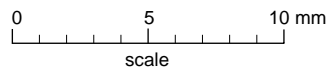
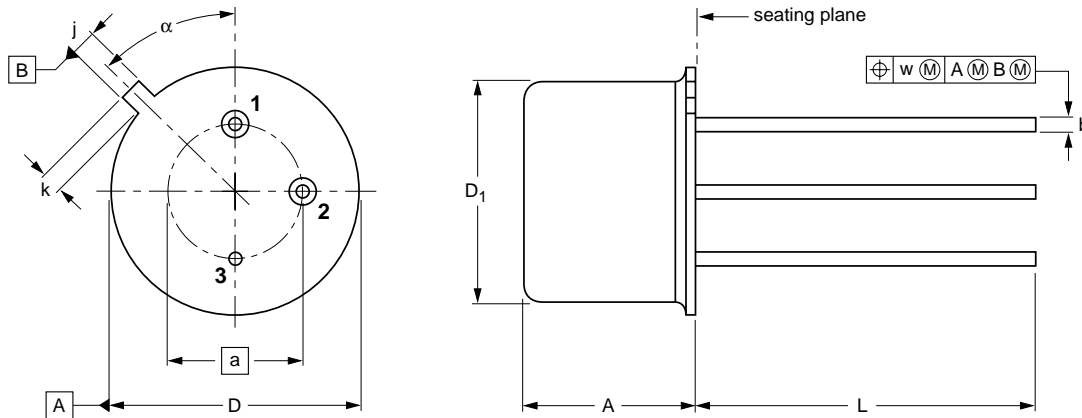
NPN switching transistors

BSW66A; BSW67A; BSW68A

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 switching transistors

## BSW66A; BSW67A; BSW68A

**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 switching transistors

BSW66A; BSW67A; BSW68A

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