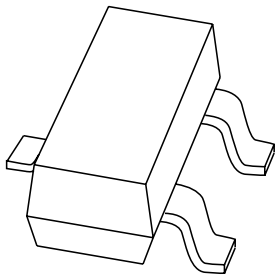


# DATA SHEET



## **BSR15; BSR16** PNP switching transistors

Product specification  
Supersedes data of 1999 Apr 15

2004 Jan 13

# PNP switching transistors

# BSR15; BSR16

### FEATURES

- High current (max. 600 mA)
- Low voltage (max. 60 V).

### APPLICATIONS

- Medium power switching.

### DESCRIPTION

PNP switching transistor in a SOT23 plastic package.  
NPN complements: BSR13 and BSR14.

### MARKING

TYPE NUMBER	MARKING CODE <sup>(1)</sup>
BSR15	T7*
BSR16	T8*

### Note

- \* = p : Made in Hong Kong.  
\* = t : Made in Malaysia.  
\* = W : Made in China.

### PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector

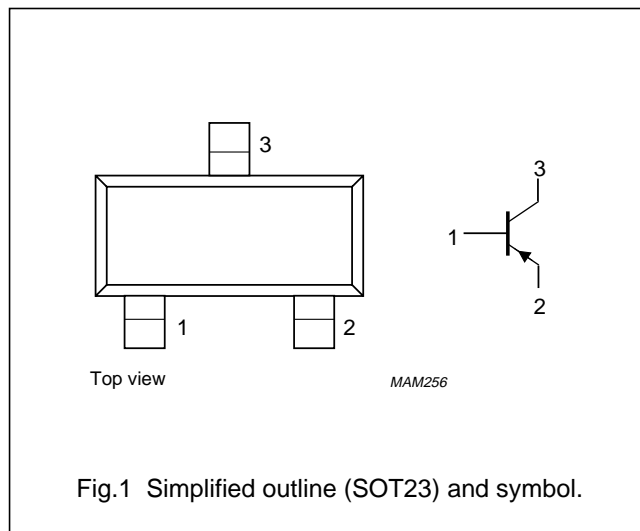


Fig.1 Simplified outline (SOT23) and symbol.

### ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
BSR15	-	plastic surface mounted package; 3 leads	SOT23
BSR16			

## PNP switching transistors

## BSR15; BSR16

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–60	V
$V_{CEO}$	collector-emitter voltage	open base	–	–40	V
	BSR15		–	–60	V
	BSR16		–	–60	V
$V_{EBO}$	emitter-base voltage	open collector	–	–5	V
$I_C$	collector current (DC)		–	–600	mA
$I_{CM}$	peak collector current		–	–800	mA
$I_{BM}$	peak base current		–	–200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	250	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°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	note 1	500	K/W

**Note**

1. Transistor mounted on an FR4 printed-circuit board.

## PNP switching transistors

## BSR15; BSR16

## CHARACTERISTICS

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

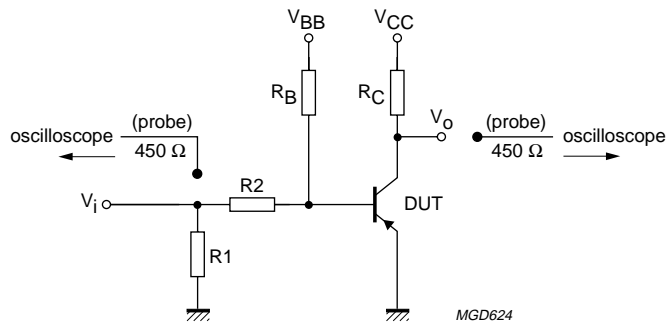
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{CBO}$	collector cut-off current BSR15	$I_E = 0; V_{CB} = -50\text{ V}$ $I_E = 0; V_{CB} = -50\text{ V}; T_j = 150\text{ °C}$	– –	–20 –20	nA $\mu\text{A}$
	collector cut-off current BSR16	$I_E = 0; V_{CB} = -50\text{ V}$ $I_E = 0; V_{CB} = -50\text{ V}; T_j = 150\text{ °C}$	– –	–10 –10	nA $\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -5\text{ V}$	–	–50	nA
$h_{FE}$	DC current gain BSR15	$I_C = -0.1\text{ mA}; V_{CE} = -10\text{ V}$	35 75	– –	
	BSR16				
	DC current gain BSR15	$I_C = -1\text{ mA}; V_{CE} = -10\text{ V}$	50 100	– –	
	BSR16				
	DC current gain BSR15	$I_C = -10\text{ mA}; V_{CE} = -10\text{ V}$	75 100	– –	
	BSR16				
DC current gain	$I_C = -150\text{ mA}; V_{CE} = -10\text{ V}; \text{note 1}$	100	300		
DC current gain	$I_C = -500\text{ mA}; V_{CE} = -10\text{ V}; \text{note 1}$	30 50	– –		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -150\text{ mA}; I_B = -15\text{ mA}$	–	–400	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	–	–1.6	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -150\text{ mA}; I_B = -15\text{ mA}$	–	–1.3	V
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	–	–2.6	V
$C_c$	collector capacitance	$I_E = I_E = 0; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$	–	8	pF
$C_e$	emitter capacitance	$I_C = I_C = 0; V_{EB} = -2\text{ V}; f = 1\text{ MHz}$	–	30	pF
$f_T$	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -20\text{ V}; f = 100\text{ MHz}$	200	–	MHz
<b>Switching times (between 10% and 90% levels); (see Fig.2)</b>					
$t_{on}$	turn-on time	$I_{Con} = -150\text{ mA}; I_{Bon} = -15\text{ mA};$ $I_{Boff} = 15\text{ mA}$	–	40	ns
$t_d$	delay time		–	12	ns
$t_r$	rise time		–	30	ns
$t_{off}$	turn-off time		–	365	ns
$t_s$	storage time		–	300	ns
$t_f$	fall time		–	65	ns

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

PNP switching transistors

BSR15; BSR16



$V_i = -9.5 \text{ V}$ ;  $T = 500 \mu\text{s}$ ;  $t_p = 10 \mu\text{s}$ ;  $t_r = t_f \leq 3 \text{ ns}$ .  
 $R_1 = 68 \Omega$ ;  $R_2 = 325 \Omega$ ;  $R_B = 325 \Omega$ ;  $R_C = 160 \Omega$ .  
 $V_{BB} = 3.5 \text{ V}$ ;  $V_{CC} = -29.5 \text{ V}$ .  
 Oscilloscope: input impedance  $Z_i = 50 \Omega$ .

Fig.2 Test circuit for switching times.

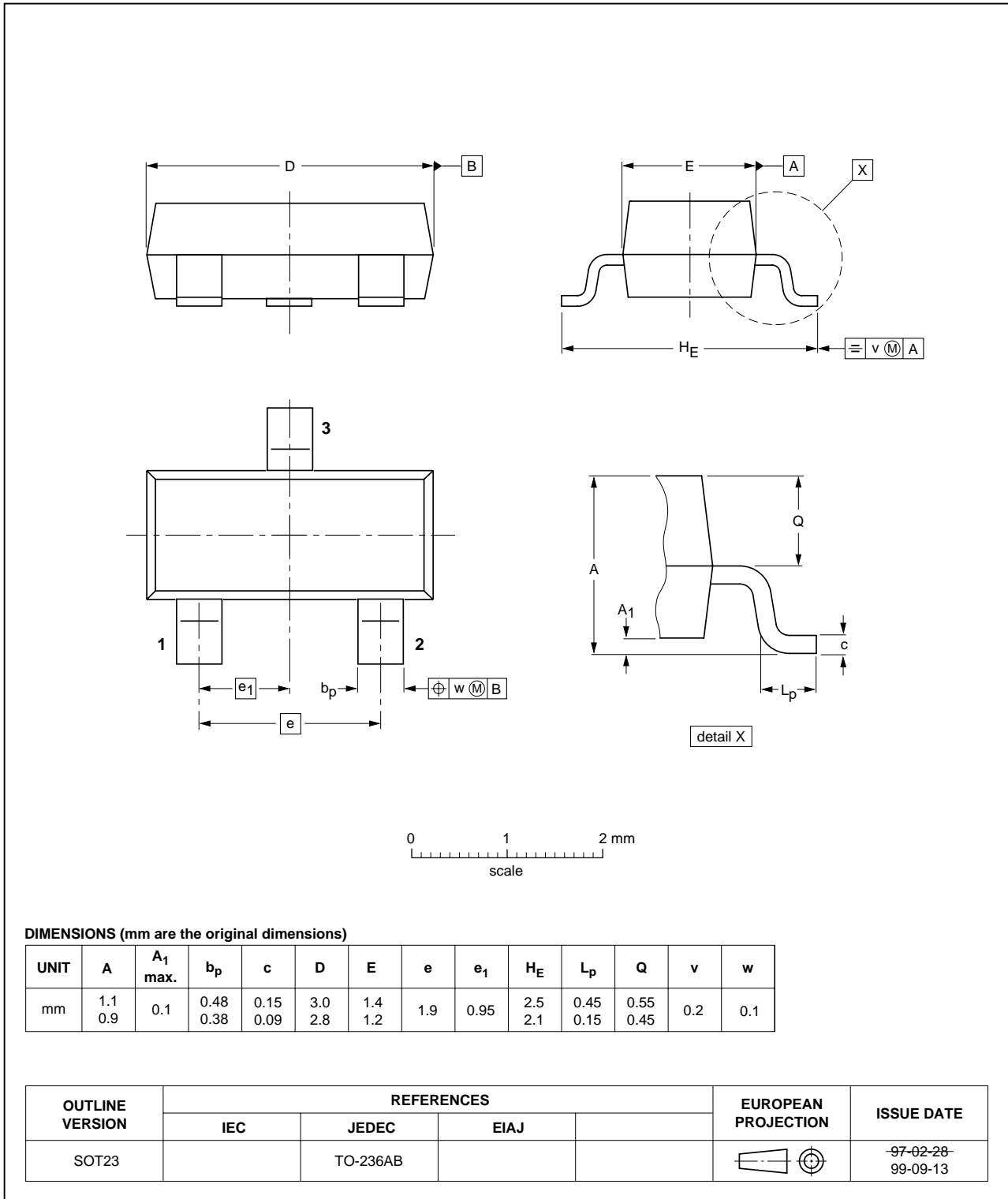
PNP switching transistors

BSR15; BSR16

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



## PNP switching transistors

## BSR15; BSR16

## DATA SHEET STATUS

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Printed in The Netherlands

R75/04/pp8

Date of release: 2004 Jan 13

Document order number: 9397 750 12421

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