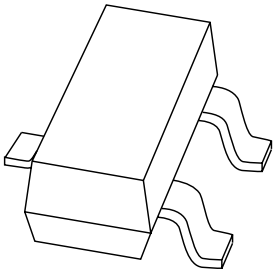
DATA SHEET



BSR15; BSR16
PNP switching transistors

Product data sheet
Supersedes data of 1999 Apr 15

2004 Jan 13

NXP founded by Philips

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(1)
BSR15	T7*
BSR16	T8*

Note

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

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector

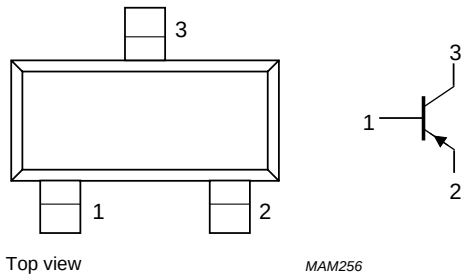


Fig.1 Simplified outline (SOT23) and symbol.

ORDERING INFORMATION

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

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			
	BSR15		–	−40	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	$T_{amb} \leq 25$ °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.

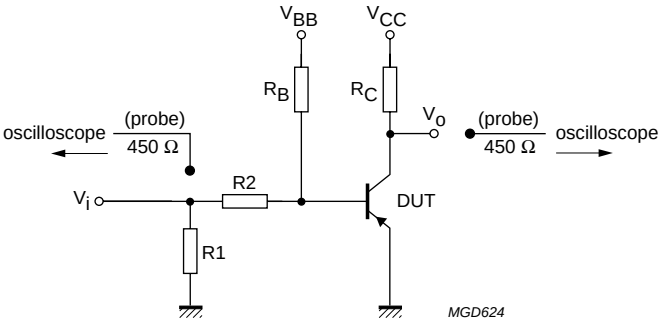
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current				
	BSR15	I_E = 0; V_{CB} = –50 V	–	–20	nA
		I_E = 0; V_{CB} = –50 V; T_j = 150 °C	–	–20	μA
	collector cut-off current				
	BSR16	I_E = 0; V_{CB} = –50 V	–	–10	nA
		I_E = 0; V_{CB} = –50 V; T_j = 150 °C	–	–10	μA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = –5 V	–	–50	nA
h_{FE}	DC current gain	I_C = –0.1 mA; V_{CE} = –10 V			
	BSR15		35	–	
	BSR16		75	–	
	DC current gain	I_C = –1 mA; V_{CE} = –10 V			
	BSR15		50	–	
	BSR16		100	–	
	DC current gain	I_C = –10 mA; V_{CE} = –10 V			
	BSR15		75	–	
	BSR16		100	–	
	DC current gain	I_C = –150 mA; V_{CE} = –10 V; note 1	100	300	
	DC current gain	I_C = –500 mA; V_{CE} = –10 V; note 1			
	BSR15		30	–	
	BSR16		50	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –150 mA; I_B = –15 mA	–	–400	mV
		I_C = –500 mA; I_B = –50 mA	–	–1.6	V
V_{BEsat}	base-emitter saturation voltage	I_C = –150 mA; I_B = –15 mA	–	–1.3	V
		I_C = –500 mA; I_B = –50 mA	–	–2.6	V
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = –10 V; f = 1 MHz	–	8	pF
C_e	emitter capacitance	I_C = i_c = 0; V_{EB} = –2 V; f = 1 MHz	–	30	pF
f_T	transition frequency	I_C = –50 mA; V_{CE} = –20 V; f = 100 MHz	200	–	MHz
Switching times (between 10% and 90% levels); (see Fig.2)					
t_{on}	turn-on time	I_{Con} = –150 mA; I_{Bon} = –15 mA; I_{Boff} = 15 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: $t_p \leq 300$ μs; $\delta \leq 0.02$.

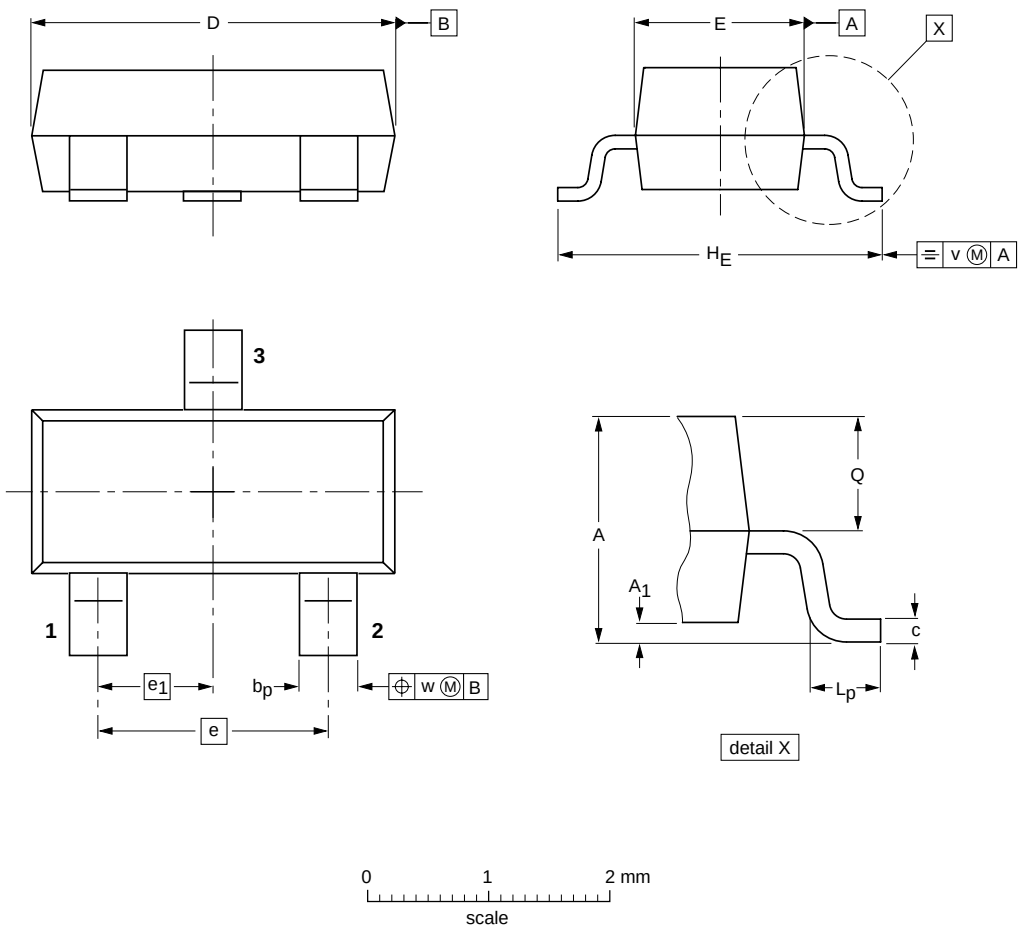


V_i = −9.5 V; T = 500 μs; t_p = 10 μs; $t_r = t_f \leq 3$ ns.
R1 = 68 Ω; R2 = 325 Ω; R_B = 325 Ω; R_C = 160 Ω.
V_{BB} = 3.5 V; V_{CC} = −29.5 V.
Oscilloscope: input impedance Z_i = 50 Ω.

Fig.2 Test circuit for switching times.

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				~~04-11-04~~ 06-03-16

DATA SHEET STATUS

DOCUMENT STATUS[1]	PRODUCT STATUS[2]	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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