

PNP switching transistor

BSR12

FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 15 V).

APPLICATIONS

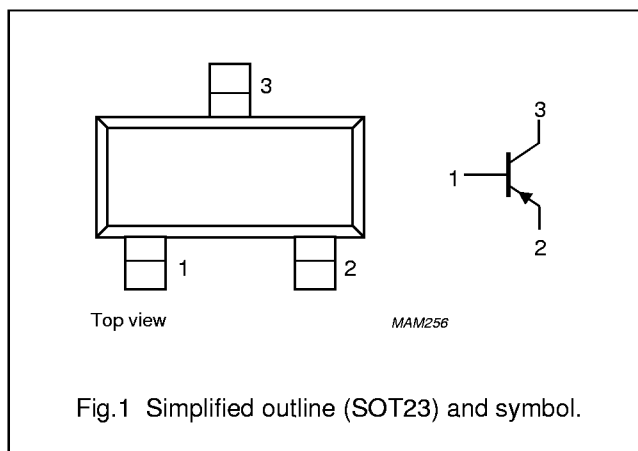
- High-speed, saturated switching applications for industrial service in thick and thin-film circuits.

DESCRIPTION

PNP switching transistor in a SOT23 plastic package.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



MARKING

TYPE NUMBER	MARKING CODE
BSR12	B5p

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–15	V
V_{CEO}	collector-emitter voltage	open base	–	–15	V
I_{CM}	peak collector current		–	–200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	–	250	mW
T_j	junction temperature		–	150	$^\circ\text{C}$
h_{FE}	DC current gain	$I_C = -10\text{ mA}; V_{CE} = -1\text{ V}$	30	–	
		$I_C = -50\text{ mA}; V_{CE} = -1\text{ V}$	30	120	
f_T	transition frequency	$f = 500\text{ MHz}; I_C = -50\text{ mA}; V_{CE} = -10\text{ V}$	1.5	–	GHz
t_{off}	turn-off time	$I_{Con} = -30\text{ mA}; I_{Bon} = -3\text{ mA}; I_{Boff} = 3\text{ mA}$	–	30	ns

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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	–	–15	V
V _{CEO}	collector-emitter voltage	open base	–	–15	V
V _{EBO}	emitter-base voltage	open collector	–	–3	V
I _C	collector current (DC)		–	–100	mA
I _{CM}	peak collector current		–	–200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	–	250	mW
T _{stg}	storage temperature		–65	+150	°C
T _j	junction temperature		–	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 a ceramic substrate 8 × 10 × 0.7 mm.

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CHARACTERISTICS

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

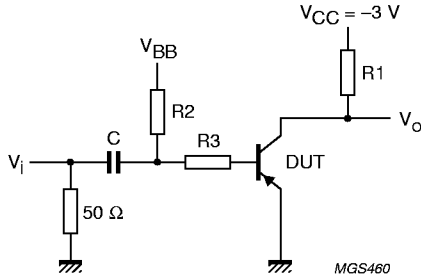
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0; V_{CB} = -10\text{ V}$	–	–	–50	nA
		$I_E = 0; V_{CB} = -10\text{ V}; T_{amb} = 125\text{ }^{\circ}\text{C}$	–	–	–5	μA
I_{CES}	collector cut-off current	$V_{BE} = 0; V_{CE} = -10\text{ V}$	–	–	–50	nA
$V_{(BR)CBO}$	breakdown voltage	$I_E = 0; I_C = -10\text{ }\mu\text{A}$	–15	–	–	V
$V_{(BR)CES}$	breakdown voltage	$V_{BE} = 0; I_C = -10\text{ }\mu\text{A}$	–15	–	–	V
$V_{(BR)EBO}$	breakdown voltage	$I_C = 0; I_E = -100\text{ }\mu\text{A}$	–3	–	–	V
$V_{CEOsust}$	collector-emitter sustaining voltage	$I_B = 0; I_C = -10\text{ mA}$	–15	–	–	V
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -1\text{ mA}; \text{note 1}$	–	–	–130	mV
		$I_C = -50\text{ mA}; I_B = -5\text{ mA}; \text{note 1}$	–	–180	–270	mV
		$I_C = -100\text{ mA}; I_B = -10\text{ mA}; \text{note 1}$	–	–	–450	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -1\text{ mA}; \text{note 1}$	–725	–	–920	mV
		$I_C = -50\text{ mA}; I_B = -5\text{ mA}; \text{note 1}$	–800	–	–1 150	mV
		$I_C = -100\text{ mA}; I_B = -10\text{ mA}; \text{note 1}$	–900	–	–1 500	mV
h_{FE}	DC current gain	$I_C = -1\text{ mA}; V_{CE} = -1\text{ V}; \text{note 1}$	30	–	–	
		$I_C = -10\text{ mA}; V_{CE} = -1\text{ V}; \text{note 1}$	30	–	–	
		$I_C = -50\text{ mA}; V_{CE} = -1\text{ V}; \text{note 1}$	30	–	120	
		$I_C = -50\text{ mA}; V_{CE} = -1\text{ V}; T_{amb} = 55\text{ }^{\circ}\text{C}; \text{note 1}$	30	–	–	
		$I_C = -100\text{ mA}; V_{CE} = -1\text{ V}; \text{note 1}$	20	–	–	
f_T	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 500\text{ MHz}$	1.5	–	–	GHz
C_c	collector capacitance	$I_E = I_e = 0; V_{CB} = -5\text{ V}$	–	–	4.5	pF
C_e	emitter capacitance	$I_C = I_c = 0; V_{EB} = -0.5\text{ V}$	–	–	6	pF
Switching time (see Fig.2)						
t_{on}	turn-on time	$V_i = -6.85\text{ V}; V_{BB} = 0\text{ V}; I_{Con} = -30\text{ mA}; I_{Bon} = -3.0\text{ mA}$	–	–	20	ns
t_{off}	turn-off time	$V_i = 11.7\text{ V}; V_{BB} = -9.85\text{ V}; I_{Con} = -30\text{ mA}; I_{Bon} = -3\text{ mA}; I_{Boff} = 3\text{ mA}$	–	–	30	ns

Note

1. Pulse test: $t_p = 300\text{ }\mu\text{s}; \delta = 0.01$.

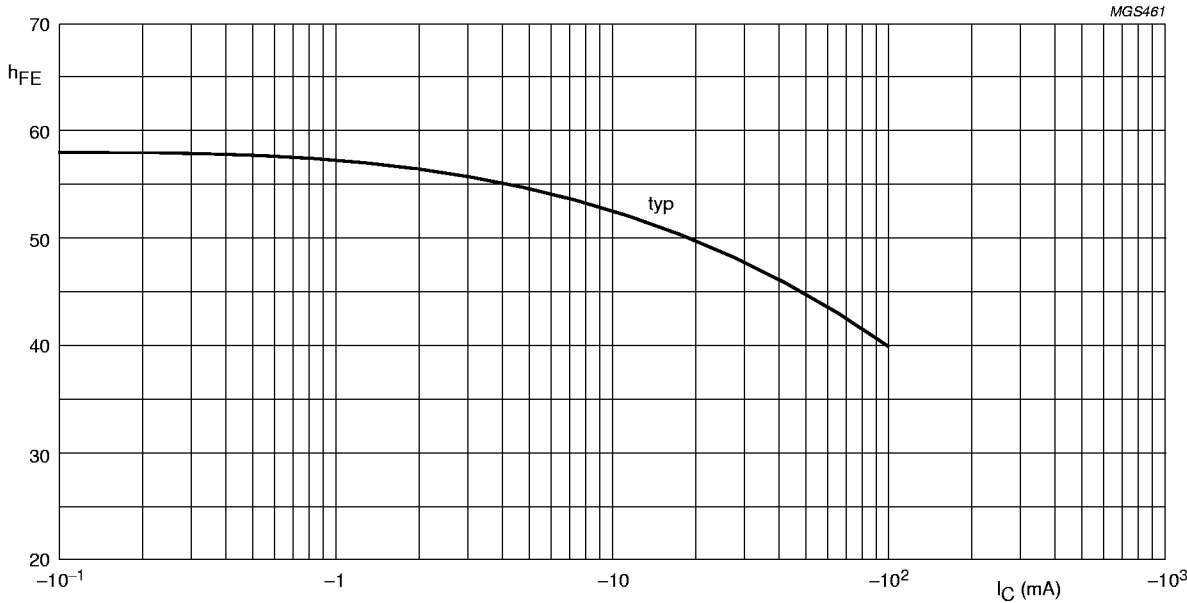
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R1 = 94 Ω; R2 = 1 kΩ; R3 = 2 kΩ; C = 0.1 μF.
 Pulse generator: Pulse duration $t_p = 400$ ns. Rise time $t_r < 1$ ns. Output impedance $Z_O = 50$ Ω.
 Sampling scope: Rise time $t_r < 1$ ns. Input impedance $Z_i = 100$ kΩ.

Fig.2 Test circuit for switching times.

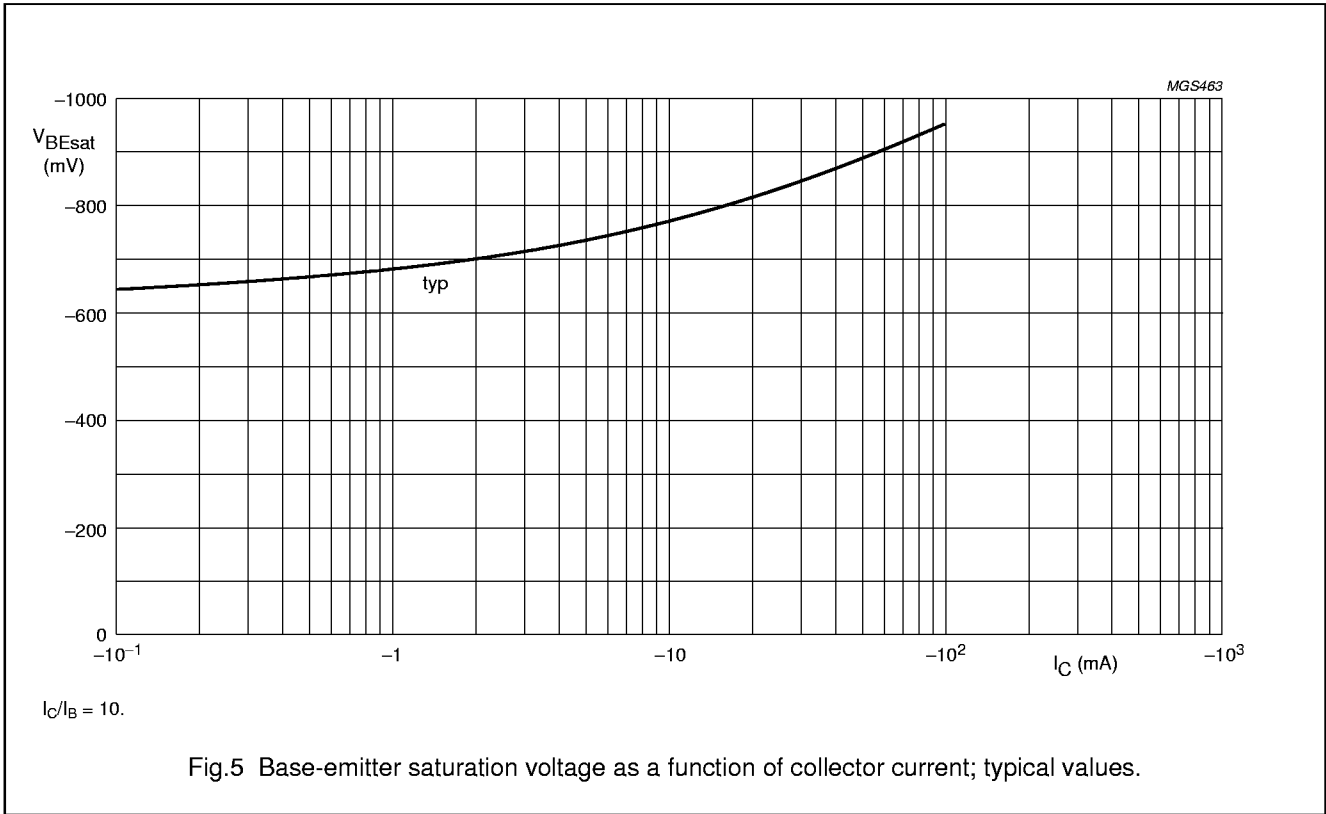
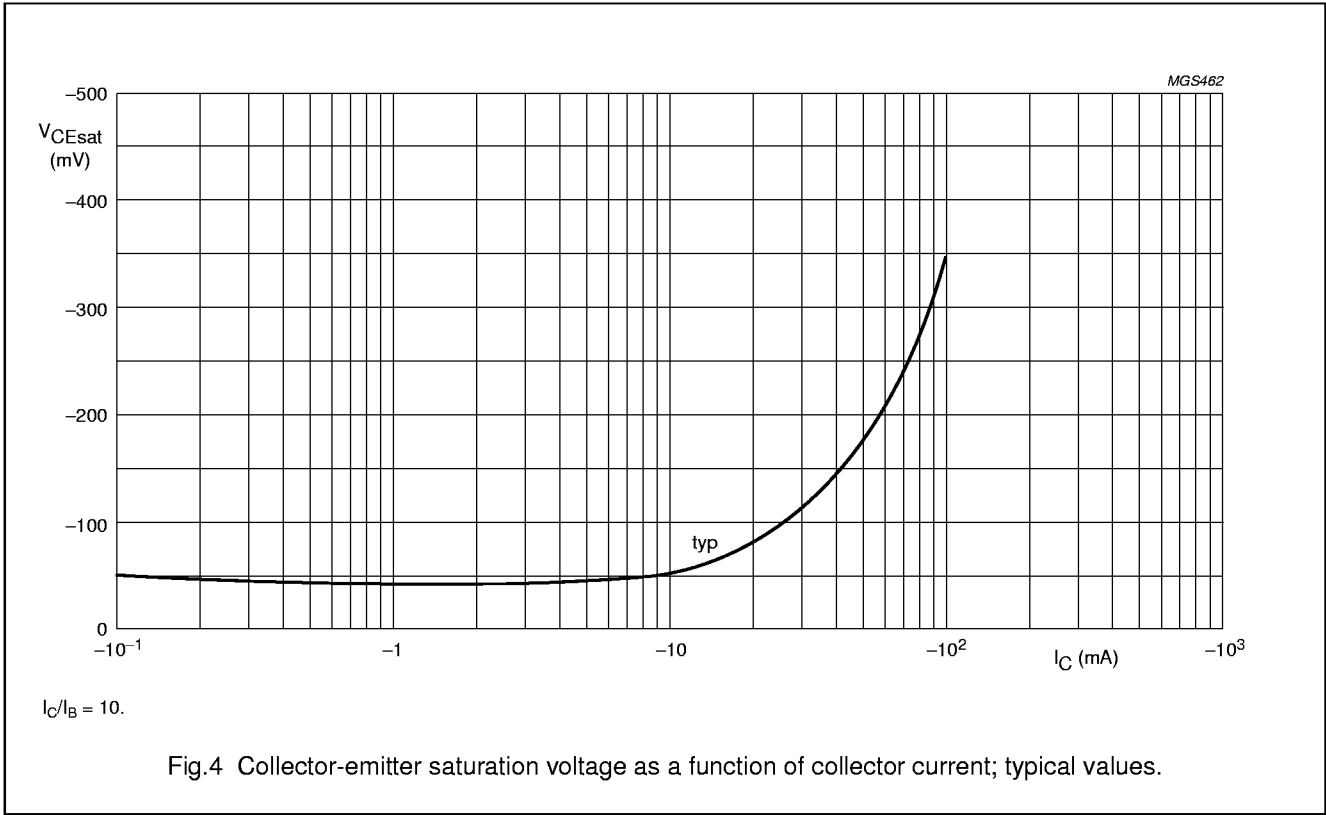


$V_{CE} = -1$ V; $T_{amb} = 25^\circ\text{C}$.

Fig.3 DC current gain; typical values.

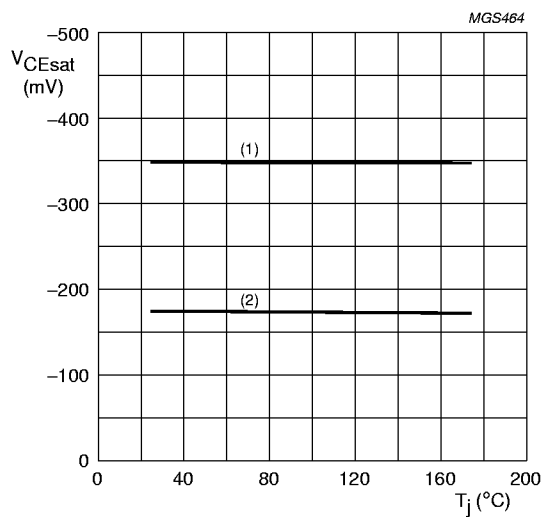
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- (1) $I_C = 100\text{ mA}$; $I_B = 10\text{ mA}$
- (2) $I_C = 50\text{ mA}$ and $I_B = 5\text{ mA}$.

Fig.6 Collector-emitter saturation voltage as a function of junction temperature; typical values.

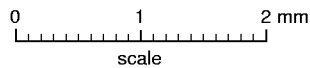
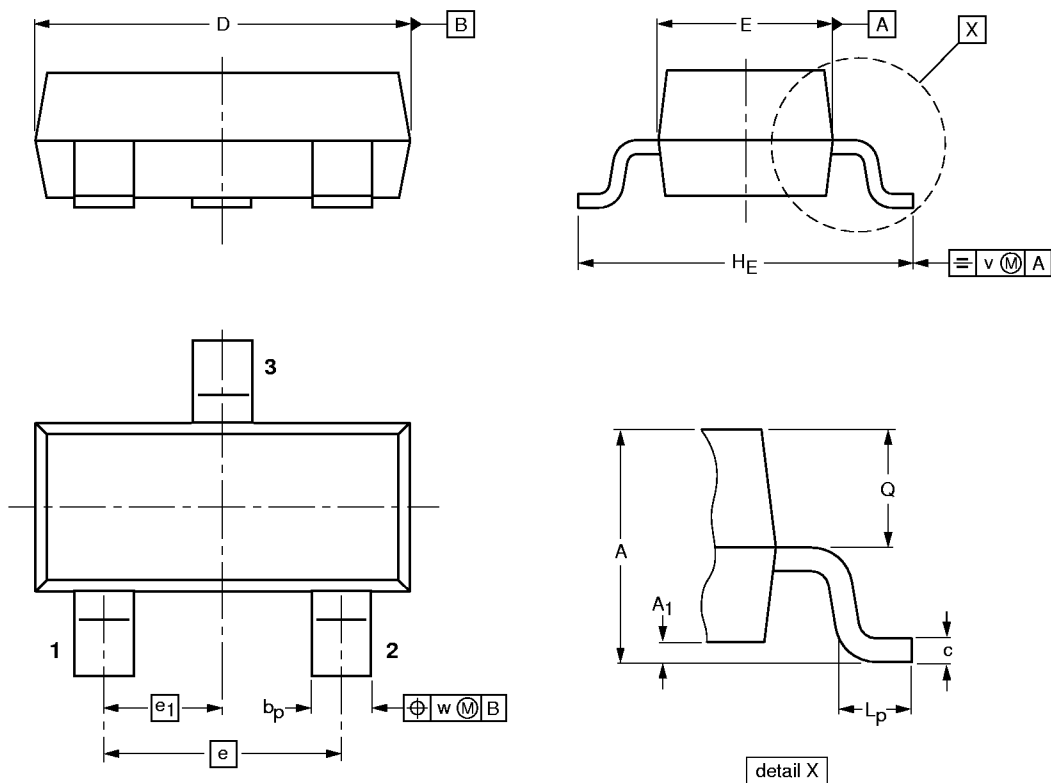
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PACKAGE OUTLINE

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	EIAJ			
SOT23						97-02-28