

## SILICON PLANAR EPITAXIAL TRANSISTORS

PNP transistors in miniature plastic packages intended for application in thick and thin film circuits. They are intended for use in telephony and general industrial applications.

### QUICK REFERENCE DATA

		BSP30	BSP31	BSP32	BSP33
Collector-base voltage (open emitter)	$-V_{CBO}$ max.	70	70	90	90 V
Collector-emitter voltage (open base)	$-V_{CEO}$ max.	60	60	80	80 V
Collector current (DC)	$-I_C$ max.	1	1	1	1 A
Total power dissipation up to $T_{amb} = 25^\circ\text{C}$	$P_{tot}$ max.	1,5	1,5	1,5	1,5 W
Junction temperature	$T_j$ max.	150	150	150	150 $^\circ\text{C}$
DC current gain	$h_{FE} >$	40	100	40	100
	$h_{FE} <$	120	300	120	300
Transition frequency at $f = 100$ MHz	$f_T >$	100	100	100	100 MHz

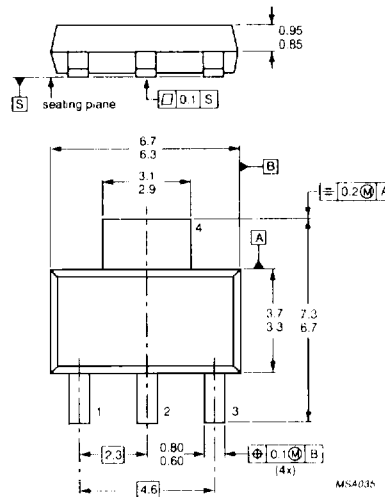
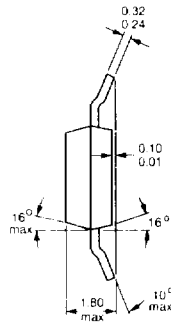
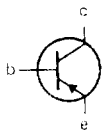
### MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-223

#### Pinning

- 1 = Base
- 2 = Collector
- 3 = Emitter
- 4 = Collector



**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BSP30	BSP31	BSP32	BSP33
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	70	70	90	90 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	60	60	80	80 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5	5	5	5 V
Collector current (DC)	$-I_C$	max.			1	A
Base current (DC)	$-I_B$	max.			0,1	A
Total power dissipation up to $T_{amb} = 25^{\circ}C^*$	$P_{tot}$	max.			1,5	W
Storage temperature range	$T_{stg}$				-65 to +150	$^{\circ}C$
Junction temperature	$T_j$	max.			150	$^{\circ}C$

**THERMAL RESISTANCE**

From junction to collector tab	$R_{thj-tab}$	=			10	K/W
From junction to ambient*	$R_{thj-a}$	=			83,3	K/W

\* Device mounted on an epoxy printed circuit board 40 mm x 40 mm x 1,5 mm; mounting pad for the collector lead min. 6 cm<sup>2</sup>.

## CHARACTERISTICS

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

## Collector cut-off current

$I_E = 0; -V_{CB} = 60\text{ V}$	$-I_{CBO}$	<	100	nA
$I_E = 0; -V_{CB} = 60\text{ V}; T_j = 150\text{ }^{\circ}\text{C}$	$-I_{CBO}$	<	50	$\mu\text{A}$

## Breakdown voltages

			BSP30	BSP31	BSP32	BSP33	
$I_B = 0; -I_C = 10\text{ mA}$	$-V_{(BR)CEO}$	>	60	60	80	80	V
$V_{BE} = 0; -I_C = 10\text{ }\mu\text{A}$	$-V_{(BR)CES}$	>	70	70	90	90	V
$I_C = 0; -I_E = 10\text{ }\mu\text{A}$	$-V_{(BR)EBO}$	>	5	5	5	5	V

## Saturation voltages \*

$-I_C = 150\text{ mA}; -I_B = 15\text{ mA}$	$-V_{CEsat}$	<	0,25	0,25	0,25	0,25	V
	$-V_{BEsat}$	<	1,0	1,0	1,0	1,0	V
$-I_C = 500\text{ mA}; -I_B = 50\text{ mA}$	$-V_{CEsat}$	<	0,5	0,5	0,5	0,5	V
	$-V_{BEsat}$	<	1,2	1,2	1,2	1,2	V

## DC current gain\*

$-I_C = 100\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	$h_{FE}$	>	10	30	10	30
$-I_C = 100\text{ mA}; V_{CE} = 5\text{ V}$	$h_{FE}$	>	40	100	40	100
	$h_{FE}$	<	120	300	120	300
$-I_C = 500\text{ mA}; V_{CE} = 5\text{ V}$	$h_{FE}$	>	30	50	30	50

Transition frequency at  $f = 100\text{ MHz}$ 

$-I_C = 50\text{ mA}; -V_{CE} = 10\text{ V}$	$f_T$	>	100			MHz
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Collector capacitance at  $f = 1\text{ MHz}$ 

$I_E = I_E = 0; -V_{CB} = 10\text{ V}$	$C_c$	<	20			pF
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Emitter capacitance at  $f = 1\text{ MHz}$ 

$I_C = I_C = 0; -V_{EB} = 0,5\text{ V}$	$C_e$	<	120			pF
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Switching times see next page.

\* Measured under pulse conditions:  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta < 0,01$ .

**CHARACTERISTICS** (continued)

$T_{amb} = 25\text{ }^{\circ}\text{C}$

**Switching times**

$-I_{Con} = 100\text{ mA}; -I_{Bon} = +I_{Boff} = 5\text{ mA}$

Turn on time

$t_{on} \leq 500\text{ ns}$

Turn off time

$t_{off} \leq 650\text{ ns}$

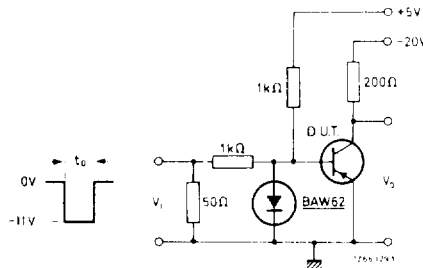


Fig. 2 Switching times test circuit.

Pulse generator:

Pulse duration  $t_0 = 10\text{ }\mu\text{s}$

Rise time  $t_r \leq 15\text{ ns}$

Fall time  $t_f \leq 15\text{ ns}$

Source impedance  $Z_S = 50\text{ }\Omega$

Oscilloscope:

Rise time  $t_r \leq 15\text{ ns}$

Input impedance  $Z_I \geq 100\text{ k}\Omega$