

SILICON PLANAR EPITAXIAL TRANSISTOR

PNP transistor in a microminiature SMD package (SOT-223). Designed primarily for high-speed, saturated switching applications in industrial service.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	40 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	40 V
Collector current (DC)	$-I_C$	max.	200 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	1,5 W
Junction temperature	T_j	max.	150 $^\circ\text{C}$
DC current gain			
$-I_C = 10\text{ mA}; -V_{CE} = 1\text{ V}$	h_{FE}	$>$	100
		$<$	300
Transition frequency at $f = 100\text{ MHz}$			
$-I_C = 10\text{ mA}; -V_{CE} = 20\text{ V}$	f_T	$>$	250 MHz
Storage time			
$-I_{Con} = 10\text{ mA}; -I_{Bon} = I_{Boff} = 1\text{ mA}$	t_s	$<$	225 ns

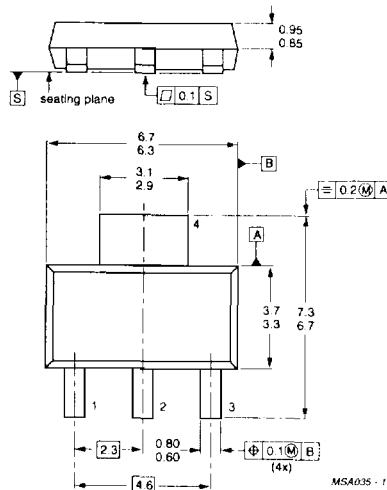
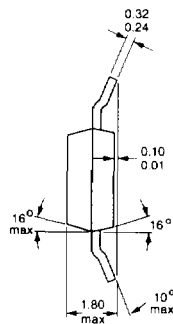
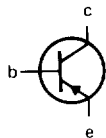
MECHANICAL DATA

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)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	40 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	40 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5 V
Collector current (DC)	$-I_C$	max.	200 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}^*$	P_{tot}	max.	1,5 W
Storage temperature range	T_{stg}		-65 to +150 $^\circ\text{C}$
Junction temperature	T_j	max.	150 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j-a}$	=	83,3 K/W
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CHARACTERISTICS

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

Currents at reverse biased emitter junction

$-V_{CE} = 30\text{ V}; +V_{BE} = 3\text{ V}$	$-I_{CEX}$	<	50 nA
	$+I_{BEX}$	<	50 nA

Saturation voltages

$-I_C = 10\text{ mA}; -I_B = 1\text{ mA}$	$-V_{CEsat}$	<	250 mV
	$-V_{BEsat}$		650 to 850 mV
$-I_C = 50\text{ mA}; -I_B = 5\text{ mA}$	$-V_{CEsat}$	<	400 mV
	$-V_{BEsat}$	<	950 mV

DC current gain

$-I_C = 0,1\text{ mA}; -V_{CE} = 1\text{ V}$	h_{FE}	>	60
$-I_C = 1\text{ mA}; -V_{CE} = 1\text{ V}$	h_{FE}	>	80
$-I_C = 10\text{ mA}; -V_{CE} = 1\text{ V}$	h_{FE}	>	100
$-I_C = 50\text{ mA}; -V_{CE} = 1\text{ V}$	h_{FE}	<	300
$-I_C = 100\text{ mA}; -V_{CE} = 1\text{ V}$	h_{FE}	>	60
	h_{FE}	>	30

Collector capacitance at $100\text{ kHz} \leq f \leq 1\text{ MHz}$

$I_E = I_E = 0; -V_{CB} = 5\text{ V}$	C_c	<	4,5 pF
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Emitter capacitance at $100\text{ kHz} \leq f \leq 1\text{ MHz}$

$I_C = I_C = 0; -V_{EB} = 0,5\text{ V}$	C_e	<	10 pF
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Transition frequency at $f = 100\text{ MHz}$

$-I_C = 10\text{ mA}; -V_{CE} = 20\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$	f_T	>	250 MHz
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Noise figure at $R_S = 1\text{ k}\Omega$

$-I_C = 100\text{ }\mu\text{A}; -V_{CE} = 5\text{ V}$			
$f = 10\text{ Hz to } 15,7\text{ kHz}; T_{amb} = 25\text{ }^\circ\text{C}$	F	<	4,0 dB

* 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 cm²

Switching times

Turn-on time (see Figs 2 and 3) when switched from
 $+V_{BEoff} = 0,5 \text{ V}$ to $-I_{Con} = 10 \text{ mA}$; $-I_{Bon} = 1 \text{ mA}$

Delay time

Rise time

$t_d < 35 \text{ ns}$
 $t_r < 35 \text{ ns}$

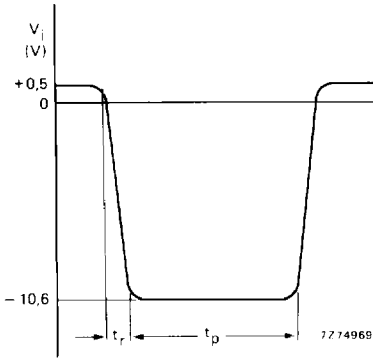


Fig. 2 Input waveform; $t_r < 1 \text{ ns}$; $t_p = 300 \text{ ns}$; $\delta = 0,02$.

Turn-off time (see Figs 4 and 5)

$-I_{Con} = 10 \text{ mA}$; $-I_{Bon} = I_{Boff} = 1 \text{ mA}$

Storage time

Fall time

$t_s < 225 \text{ ns}$
 $t_f < 75 \text{ ns}$

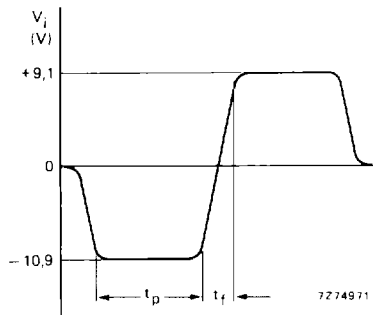


Fig. 4 Input waveform; $t_f < 1 \text{ ns}$;
 $10 \mu\text{s} < t_p < 500 \mu\text{s}$; $\delta = 0,02$.

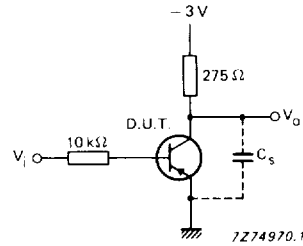


Fig. 3 Delay and rise time test circuit; total shunt capacitance of test jig and connectors $C_s < 4 \text{ pF}$; scope impedance = $10 \text{ M}\Omega$.

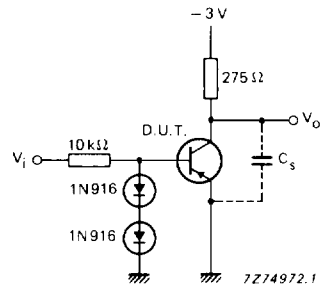


Fig. 5 Storage and fall time test circuit; total shunt capacitance of test jig and connectors $C_s < 4 \text{ pF}$; scope impedance = $10 \text{ M}\Omega$.