SILICON PLANAR EPITAXIAL TRANSISTOR

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

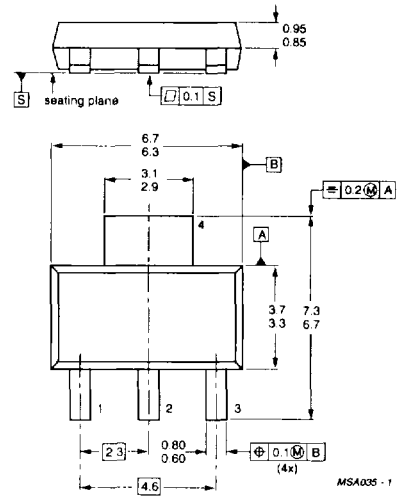
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	60 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 °C	P_{tot}	max.	1,5 W
Junction temperature	T_j	max.	150 °C
DC current gain I_C = 10 mA; V_{CE} = 1 V	h_{FE}	> <	100 300
Transition frequency at f = 100 MHz I_C = 10 mA; V_{CE} = 20 V	f_T	>	300 MHz
Storage time I_{Con} = 10 mA; I_{Bon} = $-I_{Boff}$ = 1 mA	t_s	<	200 ns

MECHANICAL DATA

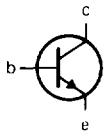
Dimensions in mm

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.	60 V
Collector-emitter voltage (open base)	V_{CEO}	max.	40 V
Emitter-base voltage (open collector)	V_{EBO}	max.	6 V
Collector current (DC)	I_C	max.	200 mA
Total power dissipation at T_{amb} = 25 °C*	P_{tot}	max.	1,5 W
Storage temperature range	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Currents at reverse biased emitter junction			
V_{CE} = 30 V; $-V_{BE}$ = 3 V	I_{CEX}	<	50 nA
	$-I_{BEX}$	<	50 nA
Saturation voltages			
I_C = 10 mA; I_B = 1 mA	V_{CEsat}	<	200 mV
	V_{BEsat}		650 to 850 mV
I_C = 50 mA; I_B = 5 mA	V_{CEsat}	<	300 mV
	V_{BEsat}	<	950 mV
DC current gain			
I_C = 0,1 mA; V_{CE} = 1 V	h_{FE}	>	40
I_C = 1 mA; V_{CE} = 1 V	h_{FE}	>	70
I_C = 10 mA; V_{CE} = 1 V	h_{FE}	>	100
		<	300
I_C = 50 mA; V_{CE} = 1 V	h_{FE}	>	60
I_C = 100 mA; V_{CE} = 1 V	h_{FE}	>	30
Collector capacitance at 100 kHz ≤ f ≤ 1 MHz			
$I_E = I_e$ = 0; V_{CB} = 5 V	C_c	<	4,0 pF
Emitter capacitance at 100 kHz ≤ f ≤ 1 MHz			
$I_C = I_c$ = 0; V_{EB} = 0,5 V	C_e	<	8,0 pF
Transition frequency at f = 100 MHz			
I_C = 10 mA; V_{CE} = 20 V; T_{amb} = 25 °C	f_T	>	300 MHz
Noise figure at R_S = 1 kΩ			
I_C = 100 μA; V_{CE} = 5 V			
f = 10 Hz to 15,7 kHz; T_{amb} = 25 °C	F	<	5,0 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 V to I_{Con} = 10 mA; I_{Bon} = 1 mA

Delay time	t_d	<	35 ns
Rise time	t_r	<	35 ns

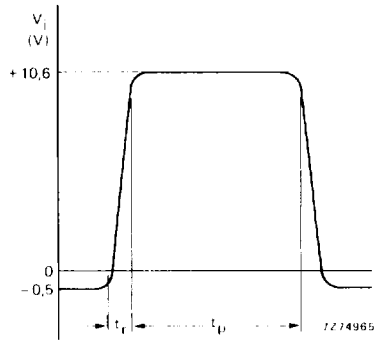


Fig. 2 Input waveform; $t_r < 1$ ns; t_p = 300 ns; δ = 0,02.

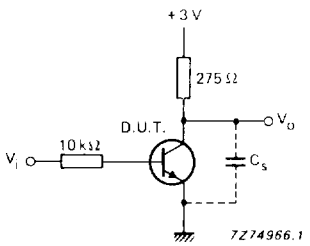


Fig. 3 Delay and rise time test circuit; total shunt capacitance of test jig and connectors $C_s < 4$ pF; scope impedance = 10 MΩ.

Turn-off time (see Figs 4 and 5)
I_{Con} = 10 mA; $I_{Bon} = -I_{Boff}$ = 1 mA

Storage time	t_s	<	200 ns
Fall time	t_f	<	50 ns

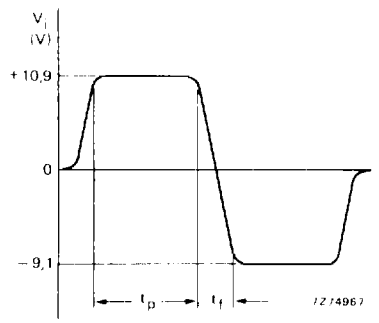


Fig. 4 Input waveform; $t_f < 1$ ns; 10 μs < t_p < 500 μs; δ = 0,02.

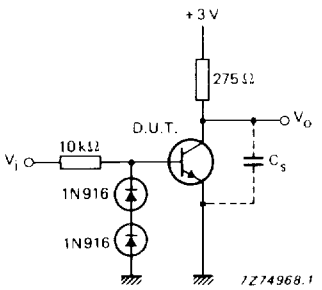


Fig. 5 Storage and fall time test circuit; total shunt capacitance of test jig and connectors $C_s < 4$ pF; scope impedance = 10 MΩ.