SILICON LOW-POWER SWITCHING TRANSISTORS

P-N-P silicon transistor in a microminiature plastic package, intended for switching and linear applications in thick and thin-film circuits.

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 up to T_{amb} = 25 °C	P_{tot}	max.	250 mW
Junction temperature	T_j	max.	150 °C
DC current gain $-I_C$ = 10 mA; $-V_{CE}$ = 1 V	h_{FE}	100 to 300	
Transition frequency at f = 100 MHz $-I_C$ = 10 mA; $-V_{CE}$ = 20 V	f_T	>	250 MHz

MECHANICAL DATA Dimensions in mm

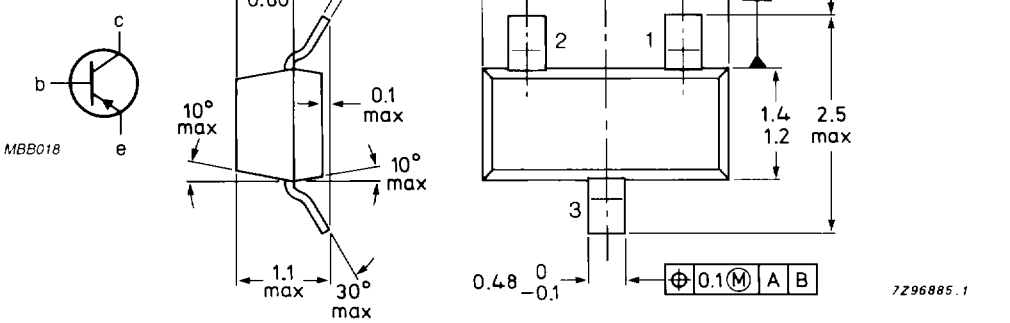
Fig.1 SOT-23.

Marking code

BSR18A = T92

Pinning:

1 = base
2 = emitter
3 = collector



TOP VIEW

Reverse pinning types are available on request.

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 (d.c.)	$-I_C$	max.	200 mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	250 mW
Storage temperature	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	500 K/W

CHARACTERISTICS

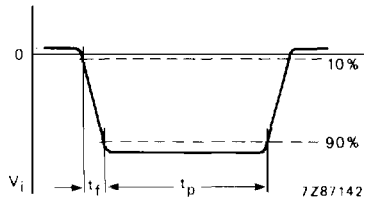
T_{amb} = 25 °C unless otherwise specified

Collector cut-off current			
I_E = 0; $-V_{CB}$ = 30 V	$-I_{CBO}$	<	50 nA
Emitter cut-off current			
I_C = 0; $-V_{EB}$ = 3 V	$-I_{EBO}$	<	50 nA
Saturation voltages**			
$-I_C$ = 10 mA; $-I_B$ = 1 mA	$-V_{CEsat}$	<	250 mV
	$-V_{BEsat}$		650 to 850 mV
$-I_C$ = 50 mA; $-I_B$ = 5 mA	$-V_{CEsat}$	<	400 mV
	$-V_{BEsat}$	<	950 mV
Collector capacitance at f = 100 kHz			
$I_E = I_e$ = 0; $-V_{CB}$ = 5 V	C_c	<	4,5 pF
Emitter capacitance at f = 100 kHz			
$I_C = I_c$ = 0; $-V_{EB}$ = 0,5 V	C_e	<	10 pF

* Mounted on an FR4 printed-circuit board 8 mm x 10 mm x 0.7 mm.

** Measured under pulse conditions; t_p = 300 μs; δ = 0,01.

D.C. current gain*			
$-I_C$ = 0,1 mA; $-V_{CE}$ = 1 V	h_{FE}	>	60
$-I_C$ = 1,0 mA; $-V_{CE}$ = 1 V	h_{FE}	>	80
$-I_C$ = 10 mA; $-V_{CE}$ = 1 V	h_{FE}		100 to 300
$-I_C$ = 50 mA; $-V_{CE}$ = 1 V	h_{FE}	>	60
$-I_C$ =100 mA; $-V_{CE}$ = 1 V	h_{FE}	>	30
Transition frequency at f = 100 MHz			
$-I_C$ = 10 mA; $-V_{CE}$ = 20 V	f_T	>	250 MHz
Noise figure at R_S = 1 kΩ			
$-I_C$ = 100 μA; $-V_{CE}$ = 5 V			
f = 10 to 15 700 Hz	F	<	4 dB
h parameters (common emitter) at f = 1 kHz			
$-I_C$ = 1 mA; $-V_{CE}$ = 10 V			
input impedance	h_{ie}		2 to 12 kΩ
reverse voltage transfer ratio	h_{re}		1 to 10.10^{-4}
small signal current gain	h_{fe}		100 to 400
output admittance	h_{oe}		3 to 60 μS
Switching times (between 10% and 90% levels)			
$-I_C$ = 10 mA; $-I_{Bon}$ = $+I_{Boff}$ = 1 mA			
delay time	t_d	<	35 ns
rise time	t_r	<	35 ns



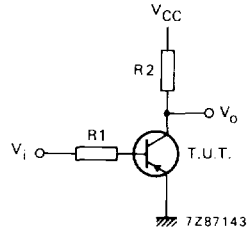
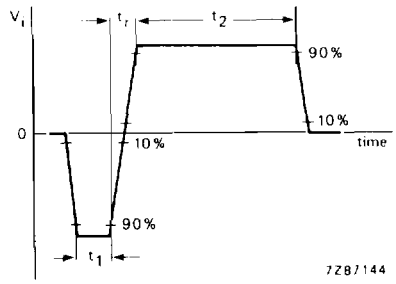


Fig. 2 Waveform and test circuit delay and rise time.
V_i = +0,5 to −10,6 V; $-V_{CC}$ = 3 V; R1 = 10 kΩ; R2 = 275 Ω.
Total shunt capacitance of test jig and connectors = $C_s \leqslant 4$ pF.
Pulse generator: pulse duration 300 ns; fall time < 1 ns; duty factor 2%.

* Measured under pulsed conditions to avoid excessive dissipation; pulse duration $t_p \leq 300$ μs; duty factor $\delta \leq 0.01$.

Switching times (between 10% and 90% levels)
$-I_C = 10$ mA, $-I_{Bon} = I_{Boff} = 1$ mA

storage time	t_s	< 225 ns
fall time	t_r	< 75 ns



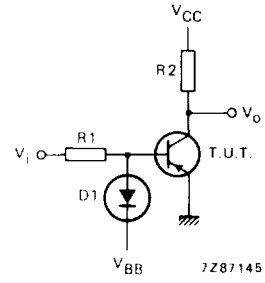


Fig. 3 Waveform and test circuit fall and storage time.
$V_i = -9{,}1$ to $+10{,}9$ V; $V_{CC} = 3$ V; $V_{BB} = 0$ V (ground); R1 = 10 kΩ; R2 = 275 Ω; D1 = 1N916.
Total shunt capacitance of test jig and connectors = $C_s \leqslant 4$ pF.
Pulse generator: pulse duration $t_1 = 10$ to 500 μs; rise time $t_r < 1$ ns; duty factor $\delta = 2\%$.