SILICON LOW-POWER SWITCHING TRANSISTORS

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

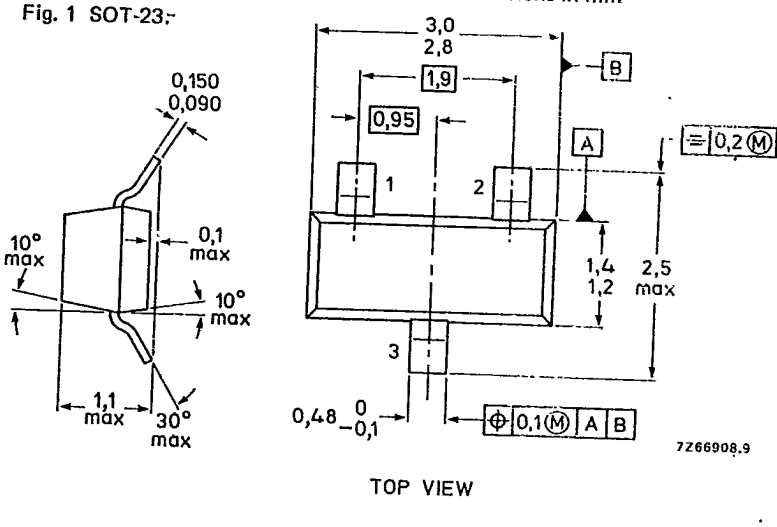
QUICK REFERENCE DATA

Collector-base voltage (open emitter)		$-V_{CBO}$	max.	40 V
Collector-emitter voltage (open base)		$-V_{CEO}$	max.	40 V
Collector current (d.c.)		$-I_C$	max.	200 mA
Total power dissipation up to T_{amb} = 65 °C		P_{tot}	max.	250 mW
Junction temperature		T_j	max.	150 °C
D.C. current gain				
$-I_C$ = 10 mA; $-V_{CE}$ = 1 V	BSR18	h_{FE}		50 to 150
$-I_C$ = 10 mA; $-V_{CE}$ = 1 V	BSR18A	h_{FE}		100 to 300
Transition frequency at f = 500 MHz				
$-I_C$ = 10 mA; $-V_{CE}$ = 20 V	BSR18	f_T	>	200 MHz
$-I_C$ = 10 mA; $-V_{CE}$ = 20 V	BSR18A	f_T	>	250 MHz

MECHANICAL DATA

Fig. 1 SOT-23.

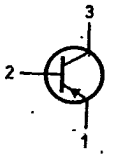
Dimensions in mm



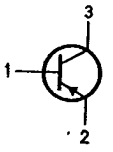
TOP VIEW

Marking code

BSR18 = T9
BSR18A = T92



BSR18R = T91
BSR18AR = T93



R-types are available on request.
See also *Soldering recommendations.*

BSR18
BSR18A

T-37-15

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 $T_{amb} \leqslant 65$ °C	P_{tot}	max.	200 mW
Storage temperature	T_{stg}		−55 to +150 °C
Junction temperature	T_j	max.	150 °C

THERMAL CHARACTERISTICS*

$T_j = P \times (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	50 K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280 K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90 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

* See *Thermal characteristics.*

** Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

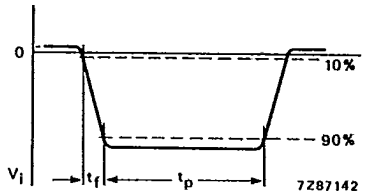
▲ Measured under pulse conditions; $t_p = 300\ \mu s$; $\delta = 0{,}01$.

Silicon low-power switching transistors

BSR18
BSR18A

T-37-15

		BSR18	BSR18A
D.C. current gain*			
$-I_C$ = 0,1 mA; $-V_{CE}$ = 1 V	h_{FE}	> 30	60
$-I_C$ = 1,0 mA; $-V_{CE}$ = 1 V	h_{FE}	> 40	80
$-I_C$ = 10 mA; $-V_{CE}$ = 1 V	h_{FE}	50 to 150	100 to 300
$-I_C$ = 50 mA; $-V_{CE}$ = 1 V	h_{FE}	> 30	60
$-I_C$ =100 mA; $-V_{CE}$ = 1 V	h_{FE}	> 15	30
Transition frequency at f = 100 MHz			
$-I_C$ = 10 mA; $-V_{CE}$ = 20 V	f_T	> 200	250 MHz
Noise figure at R_S = 1 kΩ			
$-I_C$ = 100 μA; $-V_{CE}$ = 5 V			
f = 10 to 15 700 Hz	F	< 5	4 dB
h parameters (common emitter) at f = 1 kHz			
$-I_C$ = 1 mA; $-V_{CE}$ = 10 V			
input impedance	h_{ie}	0,5 to 8	2 to 12 kΩ
reverse voltage transfer ratio	h_{re}	0,1 to 5.10^{-4}	1 to 10.10^{-4}
small signal current gain	h_{fe}	50 to 200	100 to 400
output admittance	h_{oe}	1 to 40	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



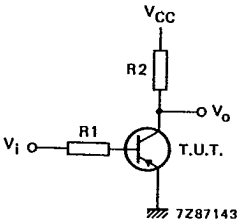
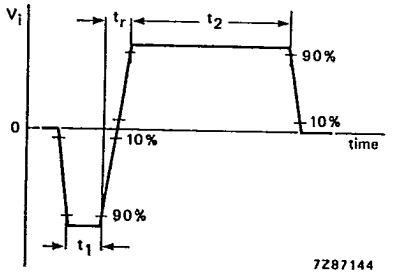


Fig. 2 Waveform and test circuit delay and rise time.
V_i = +0,5 to −10,6 V; $-V_{CC}$ = 3 V; R1 = 10 kΩ; R2 = 275 Ω.
Total shunt capacitance of test jig and connectors = $C_s \leqslant 4$ pF.
Pulse generator: pulse duration 300 ns; fall time < 1 ns; duty factor 2%.

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

		BSR18	BSR18A
storage time	t_s <	200	225 ns
fall time	t_f <	60	75 ns



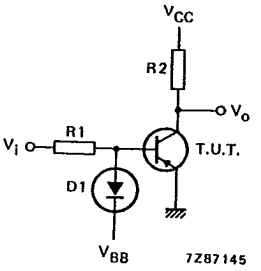


Fig. 3 Waveform and test circuit fall and storage time.
V_i = −9,1 to +10,9 V; V_{CC} = 3 V; V_{BB} = 0 V (ground); R1 = 10 kΩ; R2 = 275 Ω; D1 = 1N916.
Total shunt capacitance of test jig and connectors = $C_s \leqslant 4$ pF.
Pulse generator: pulse duration t_1 = 10 to 500 μs; rise time $t_r < 1$ ns;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

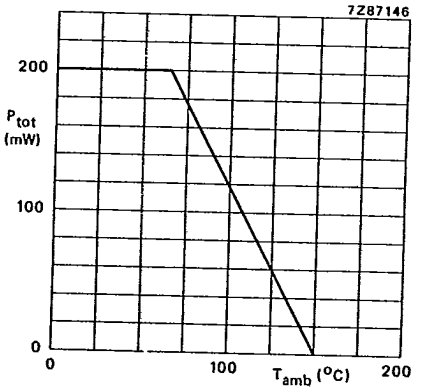


Fig. 4 Power derating curve.