P-N-P DARLINGTON TRANSISTORS

Silicon planar transistors in plastic TO-92 envelopes, intended for industrial applications e.g. print hammer, solenoid, relay and lamp driving.

N-P-N complements are the BSR50, BSR51 and BSR52.

QUICK REFERENCE DATA

			BSR60	BSR61	BSR62	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	60	80	90	V
Collector-emitter voltage (see Fig. 6)	$-V_{CER}$	max.	45	60	80	V
Collector current (average)	$-I_{C(AV)}$	max.	1,0	1,0	1,0	A
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	0,8	0,8	0,8	W
Junction temperature	T_j	max.	150	150	150	°C
Collector-emitter saturation voltage $-I_C$ = 0,5 A; $-I_B$ = 0,5 mA	$-V_{CEsat}$	<	1,3	1,3	1,4	V
D.C. current gain						
$-I_C$ = 150 mA; $-V_{CE}$ = 10 V	h_{FE}	>		1000		
$-I_C$ = 500 mA; $-V_{CE}$ = 10 V	h_{FE}	>		2000		
Turn-off time when switched from $-I_{Con}$ = 500 mA; $-I_{Bon}$ = 0,5 mA to cut-off with + I_{Boff} = 0,5 mA	t_{off}	<		1,5		µs

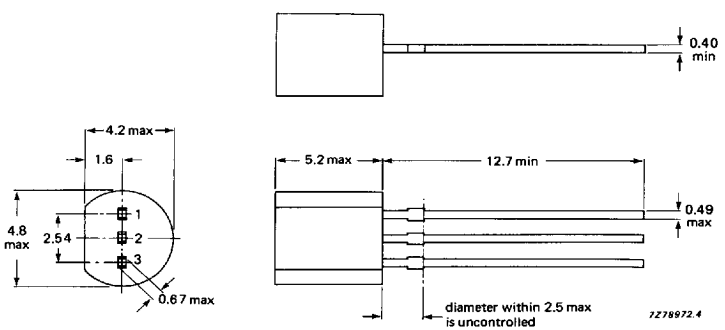
MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-92. For circuit diagram, see Fig. 2.

Pinning

1 = base
2 = collector
3 = emitter



Capability approved to CECC NECC-C-002

RATINGS

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

			BSR60	BSR61	BSR62	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	60	80	90	V
Collector-emitter voltage (see Fig. 6)	$-V_{CER}$	max.	45	60	80	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5	5	5	V
Collector current (average)	$-I_{C(AV)}$	max.		1,0		A
Collector current (peak value)	$-I_{CM}$	max.		2,0		A
Base current (d.c.)	$-I_B$	max.		0,1		A
Total power dissipation						
up to T_{amb} = 25 °C	P_{tot}	max.		0,8		W
up to T_{amb} = 25 °C *	P_{tot}	max.		1,0		W
Storage temperature	T_{stg}			−65 to + 150		°C
Junction temperature **	T_j	max.		150		°C

THERMAL RESISTANCE **

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	156	K/W

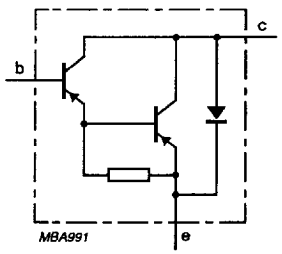


Fig. 2 Circuit diagram.

* Transistor mounted on printed-circuit board, maximum lead length 3 mm, mounting pad for collector lead minimum 10 mm x 10 mm.

** Based on maximum average junction temperature in line with common industrial practice. The resulting higher junction temperature of the output transistor part is taken into account.

CHARACTERISTICS

T_j = 25 °C

Collector cut-off current				
I_E = 0; $-V_{CB}$ = 45 V	**BSR60**	$-I_{CBO}$	<	50 nA
I_E = 0; $-V_{CB}$ = 60 V	**BSR61**	$-I_{CBO}$	<	50 nA
I_E = 0; $-V_{CB}$ = 80 V	**BSR62**	$-I_{CBO}$	<	50 nA
Emitter cut-off current				
I_C = 0; $-V_{EB}$ = 4 V		$-I_{EBO}$	<	50 nA
Saturation voltages				
$-I_C$ = 0,5 A; $-I_B$ = 0,5 mA	**BSR60; BSR61**	$-V_{CEsat}$	<	1,3 V
		$-V_{BEsat}$	<	1,9 V
$-I_C$ = 0,5 A; $-I_B$ = 0,5 mA	**BSR62**	$-V_{CEsat}$	<	1,4 V
		$-V_{BEsat}$	<	2,0 V
$-I_C$ = 1,0 A; $-I_B$ = 1,0 mA	**BSR61**	$-V_{CEsat}$	<	1,6 V
		$-V_{BEsat}$	<	2,2 V
$-I_C$ = 1,0 A; $-I_B$ = 4,0 mA	**BSR60**	$-V_{CEsat}$	<	1,6 V
		$-V_{BEsat}$	<	2,2 V
$-I_C$ = 1,0 A; $-I_B$ = 4,0 mA	**BSR62**	$-V_{CEsat}$	<	1,8 V
		$-V_{BEsat}$	<	2,4 V
D.C. current gain				
$-I_C$ = 150 mA; $-V_{CE}$ = 10 V		h_{FE}	>	1000
$-I_C$ = 500 mA; $-V_{CE}$ = 10 V		h_{FE}	>	2000
Small-signal current gain at f = 35 MHz				
$-I_C$ = 500 mA; $-V_{CE}$ = 5 V		h_{fe}	typ.	10

Switching times (see Figs 3 and 4)

$-I_{Con}$ = 500 mA; $-I_{Bon}$ = + I_{Boff} = 0,5 mA

Turn-on time	t_{on}	<	1,0 μs
Turn-off time	t_{off}	<	1,5 μs

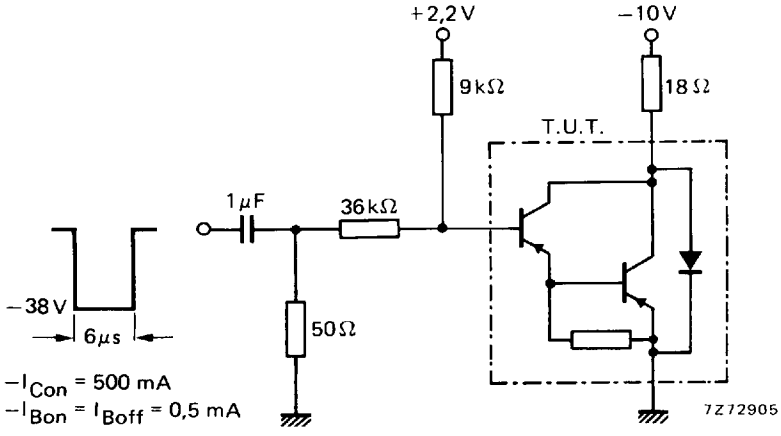


Fig. 3 Test circuit for 500 mA switching.

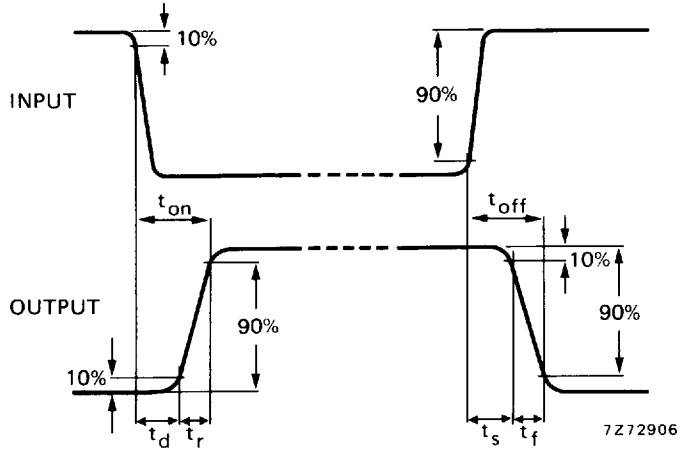


Fig. 4 Switching waveforms.

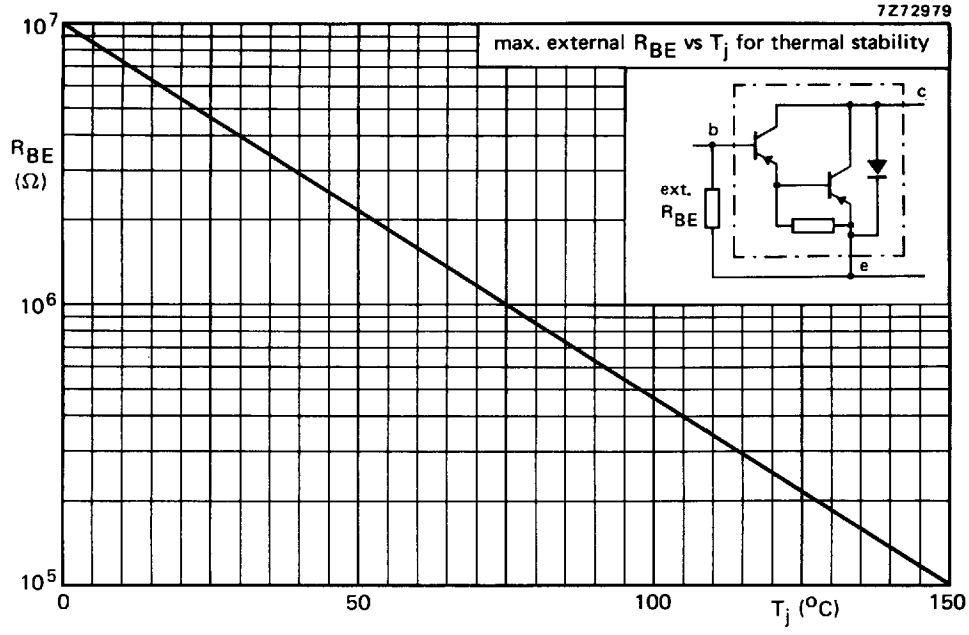


Fig. 5.

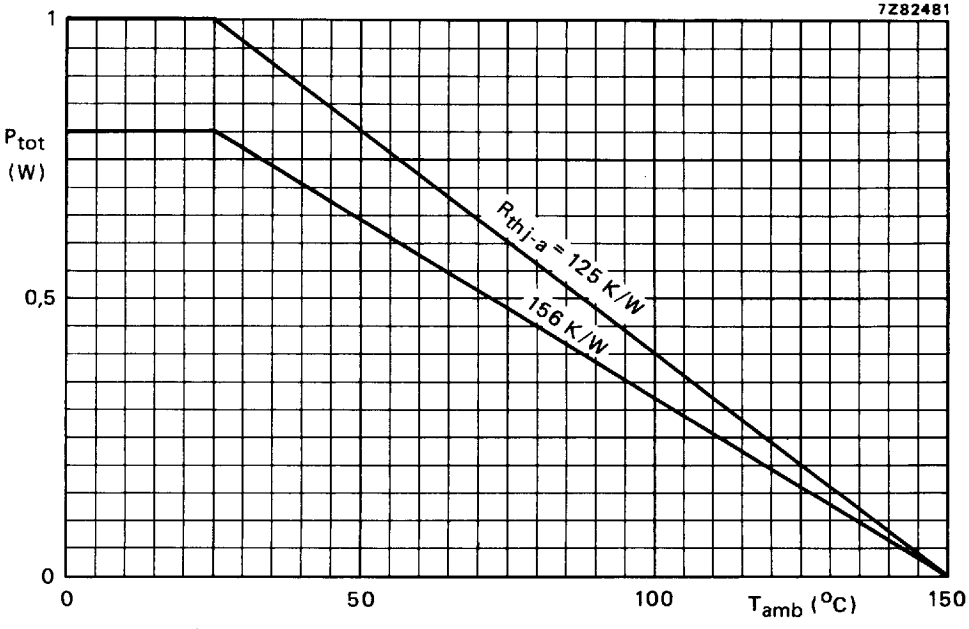


Fig. 6 Maximum permissible power dissipation as a function of ambient temperature.

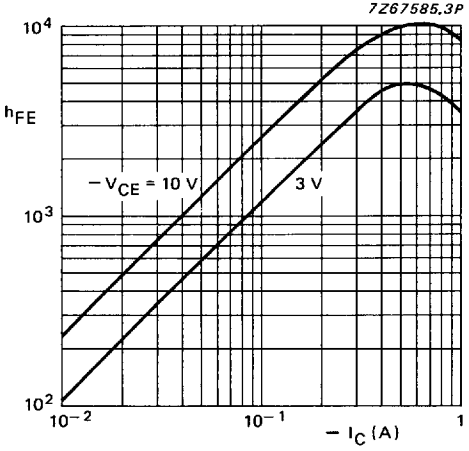


Fig. 7 T_j = 25 °C.

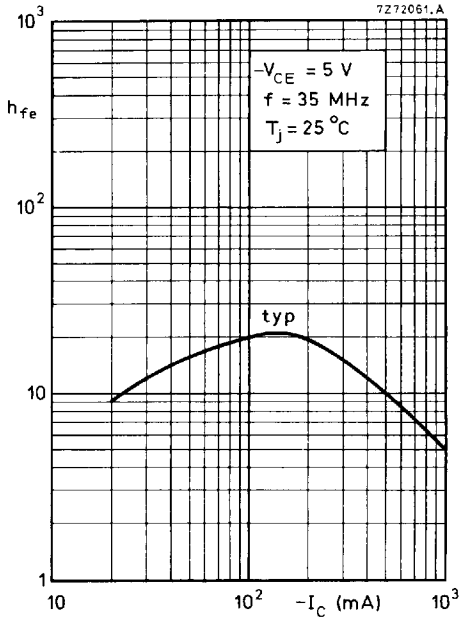


Fig. 8.