

PNP Darlington transistors

BSR60; BSR61; BSR62

FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V)
- Integrated diode and resistor.

APPLICATIONS

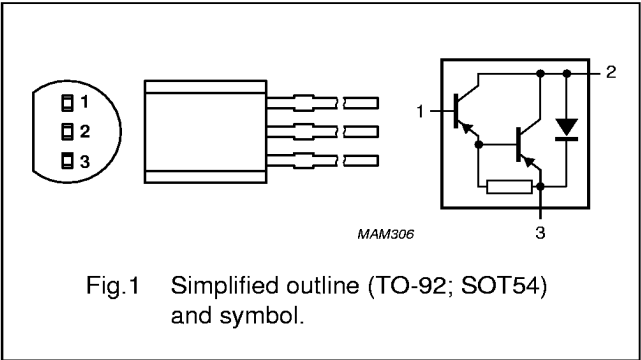
- Industrial applications such as:
 - Print hammer
 - Solenoid
 - Relay and lamp driving.

DESCRIPTION

PNP Darlington transistor in a TO-92; SOT54 plastic package. NPN complements: BSR50, BSR51 and BSR52.

PINNING

PIN	DESCRIPTION
1	base
2	collector
3	emitter



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter				
	BSR60		–	–	–60	V
	BSR61		–	–	–80	V
V_{CES}	collector-emitter voltage	$V_{BE} = 0$				
	BSR60		–	–	–45	V
	BSR61		–	–	–60	V
I_C	collector current (DC)		–	–	–1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	–		0.83	W
h_{FE}	DC current gain	$I_C = -150\text{ mA}; V_{CE} = -10\text{ V}$	1 000	–	–	
		$I_C = -500\text{ mA}; V_{CE} = -10\text{ V}$	2 000	–	–	
f_T	transition frequency	$I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$	–	200	–	MHz

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	BSR60		–	–60	V
	BSR61		–	–80	V
	BSR62		–	–90	V
V_{CES}	collector-emitter voltage	$V_{BE} = 0$			
	BSR60		–	–45	V
	BSR61		–	–60	V
	BSR62		–	–80	V
V_{EBO}	emitter-base voltage	open collector	–	–5	V
I_C	collector current (DC)		–	–1	A
I_{CM}	peak collector current		–	–2	A
I_B	base current (DC)		–	–0.2	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$; note 1	–	0.83	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Note

1. Transistor mounted on an FR4 printed-circuit board.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	150	K/W

Note

1. Transistor mounted on an FR4 printed-circuit board.

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	collector cut-off current					
	BSR60	$V_{BE} = 0; V_{CE} = -45\text{ V}$	—	—	—50	nA
	BSR61	$V_{BE} = 0; V_{CE} = -60\text{ V}$	—	—	—50	nA
	BSR62	$V_{BE} = 0; V_{CE} = -80\text{ V}$	—	—	—50	nA
I_{EBO}	emitter cut-off current	$I_C = 0; V_{EB} = -4\text{ V}$	—	—	—50	nA
h_{FE}	DC current gain	$V_{CE} = -10\text{ V}$; see Fig.2				
		$I_C = -150\text{ mA}$	1000	—	—	
		$I_C = -500\text{ mA}$	2000	—	—	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -0.5\text{ mA}$				
	BSR60; BSR61		—	—	—1.3	V
	BSR62		—	—	—1.4	V
V_{CEsat}	collector-emitter saturation voltage					
	BSR60	$I_C = -1\text{ A}; I_B = -4\text{ mA}$	—	—	—1.6	V
	BSR61	$I_C = -1\text{ A}; I_B = -1\text{ mA}$	—	—	—1.6	V
	BSR62	$I_C = -1\text{ A}; I_B = -4\text{ mA}$	—	—	—1.8	V
V_{BEsat}	base-emitter saturation voltage	$I_C = -0.5\text{ A}; I_B = -0.5\text{ mA}$				
	BSR60; BSR61		—	—	—1.9	V
	BSR62		—	—	—2	V
V_{BEsat}	base-emitter saturation voltage					
	BSR60	$I_C = -1\text{ A}; I_B = -4\text{ mA}$	—	—	—2.2	V
	BSR61	$I_C = -1\text{ A}; I_B = -1\text{ mA}$	—	—	—2.2	V
	BSR62	$I_C = -1\text{ A}; I_B = -4\text{ mA}$	—	—	—2.4	V
f_T	transition frequency	$I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$	—	200	—	MHz
Switching times (between 10% and 90% levels); see Fig.3						
t_{on}	turn-on time	$I_{Con} = -500\text{ mA}; I_{Bon} = -0.5\text{ mA};$	—	—	0.5	μs
t_{off}	turn-off time	$I_{Boff} = 0.5\text{ mA}$	—	—	0.7	μs

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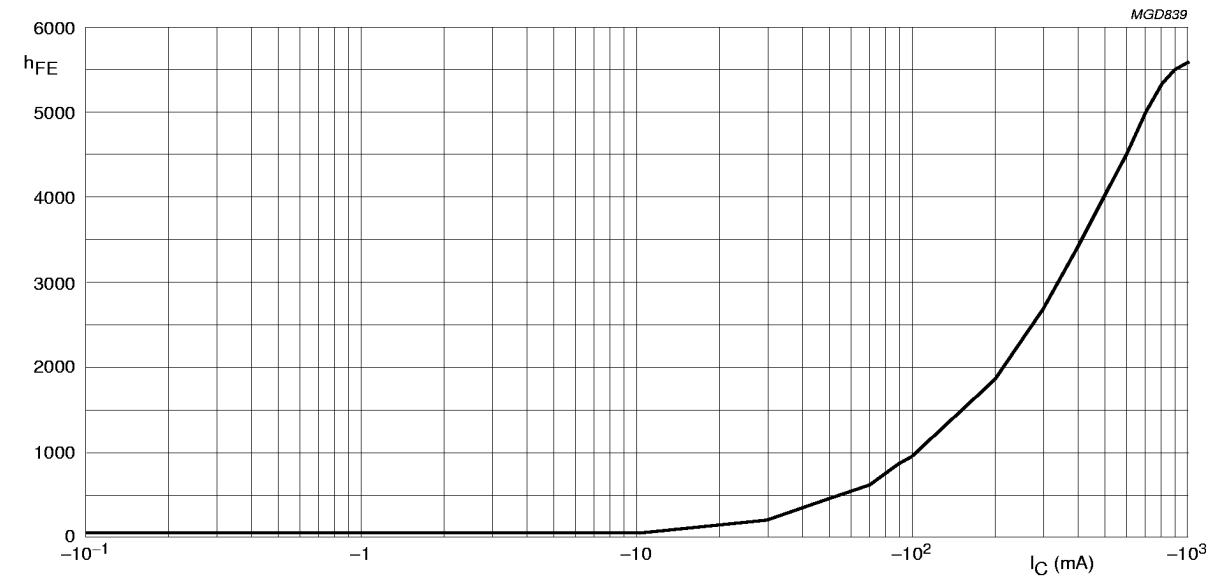
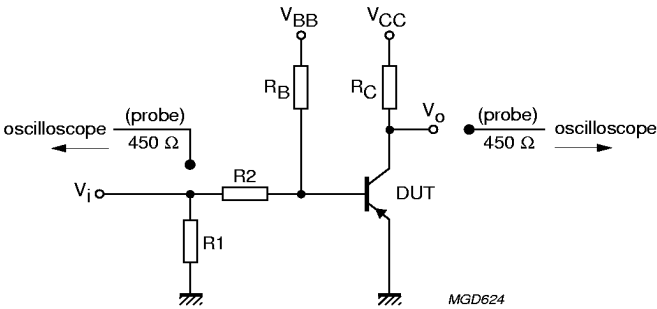


Fig.2 DC current gain; typical values.



$V_i = -10$ V; $T = 200$ μ s; $t_p = 6$ μ s; $t_r = t_f \leq 3$ ns.
 $R_1 = 56$ Ω ; $R_2 = 10$ k Ω ; $R_B = 10$ k Ω ; $R_C = 18$ Ω .
 $V_{BB} = 1.8$ V; $V_{CC} = -10.7$ V.
Oscilloscope: input impedance $Z_i = 50$ Ω .

Fig.3 Test circuit for switching times.

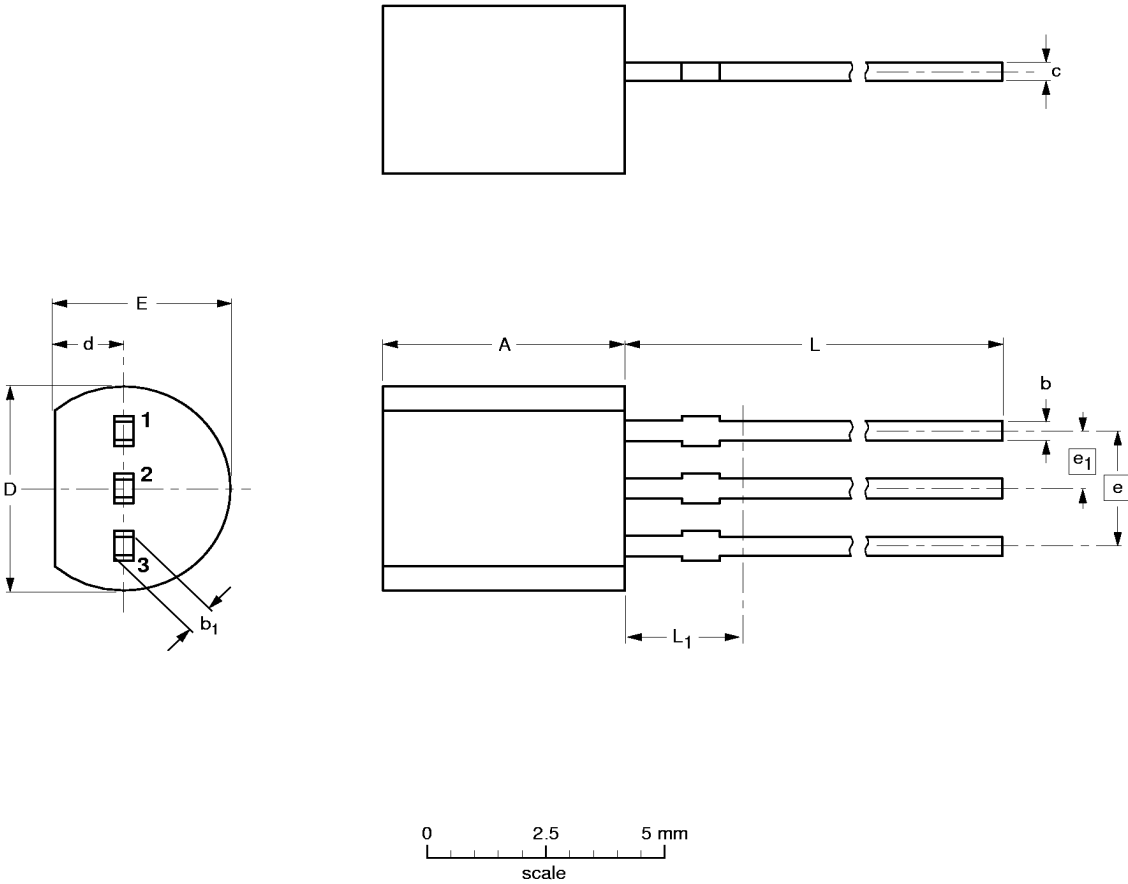
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads

SOT54



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b ₁	c	D	d	E	e	e ₁	L	L ₁ ⁽¹⁾
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT54		TO-92	SC-43			97-02-28