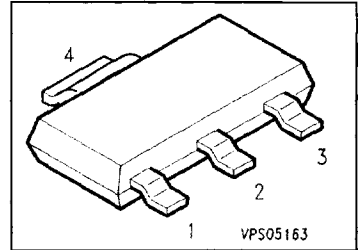


## NPN Silicon Darlington Transistors

**BSP 50**  
**... BSP 52**

- High collector current
- Low collector-emitter saturation voltage
- Complementary types: BSP 60 ... BSP 62 (PNP)



Type	Marking	Ordering Code (tape and reel)	Pin Configuration				Package <sup>1)</sup>
			1	2	3	4	
BSP 50	BSP 50	Q62702-P1163	B	C	E	C	SOT-223
BSP 51	BSP 51	Q62702-P1164					
BSP 52	BSP 52	Q62702-P1165					

### Maximum Ratings

Parameter	Symbol	Values			Unit
		BSP 50	BSP 51	BSP 52	
Collector-emitter voltage	$V_{CEr}$	45	60	80	V
Collector-base voltage	$V_{CB0}$	60	80	90	
Emitter-base voltage	$V_{EB0}$	5			
Collector current	$I_C$	1			A
Peak collector current	$I_{CM}$	2			
Base current	$I_B$	0.1			
Total power dissipation, $T_s = 124\text{ °C}$	$P_{tot}$	1.5			W
Junction temperature	$T_j$	150			°C
Storage temperature range	$T_{stg}$	- 65 ... + 150			

### Thermal Resistance

Junction - ambient <sup>2)</sup>	$R_{th JA}$	≤ 72	K/W
Junction - soldering point	$R_{th JS}$	≤ 17	

<sup>1)</sup> For detailed information see chapter Package Outlines.

<sup>2)</sup> Package mounted on epoxy pcb 40 mm × 40 mm × 1.5 mm/6 cm<sup>2</sup> Cu.

## Electrical Characteristics

at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

### DC characteristics

Collector-emitter breakdown voltage <sup>1)</sup> $I_C = 10\text{ mA}$	$V_{(BR)CER}$	45 60 80	— — —	— — —	V
Collector-base breakdown voltage $I_C = 100\ \mu\text{A}$ , $I_B = 0$	$V_{(BR)CB0}$	60 80 90	— — —	— — —	
Emitter-base breakdown voltage $I_E = 100\ \mu\text{A}$ , $I_B = 0$	$V_{(BR)EB0}$	5	—	—	
Collector-emitter cutoff current $V_{CE} = V_{CERmax}$ , $V_{BE} = 0$	$I_{CES}$	—	—	10	$\mu\text{A}$
Emitter-base cutoff current $V_{EB} = 4\text{ V}$ , $I_C = 0$	$I_{EB0}$	—	—	10	
DC current gain <sup>2)</sup> $I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$	$h_{FE}$	1000 2000	— —	— —	—
Collector-emitter saturation voltage <sup>2)</sup> $I_C = 500\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 1\text{ A}$ , $I_B = 1\text{ mA}$	$V_{CEsat}$	— —	— —	1.3 1.8	V
Base-emitter saturation voltage <sup>2)</sup> $I_C = 500\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 1\text{ A}$ , $I_B = 1\text{ mA}$	$V_{BEsat}$	— —	— —	1.9 2.2	

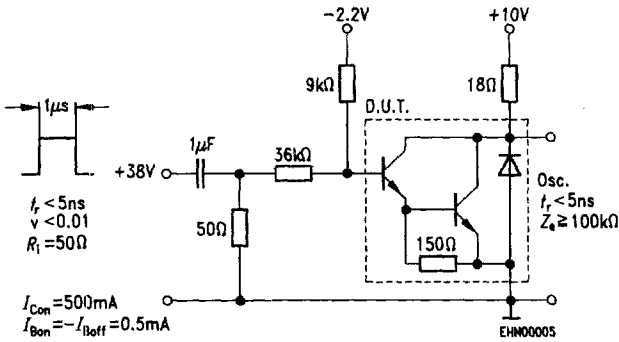
### AC characteristics

Transition frequency $I_C = 100\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 100\text{ MHz}$	$f_T$	—	200	—	MHz
Switching times $I_C = 500\text{ mA}$ , $I_{B1} = I_{B2} = 0.5\text{ mA}$ (see diagrams)	$t_{on}$ $t_{off}$	— —	400 1500	— —	ns ns

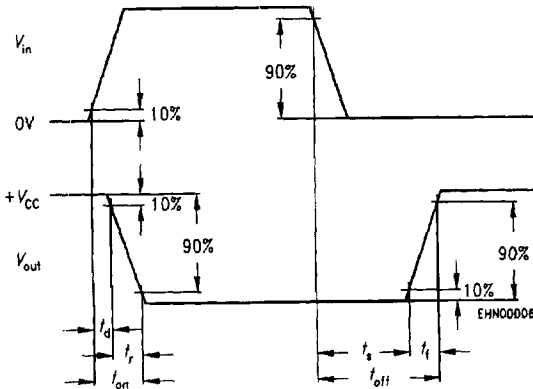
1) Compare  $R_{BE}$  for thermal stability.

2) Pulse test conditions:  $t \leq 300\ \mu\text{s}$ ,  $D = 2\%$ .

Switching time test circuit



Switching time waveform



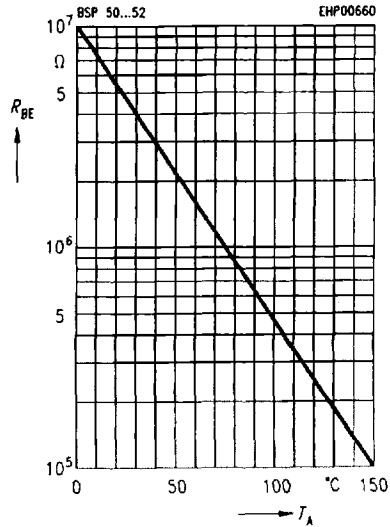
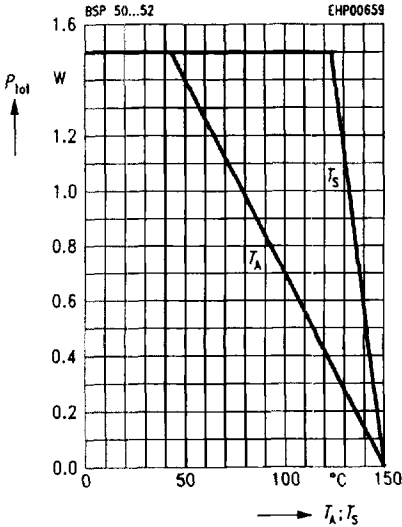
**Total power dissipation  $P_{tot} = f(T_A^*, T_S)$**

\* Package mounted on epoxy

**External resistance  $R_{BE} = f(T_A)^{**}$**

$V_{CB} = V_{CE\ max}$

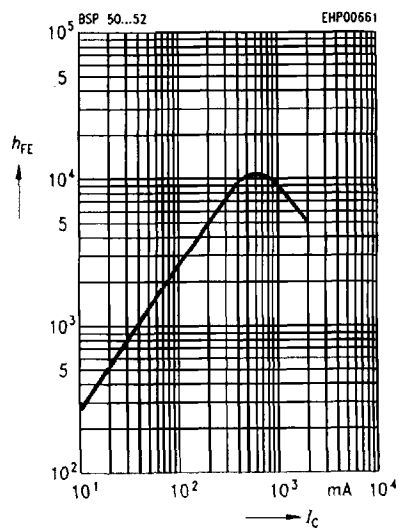
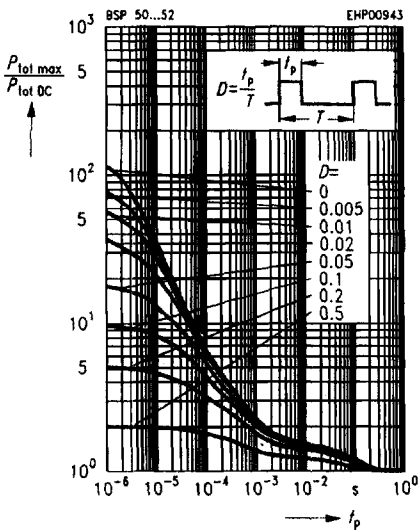
\*\*  $R_{BE\ max}$  for thermal stability



**Permissible pulse load  $P_{tot\ max} / P_{tot\ DC} = f(t_p)$**

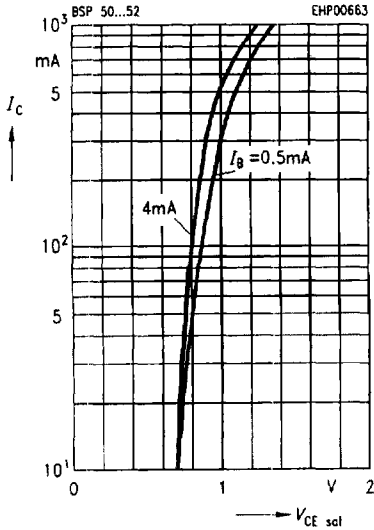
**DC current gain  $h_{FE} = f(I_c)$**

$V_{CE} = 10\ V$



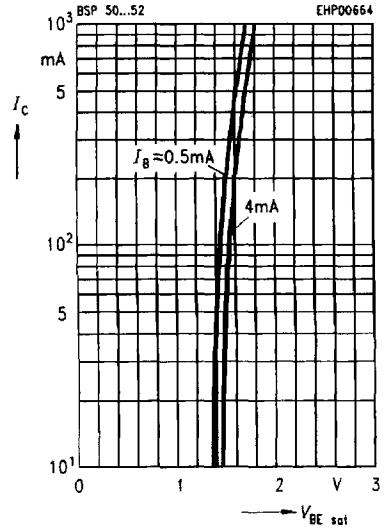
**Collector-emitter saturation voltage**

$I_C = f(V_{CE\ sat}), I_B$ -parameter



**Base-emitter saturation voltage**

$I_C = f(V_{BE\ sat}), I_B$ -parameter



**Transition frequency  $f_T = f(I_C)$**

$V_{CE} = 5\text{ V}, f = 100\text{ MHz}$

