

## 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	100	
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>	$R_{th JA}$	$\leq 72$	K/W
Junction - soldering point	$R_{th JS}$	$\leq 17$	

1) For detailed information see chapter Package Outlines.

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

## Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

### DC characteristics

Collector-emitter breakdown voltage <sup>1)</sup> $I_C = 10\text{ mA}$	$V_{(BR)CER}$	BSP 50	45	–	–	V
BSP 51		60	–	–		
BSP 52		80	–	–		
Collector-base breakdown voltage $I_C = 100\text{ }\mu\text{A}, I_B = 0$	$V_{(BR)CB0}$	BSP 50	60	–	–	
BSP 51		80	–	–		
BSP 52		100	–	–		
Emitter-base breakdown voltage $I_E = 100\text{ }\mu\text{A}, I_B = 0$	$V_{(BR)EB0}$		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	V
			–	–	1.8	
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	

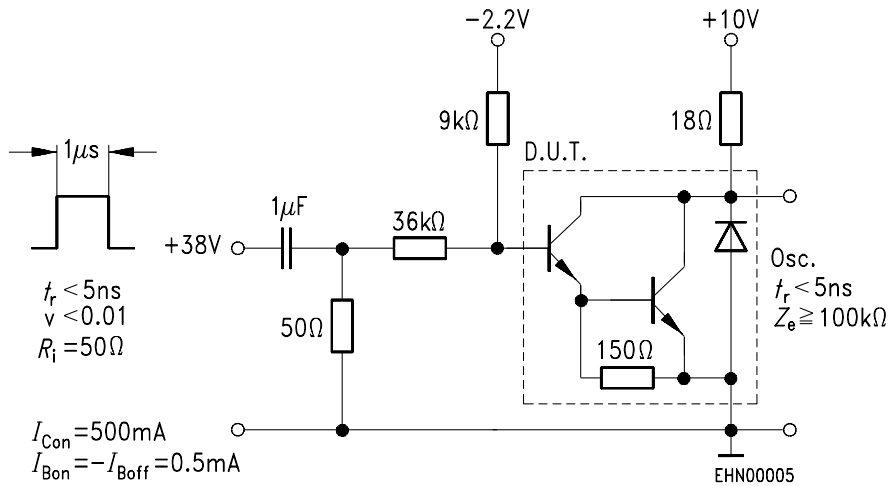
### AC characteristics

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)	$t_{on}$	–	400	–	ns
	$t_{off}$	–	1500	–	ns

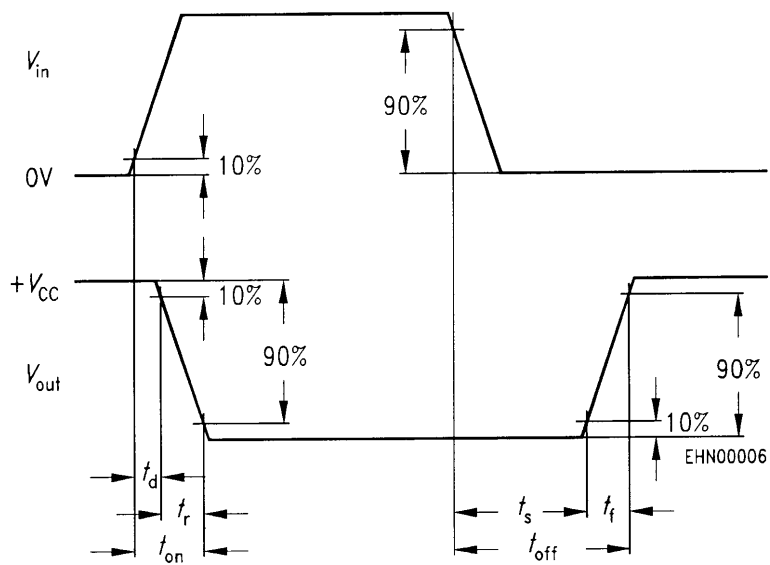
1) Compare  $R_{BE}$  for thermal stability.

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

## Switching time test circuit

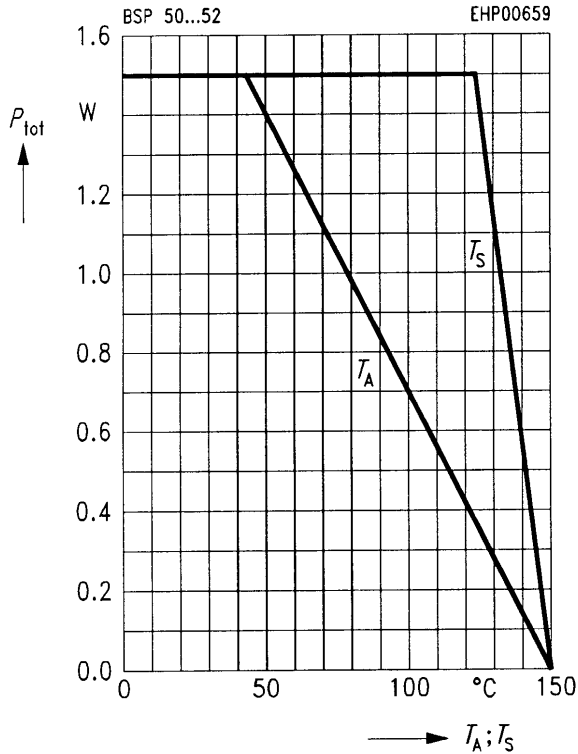


## Switching time waveform



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

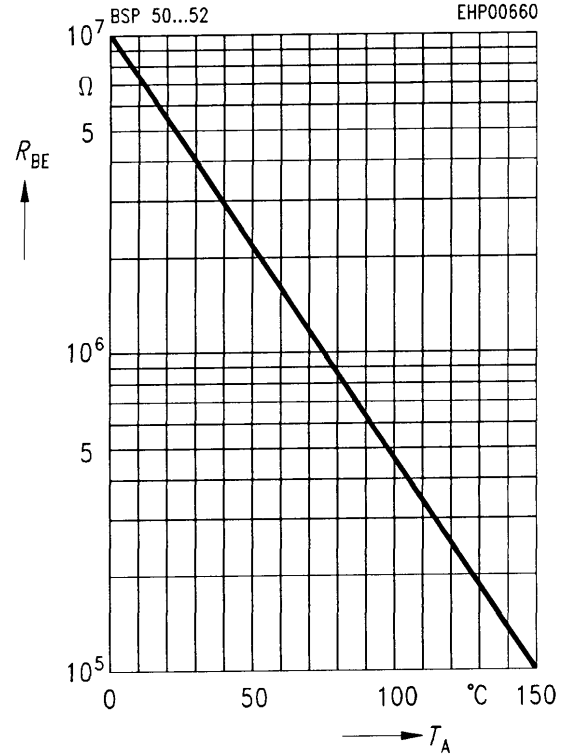
\* Package mounted on epoxy



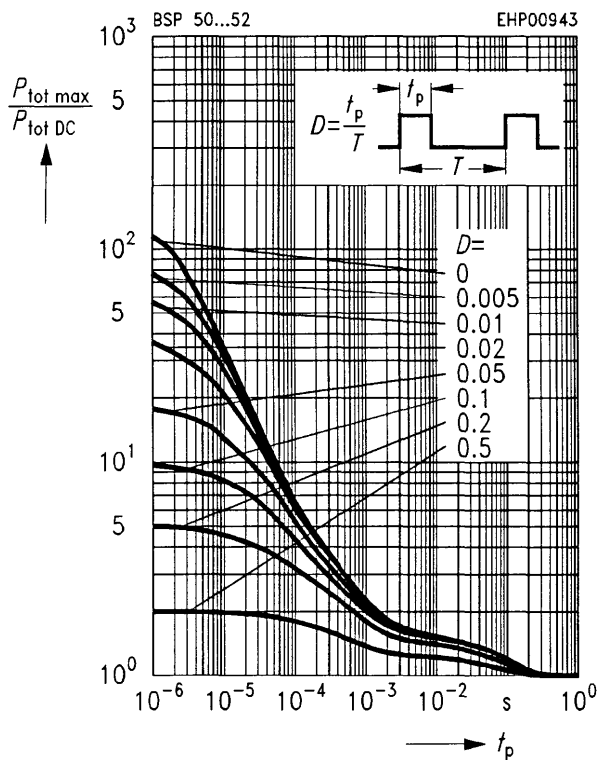
### External resistance $R_{BE} = f(T_A)^{**}$

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

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

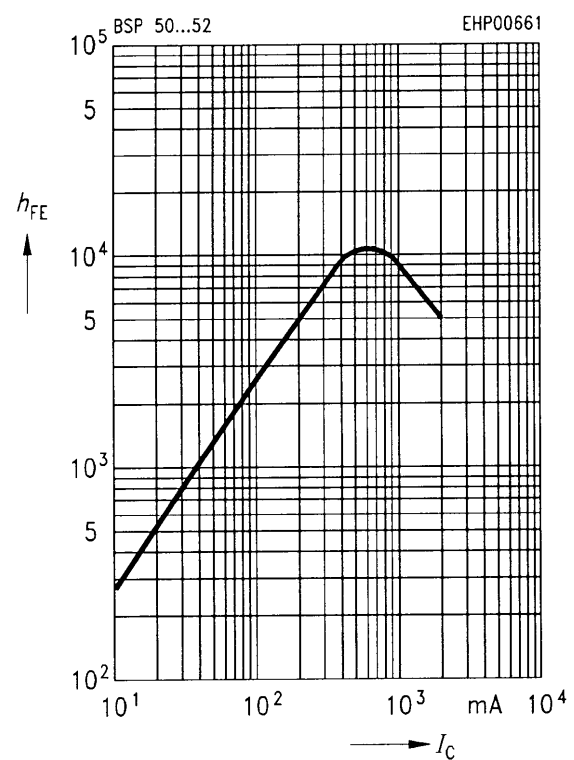


### Permissible pulse load $P_{tot\ max} / P_{tot\ DC} = f(t_p)$



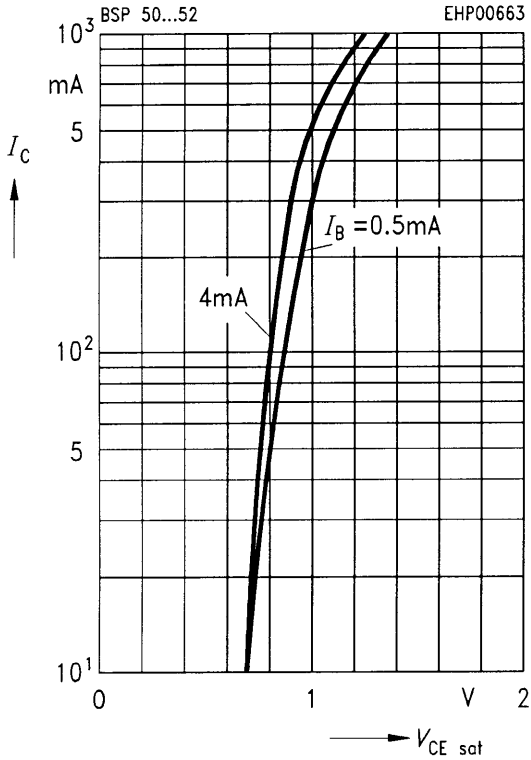
### DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 10\ V$



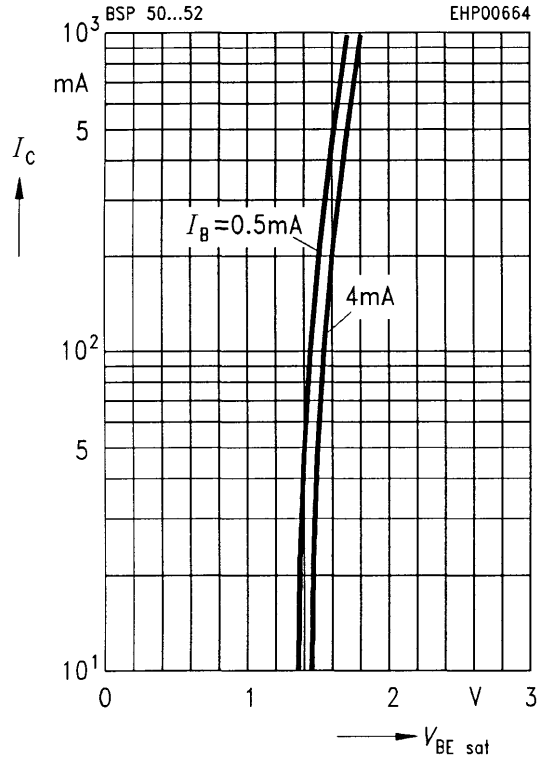
**Collector-emitter saturation voltage**

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



**Base-emitter saturation voltage**

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



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

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

