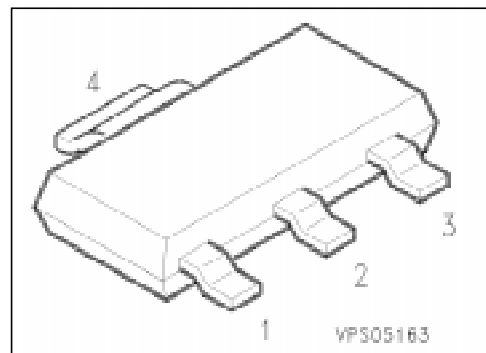


NPN Silicon Darlington Transistors

**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 ¹⁾
			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, $T_{\text{S}} = 124\text{ }^{\circ}\text{C}$	P_{tot}	1.5			W
Junction temperature	T_{j}	150			$^{\circ}\text{C}$
Storage temperature range	T_{stg}	− 65 ... + 150			

Thermal Resistance

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

¹⁾ For detailed information see chapter Package Outlines.

²⁾ Package mounted on epoxy pcb 40 mm × 40 mm × 1.5 mm/6 cm² 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 ¹⁾ $I_C = 10\text{ mA}$ BSP 50 BSP 51 BSP 52	$V_{(BR)CER}$	45 60 80	— — —	— — —	V
Collector-base breakdown voltage $I_C = 100\text{ }\mu\text{A}$, $I_B = 0$ BSP 50 BSP 51 BSP 52	$V_{(BR)CB0}$	60 80 100	— — —	— — —	
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	μA
Emitter-base cutoff current $V_{EB} = 4\text{ V}$, $I_C = 0$	I_{EB0}	—	—	10	
DC current gain ²⁾ $I_C = 150\text{ mA}$, $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$, $V_{CE} = 10\text{ V}$	h_{FE}	1000 2000	— —	— —	—
Collector-emitter saturation voltage ²⁾ $I_C = 500\text{ mA}$, $I_B = 0.5\text{ mA}$ $I_C = 1\text{ A}$, $I_B = 1\text{ mA}$	V_{CEsat}	— —	— —	1.3 1.8	V
Base-emitter saturation voltage ²⁾ $I_C = 500\text{ mA}$, $I_B = 0.5\text{ mA}$ $I_C = 1\text{ A}$, $I_B = 1\text{ mA}$	V_{BEsat}	— —	— —	1.9 2.2	

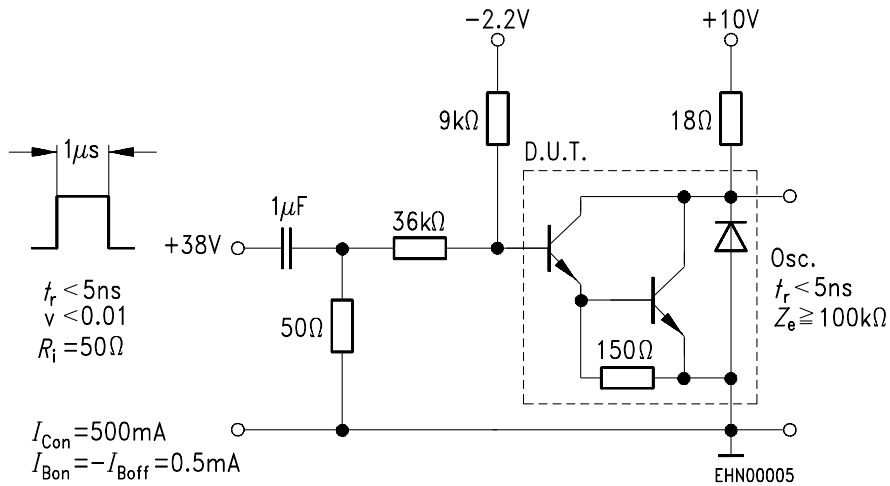
AC characteristics

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

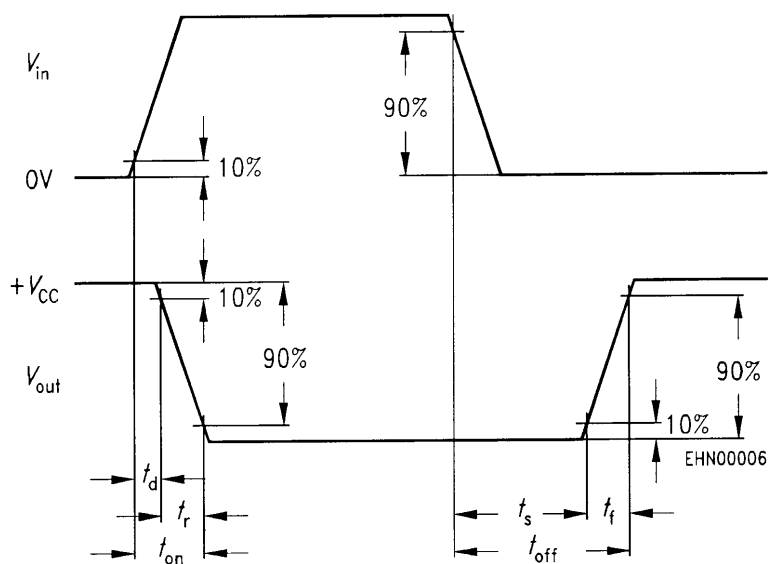
¹⁾ Compare R_{BE} for thermal stability.

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

Switching time test circuit

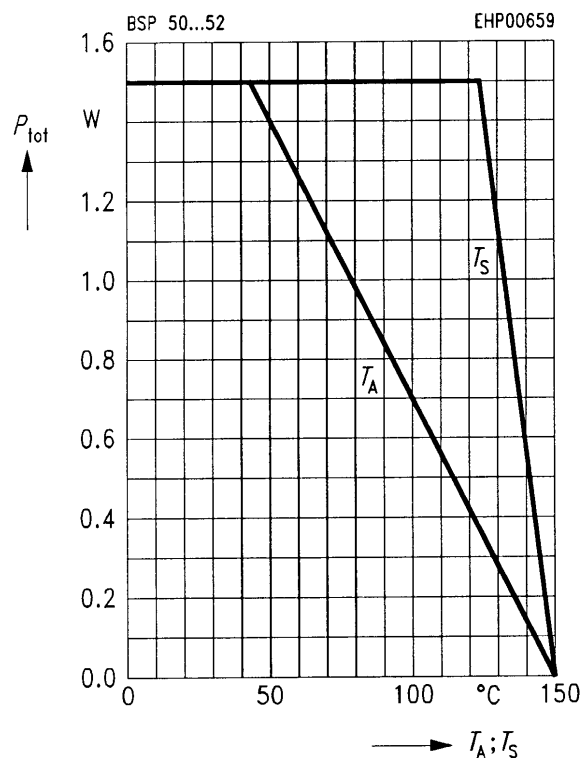


Switching time waveform



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

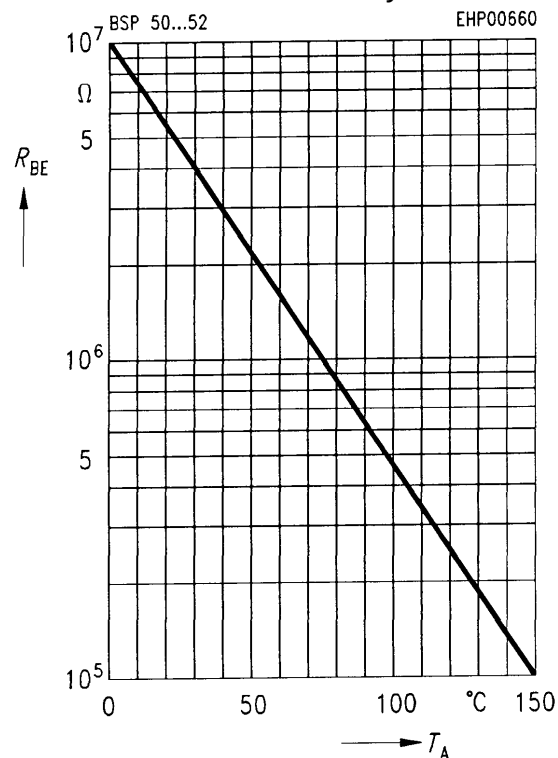
* Package mounted on epoxy



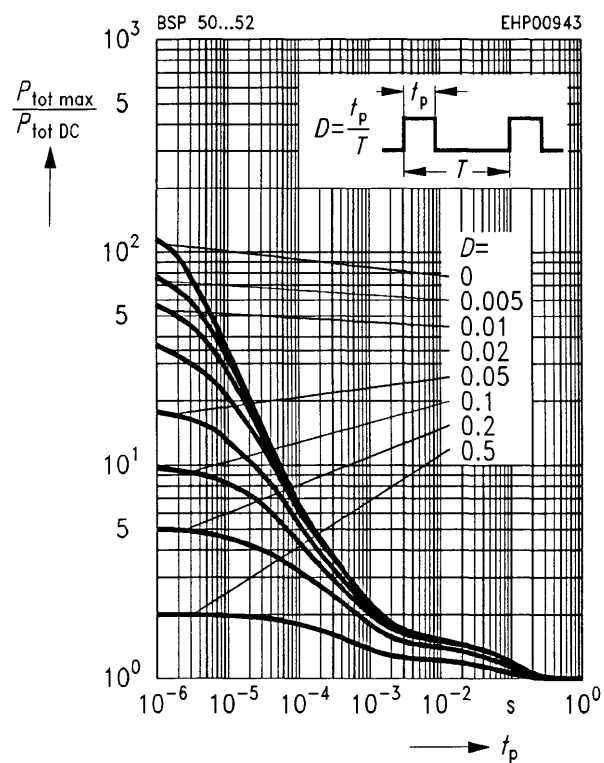
External resistance $R_{\text{BE}} = f(T_A)^{**}$

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

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

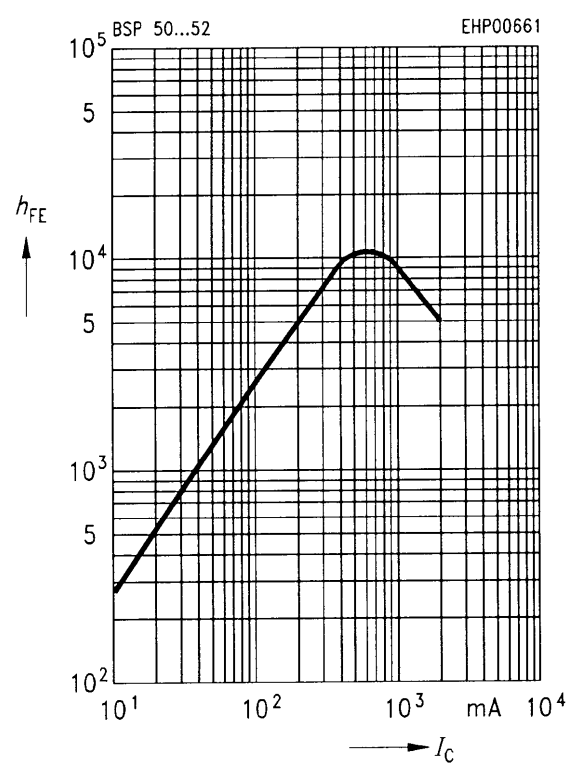


Permissible pulse load $P_{\text{tot max}} / P_{\text{tot DC}} = f(t_p)$



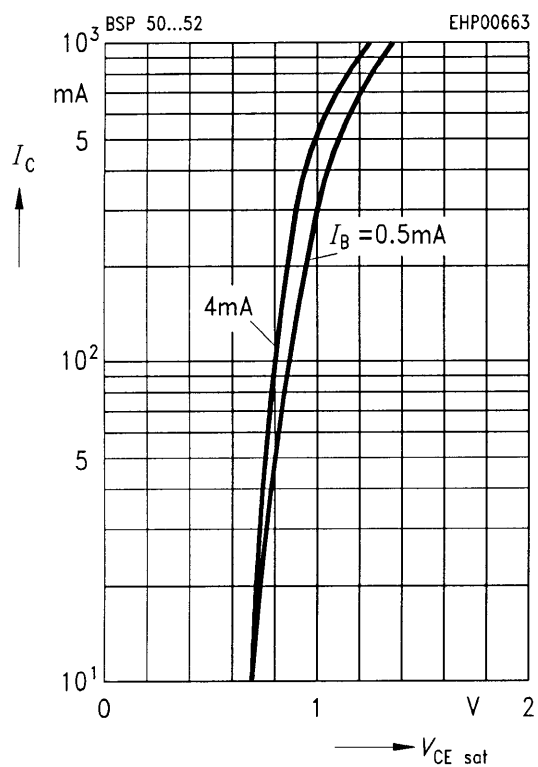
DC current gain $h_{\text{FE}} = f(I_C)$

$V_{\text{CE}} = 10 \text{ V}$



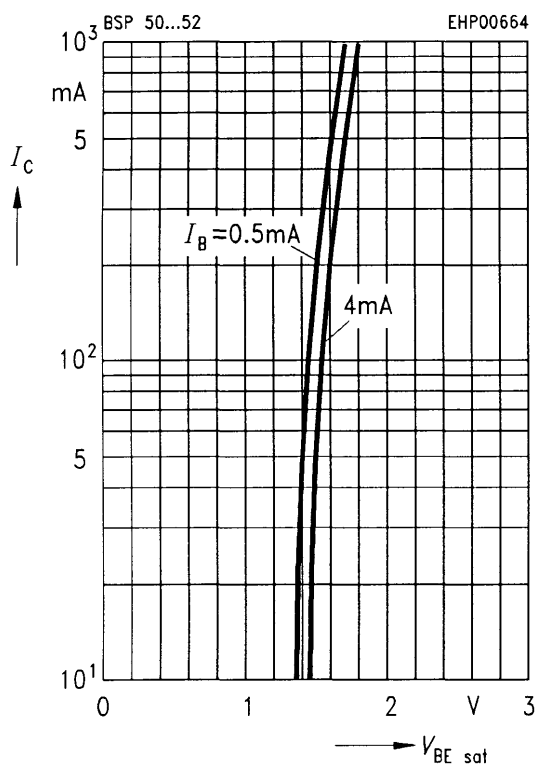
Collector-emitter saturation voltage

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



Base-emitter saturation voltage

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



Transition frequency $f_T = f(I_C)$

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

