# SIEMENS

PNP Silicon Darlington Transistors

**BSP 60
… BSP 62**

● High collector current
● Low collector-emitter saturation voltage
● Complementary types: BSP 50 … BSP 52 (NPN)
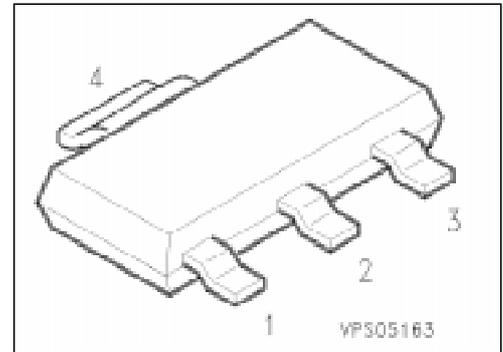
Type	Marking	Ordering Code (tape and reel)	Pin Configuration 1	2	3	4	Package[1]
BSP 60	BSP 60	Q62702-P1166	B	C	E	C	SOT-223
BSP 61	BSP 61	Q62702-P1167					
BSP 62	BSP 62	Q62702-P1168					

Maximum Ratings

Parameter	Symbol	Values BSP 60	BSP 61	BSP 62	Unit
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, $T_S = 124\ ^\circ C$	P_{tot}	1.5			W
Junction temperature	T_j	150			$^\circ C$
Storage temperature range	T_{stg}	$-65 … +150$			

Thermal Resistance

Parameter	Symbol	Values	Unit
Junction - ambient[2]	$R_{th\ JA}$	≤ 72	K/W
Junction - soldering point	$R_{th\ JS}$	≤ 17	

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[1] For detailed information see chapter Package Outlines.

[2] Package mounted on epoxy pcb 40 mm $\times$ 40 mm $\times$ 1.5 mm/6 cm^2 Cu.

Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Collector-emitter breakdown voltage[1] $I_C = 10$ mA, $R_{BE} = 150\ \Omega$ BSP 60 BSP 61 BSP 62	$V_{(BR)CER}$	45 60 80	– – –	– – –	V
Collector-base breakdown voltage $I_C = 100\ \mu A$, $I_B = 0$ BSP 60 BSP 61 BSP 62	$V_{(BR)CB0}$	60 80 90	– – –	– – –	
Emitter-base breakdown voltage $I_E = 100\ \mu A$, $I_B = 0$	$V_{(BR)EB0}$	5	–	–	
Collector-emitter cutoff current $V_{CE} = V_{CERmax}$, $V_{BE} = 0$	I_{CES}	–	–	10	μA
Emitter-base cutoff current $V_{EB} = 4$ V, $I_C = 0$	I_{EB0}	–	–	10	
DC current gain[2] $I_C = 150$ mA, $V_{CE} = 10$ V $I_C = 500$ mA, $V_{CE} = 10$ V	h_{FE}	1000 2000	– –	– –	–
Collector-emitter saturation voltage[2] $I_C = 500$ mA, $I_B = 0.5$ mA $I_C = 1$ A, $I_B = 1$ mA	V_{CEsat}	– –	– –	1.3 1.8	V
Base-emitter saturation voltage[2] $I_C = 500$ mA, $I_B = 0.5$ mA $I_C = 1$ A, $I_B = 1$ mA	V_{BEsat}	– –	– –	1.9 2.2	

AC characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Transition frequency $I_C = 100$ mA, $V_{CE} = 5$ V, $f = 100$ MHz	f_T	–	200	–	MHz
Switching times $I_C = 500$ mA, $I_{B1} = I_{B2} = 0.5$ mA (see diagrams)	t_{on} t_{off}	– –	400 1500	– –	ns ns

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[1] Compare R_{BE} for thermal stability.
[2] Pulse test conditions: $t \leq 300\ \mu s$, $D = 2\ \%$.

Switching time test circuit

+2.2V

−10V

9kΩ

18Ω

D.U.T.

1μs

1μF

36kΩ

$t_r < 5ns$
v < 0.01
$R_i = 50Ω$

−38V

50Ω

150Ω

Osc.
$t_r < 5ns$
$Z_e \gtrsim 100kΩ$

$I_{Con} = 500mA$
$-I_{Bon} = I_{Boff} = 0.5mA$

EHN00067
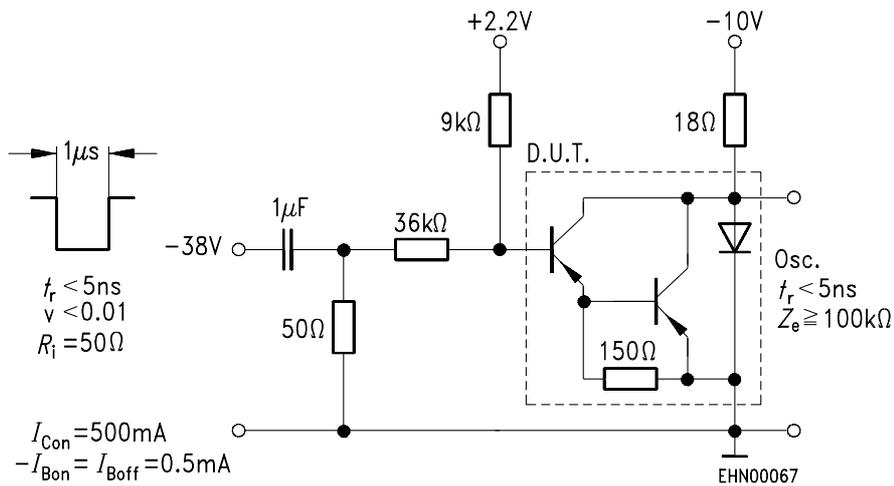
Switching time waveform

0V

10%

90%

V_{in}

V_{out}

10%

90%

90%

10%

$-V_{CC}$

t_d

t_r

t_{on}

t_s

t_f

t_{off}

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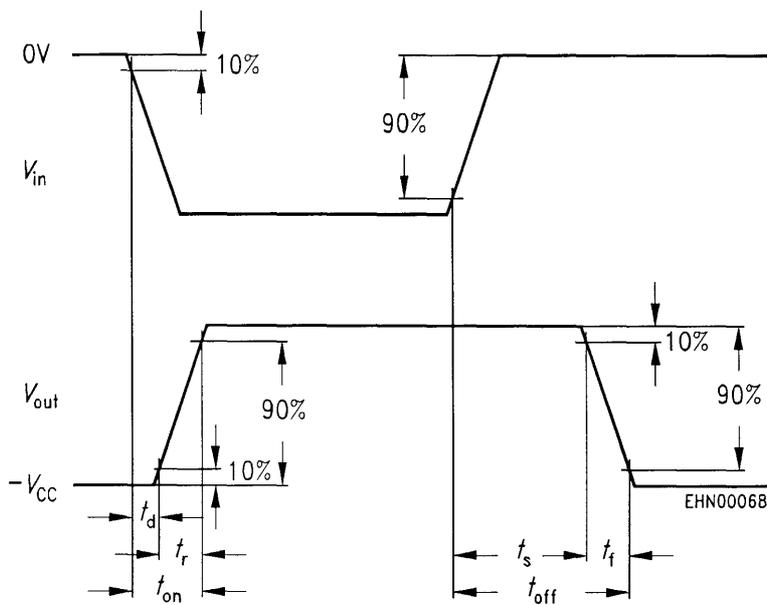
Total power dissipation $P_{tot} = f (T_A*; T_S)$
* Package mounted on epoxy

BSP 60...62 — EHP00665
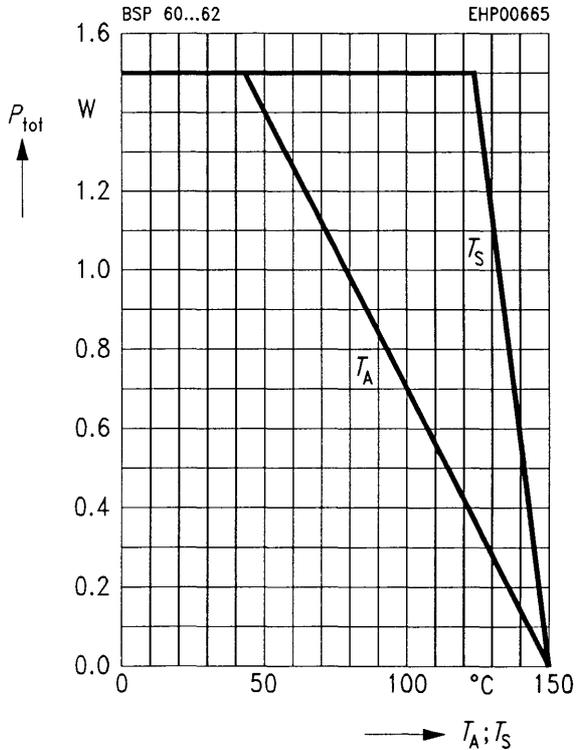
External resistance $R_{BE} = f (T_A)$**
$V_{CB} = V_{CE\ max}$
** $R_{BE\ max}$ for thermal stability

BSP 60...62 — EHP00666
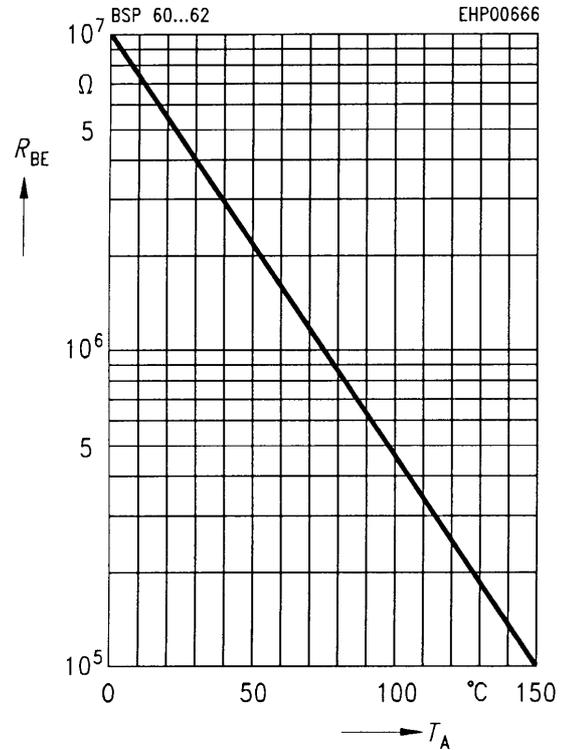
Permissible pulse load $P_{tot\ max} / P_{tot\ DC} = f (t_p)$

BSP 60...62 — EHP00273

$D = \frac{t_p}{T}$

D=
0
0.005
0.01
0.02
0.05
0.1
0.2
0.5

DC current gain $h_{FE} = f (I_C)$
$V_{CE} = 10$ V

BSP 60...62 — EHP00667
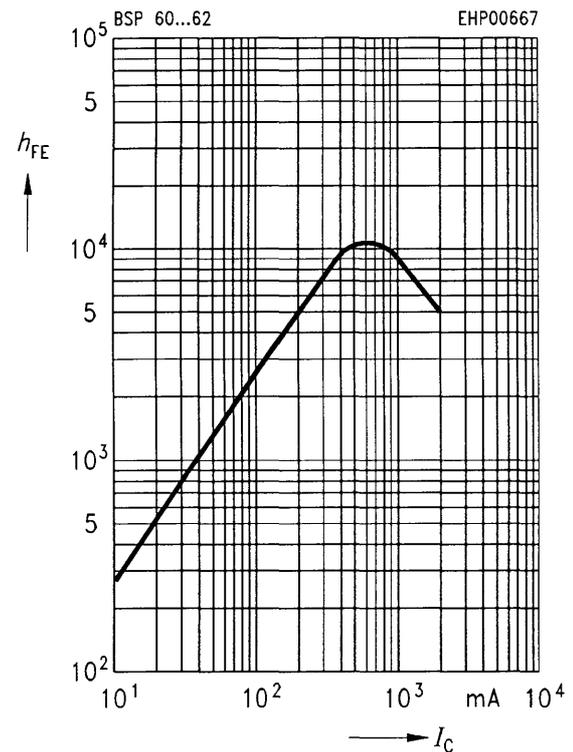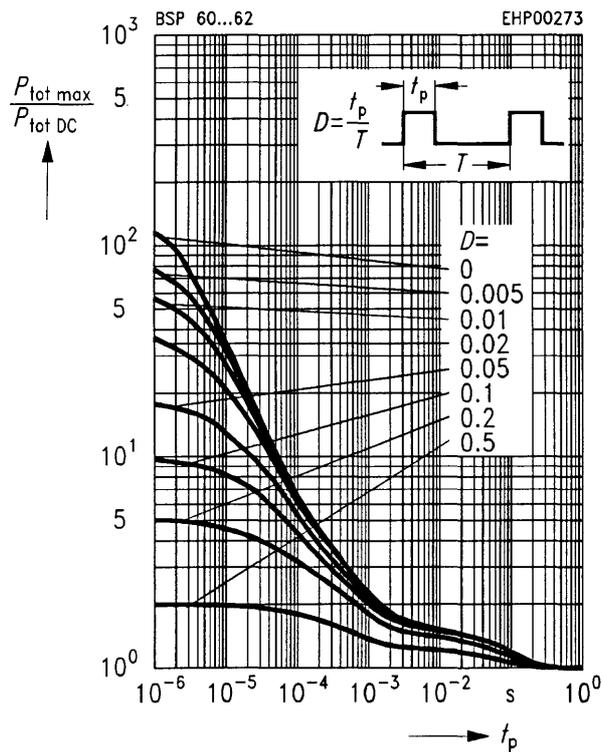
Collector-emitter saturation voltage
$I_C = f(V_{CE\,sat})$, I_B-parameter
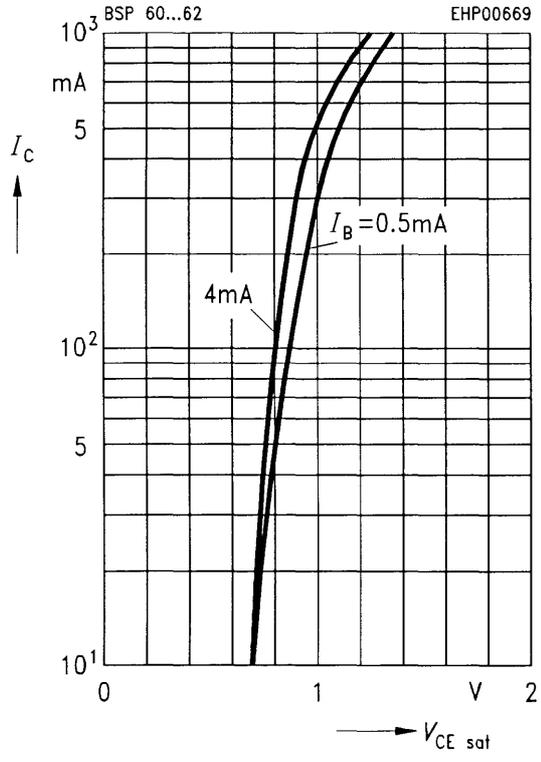
Base-emitter saturation voltage
$I_C = f(V_{BE\,sat})$, I_B-parameter
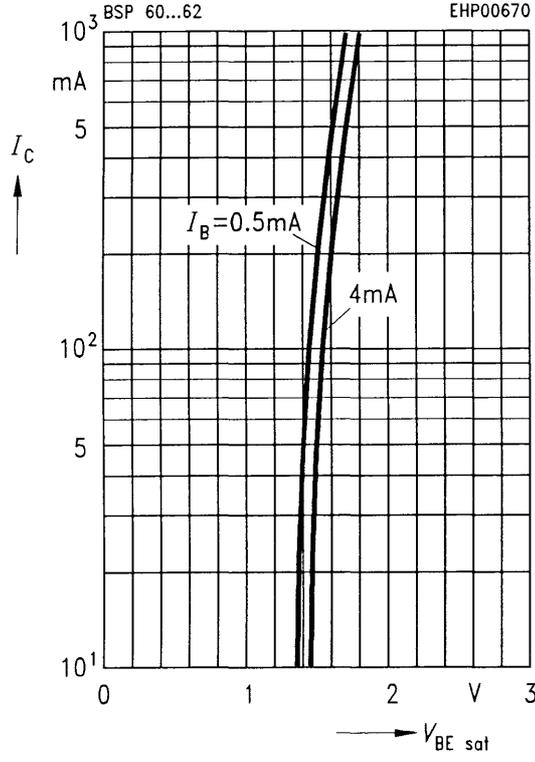
Transition frequency $f_T = f(I_C)$
$V_{CE} = 10\ V$, $f = 100\ MHz$