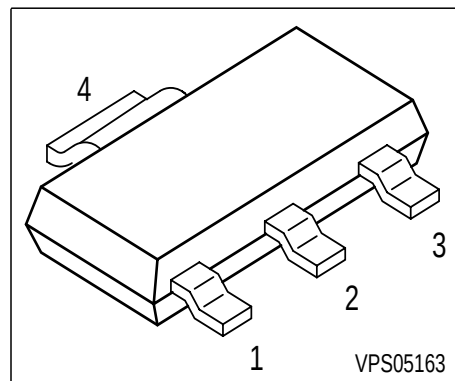


## PNP Silicon Darlington Transistors

- High collector current
- Low collector-emitter saturation voltage
- Complementary types: BSP50 ... BSP52 (NPN)



| Type  | Marking | Pin Configuration |       |       |       | Package |
|-------|---------|-------------------|-------|-------|-------|---------|
| BSP60 | BSP 60  | 1 = B             | 2 = C | 3 = E | 4 = C | SOT223  |
| BSP61 | BSP 61  | 1 = B             | 2 = C | 3 = E | 4 = C | SOT223  |
| BSP62 | BSP 62  | 1 = B             | 2 = C | 3 = E | 4 = C | SOT223  |

### Maximum Ratings

| Parameter                                      | Symbol    | BSP60       | BSP61 | BSP62 | Unit |
|------------------------------------------------|-----------|-------------|-------|-------|------|
| Collector-emitter voltage                      | $V_{CEO}$ | 45          | 60    | 80    | V    |
| Collector-base voltage                         | $V_{CBO}$ | 60          | 80    | 90    |      |
| Emitter-base voltage                           | $V_{EBO}$ | 5           | 5     | 5     |      |
| DC collector current                           | $I_C$     | 1           |       |       | A    |
| Peak collector current                         | $I_{CM}$  | 2           |       |       |      |
| Base current                                   | $I_B$     | 100         |       |       | mA   |
| Total power dissipation, $T_S = 124\text{ °C}$ | $P_{tot}$ | 1.5         |       |       | W    |
| Junction temperature                           | $T_j$     | 150         |       |       | °C   |
| Storage temperature                            | $T_{stg}$ | -65 ... 150 |       |       |      |

### Thermal Resistance

|                                          |            |     |     |
|------------------------------------------|------------|-----|-----|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | ≤17 | K/W |
|------------------------------------------|------------|-----|-----|

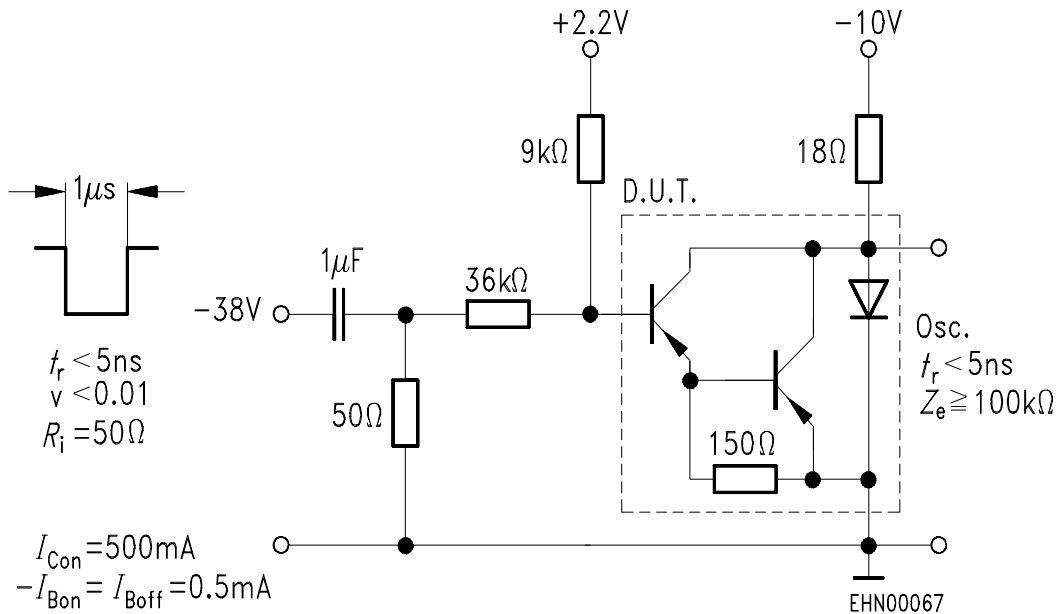
<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

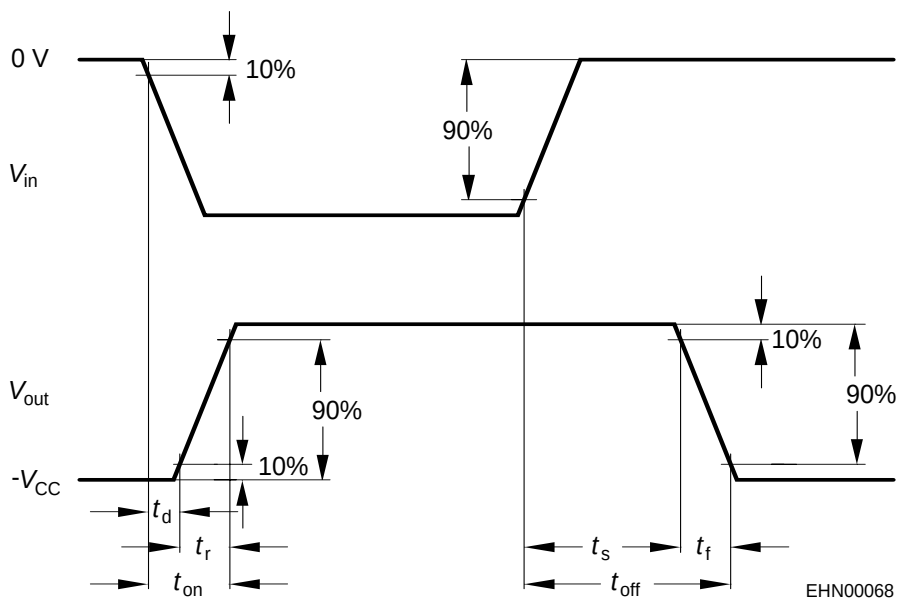
| Parameter                                                                                                                            | Symbol        | Values         |             |             | Unit          |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------------|-------------|---------------|
|                                                                                                                                      |               | min.           | typ.        | max.        |               |
| DC Characteristics                                                                                                                   |               |                |             |             |               |
| Collector-emitter breakdown voltage<br>$I_C = 10\text{ mA}$ , $I_B = 0$<br>BSP60<br>BSP61<br>BSP62                                   | $V_{(BR)CEO}$ | 45<br>60<br>80 | -<br>-<br>- | -<br>-<br>- | V             |
| Collector-base breakdown voltage<br>$I_C = 100\text{ }\mu\text{A}$ , $I_E = 0$<br>BSP60<br>BSP61<br>BSP62                            | $V_{(BR)CBO}$ | 60<br>80<br>90 | -<br>-<br>- | -<br>-<br>- |               |
| Emitter-base breakdown voltage<br>$I_E = 100\text{ }\mu\text{A}$ , $I_C = 0$                                                         | $V_{(BR)EBO}$ | 5              | -           | -           |               |
| Collector-emitter cutoff current<br>$V_{CE} = V_{CEOmax}$ , $V_{BE} = 0$                                                             | $I_{CES}$     | -              | -           | 10          | $\mu\text{A}$ |
| Emitter cutoff current<br>$V_{EB} = 4\text{ V}$ , $I_C = 0$                                                                          | $I_{EBO}$     | -              | -           | 10          |               |
| DC current gain 1)<br>$I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ V}$<br>$I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$               | $h_{FE}$      | 1000<br>2000   | -<br>-      | -<br>-      | -             |
| Collector-emitter saturation voltage1)<br>$I_C = 500\text{ mA}$ , $I_B = 0.55\text{ mA}$<br>$I_C = 1\text{ A}$ , $I_B = 1\text{ mA}$ | $V_{CEsat}$   | -<br>-         | -<br>-      | 1.3<br>1.8  | V             |
| Base-emitter saturation voltage 1)<br>$I_C = 500\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>$I_C = 1\text{ A}$ , $I_B = 1\text{ mA}$      | $V_{BEsat}$   | -<br>-         | -<br>-      | 1.9<br>2.2  |               |
| AC Characteristics                                                                                                                   |               |                |             |             |               |
| Transition frequency<br>$I_C = 100\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 100\text{ MHz}$                                         | $f_T$         | -              | 200         | -           | MHz           |
| Turn-on time<br>$I_C = 500\text{ mA}$ , $I_{B1} = I_{B2} = 0.5\text{mA}$                                                             | $t_{(on)}$    | -              | 400         | -           | ns            |
| Turn-off time<br>$I_C = 500\text{ mA}$ , $I_{B1} = I_{B2} = 0.5\text{mA}$                                                            | $t_{(off)}$   | -              | 1500        | -           |               |

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

## Switching time test circuit

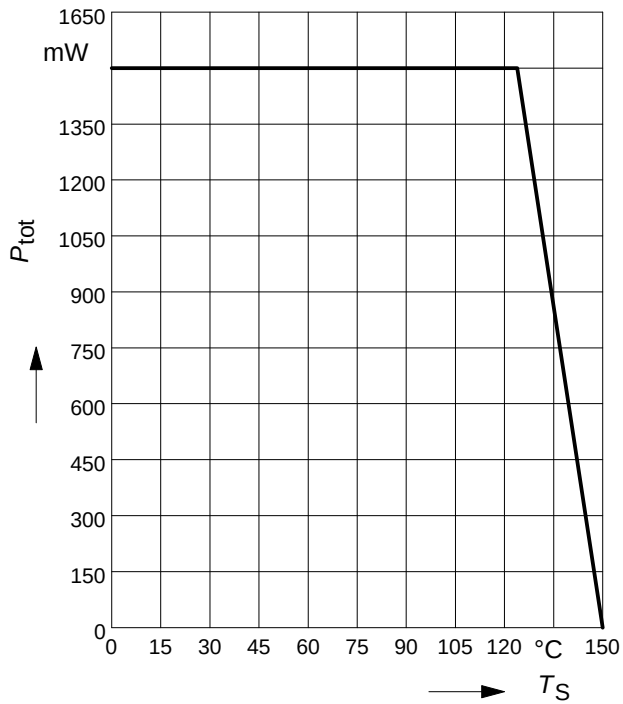


## Switching time waveform



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

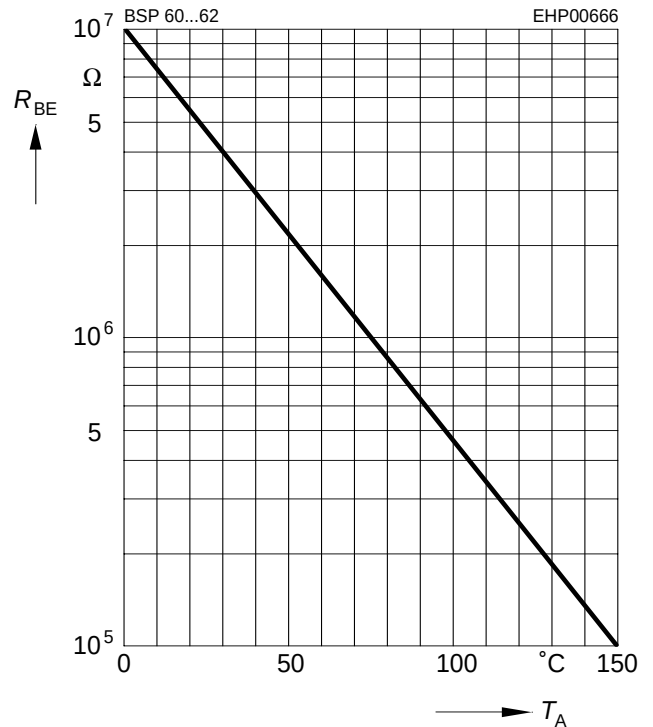
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**



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

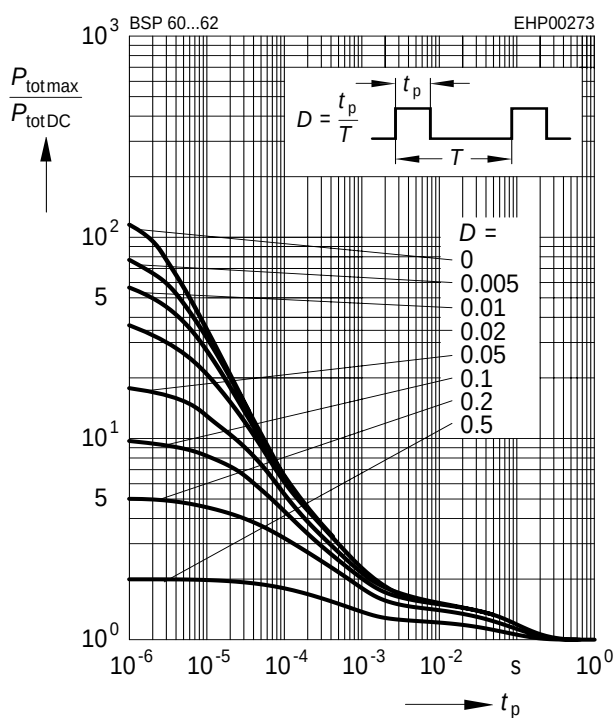
$V_{\text{CB}} = V_{\text{CEmax}}$

**\*\*  $R_{\text{BEmax}}$  for thermal stability**



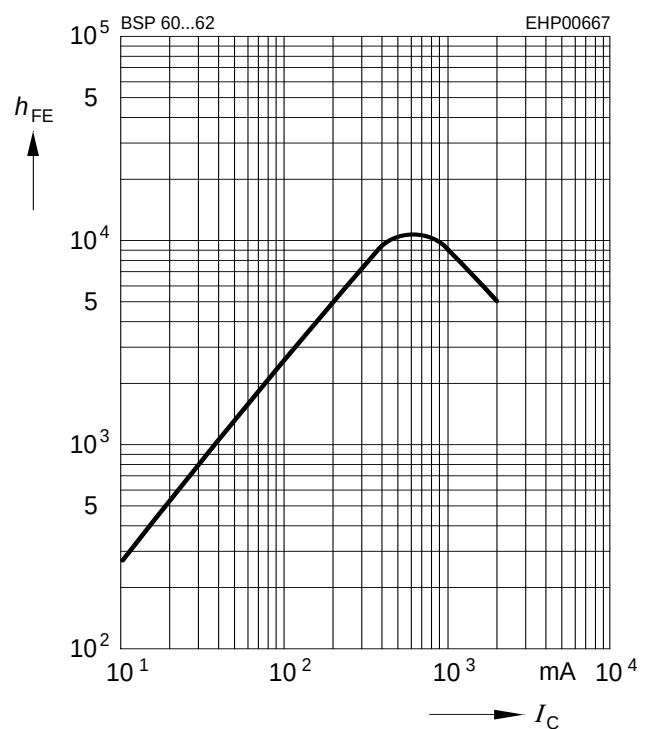
**Permissible pulse load**

$P_{\text{totmax}} / P_{\text{totDC}} = f(t_p)$



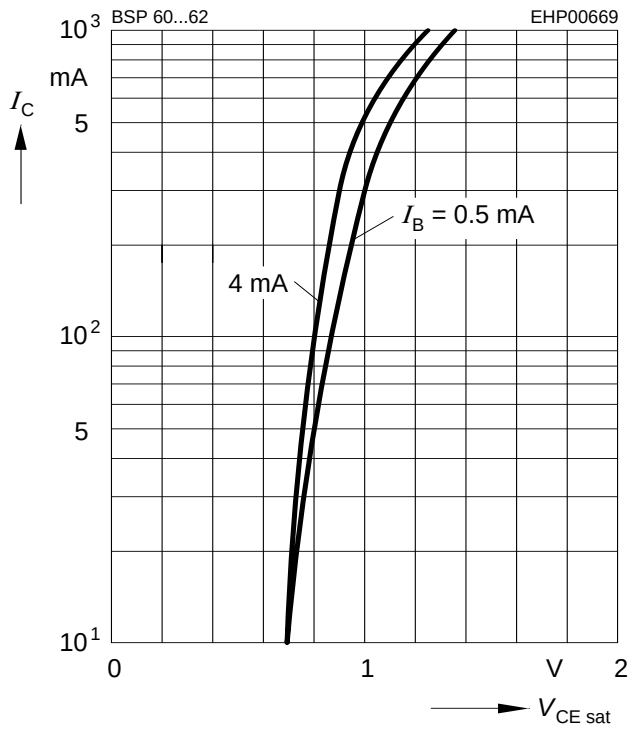
**DC current gain  $h_{\text{FE}} = f(I_C)$**

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



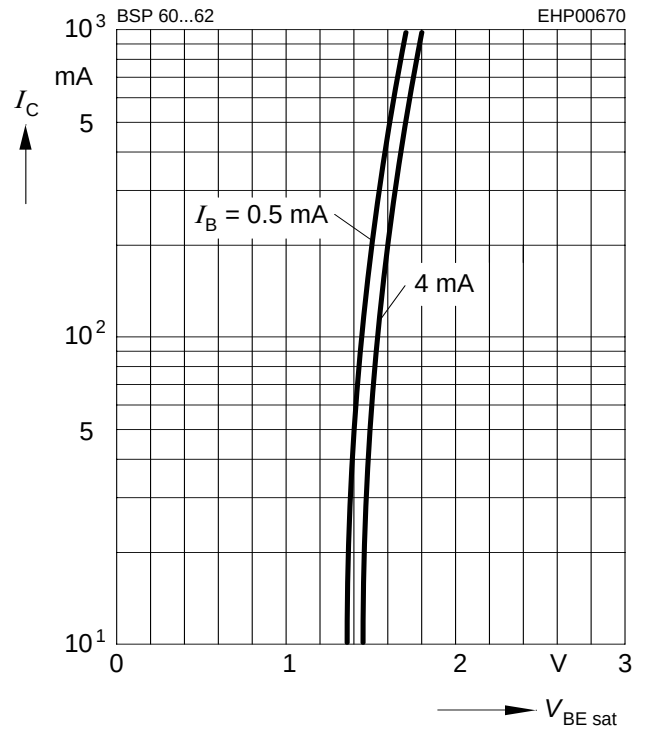
### Collector-emitter saturation voltage

$I_C = f(V_{CEsat}), I_B$  - parameter



### Base-emitter saturation voltage

$I_C = f(V_{BEsat}), I_B$  - parameter



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

$V_{CE} = 10V, f = 100MHz$

