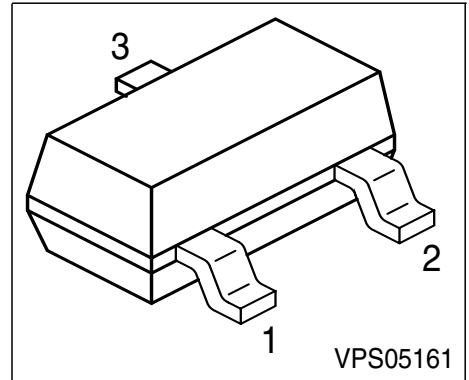


NPN Silicon Darlington Transistors

- High DC current gain
- High collector current
- Low collector-emitter saturation voltage



| Type | Marking | Pin Configuration | | | Package |
|----------|---------|-------------------|-------|-------|---------|
| SMBTA 13 | s1M | 1 = B | 2 = E | 3 = C | SOT-23 |
| SMBTA 14 | s1N | 1 = B | 2 = E | 3 = C | SOT-23 |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|-----------|-------------|------|
| Collector-emitter voltage | V_{CES} | 30 | V |
| Collector-base voltage | V_{CBO} | 30 | |
| Emitter-base voltage | V_{EBO} | 10 | |
| DC collector current | I_C | 300 | mA |
| Peak collector current | I_{CM} | 500 | mA |
| Base current | I_B | 100 | |
| Peak base current | I_{BM} | 200 | |
| Total power dissipation, $T_S = 81\text{ °C}$ | P_{tot} | 330 | mW |
| Junction temperature | T_j | 150 | °C |
| Storage temperature | T_{stg} | -65 ... 150 | |

Thermal Resistance

| | | | |
|--------------------------------|------------|------|-----|
| Junction ambient ¹⁾ | R_{thJA} | ≤280 | K/W |
| Junction - soldering point | R_{thJS} | ≤210 | |

1) Package mounted on pcb 40mm x 40mm x 1.5mm / 6cm² Cu

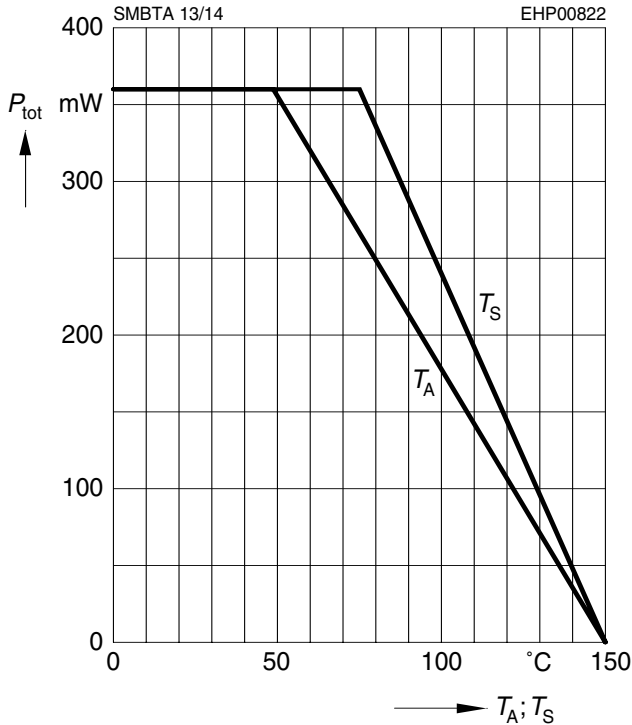
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|---|---------------|--|---------------------------------|------------------|---------------|
| | | min. | typ. | max. | |
| DC Characteristics | | | | | |
| Collector-emitter breakdown voltage $I_C = 10 \mu\text{A}$, $V_{BE} = 0$ | $V_{(BR)CES}$ | 30 | - | - | V |
| Collector-base breakdown voltage $I_C = 10 \mu\text{A}$, $I_B = 0$ | $V_{(BR)CBO}$ | 30 | - | - | |
| Emitter-base breakdown voltage $I_E = 10 \mu\text{A}$, $I_C = 0$ | $V_{(BR)EBO}$ | 10 | - | - | |
| Collector cutoff current $V_{CB} = 30 \text{ V}$, $I_E = 0$ | I_{CBO} | - | - | 100 | nA |
| Collector cutoff current $V_{CB} = 30 \text{ V}$, $I_E = 0$, $T_A = 150^\circ\text{C}$ | I_{CBO} | - | - | 10 | μA |
| Emitter cutoff current $V_{EB} = 10 \text{ V}$, $I_C = 0$ | I_{EBO} | - | - | 100 | nA |
| DC current gain 1) $I_C = 10 \text{ mA}$, $V_{CE} = 5 \text{ V}$ $I_C = 100 \text{ mA}$, $V_{CE} = 5 \text{ V}$ | h_{FE} | SMBTA 13 SMBTA 14 SMBTA 13 SMBTA 14 | 5000 10000 10000 20000 | - - - - | - |
| Collector-emitter saturation voltage1) $I_C = 100 \text{ mA}$, $I_B = 0.1 \text{ mA}$ | V_{CEsat} | - | - | 1.5 | V |
| Base-emitter saturation voltage 1) $I_C = 100 \text{ mA}$, $I_B = 0.1 \text{ mA}$ | V_{BEsat} | - | - | 2 | |
| AC Characteristics | | | | | |
| Transition frequency $I_C = 50 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 20 \text{ MHz}$ | f_T | 125 | - | - | MHz |

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

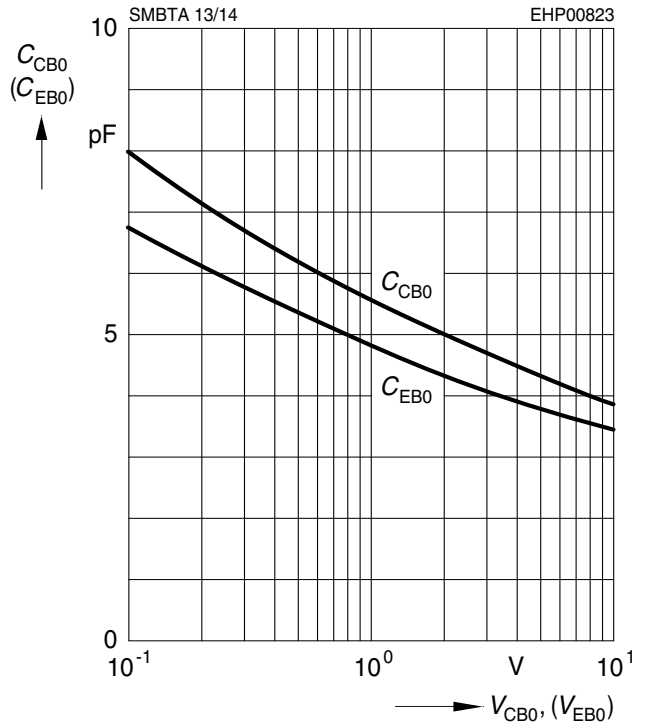
Total power dissipation $P_{tot} = f(T_A^*; T_S)$

* Package mounted on epoxy



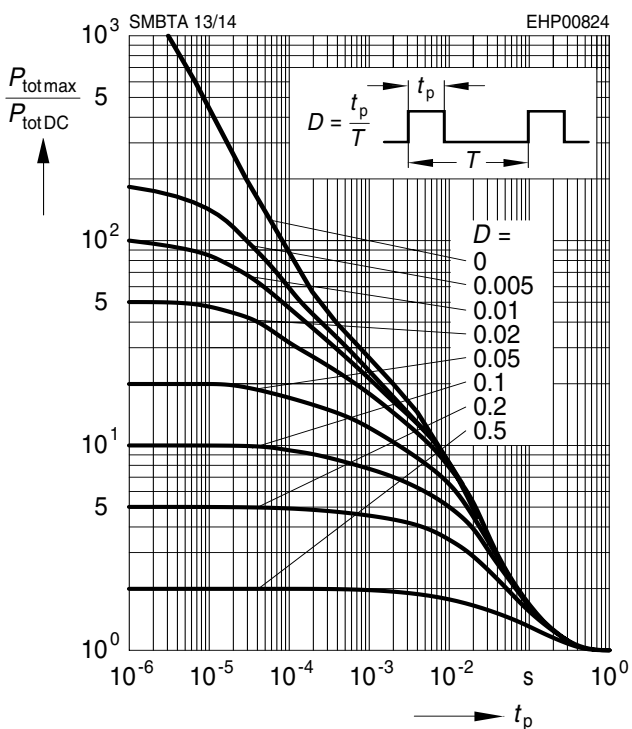
Collector-base capacitance $C_{CB} = f(V_{CB0})$

Emitter-base capacitance $C_{EB} = f(V_{EB0})$



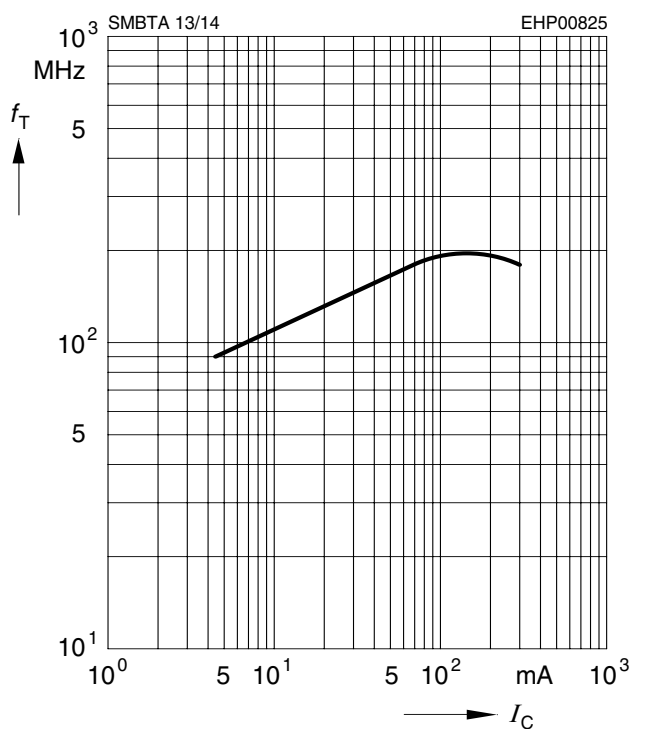
Permissible pulse load

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



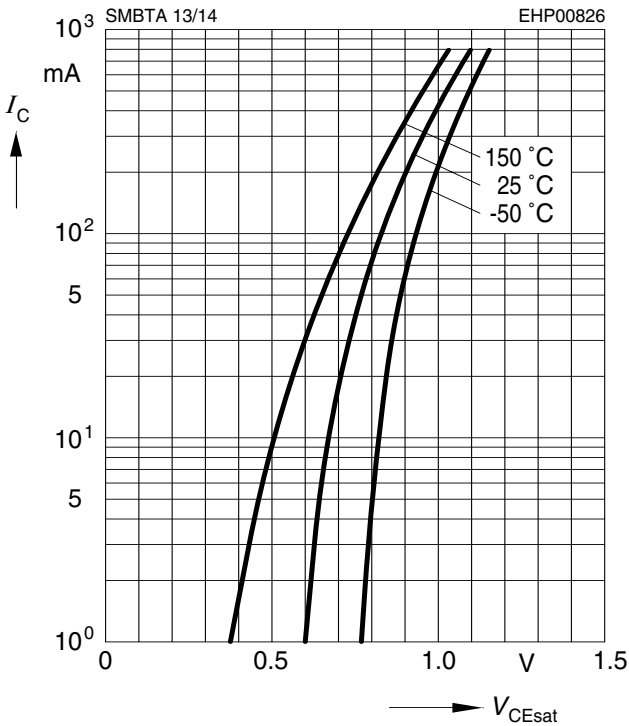
Transition frequency $f_T = f(I_C)$

$V_{CE} = 5V, f = 20MHz$



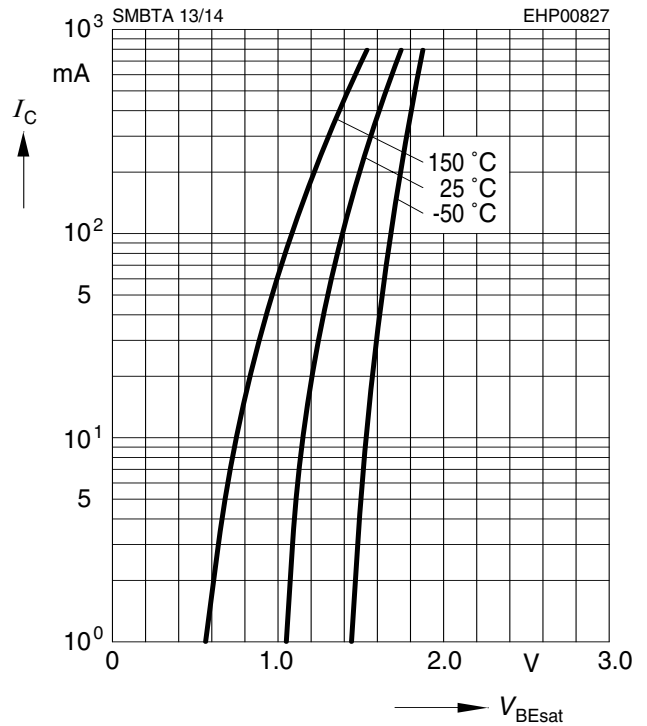
Collector-emitter saturation voltage

$I_C = f(V_{CEsat}), h_{FE} = 1000$



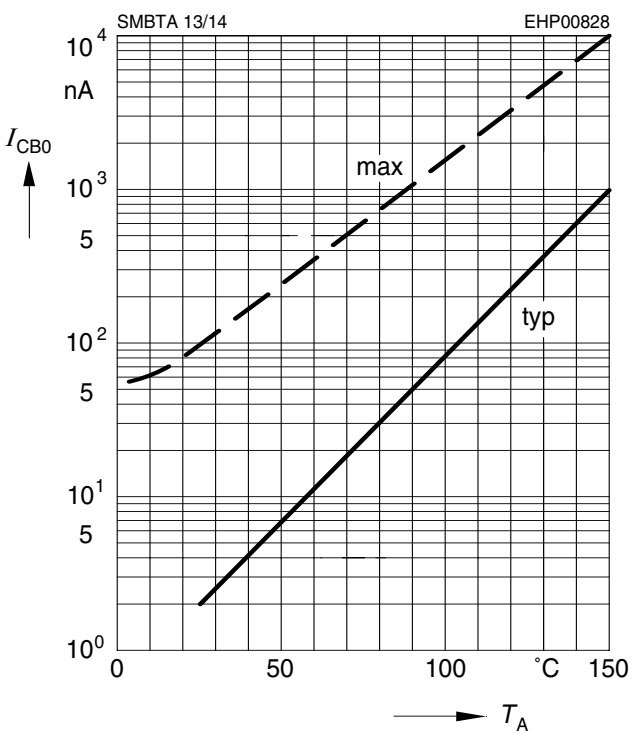
Base-emitter saturation voltage

$I_C = f(V_{BEsat}), h_{FE} = 1000$



Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = 30V$



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

$V_{CE} = 5V$

