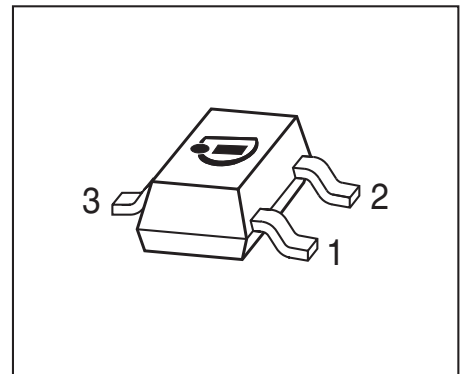


**NPN Silicon Darlington Transistor**

- High collector current
- Low collector-emitter saturation voltage
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



| Type            | Marking | Pin Configuration |     |     | Package |
|-----------------|---------|-------------------|-----|-----|---------|
| SMBTA14/MMBTA14 | s1N     | 1=B               | 2=E | 3=C | SOT23   |

**Maximum Ratings**

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

**Thermal Resistance**

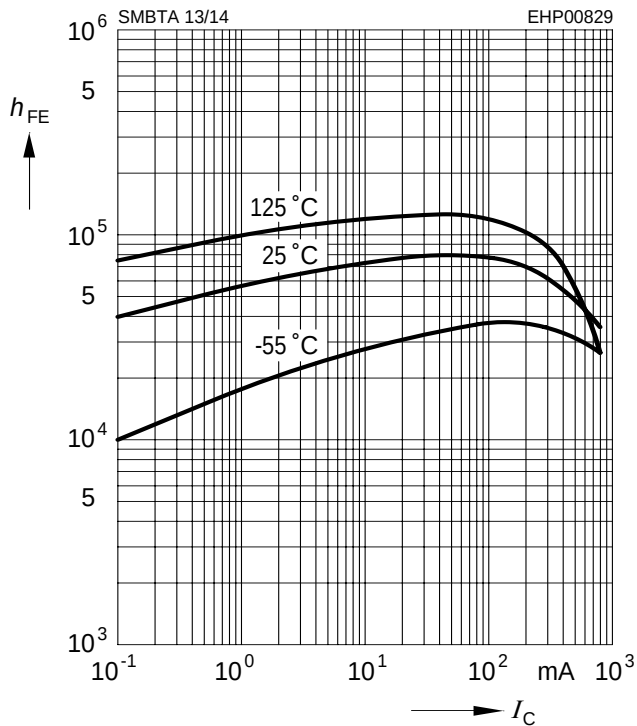
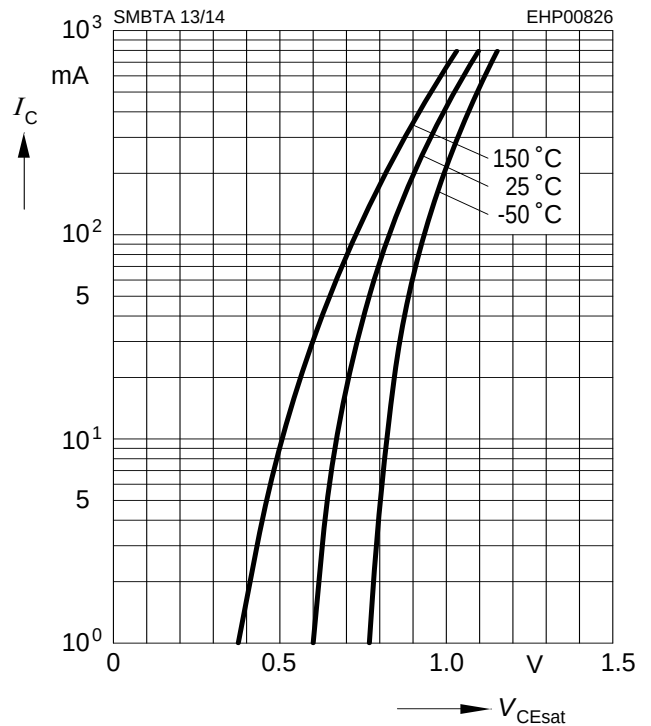
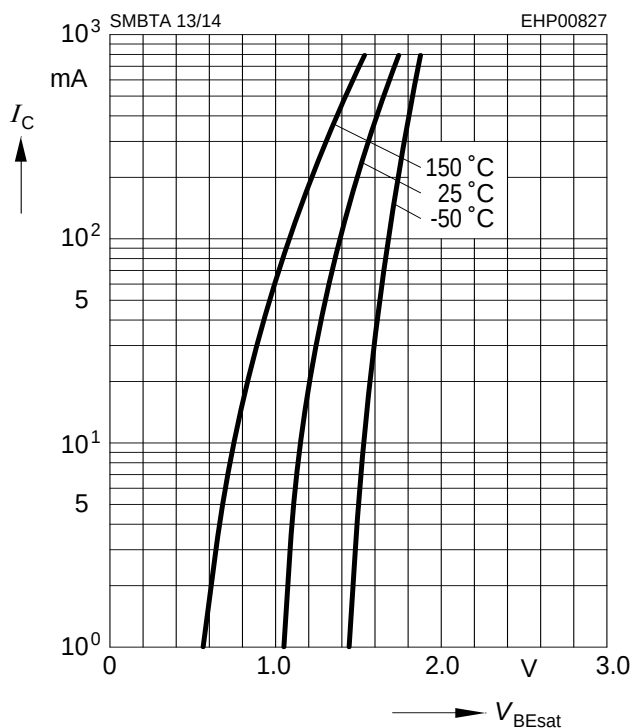
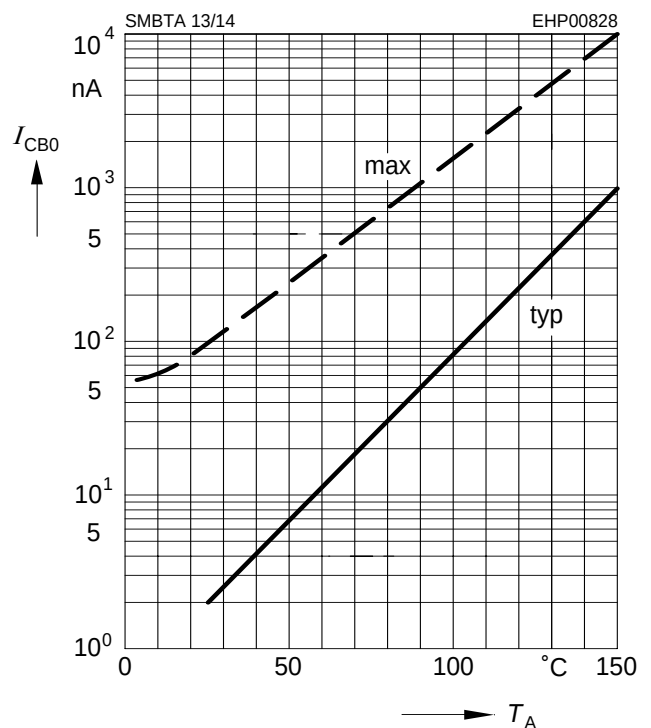
| Parameter                                | Symbol     | Value      | Unit |
|------------------------------------------|------------|------------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | $\leq 210$ | K/W  |

<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

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

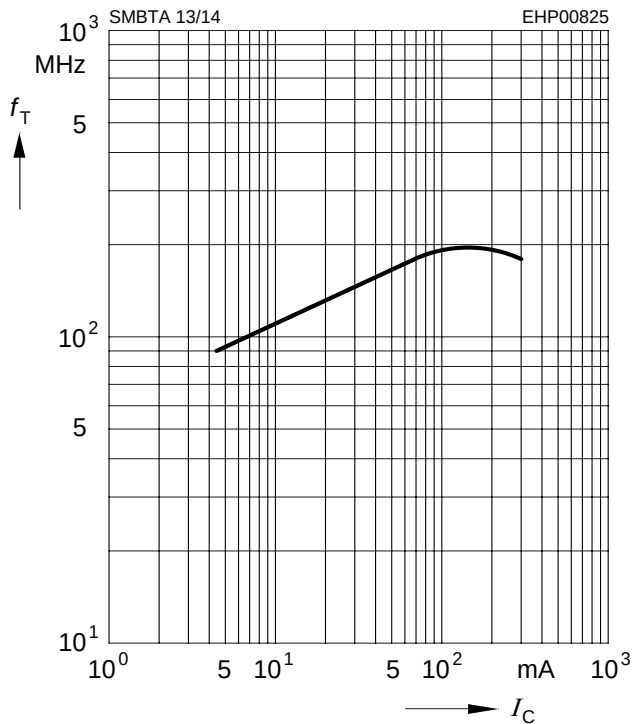
| Parameter                                                                                                                                               | Symbol                      | Values         |        |           | Unit          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------|--------|-----------|---------------|
|                                                                                                                                                         |                             | min.           | typ.   | max.      |               |
| DC Characteristics                                                                                                                                      |                             |                |        |           |               |
| Collector-base breakdown voltage<br>$I_C = 10\ \mu\text{A}$ , $I_E = 0$                                                                                 | $V_{(\text{BR})\text{CBO}}$ | 30             | -      | -         | V             |
| Collector-emitter breakdown voltage<br>$I_C = 10\ \mu\text{A}$ , $V_{\text{BE}} = 0$                                                                    | $V_{(\text{BR})\text{CES}}$ | 30             | -      | -         |               |
| Emitter-base breakdown voltage<br>$I_E = 10\ \mu\text{A}$ , $I_C = 0$                                                                                   | $V_{(\text{BR})\text{EBO}}$ | 10             | -      | -         |               |
| Collector-base cutoff current<br>$V_{\text{CB}} = 30\ \text{V}$ , $I_E = 0$<br>$V_{\text{CB}} = 30\ \text{V}$ , $I_E = 0$ , $T_A = 150\ ^\circ\text{C}$ | $I_{\text{CBO}}$            | -<br>-         | -<br>- | 0.1<br>10 | $\mu\text{A}$ |
| Emitter-base cutoff current<br>$V_{\text{EB}} = 10\ \text{V}$ , $I_C = 0$                                                                               | $I_{\text{EBO}}$            | -              | -      | 100       | nA            |
| DC current gain <sup>1)</sup><br>$I_C = 10\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$<br>$I_C = 100\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$        | $h_{\text{FE}}$             | 10000<br>20000 | -<br>- | -<br>-    | -             |
| Collector-emitter saturation voltage <sup>1)</sup><br>$I_C = 100\ \text{mA}$ , $I_B = 0.1\ \text{mA}$                                                   | $V_{\text{CEsat}}$          | -              | -      | 1.5       | V             |
| Base emitter saturation voltage <sup>1)</sup><br>$I_C = 100\ \text{mA}$ , $I_B = 0.1\ \text{mA}$                                                        | $V_{\text{BEsat}}$          | -              | -      | 2         |               |
| AC Characteristics                                                                                                                                      |                             |                |        |           |               |
| Transition frequency<br>$I_C = 50\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$ , $f = 20\ \text{MHz}$                                                    | $f_{\text{T}}$              | 125            | -      | -         | MHz           |
| Collector-base capacitance<br>$V_{\text{CB}} = 10\ \text{V}$ , $f = 100\ \text{MHz}$                                                                    | $C_{\text{cb}}$             | -              | 3      | -         | pF            |

<sup>1)</sup>Pulse test:  $t < 300\ \mu\text{s}$ ;  $D < 2\%$

**DC current gain  $h_{FE} = f(I_C)$** 
 $V_{CE} = 5 \text{ V}$ 

**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  $I_{CBO} = f(T_A)$** 
 $V_{CBO} = 30 \text{ V}$ 


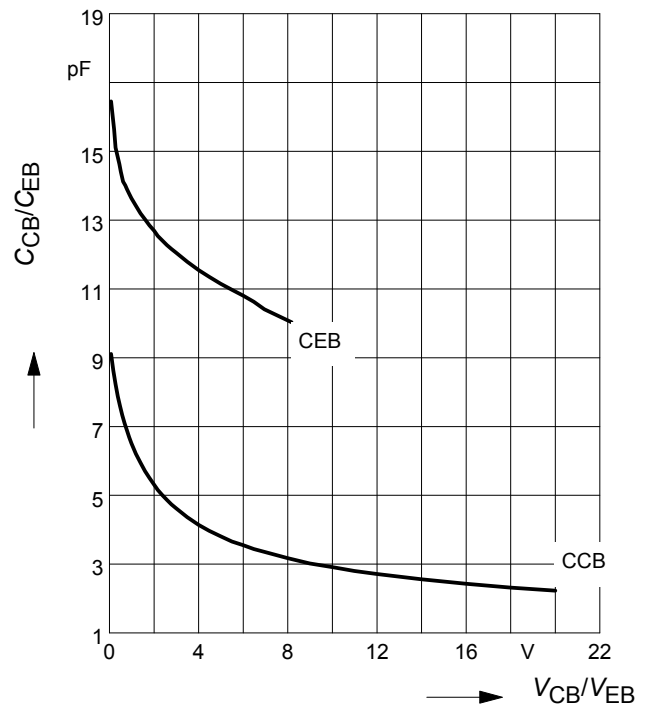
**Transition frequency  $f_T = f(I_C)$**

$V_{CE} = 5\text{ V}, f = 200\text{ MHz}$



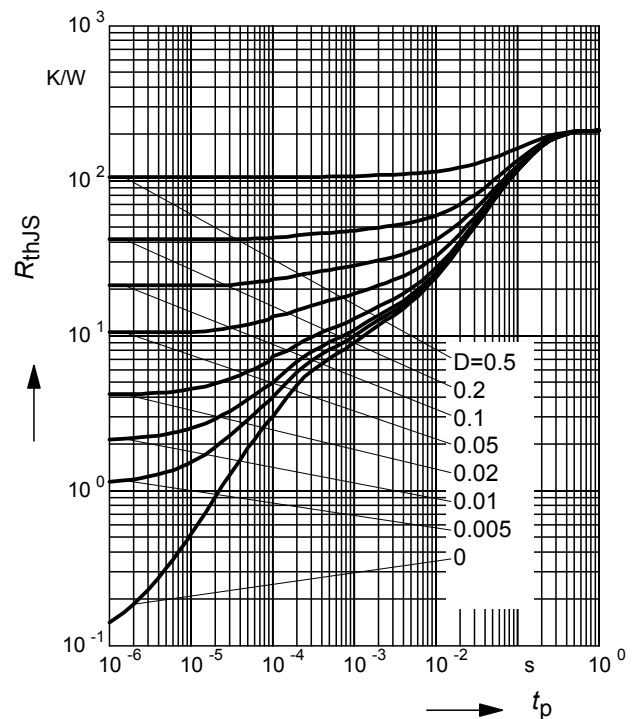
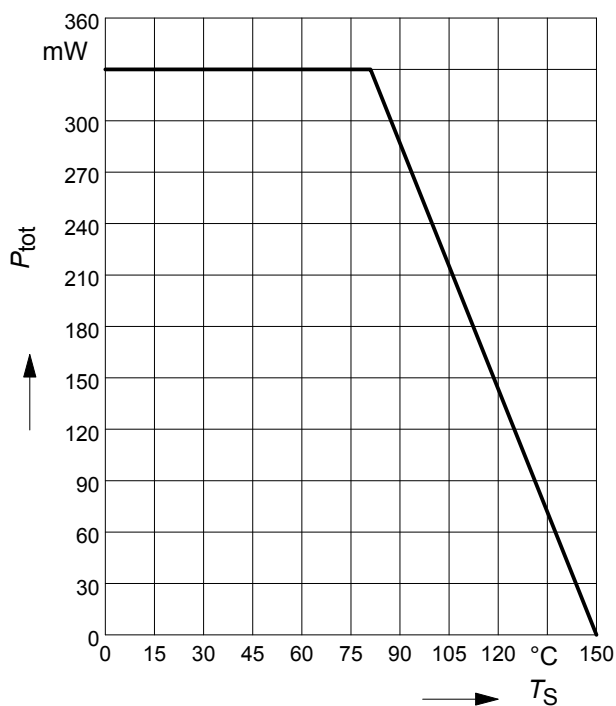
**Collector-base capacitance  $C_{cb} = f(V_{CB})$**

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



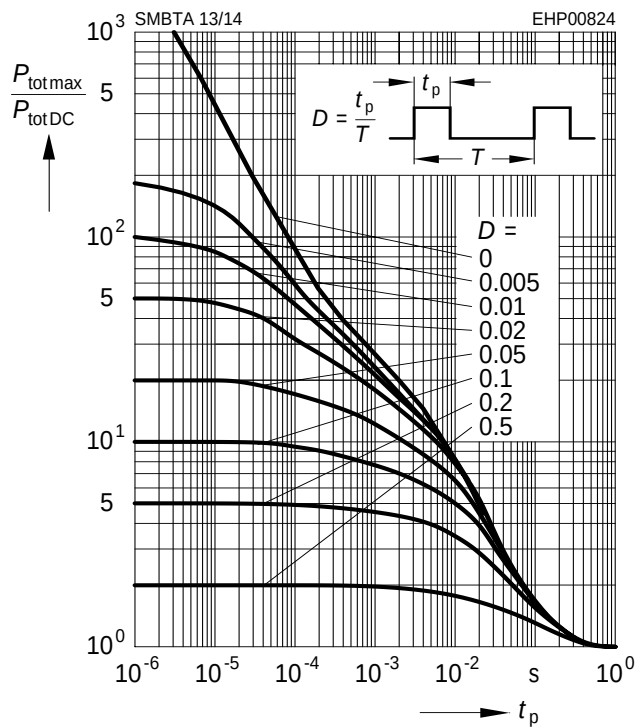
**Total power dissipation  $P_{tot} = f(T_S)$**

**Permissible Pulse Load  $R_{thJS} = f(t_p)$**

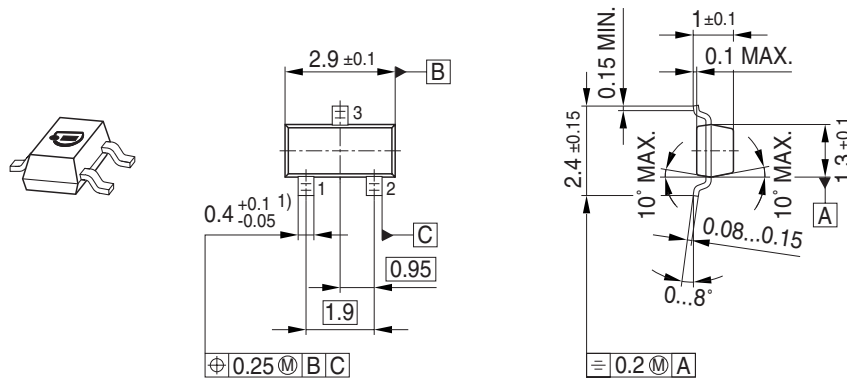


## Permissible Pulse Load

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

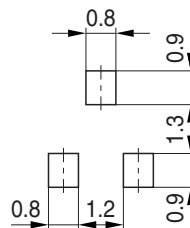


## Package Outline

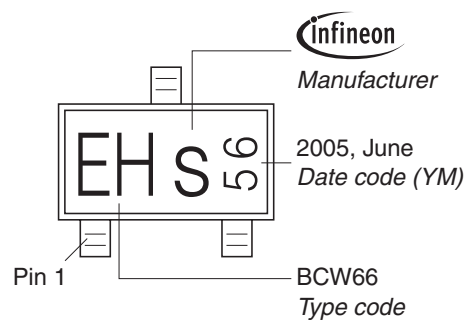


1) Lead width can be 0.6 max. in dambar area

## Foot Print

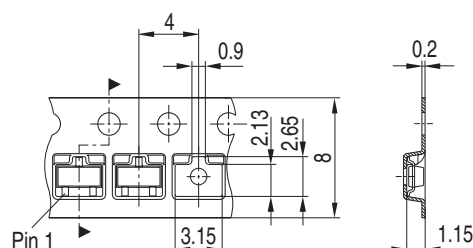


## Marking Layout (Example)



## Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel  
Reel ø330 mm = 10.000 Pieces/Reel



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