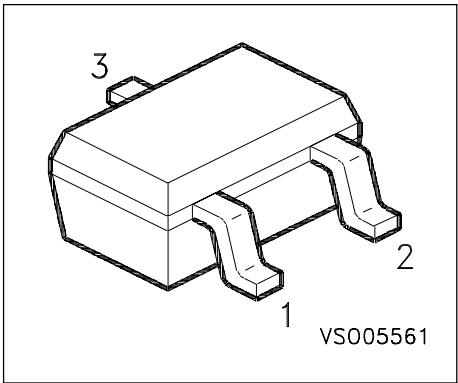
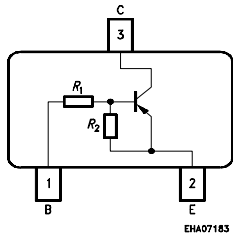


PNP Silicon Digital Transistor

- Switching circuit, inverter, interface circuit, driver circuit
- Built in bias resistor ( $R_1=4.7k\Omega$ ,  $R_2=47k\Omega$ )



| Type     | Marking | Ordering Code | Pin Configuration |     |     | Package |
|----------|---------|---------------|-------------------|-----|-----|---------|
| BCR 166W | WTs     | UPON INQUIRY  | 1=B               | 2=E | 3=C | SOT-323 |

Maximum Ratings

| Parameter                                     | Symbol      | Values         | Unit        |
|-----------------------------------------------|-------------|----------------|-------------|
| Collector-emitter voltage                     | $V_{CEO}$   | 50             | V           |
| Collector-base voltage                        | $V_{CBO}$   | 50             |             |
| Emitter-base voltage                          | $V_{EBO}$   | 5              |             |
| Input on Voltage                              | $V_{i(on)}$ | 15             |             |
| DC collector current                          | $I_C$       | 100            | mA          |
| Total power dissipation, $T_S = 124^{\circ}C$ | $P_{tot}$   | 250            | mW          |
| Junction temperature                          | $T_j$       | 150            | $^{\circ}C$ |
| Storage temperature                           | $T_{stg}$   | - 65 ... + 150 |             |

Thermal Resistance

|                                |            |            |     |
|--------------------------------|------------|------------|-----|
| Junction ambient <sup>1)</sup> | $R_{thJA}$ | $\leq 240$ | K/W |
| Junction - soldering point     | $R_{thJS}$ | $\leq 105$ |     |

1) Package mounted on pcb 40mm x 40mm x 1.5mm / 0.5cm<sup>2</sup> 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<br>$I_C = 100\ \mu\text{A}$ , $I_B = 0$               | $V_{(BR)CEO}$ | 50   | -   | -    | V                |
| Collector-base breakdown voltage<br>$I_C = 10\ \mu\text{A}$ , $I_B = 0$                   | $V_{(BR)CBO}$ | 50   | -   | -    |                  |
| Collector cutoff current<br>$V_{CB} = 40\ \text{V}$ , $I_E = 0$                           | $I_{CBO}$     | -    | -   | 100  | nA               |
| Emitter cutoff current<br>$V_{EB} = 5\ \text{V}$ , $I_C = 0$                              | $I_{EBO}$     | -    | -   | 155  | $\mu\text{A}$    |
| DC current gain<br>$I_C = 5\ \text{mA}$ , $V_{CE} = 5\ \text{V}$                          | $h_{FE}$      | 70   | -   | -    | -                |
| Collector-emitter saturation voltage 1)<br>$I_C = 10\ \text{mA}$ , $I_B = 0.5\ \text{mA}$ | $V_{CEsat}$   | -    | -   | 0.3  | V                |
| Input off voltage<br>$I_C = 100\ \mu\text{A}$ , $V_{CE} = 5\ \text{V}$                    | $V_{i(off)}$  | 0.4  | -   | 0.8  |                  |
| Input on Voltage<br>$I_C = 2\ \text{mA}$ , $V_{CE} = 0.3\ \text{V}$                       | $V_{i(on)}$   | 0.5  | -   | 1.4  |                  |
| Input resistor                                                                            | $R_1$         | 3.2  | 4.7 | 6.2  | $\text{k}\Omega$ |
| Resistor ratio                                                                            | $R_1/R_2$     | 0.09 | 0.1 | 0.11 | -                |

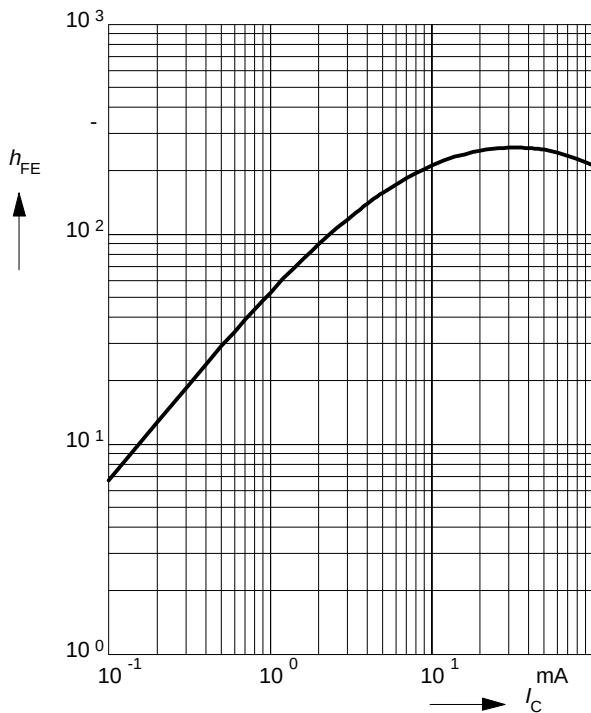
### AC Characteristics

|                                                                                                |          |   |     |   |     |
|------------------------------------------------------------------------------------------------|----------|---|-----|---|-----|
| Transition frequency<br>$I_C = 10\ \text{mA}$ , $V_{CE} = 5\ \text{V}$ , $f = 100\ \text{MHz}$ | $f_T$    | - | 160 | - | MHz |
| Collector-base capacitance<br>$V_{CB} = 10\ \text{V}$ , $f = 1\ \text{MHz}$                    | $C_{cb}$ | - | 3   | - | pF  |

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

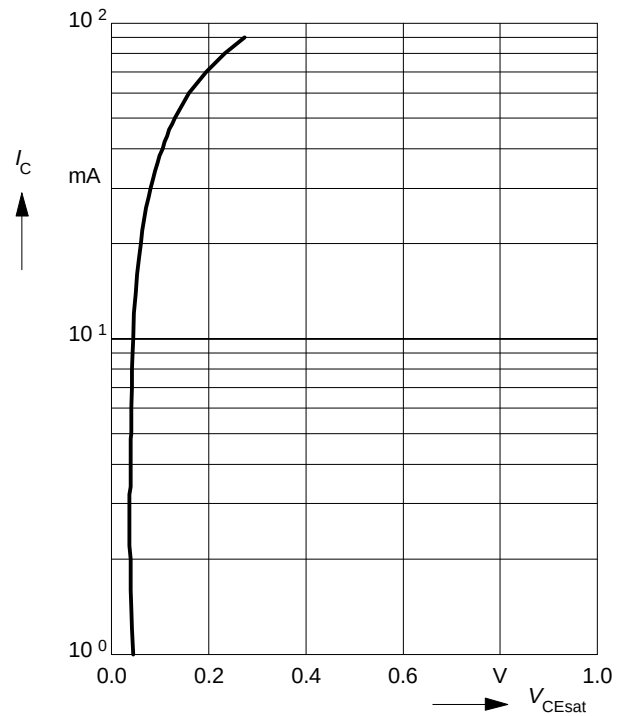
## DC Current Gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$  (common emitter configuration)



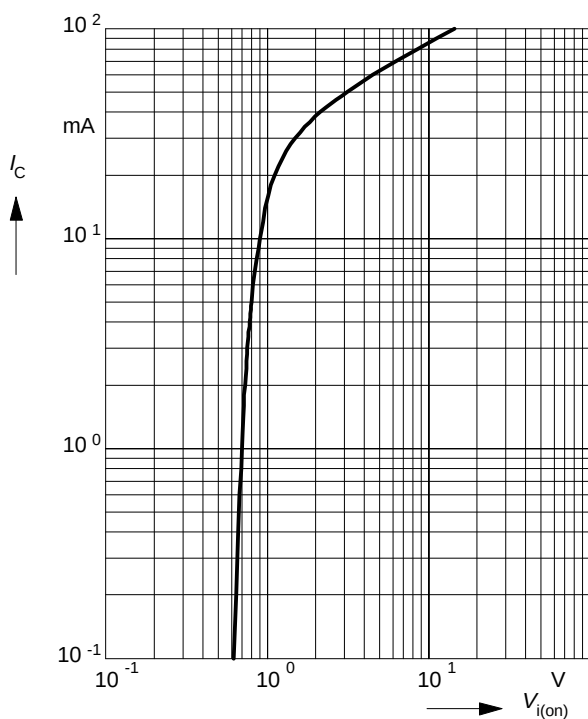
## Collector-Emitter Saturation Voltage

$V_{CEsat} = f(I_C)$ ,  $h_{FE} = 20$



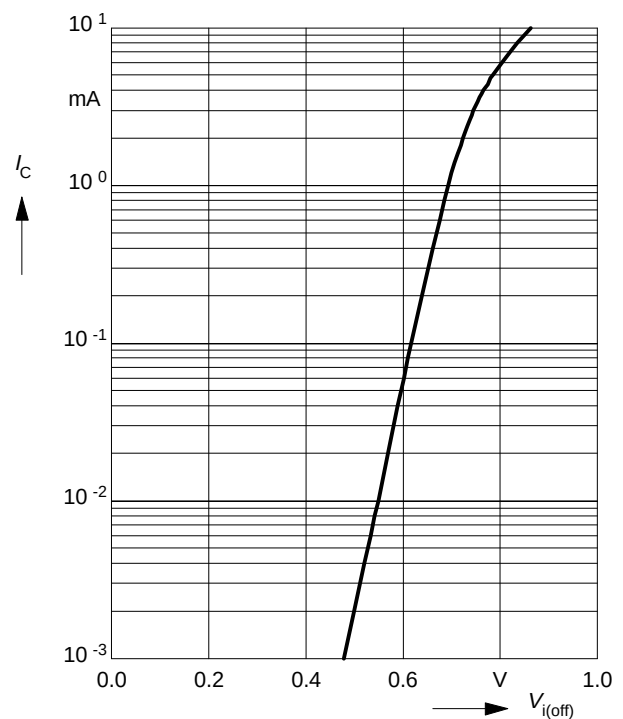
## Input on Voltage $V_{i(on)} = f(I_C)$

$V_{CE} = 0.3V$  (common emitter configuration)



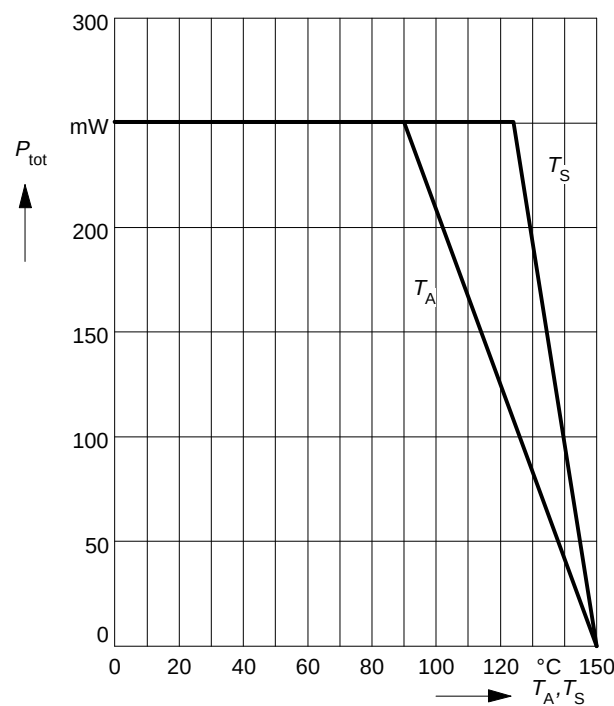
## Input off voltage $V_{i(off)} = f(I_C)$

$V_{CE} = 5V$  (common emitter configuration)

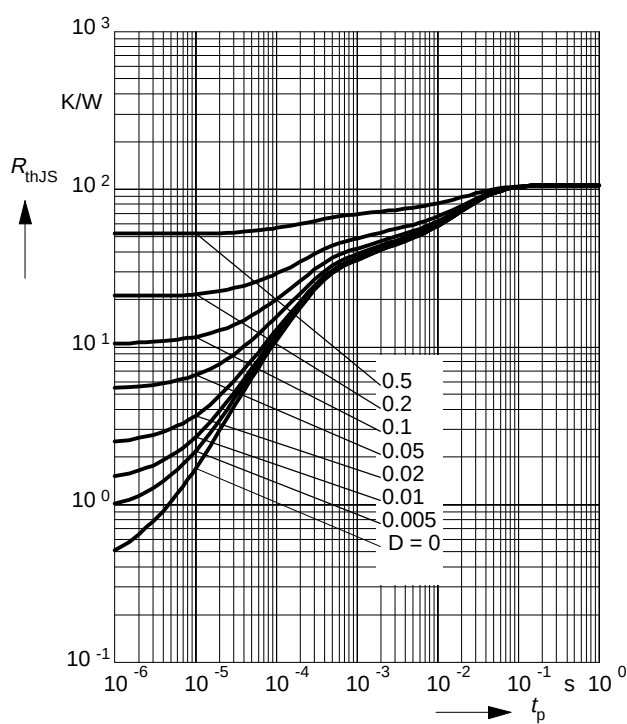


Total power dissipation  $P_{\text{tot}} = f(T_A^*; T_S)$

\* Package mounted on epoxy



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



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

