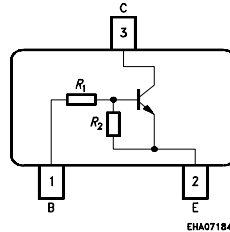


### NPN Silicon Digital Transistor

- Switching circuit, inverter, interface circuit, driver circuit
- Built in bias resistor ( $R_1=47k\Omega$ ,  $R_2=22k\Omega$ )



| Type     | Marking | Ordering Code | Pin Configuration |       |       | Package |
|----------|---------|---------------|-------------------|-------|-------|---------|
| BCR 146W | WLS     | 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                               | $V_{EBO}$   | 10             |                  |
| Input on Voltage                                   | $V_{i(on)}$ | 50             |                  |
| DC collector current                               | $I_C$       | 70             | mA               |
| Total power dissipation, $T_S = 124^\circ\text{C}$ | $P_{tot}$   | 250            | mW               |
| Junction temperature                               | $T_j$       | 150            | $^\circ\text{C}$ |
| 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>$V_{EB} = 10 \text{ V}, I_C = 0$                             | $I_{EBO}$     | -    | -    | 220  | $\mu\text{A}$    |
| DC current gain<br>$I_C = 5 \text{ mA}, V_{CE} = 5 \text{ V}$                          | $h_{FE}$      | 50   | -    | -    | -                |
| 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>$I_C = 100 \mu\text{A}, V_{CE} = 5 \text{ V}$                     | $V_{i(off)}$  | 1.2  | -    | 2.6  |                  |
| Input on Voltage<br>$I_C = 2 \text{ mA}, V_{CE} = 0.3 \text{ V}$                       | $V_{i(on)}$   | 1.5  | -    | 4    |                  |
| Input resistor   | $R_1$         | 32   | 47   | 62   | $\text{k}\Omega$ |
| Resistor ratio   | $R_1/R_2$     | 1.92 | 2.14 | 2.36 | -                |

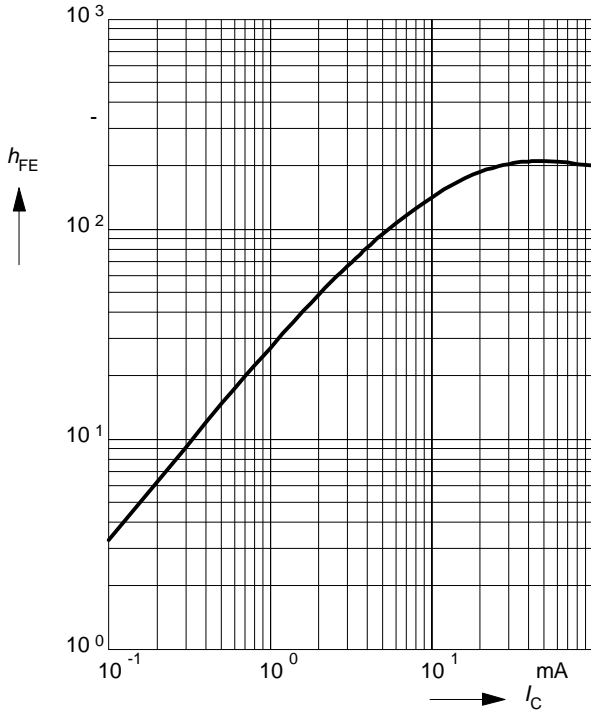
### AC Characteristics

|  |          |   |     |   |     |
|--|----------|---|-----|---|-----|
| Transition frequency<br>$I_C = 10 \text{ mA}, V_{CE} = 5 \text{ V}, f = 100 \text{ MHz}$ | $f_T$    | - | 150 | - | MHz |
| Collector-base capacitance<br>$V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}$                 | $C_{cb}$ | - | 3   | - | pF  |

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

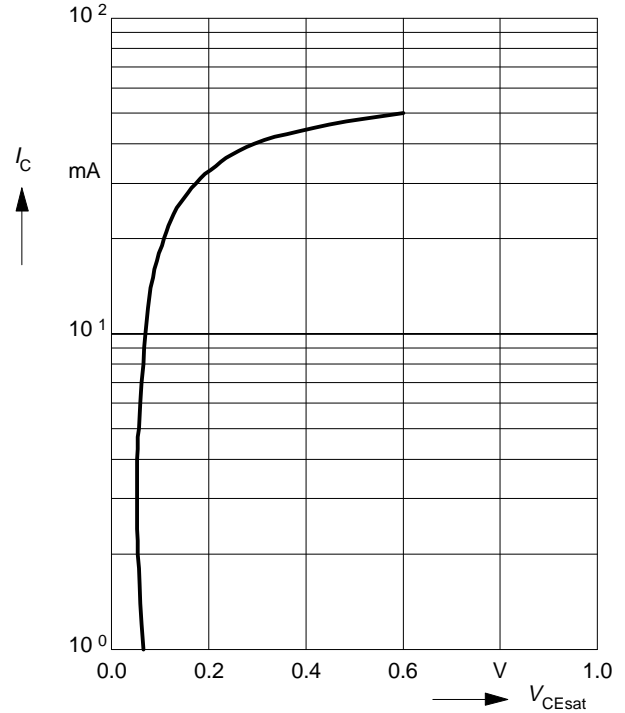
### DC Current Gain $h_{FE} = f(I_C)$

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



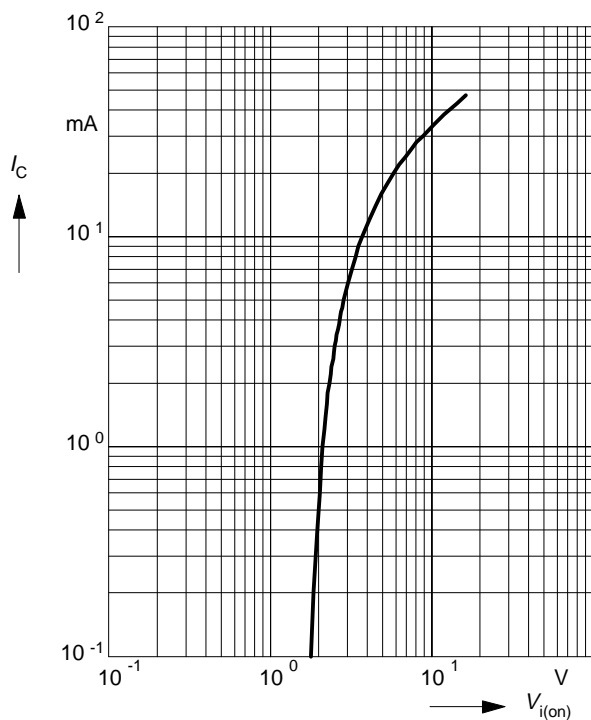
### Collector-Emitter Saturation Voltage $V_{CEsat} = f(I_C), h_{FE} = 20$

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



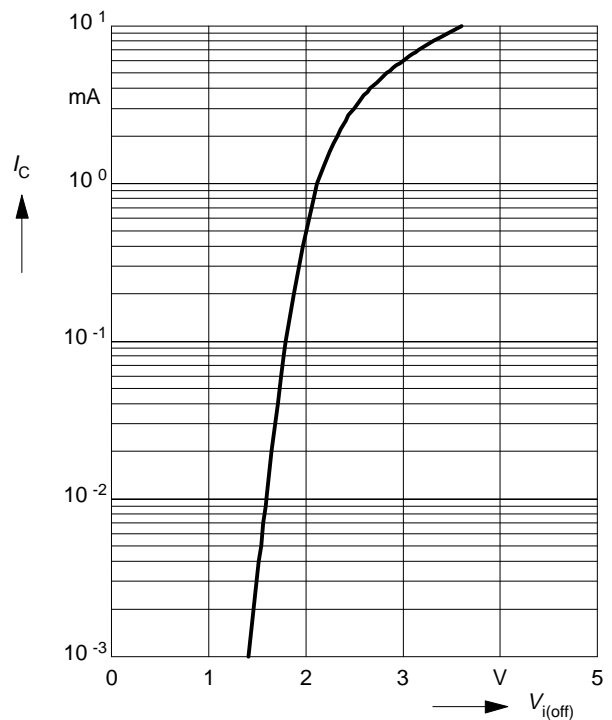
### Input on Voltage $V_{i(on)} = f(I_C)$

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



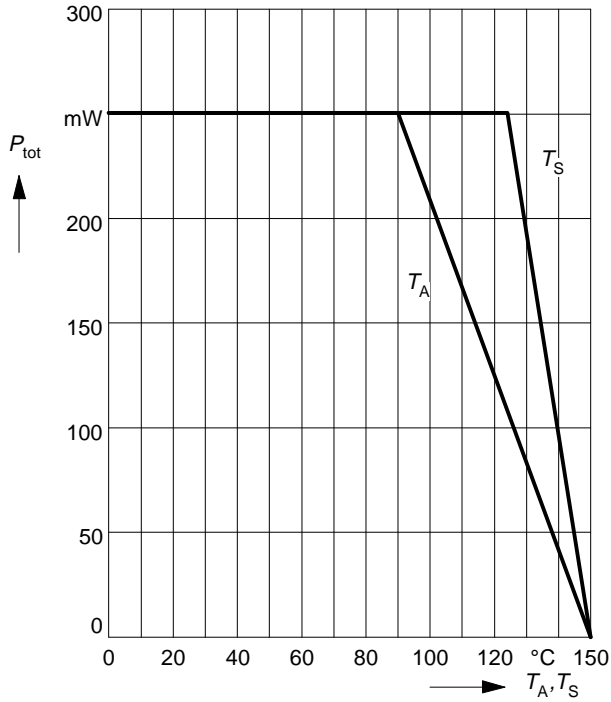
### Input off voltage $V_{i(off)} = f(I_C)$

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



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

\* Package mounted on epoxy



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



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

