

### NPN Silicon Digital Transistor

- Switching circuit, inverter, interface circuit, driver circuit
- Built in bias resistor ( $R_1=4.7\text{ k}\Omega$ ,  $R_2=47\text{ k}\Omega$ )
- BCR116S: Two internally isolated transistors with good matching in one multichip package
- BCR116S: For orientation in reel see package information below
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



#### BCR116 BCR116W



#### BCR116S



| Type    | Marking | Pin Configuration |      |      |      |      |      | Package |
|---------|---------|-------------------|------|------|------|------|------|---------|
| BCR116  | WG5     | 1=B               | 2=E  | 3=C  | -    | -    | -    | SOT23   |
| BCR116S | WG5     | 1=E1              | 2=B1 | 3=C2 | 4=E2 | 5=B2 | 6=C1 | SOT363  |
| BCR116W | WG5     | 1=B               | 2=E  | 3=C  | -    | -    | -    | SOT323  |

**Maximum Ratings**

| Parameter                                                                                                                                          | Symbol       | Value             | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------|------|
| Collector-emitter voltage                                                                                                                          | $V_{CEO}$    | 50                | V    |
| Collector-base voltage                                                                                                                             | $V_{CBO}$    | 50                |      |
| Input forward voltage                                                                                                                              | $V_{i(fwd)}$ | 30                |      |
| Input reverse voltage                                                                                                                              | $V_{i(rev)}$ | 5                 |      |
| Collector current                                                                                                                                  | $I_C$        | 100               | mA   |
| Total power dissipation-<br>BCR116, $T_S \leq 102^\circ\text{C}$<br>BCR116S, $T_S \leq 115^\circ\text{C}$<br>BCR116W, $T_S \leq 124^\circ\text{C}$ | $P_{tot}$    | 200<br>250<br>250 | mW   |
| Junction temperature                                                                                                                               | $T_j$        | 150               |      |
| Storage temperature                                                                                                                                | $T_{stg}$    | -65 ... 150       |      |
|                                                                                                                                                    |              |                   |      |

**Thermal Resistance**

| Parameter                                | Symbol     | Value      | Unit |
|------------------------------------------|------------|------------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ |            | K/W  |
| BCR116                                   |            | $\leq 240$ |      |
| BCR116S                                  |            | $\leq 140$ |      |
| BCR116W                                  |            | $\leq 105$ |      |

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

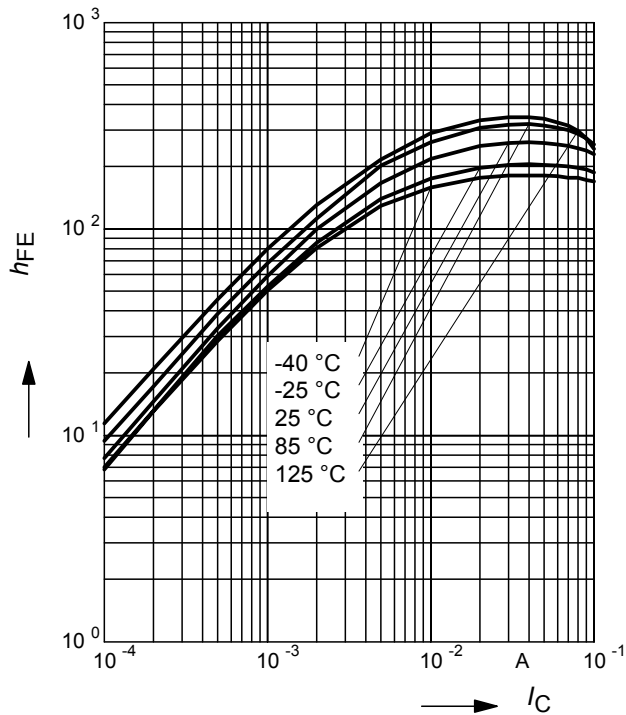
**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

| Parameter                                                                                             | Symbol                      | Values |      |      | Unit          |
|-------------------------------------------------------------------------------------------------------|-----------------------------|--------|------|------|---------------|
|                                                                                                       |                             | min.   | typ. | max. |               |
| DC Characteristics                                                                                    |                             |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 100\ \mu\text{A}$ , $I_B = 0$                           | $V_{(\text{BR})\text{CEO}}$ | 50     | -    | -    | V             |
| Collector-base breakdown voltage<br>$I_C = 10\ \mu\text{A}$ , $I_E = 0$                               | $V_{(\text{BR})\text{CBO}}$ | 50     | -    | -    |               |
| Collector-base cutoff current<br>$V_{\text{CB}} = 40\ \text{V}$ , $I_E = 0$                           | $I_{\text{CBO}}$            | -      | -    | 100  | nA            |
| Emitter-base cutoff current<br>$V_{\text{EB}} = 5\ \text{V}$ , $I_C = 0$                              | $I_{\text{EBO}}$            | -      | -    | 155  | $\mu\text{A}$ |
| DC current gain <sup>1)</sup><br>$I_C = 5\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$                 | $h_{\text{FE}}$             | 70     | -    | -    | -             |
| Collector-emitter saturation voltage <sup>1)</sup><br>$I_C = 10\ \text{mA}$ , $I_B = 0.5\ \text{mA}$  | $V_{\text{CEsat}}$          | -      | -    | 0.3  | V             |
| Input off voltage<br>$I_C = 100\ \mu\text{A}$ , $V_{\text{CE}} = 5\ \text{V}$                         | $V_{\text{i(off)}}$         | 0.4    | -    | 0.8  |               |
| Input on voltage<br>$I_C = 2\ \text{mA}$ , $V_{\text{CE}} = 0.3\ \text{V}$                            | $V_{\text{i(on)}}$          | 0.5    | -    | 1.4  |               |
| Input resistor                                                                                        | $R_1$                       | 3.2    | 4.7  | 6.2  | k $\Omega$    |
| Resistor ratio                                                                                        | $R_1/R_2$                   | 0.09   | 0.1  | 0.11 | -             |
| AC Characteristics                                                                                    |                             |        |      |      |               |
| Transition frequency<br>$I_C = 10\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$ , $f = 100\ \text{MHz}$ | $f_{\text{T}}$              | -      | 150  | -    | MHz           |
| Collector-base capacitance<br>$V_{\text{CB}} = 10\ \text{V}$ , $f = 1\ \text{MHz}$                    | $C_{\text{cb}}$             | -      | 3    | -    | pF            |

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

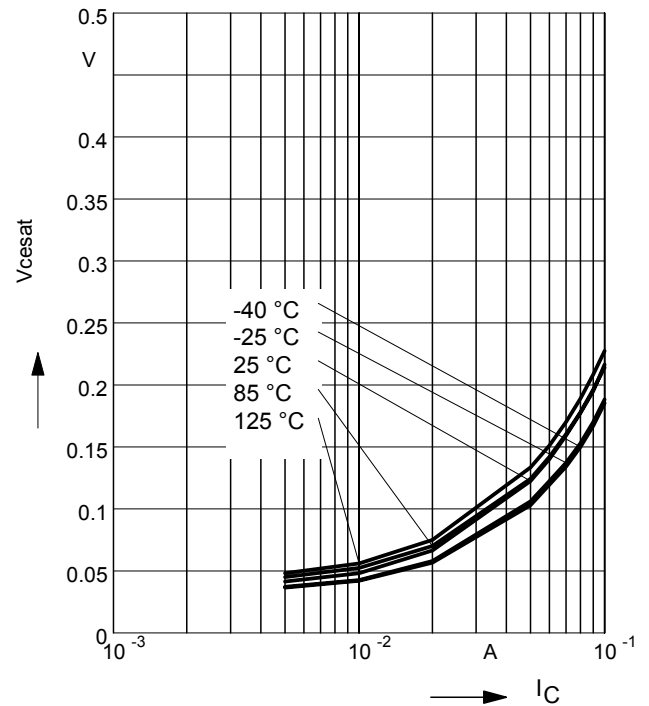
### DC current gain $h_{FE} = f(I_C)$

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



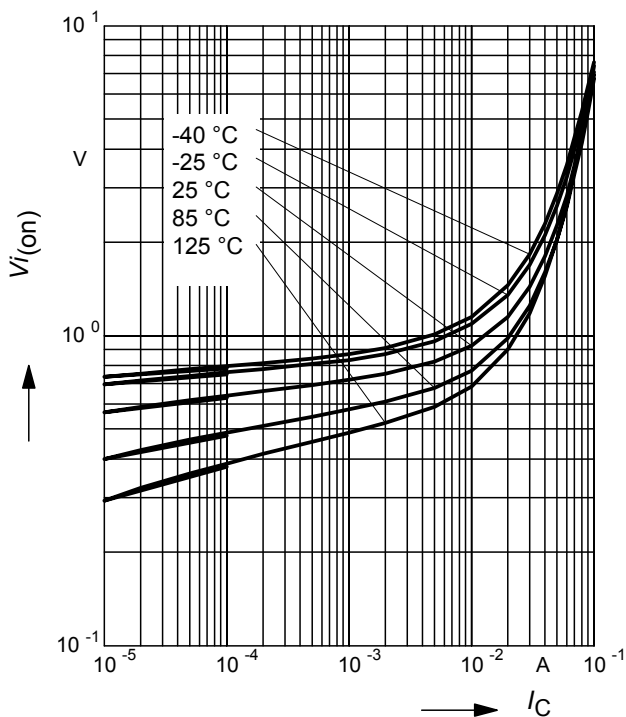
### Collector-emitter saturation voltage

$V_{CEsat} = f(I_C)$ ,  $I_C/I_B = 20$



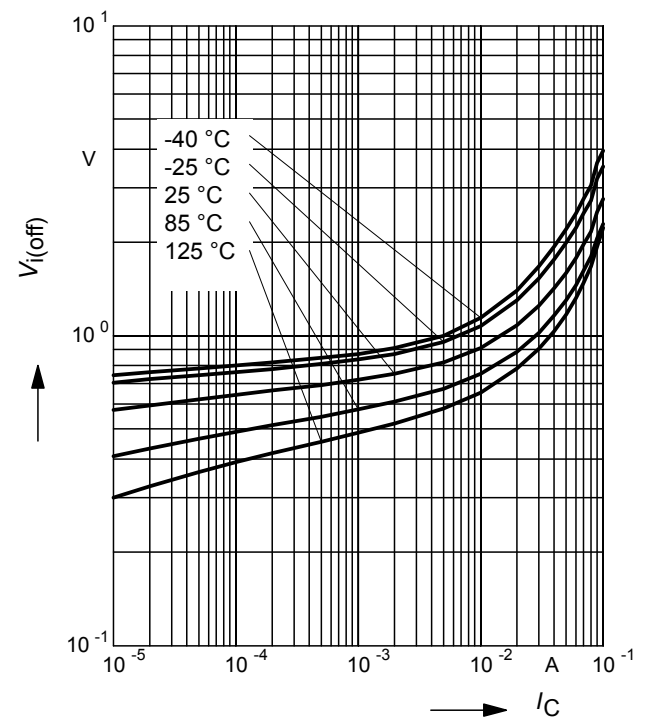
### Input on Voltage $V_{i(on)} = f(I_C)$

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



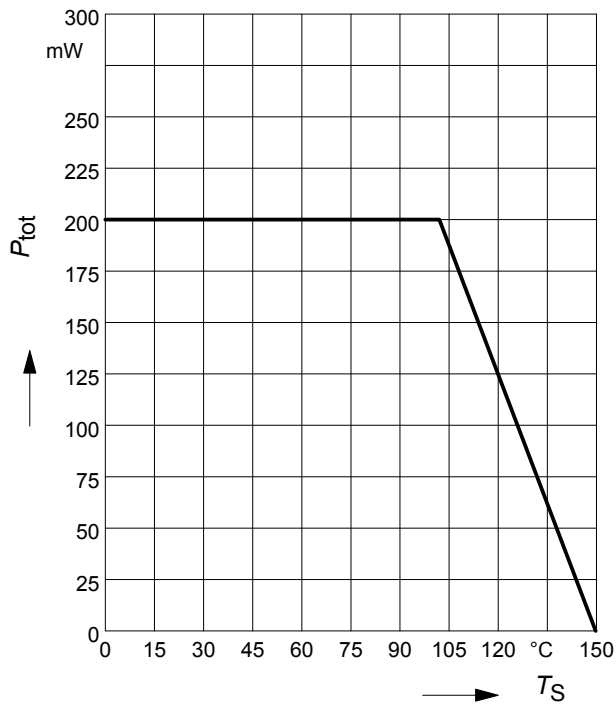
### Input off voltage $V_{i(off)} = f(I_C)$

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



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

BCR116



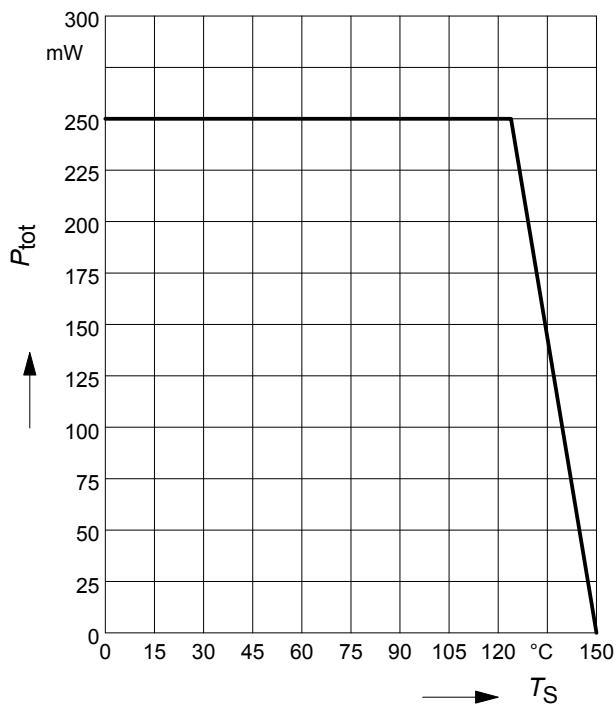
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR116S



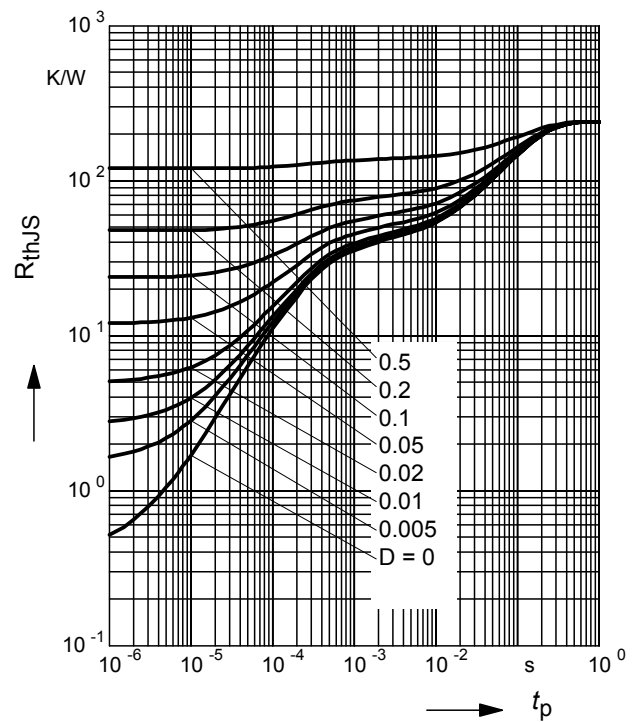
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR116W



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

BCR116



### Permissible Pulse Load

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

BCR116



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

BCR116S



### Permissible Pulse Load

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

BCR116S



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

BCR116W



## Permissible Pulse Load

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

BCR116W



## Package Outline

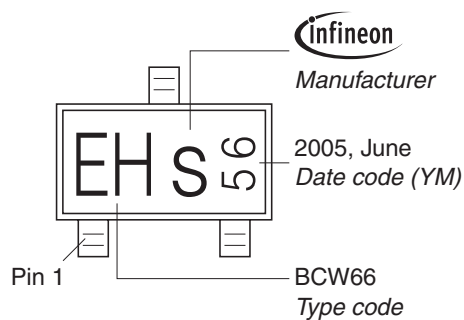


1) Lead width can be 0.6 max. in dambar area

## Foot Print



## Marking Layout (Example)



## Standard Packing

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



## Package Outline



## Foot Print



## Marking Layout (Example)



## Standard Packing

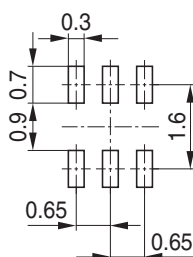
Reel  $\varnothing 180$  mm = 3.000 Pieces/Reel  
 Reel  $\varnothing 330$  mm = 10.000 Pieces/Reel



## Package Outline

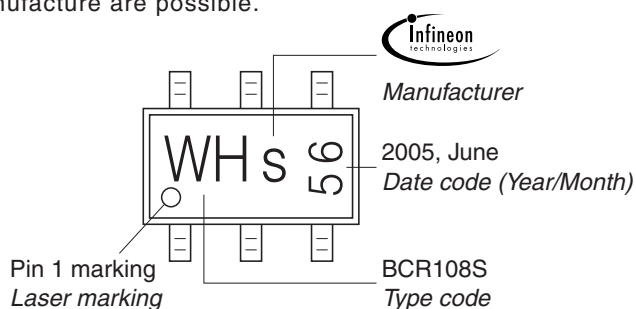


## Foot Print



## Marking Layout (Example)

Small variations in positioning of Date code, Type code and Manufacture are possible.



## Standard Packing

Reel  $\varnothing 180$  mm = 3.000 Pieces/Reel  
Reel  $\varnothing 330$  mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.



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