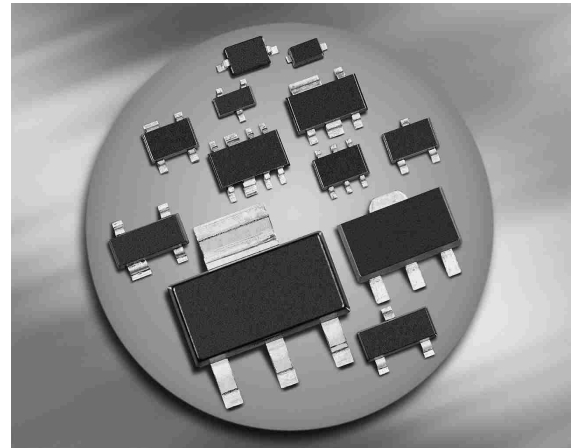
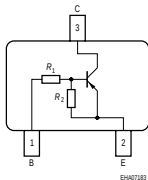


## PNP Silicon Digital Transistor

- Switching circuit, inverter, interface circuit, driver circuit
- Built in bias resistor ( $R_1 = 4.7 \text{ k}\Omega$  ,  $R_2 = 47 \text{ k}\Omega$  )
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



## BCR166 BCR166W



| Type    | Marking | Pin Configuration |     |     |   |   |   | Package |
|---------|---------|-------------------|-----|-----|---|---|---|---------|
| BCR166  | WTs     | 1=B               | 2=E | 3=C | - | - | - | SOT23   |
| BCR166W | WTs     | 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>BCR166, $T_S \leq 102^\circ\text{C}$<br>BCR166W, $T_S \leq 124^\circ\text{C}$ | $P_{tot}$    | 200<br>250  | mW               |
| Junction temperature                                                                                      | $T_j$        | 150         |                  |
| Storage temperature                                                                                       | $T_{stg}$    | -65 ... 150 | $^\circ\text{C}$ |

**Thermal Resistance**

| Parameter                                | Symbol     | Value      | Unit |
|------------------------------------------|------------|------------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ |            | K/W  |
| BCR166                                   |            | $\leq 240$ |      |
| BCR166W                                  |            | $\leq 105$ |      |

**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>$I_C = 10 \mu\text{A}$ , $I_E = 0$                               | $V_{(BR)CBO}$ | 50   | -   | -    |               |
| Collector-base cutoff current<br>$V_{CB} = 40 \text{ V}$ , $I_E = 0$                                 | $I_{CBO}$     | -    | -   | 100  | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 5 \text{ V}$ , $I_C = 0$                                    | $I_{EBO}$     | -    | -   | 155  | $\mu\text{A}$ |
| DC current gain <sup>2)</sup><br>$I_C = 5 \text{ mA}$ , $V_{CE} = 5 \text{ V}$                       | $h_{FE}$      | 70   | -   | -    | -             |
| Collector-emitter saturation voltage <sup>2)</sup><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  | $k\Omega$     |
| Resistor ratio                                                                                       | $R_1/R_2$     | 0.09 | 0.1 | 0.11 | -             |

**AC Characteristics**

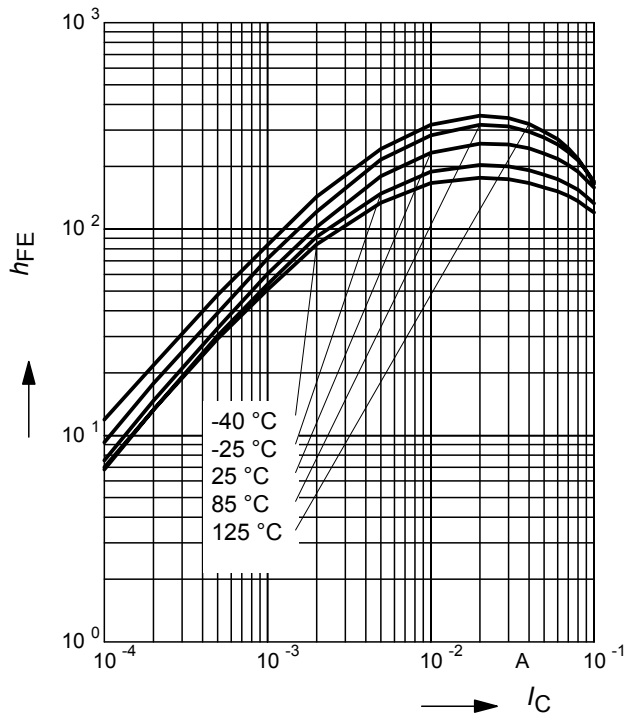
|                                                                                                |          |   |     |   |     |
|------------------------------------------------------------------------------------------------|----------|---|-----|---|-----|
| Transition frequency<br>$I_C = 10 \text{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

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

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

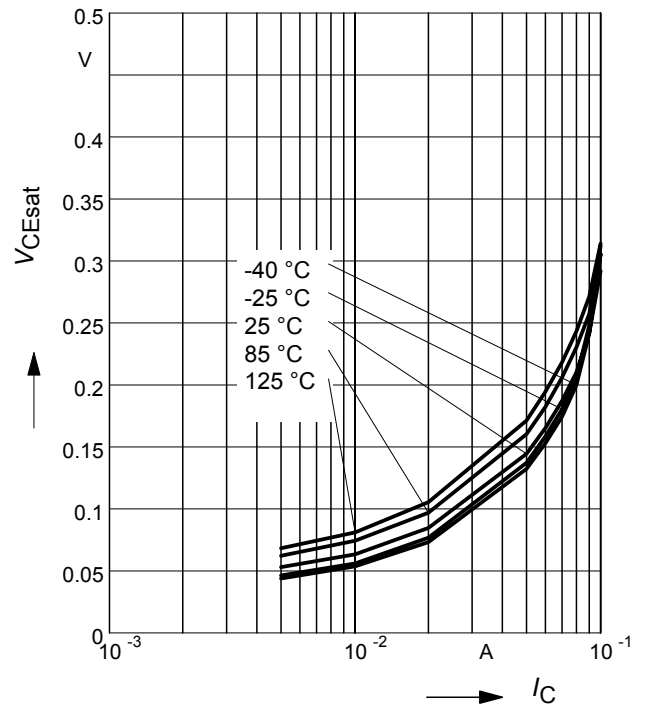
### DC current gain $h_{FE} = f(I_C)$

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



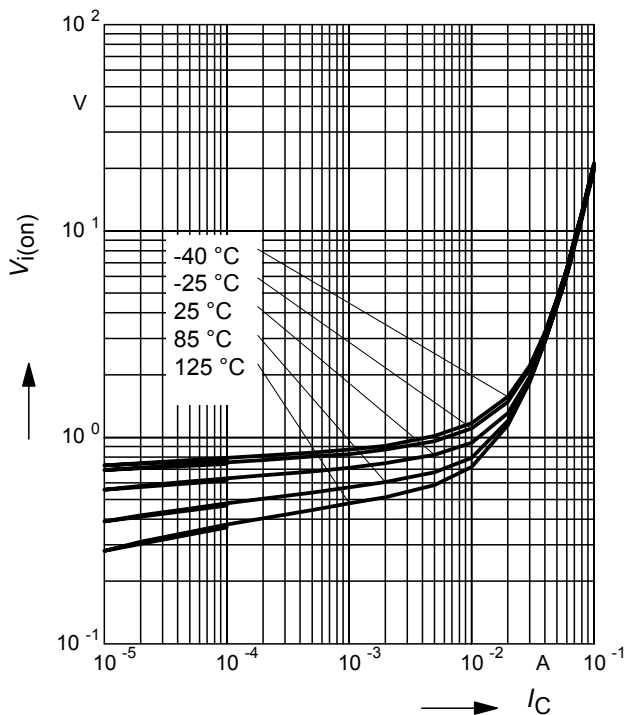
### Collector-emitter saturation voltage

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



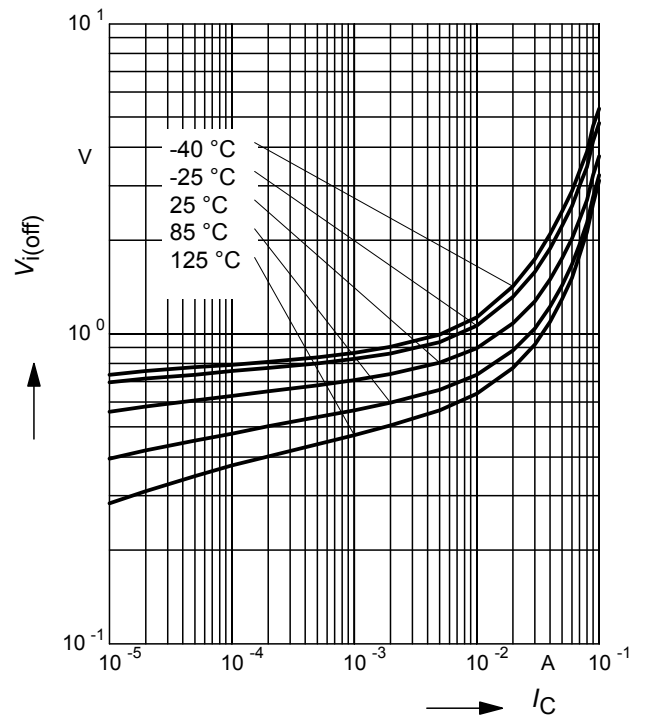
### Input on Voltage $V_{i(on)} = f(I_C)$

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



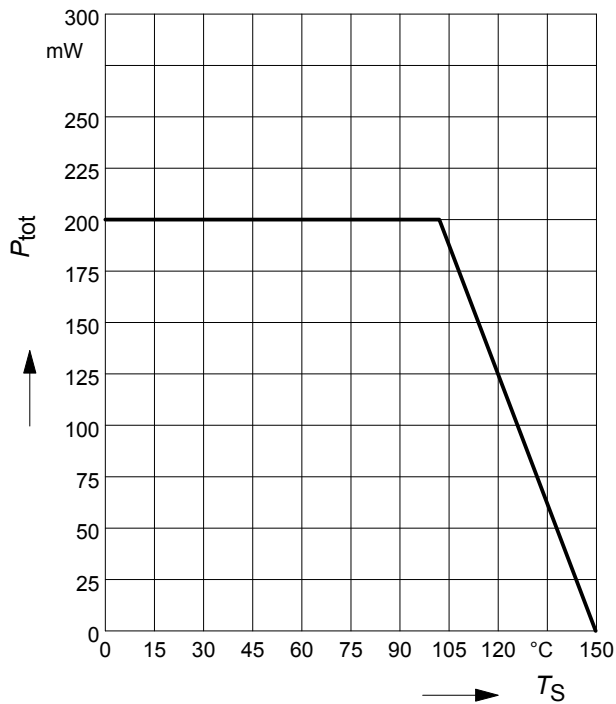
### Input off voltage $V_{i(off)} = f(I_C)$

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



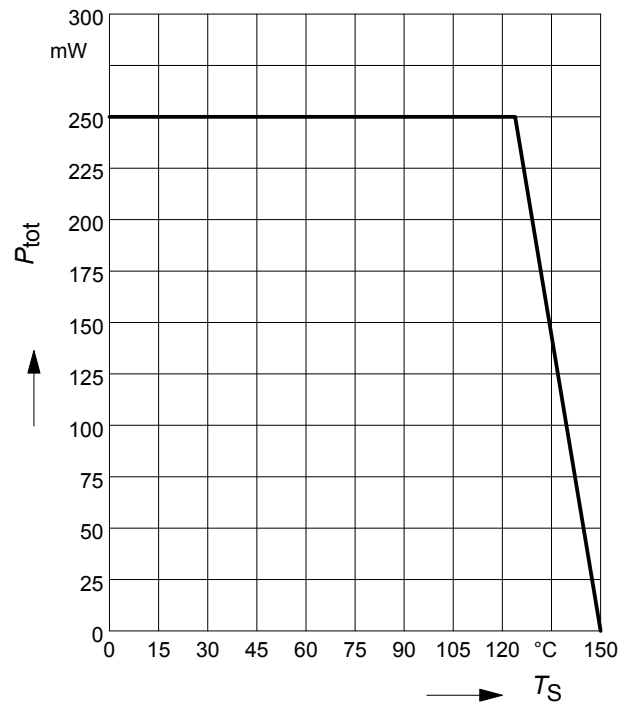
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR166



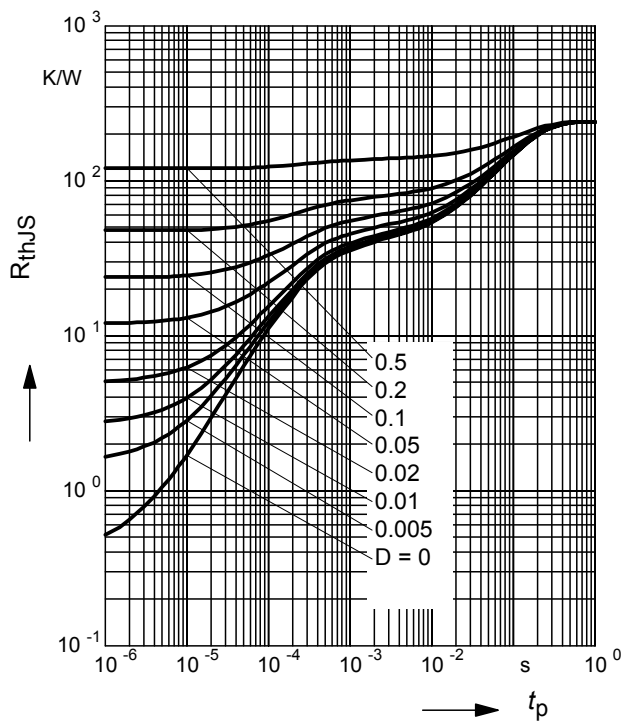
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR166W



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

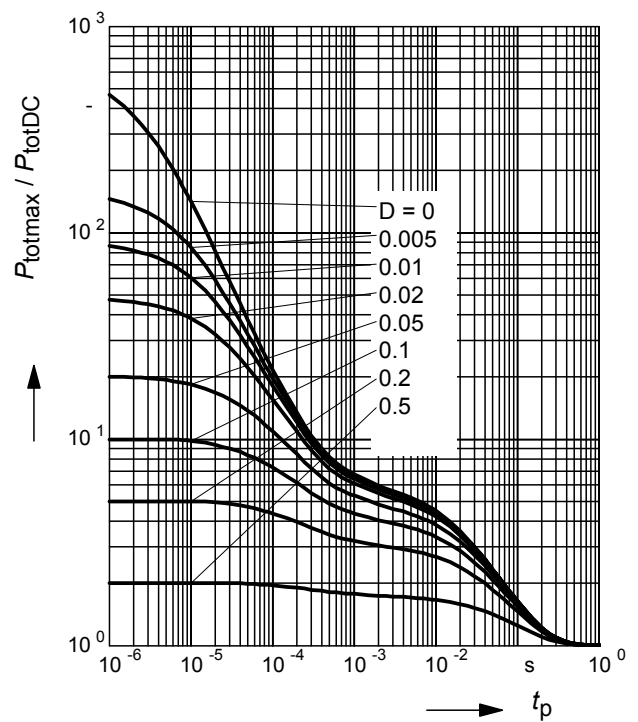
BCR166



**Permissible Pulse Load**

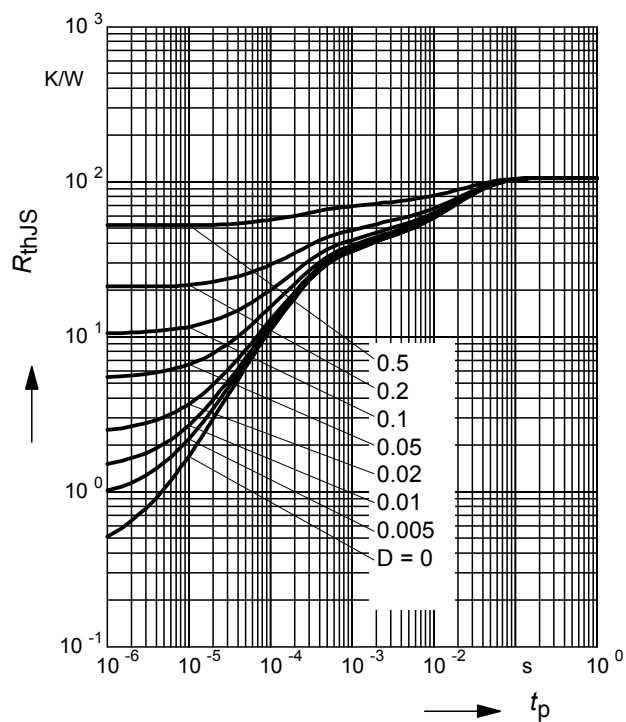
$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$

BCR166



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

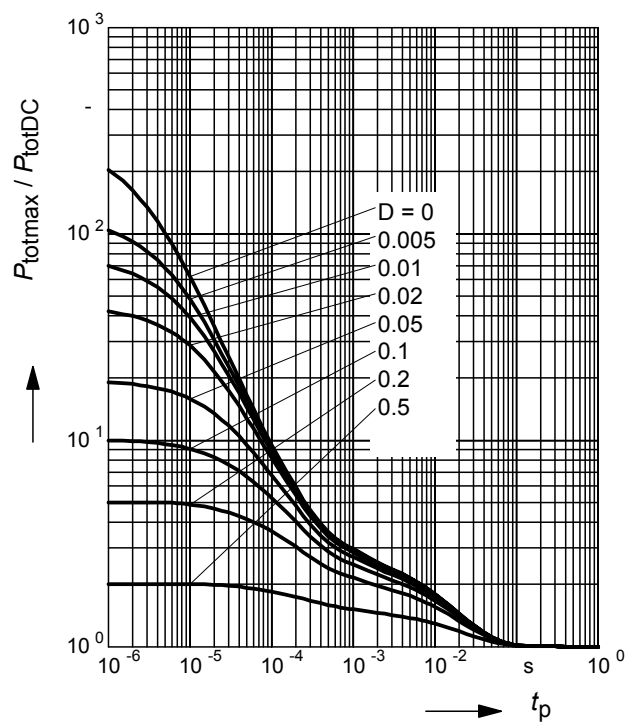
BCR166W



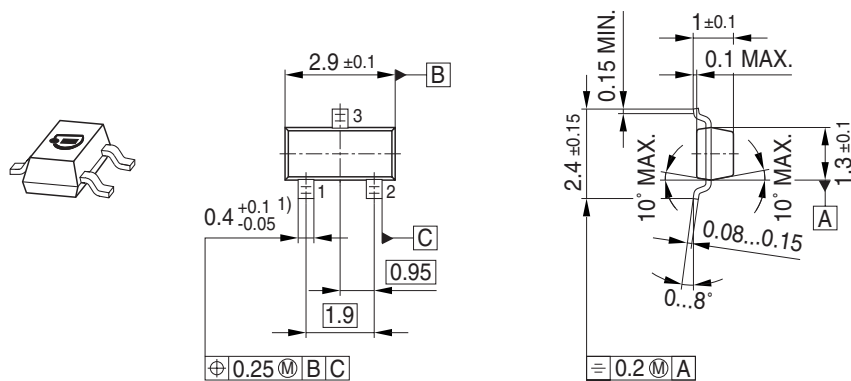
# Permissible Pulse Load

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

BCR166W

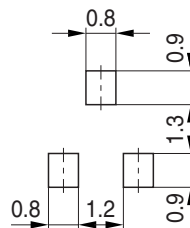


## Package Outline

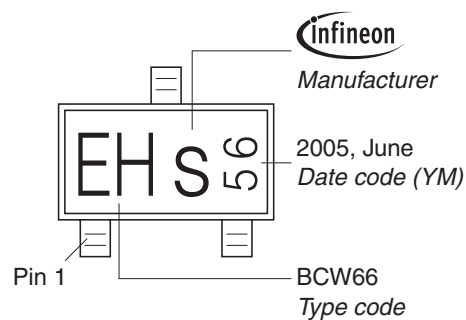


1) Lead width can be 0.6 max. in dambar area

## Foot Print

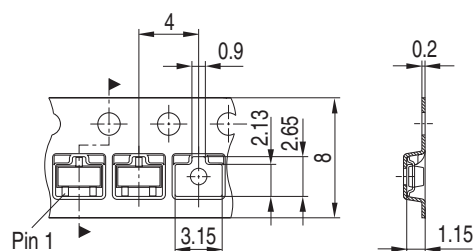


## Marking Layout (Example)

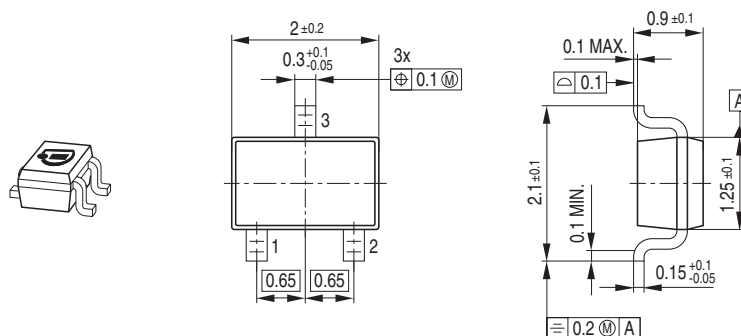


## Standard Packing

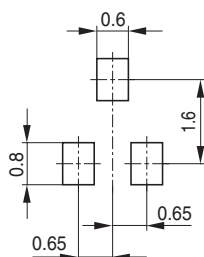
Reel ø180 mm = 3.000 Pieces/Reel  
Reel ø330 mm = 10.000 Pieces/Reel



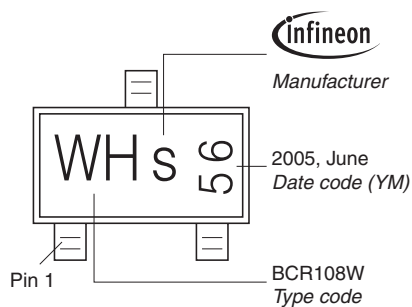
## Package Outline



## Foot Print

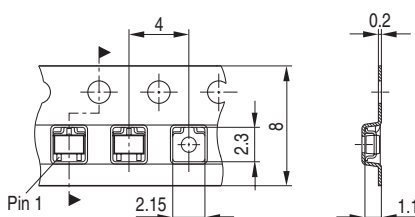


## Marking Layout (Example)



## Standard Packing

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



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