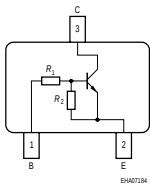


**NPN Silicon Digital Transistor**

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


**BCR146/F/L3**  
**BCR146T/W**


| Type     | Marking | Pin Configuration |     |     |   |   |   | Package  |
|----------|---------|-------------------|-----|-----|---|---|---|----------|
| BCR146   | WLs     | 1=B               | 2=E | 3=C | - | - | - | SOT23    |
| BCR146F  | WLs     | 1=B               | 2=E | 3=C | - | - | - | TSFP-3   |
| BCR146L3 | WL      | 1=B               | 2=E | 3=C | - | - | - | TSLP-3-4 |
| BCR146T  | WLs     | 1=B               | 2=E | 3=C | - | - | - | SC75     |
| BCR146W  | WLs     | 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                              |      |
| Emitter-base voltage                                                                                                                                                                                                                  | $V_{EBO}$   | 10                              |      |
| Input on voltage                                                                                                                                                                                                                      | $V_{i(on)}$ | 50                              |      |
| Collector current                                                                                                                                                                                                                     | $I_C$       | 70                              | mA   |
| Total power dissipation-<br>BCR146, $T_S \leq 102^\circ\text{C}$<br>BCR146F, $T_S \leq 128^\circ\text{C}$<br>BCR146L3, $T_S \leq 135^\circ\text{C}$<br>BCR146T, $T_S \leq 109^\circ\text{C}$<br>BCR146W, $T_S \leq 124^\circ\text{C}$ | $P_{tot}$   | 200<br>250<br>250<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><br>BCR146<br>BCR146F<br>BCR146L3<br>BCR146T<br>BCR146W | $R_{thJS}$ | $\leq 240$<br>$\leq 90$<br>$\leq 60$<br>$\leq 165$<br>$\leq 105$ | K/W  |

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

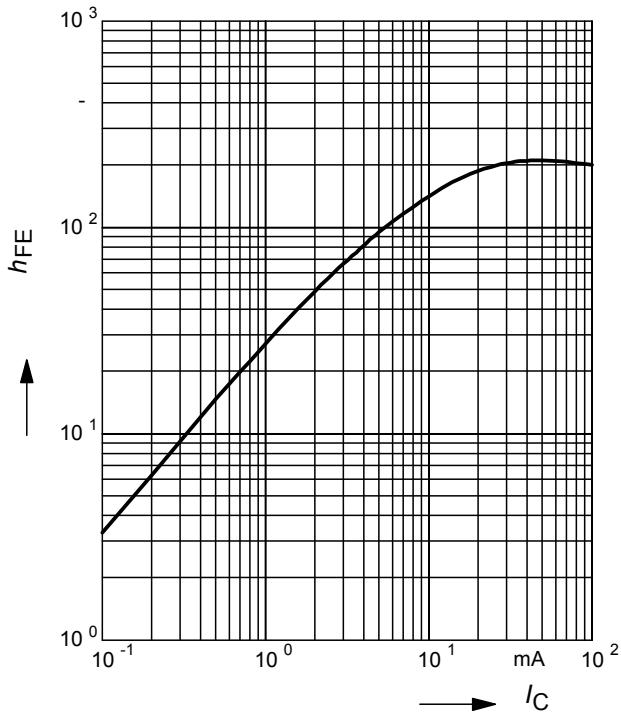
**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

| 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>$V_{\text{EB}} = 10\ \text{V}$ , $I_C = 0$                             | $I_{\text{EBO}}$            | -      | -    | 220  | $\mu\text{A}$ |
| DC current gain <sup>1)</sup><br>$I_C = 5\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$                 | $h_{\text{FE}}$             | 50     | -    | -    | -             |
| 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>$I_C = 100\ \mu\text{A}$ , $V_{\text{CE}} = 5\ \text{V}$                         | $V_{\text{i(off)}}$         | 1.2    | -    | 2.6  |               |
| Input on voltage<br>$I_C = 2\ \text{mA}$ , $V_{\text{CE}} = 0.3\ \text{V}$                            | $V_{\text{i(on)}}$          | 1.5    | -    | 4    |               |
| Input resistor                                                                                        | $R_1$                       | 32     | 47   | 62   | k $\Omega$    |
| Resistor ratio                                                                                        | $R_1/R_2$                   | 1.92   | 2.14 | 2.36 | -             |
| AC Characteristics                                                                                    |                             |        |      |      |               |
| Transition frequency<br>$I_C = 10\ \text{mA}$ , $V_{\text{CE}} = 5\ \text{V}$ , $f = 100\ \text{MHz}$ | $f_{\text{T}}$              | -      | 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:  $t < 300\ \mu\text{s}$ ;  $D < 2\%$

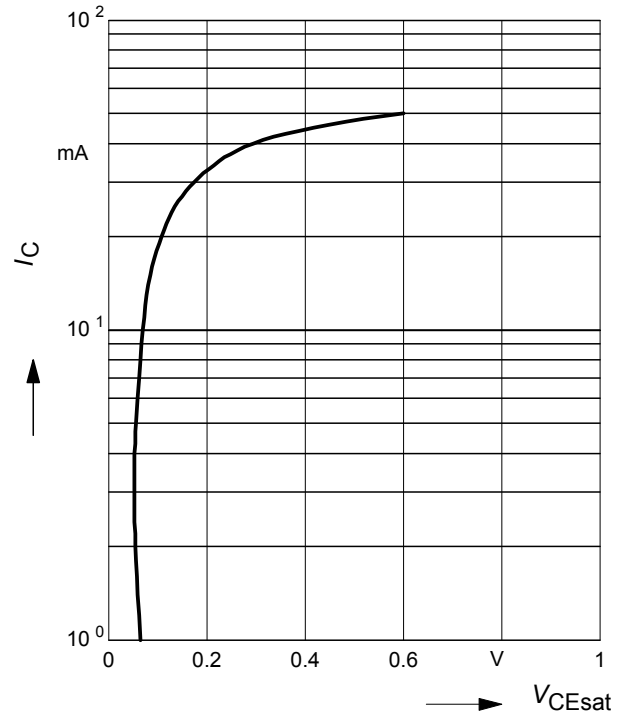
**DC current gain  $h_{FE} = f(I_C)$**

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



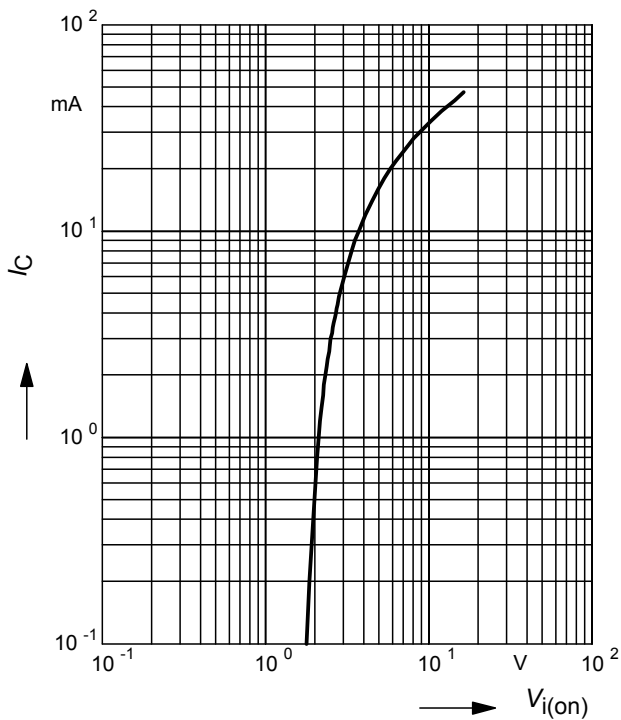
**Collector-emitter saturation voltage**

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



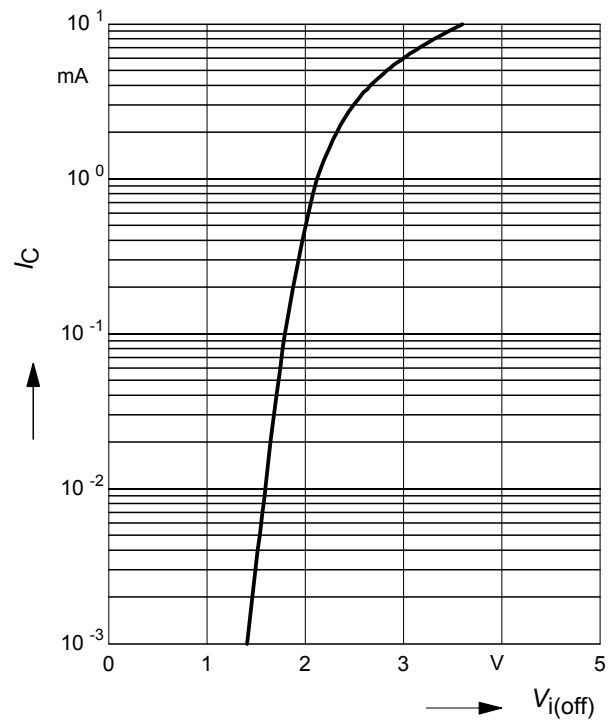
**Input on Voltage  $V_{i(on)} = f(I_C)$**

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



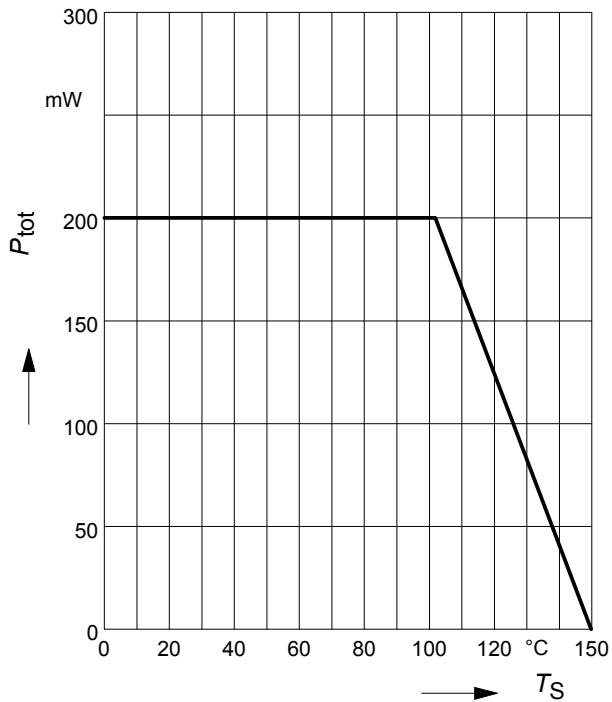
**Input off voltage  $V_{i(off)} = f(I_C)$**

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



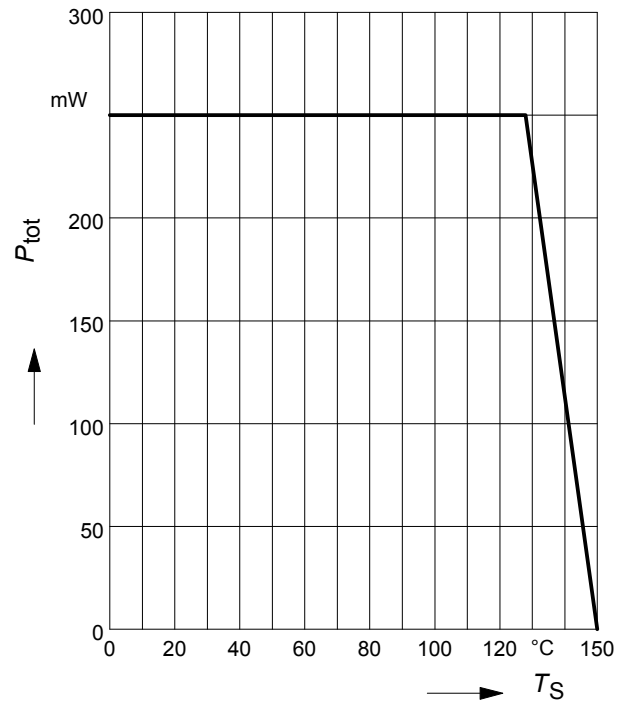
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR146



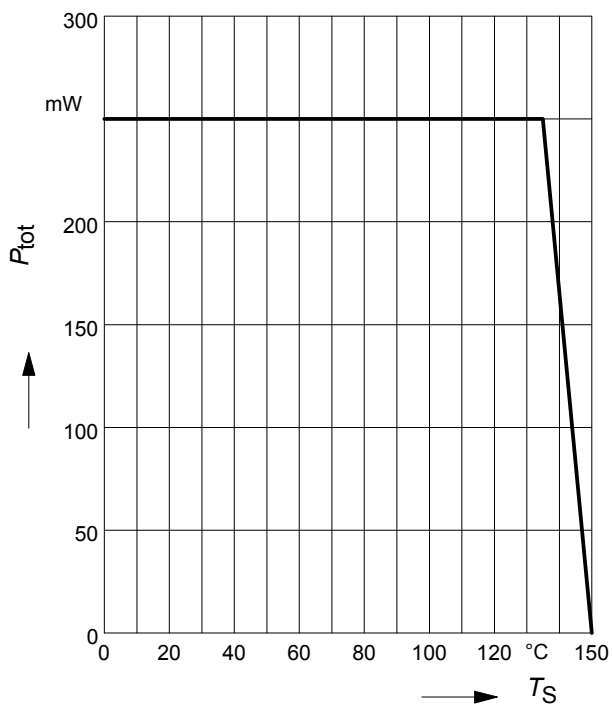
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR146F



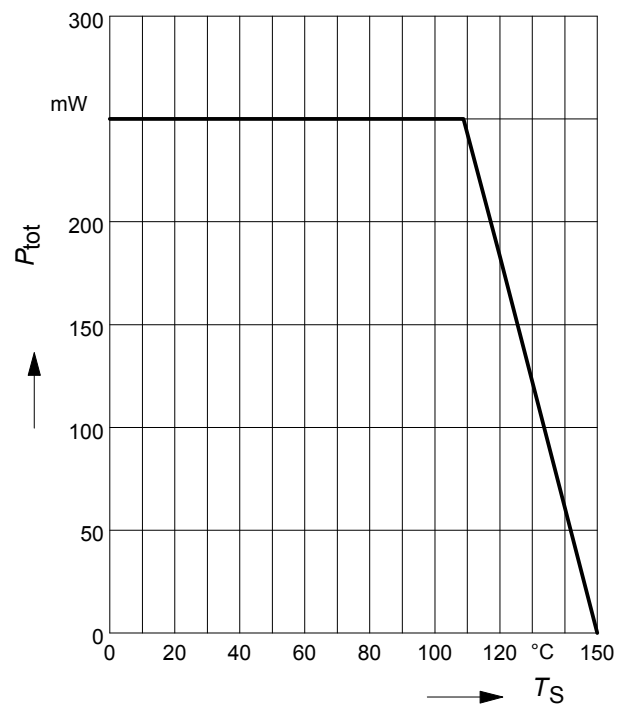
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR146L3



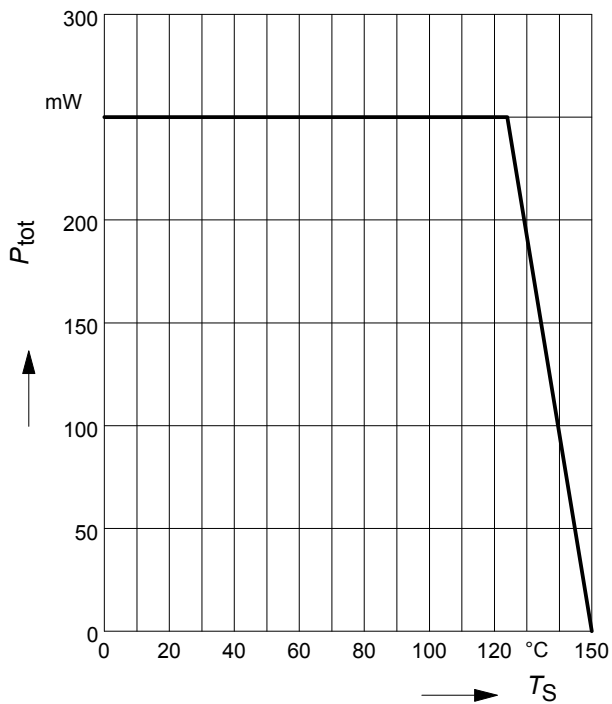
**Total power dissipation  $P_{\text{tot}} = f(T_S)$**

BCR146T



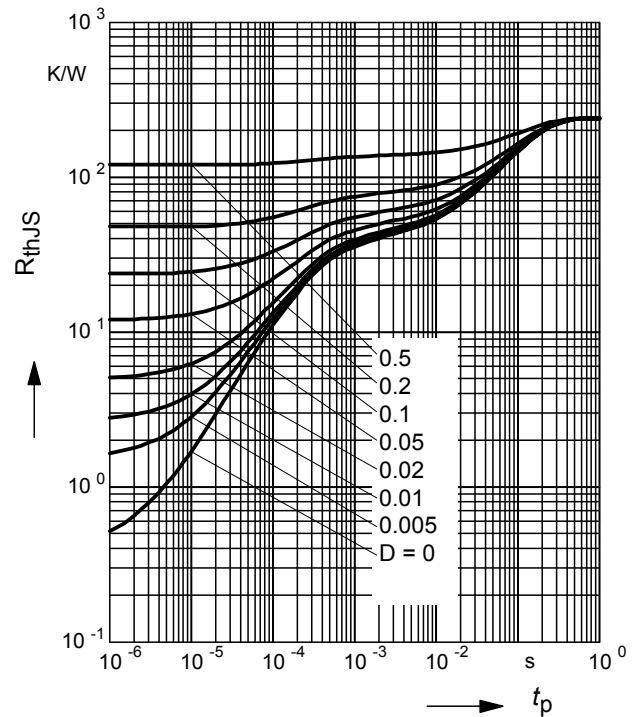
**Total power dissipation**  $P_{\text{tot}} = f(T_S)$

BCR146W



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

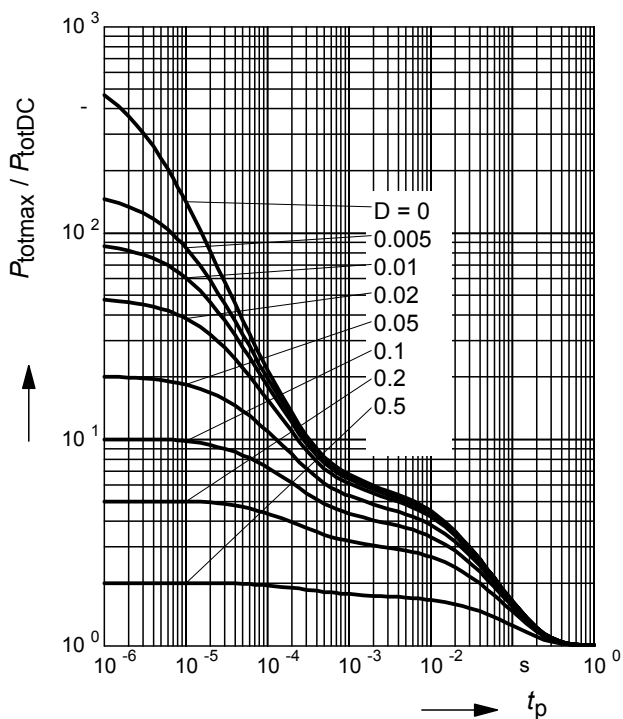
BCR146



**Permissible Pulse Load**

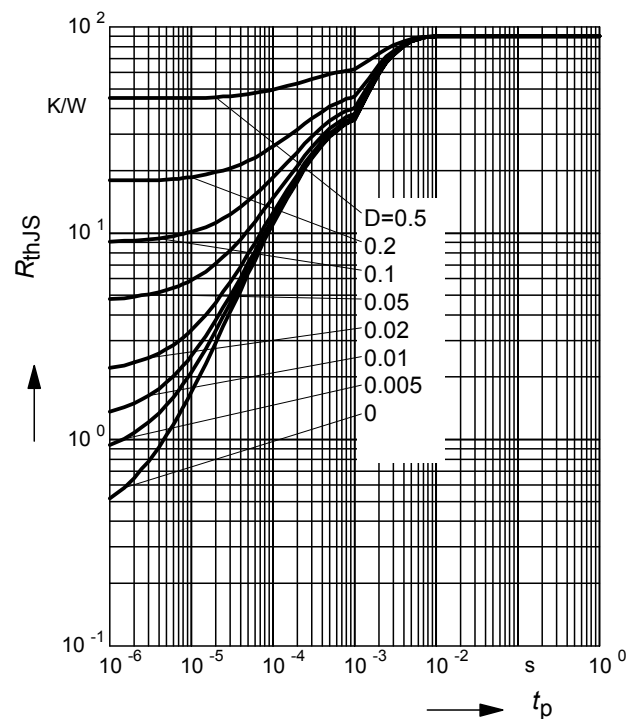
$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$

BCR146



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

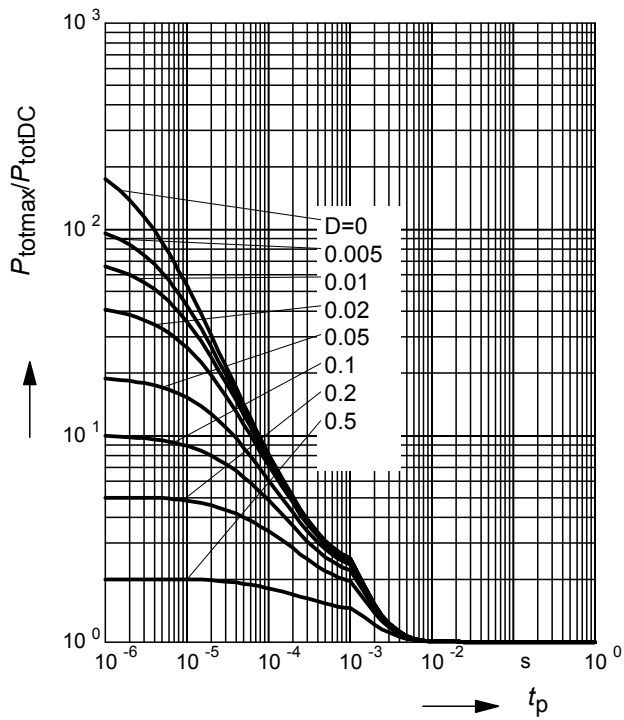
BCR146F



### Permissible Pulse Load

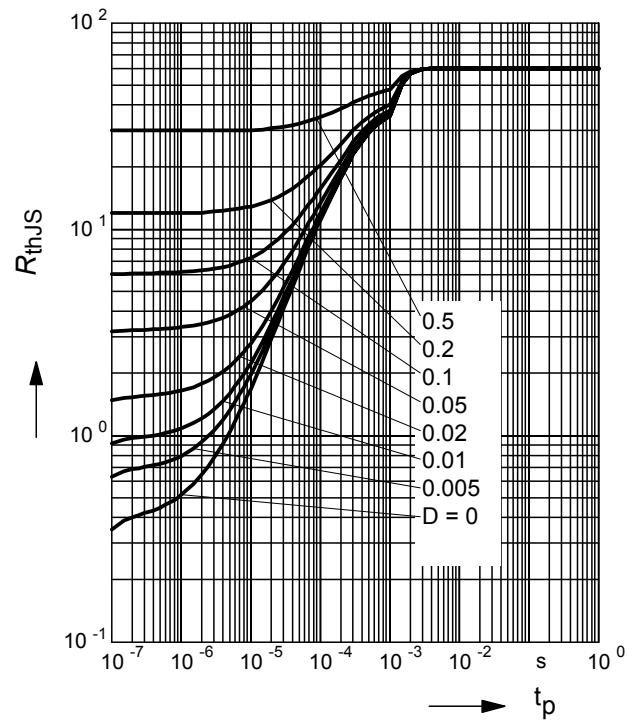
$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$

BCR146F



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

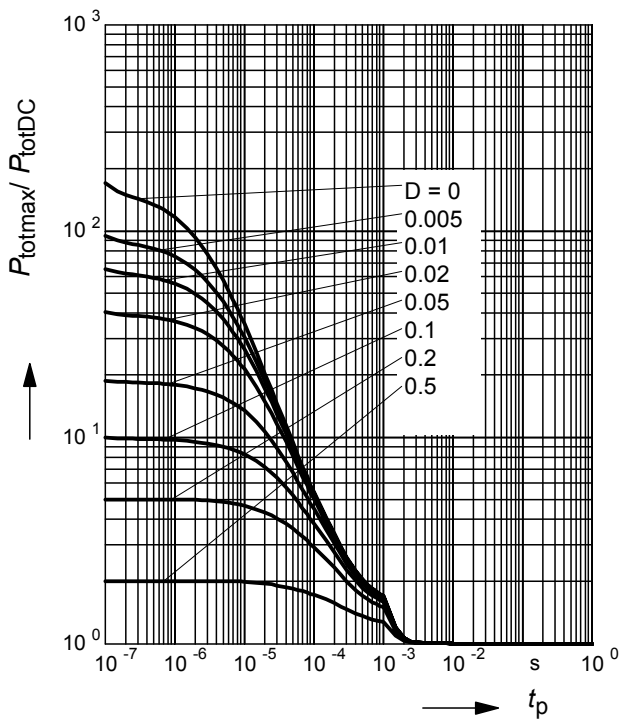
BCR146L3



### Permissible Pulse Load

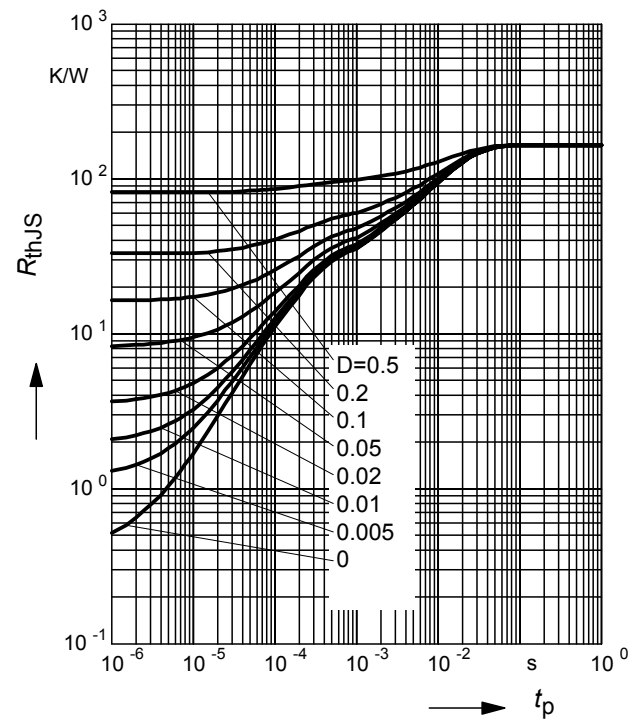
$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$

BCR146L3



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

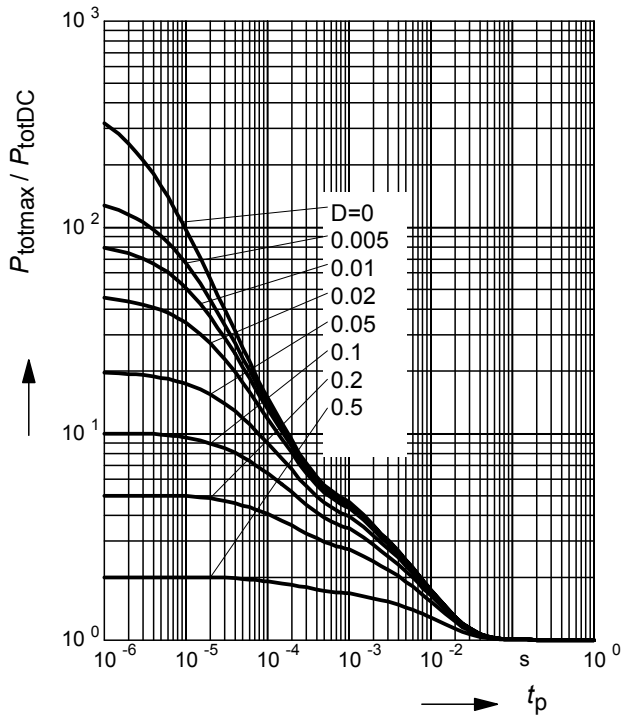
BCR146T



### Permissible Pulse Load

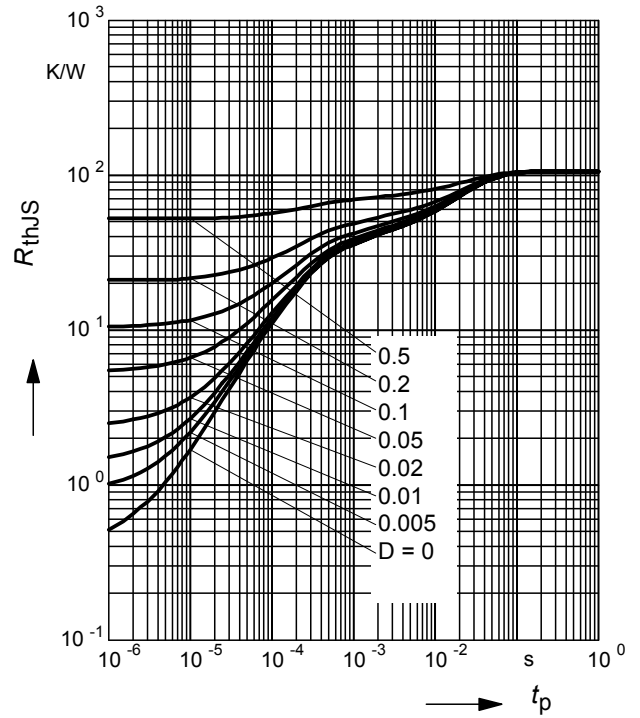
$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$

BCR146T



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

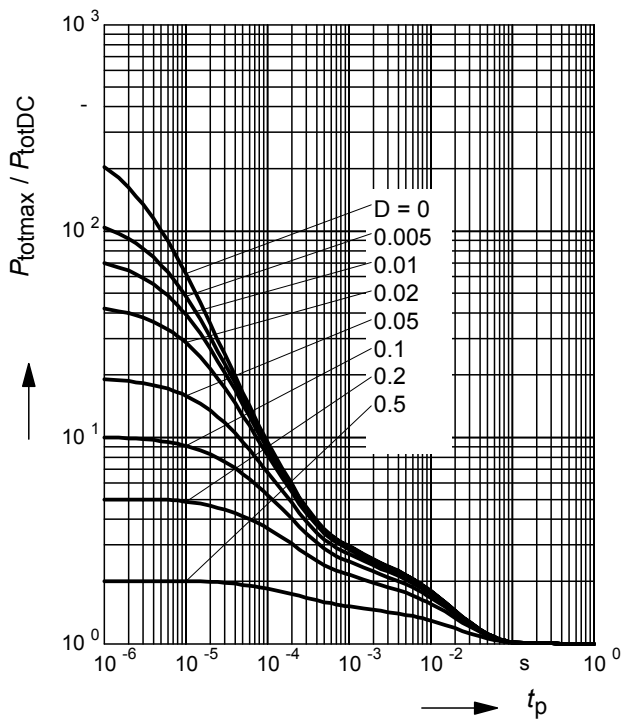
BCR146W



### Permissible Pulse Load

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

BCR146W



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