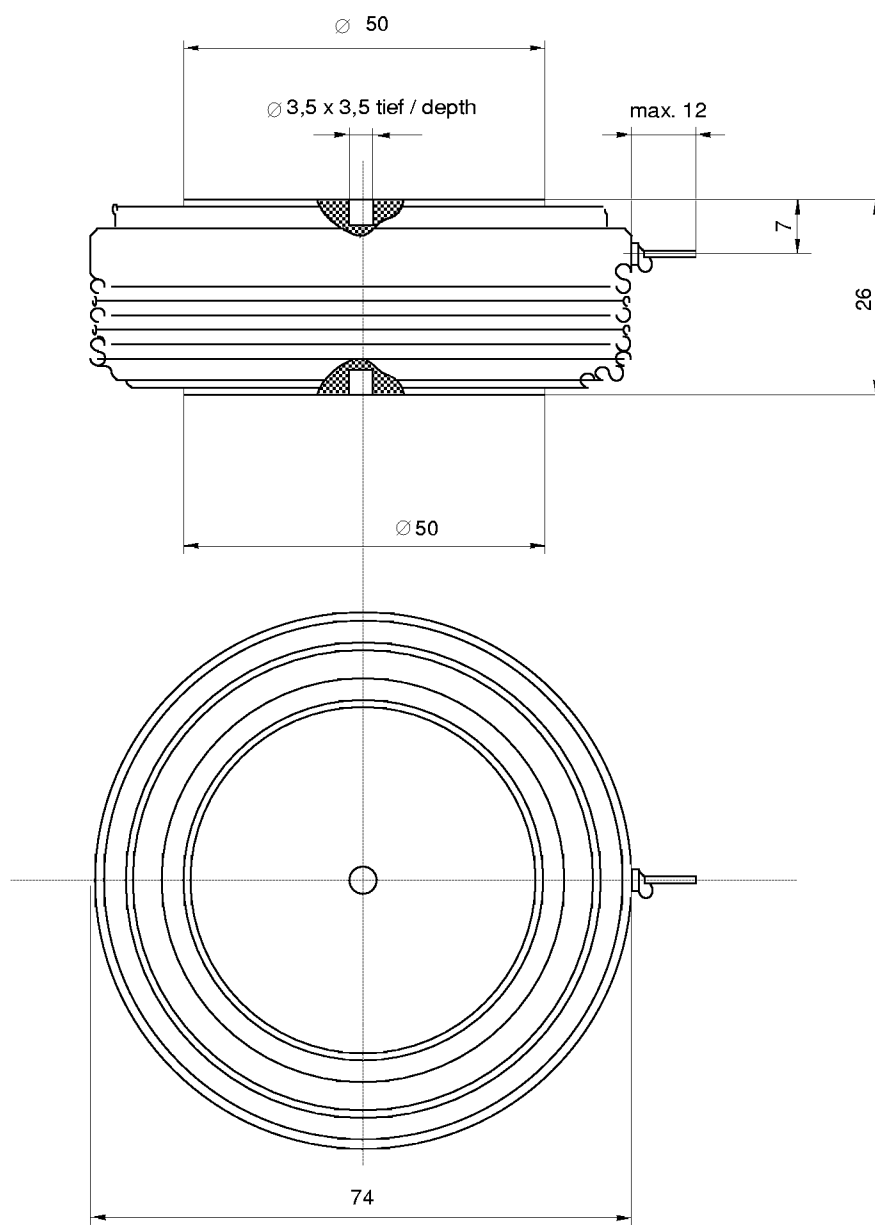




European Power-Semiconductor and Electronics Company GmbH + Co. KG

# Leistungsgleichrichterdioden Power Rectifier Diodes D 1800 N



## D 1800 N

### Elektrische Eigenschaften

### Electrical properties

#### Höchstzulässige Werte

#### Maximum rated values

|                                  |                                     |                                                    |                     |                  |                   |
|----------------------------------|-------------------------------------|----------------------------------------------------|---------------------|------------------|-------------------|
| Periodische Spitzensperrspannung | repetitive peak reverse voltage     | $t_{vj} = -40^{\circ}\text{C} \dots t_{vj \max}$   | $V_{RRM}$           | 3200, 3600, 4000 | V                 |
|                                  |                                     |                                                    |                     | 4400, 4800       | V                 |
| Stoßspitzensperrspannung         | non-repetitive peak reverse voltage | $t_{vj} = +25^{\circ}\text{C} \dots t_{vj \max}$   | $V_{RSM} = V_{RRM}$ | + 100            | V                 |
| Durchlaßstrom-Grenzeffektivwert  | RMS forward current                 |                                                    | $I_{FRMSM}$         | 3,85             | kA                |
| Dauergrenzstrom                  | mean forward current                | $t_c = 100^{\circ}\text{C}$                        | $I_{FAVM}$          | 1,8              | kA                |
|                                  |                                     | $t_c = 61^{\circ}\text{C}$                         |                     | 2,45             | kA                |
| Stoßstrom-Grenzwert              | surge forward current               | $t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ | $I_{FSM}$           | 35               | kA <sup>1)</sup>  |
|                                  |                                     | $t_{vj} = t_{vj \max}, t_p = 10 \text{ ms}$        |                     | 275              | kA                |
| Grenzlastintegral                | $I^2 t$ -value                      | $t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ | $I^2 t$             | 6125             | kA <sup>2</sup> s |
|                                  |                                     | $t_{vj} = t_{vj \max}, t_p = 10 \text{ ms}$        |                     | 3781             | kA <sup>2</sup> s |

#### Charakteristische Werte

#### Characteristic values

|                   |                   |                                              |             |      |       |    |
|-------------------|-------------------|----------------------------------------------|-------------|------|-------|----|
| Durchlaßspannung  | on-state voltage  | $t_{vj} = t_{vj \max}, i_F = 7,4 \text{ kA}$ | $V_T$       | max. | 2,82  | V  |
| Schleusenspannung | threshold voltage | $t_{vj} = t_{vj \max}$                       | $V_{T(TO)}$ |      | 0,85  | V  |
| Ersatzwiderstand  | slope resistance  | $t_{vj} = t_{vj \max}$                       | $r_T$       |      | 0,253 | mΩ |
| Sperrstrom        | reverse current   | $t_{vj} = t_{vj \max}, V_R = V_{RRM}$        | $i_R$       | max. | 100   | mA |

### Thermische Eigenschaften

### Thermal properties

|                                   |                                      |                                                   |                    |      |            |                      |
|-----------------------------------|--------------------------------------|---------------------------------------------------|--------------------|------|------------|----------------------|
| Innerer Widerstand                | thermal resistance, junction to case | beidseitig/two-sided, $\Theta = 180^{\circ} \sin$ | $R_{thJC}$         | max. | 0,0169     | $^{\circ}\text{C/W}$ |
|                                   |                                      | beidseitig/two sided, DC                          |                    | max. | 0,0160     | $^{\circ}\text{C/W}$ |
|                                   |                                      | Anode/anode, $\Theta = 180^{\circ} \sin$          |                    | max. | 0,0329     | $^{\circ}\text{C/W}$ |
|                                   |                                      | Anode/anode, DC                                   |                    | max. | 0,0320     | $^{\circ}\text{C/W}$ |
|                                   |                                      | Kathode/cathode, $\Theta = 180^{\circ} \sin$      |                    | max. | 0,0329     | $^{\circ}\text{C/W}$ |
|                                   |                                      | Kathode/cathode, DC                               |                    | max. | 0,0320     | $^{\circ}\text{C/W}$ |
| Übergangs-Wärmewiderstand         | thermal resistance, case to heatsink | beidseitig /two-sided                             | $R_{thCK}$         | max. | 0,0025     | $^{\circ}\text{C/W}$ |
|                                   |                                      | einseitig /single-sided                           |                    | max. | 0,0050     | $^{\circ}\text{C/W}$ |
| Höchstzul. Sperrschichttemperatur | max. junction temperature            |                                                   | $t_{vj \max}$      |      | 160        | $^{\circ}\text{C}$   |
| Betriebstemperatur                | operating temperature                |                                                   | $t_{c \text{ op}}$ |      | -40...+160 | $^{\circ}\text{C}$   |
| Lagertemperatur                   | storage temperature                  |                                                   | $t_{stg}$          |      | -40...+160 | $^{\circ}\text{C}$   |

### Mechanische Eigenschaften

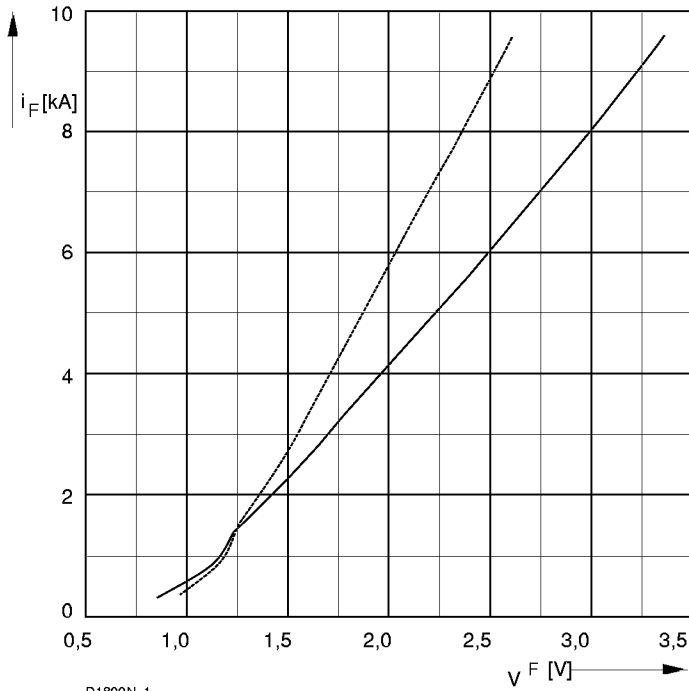
### Mechanical properties

|                             |                                 |                               |   |      |         |                  |
|-----------------------------|---------------------------------|-------------------------------|---|------|---------|------------------|
| Si-Element mit Druckkontakt | Si-pellet with pressure contact | $\varnothing = 58 \text{ mm}$ |   |      |         |                  |
| Anpreßkraft                 | clamping force                  | Gehäuseform/case design T     | F |      | 24...60 | kN               |
| Gewicht                     | weight                          |                               | G | typ. | 600     | g                |
| Kriechstrecke               | creepage distance               |                               |   |      | 30      | mm               |
| Feuchtekategorie            | humidity classification         | DIN 40040                     |   |      |         | C                |
| Schwingfestigkeit           | vibration resistance            | f = 50 Hz                     |   |      | 50      | m/s <sup>2</sup> |
| Maßbild                     | outline                         |                               |   |      |         |                  |

Seite/page

<sup>1)</sup> Gehäusegrenzstrom 32 kA (50 Hz Sinushalbwellen) / Current limit of case 32 kA (50 Hz sinusoidal half-wave)

# D1800N



D1800N\_1

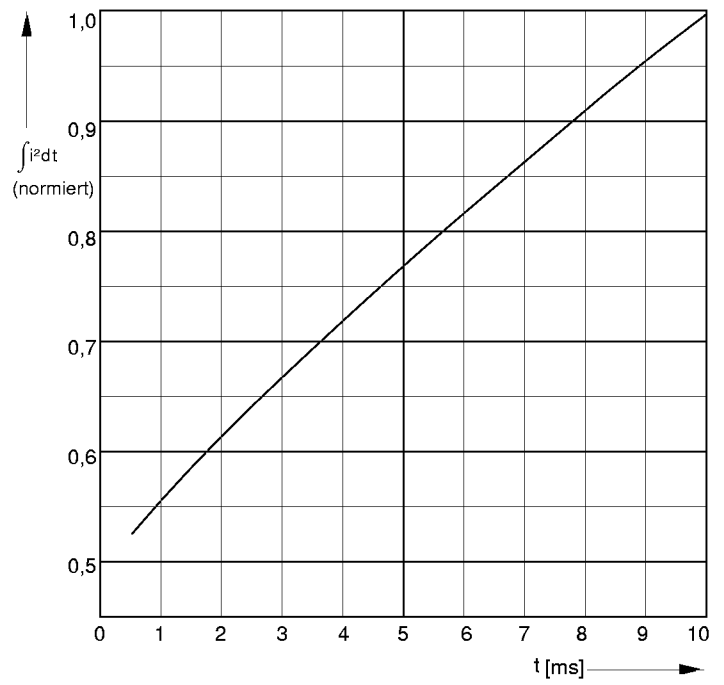
Bild/ Fig. 1

Grenzdurchlaßkennlinie

Limiting forward characteristic  $i_F = f(V_F)$

—  $t_{vj} = 25\text{ °C}$

- - -  $t_{vj} = 25\text{ °C}$

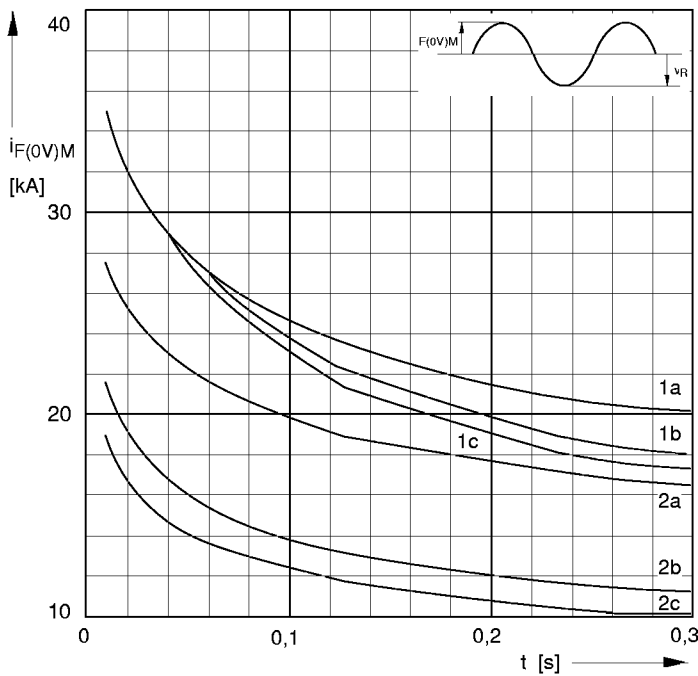


D1800N\_4

Bild / Fig. 2

Normiertes Grenzlastintegral / Normalized  $i^2t$

$\int i^2 dt = f(t_p)$



D1800N\_5

Bild / Fig. 3

Grenzstrom / Maximum overload forward current  $i_{F(0V)M} = f(t)$

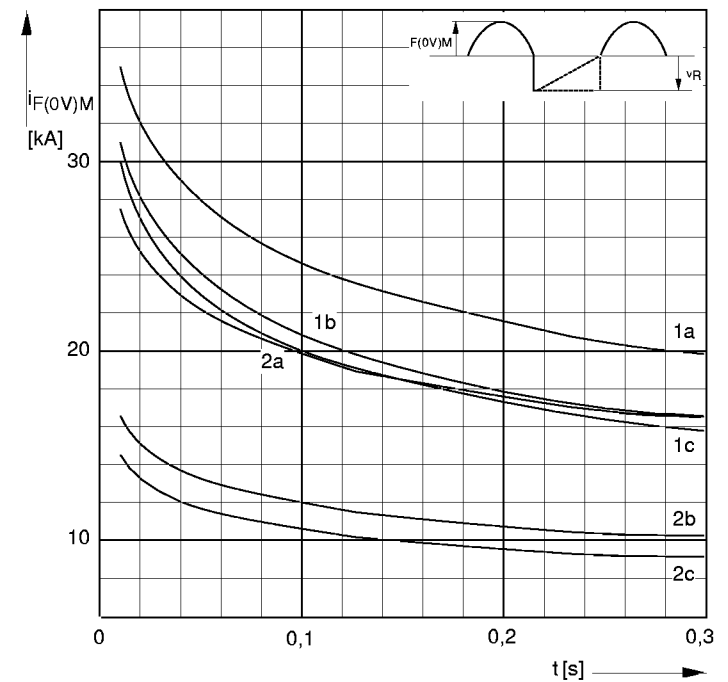
1 -  $i_{FAV(vor)} = 0\text{ A}$ ;  $t_{vj} = t_c = 25\text{ °C}$

2 -  $i_{FAV(vor)} = \text{A}$ ;  $t_c = \text{°C}$ ;  $t_{vj} = \text{°C}$

a -  $V_R \leq 50\text{ V}$

b -  $V_R = V_{RRM}$

c -  $V_R = 0.8 V_{RRM}$



D1800N\_6

Bild / Fig. 4

Grenzstrom / Maximum overload forward current  $i_{F(0V)M} = f(t)$

1 -  $i_{FAV(vor)} = 0\text{ A}$ ;  $t_{vj} = t_c = 25\text{ °C}$

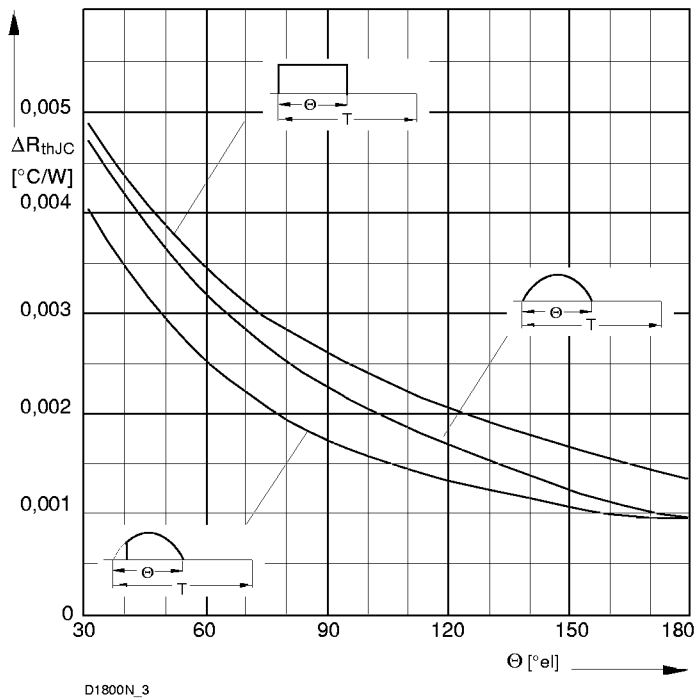
2 -  $i_{FAV(vor)} = \text{A}$ ;  $t_c = \text{°C}$ ;  $t_{vj} = \text{°C}$

a -  $V_R \leq 50\text{ V}$

b -  $V_R = 0.5 V_{RRM}$

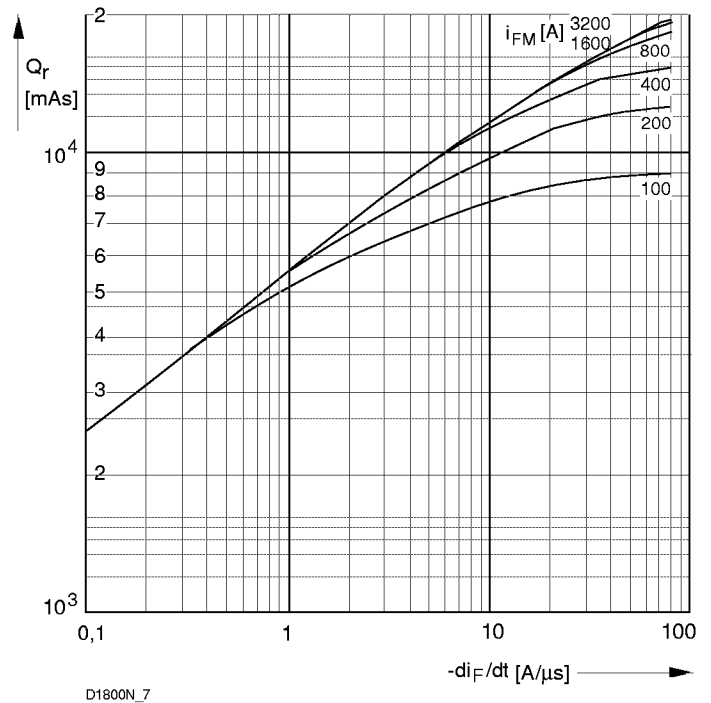
c -  $V_R = 0.8 V_{RRM}$

# D1800N



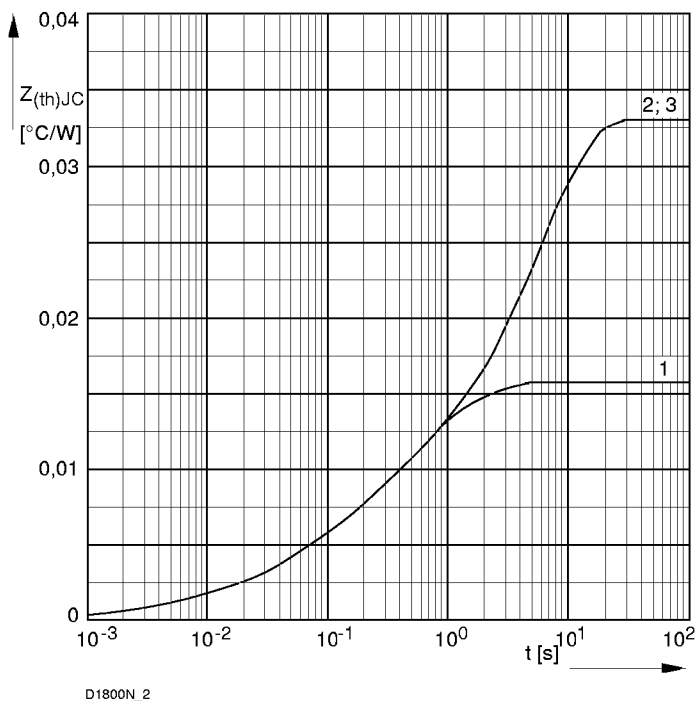
D1800N\_3

Bild / Fig. 5  
Differenz zwischen den Wärmewiderständen für Pulsstrom und DC  
Difference between the values of thermal resistance for pulse current and DC  
Parameter: Stromkurvenform / Current waveform



D1800N\_7

Bild / Fig. 6  
Sperrverzögerungsladung / Recovered charge  $Q_r = f(-di/dt)$   
 $t_{vj} = t_{vjmax}$ ;  $V_R \leq 0,5 V_{RRM}$ ;  $V_{RM} = 0,8 V_{RRM}$   
Beschaltung / Snubber:  $C = \mu F$ ;  $R = \Omega$   
Parameter: Durchlaßstrom / Forward current  $I_{FM}$



D1800N\_2

Bild / Fig. 7  
Transienter innerer Wärmewiderstand  
Transient thermal impedance  $Z_{thJC} = f(t)$ , DC  
1 - Beidseitige Kühlung / Two-sided cooling  
2 - Anodenseitige Kühlung / Anode-sided cooling  
3 - Kathodenseitige Kühlung / Cathode-sided cooling

Analytische Elemente des transienten Wärmewiderstandes  $Z_{thJC}$  für DC  
Analytical elements of transient thermal impedance  $Z_{thJC}$  for DC

| Pos. n         | 1        | 2        | 3       | 4      | 5      | 6     | 7     |
|----------------|----------|----------|---------|--------|--------|-------|-------|
| $R_{thn}$ °C/W | 0,000114 | 0,003146 | 0,00934 | 0,0242 | 0,0762 | 0,195 | 0,112 |
| $\tau_n$ [s]   | 0,000018 | 0,000282 | 0,00282 | 0,0132 | 0,265  | 1,2   | 7,57  |

Analytische Funktion / Analytical function:

$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} (1 - \exp(-t/\tau_n))$$