

**Netz-Dioden-Modul**
Rectifier Diode Module**DZ540N****DZ540N****Elektrische Eigenschaften / Electrical properties**

Höchstzulässige Werte / Maximum rated values

| | | | | | |
|--|---|-------------|--------------|----------------------|--------------------------------------|
| Periodische Spitzensperrspannung repetitive peak reverse voltages | $T_{vj} = -40^{\circ}\text{C} \dots T_{vj \max}$ | V_{RRM} | 2000 2400 | 2200 2600 | V V |
| Stoßspitzensperrspannung non-repetitive peak reverse voltage | $T_{vj} = +25^{\circ}\text{C} \dots T_{vj \max}$ | V_{RSM} | 2100 2500 | 2300 2700 | V V |
| Durchlaßstrom-Grenzeffektivwert maximum RMS on-state current | | I_{FRMSM} | | 1150 | A |
| Dauergrenzstrom average on-state current | $T_C = 100^{\circ}\text{C}$ $T_C = 73^{\circ}\text{C}$ | I_{FAVM} | | 540 732 | A A |
| Stoßstrom-Grenzwert surge current | $T_{vj} = 25^{\circ}\text{C}, t_P = 10 \text{ ms}$ $T_{vj} = T_{vj \max}, t_P = 10 \text{ ms}$ | I_{FSM} | | 16.500 14.000 | A A |
| Grenzlastintegral I^2t -value | $T_{vj} = 25^{\circ}\text{C}, t_P = 10 \text{ ms}$ $T_{vj} = T_{vj \max}, t_P = 10 \text{ ms}$ | I^2t | | 1.360.000 980.000 | A ² s A ² s |

Charakteristische Werte / Characteristic values


| | | | | | |
|--|--|------------|------|------------|----------|
| Durchlaßspannung on-state voltage | $T_{vj} = T_{vj \max}, I_F = 2200 \text{ A}$ | v_F | max. | 1,64 | V |
| Schleusenspannung threshold voltage | $T_{vj} = T_{vj \max}$ | $V_{(TO)}$ | | 0,78 | V |
| Ersatzwiderstand slope resistance | $T_{vj} = T_{vj \max}$ | r_T | | 0,31 | mΩ |
| Sperrstrom reverse current | $T_{vj} = T_{vj \max}, V_R = V_{RRM}$ | i_R | max. | 40 | mA |
| Isolations-Prüfspannung insulation test voltage | RMS, $f = 50 \text{ Hz}, t = 1 \text{ sec}$ RMS, $f = 50 \text{ Hz}, t = 1 \text{ min}$ | V_{ISOL} | | 3,6 3,0 | kV kV |

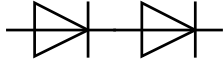
Thermische Eigenschaften / Thermal properties

| | | | | | |
|--|--|--------------------|------|-------------|----------------------|
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Modul / per Module, $\Theta = 180^{\circ}$ sin pro Modul / per Module, DC | R_{thJC} | max. | 0,0780 | $^{\circ}\text{C/W}$ |
| | | | max. | 0,0745 | $^{\circ}\text{C/W}$ |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro Modul / per Module | R_{thCH} | max. | 0,02 | $^{\circ}\text{C/W}$ |
| Höchstzulässige Sperrschichttemperatur maximum junction temperature | | $T_{vj \max}$ | | 150 | $^{\circ}\text{C}$ |
| Betriebstemperatur operating temperature | | $T_{C \text{ op}}$ | | - 40...+150 | $^{\circ}\text{C}$ |
| Lagertemperatur storage temperature | | T_{stg} | | - 40...+150 | $^{\circ}\text{C}$ |

| | | | |
|--------------|-------------|----------------------|----------|
| prepared by: | C. Drilling | date of publication: | 06.05.03 |
| approved by: | M. Leifeld | revision: | 1 |

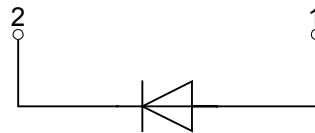
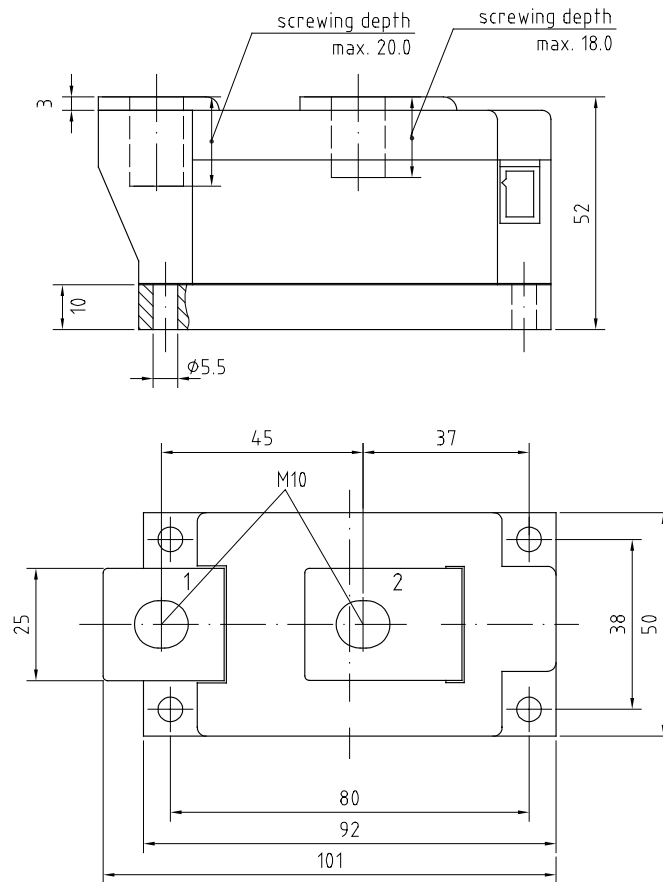
**Netz-Dioden-Modul**
Rectifier Diode Module**DZ540N****Mechanische Eigenschaften / Mechanical properties**

| | | | | |
|---|---------------------|----|-------------------|------------------|
| Gehäuse, siehe Anlage case, see annex | | | Seite 3 page 3 | |
| Si-Element mit Druckkontakt Si-pellet with pressure contact | | | | |
| Innere Isolation internal insulation | | | AIN | |
| Anzugsdrehmoment für mechanische Anschlüsse mounting torque | Toleranz $\pm 15\%$ | M1 | 5 | Nm |
| Anzugsdrehmoment für elektrische Anschlüsse terminal connection torque | Toleranz $\pm 10\%$ | M2 | 12 | Nm |
| Gewicht weight | | G | typ. 900 | g |
| Kriechstrecke creepage distance | | | 15 | mm |
| Schwingfestigkeit vibration resistance | f = 50 Hz | | 50 | m/s ² |
|  | file-No. | | E 83336 | |

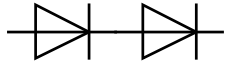


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Rectifier Diode Module

DZ540N



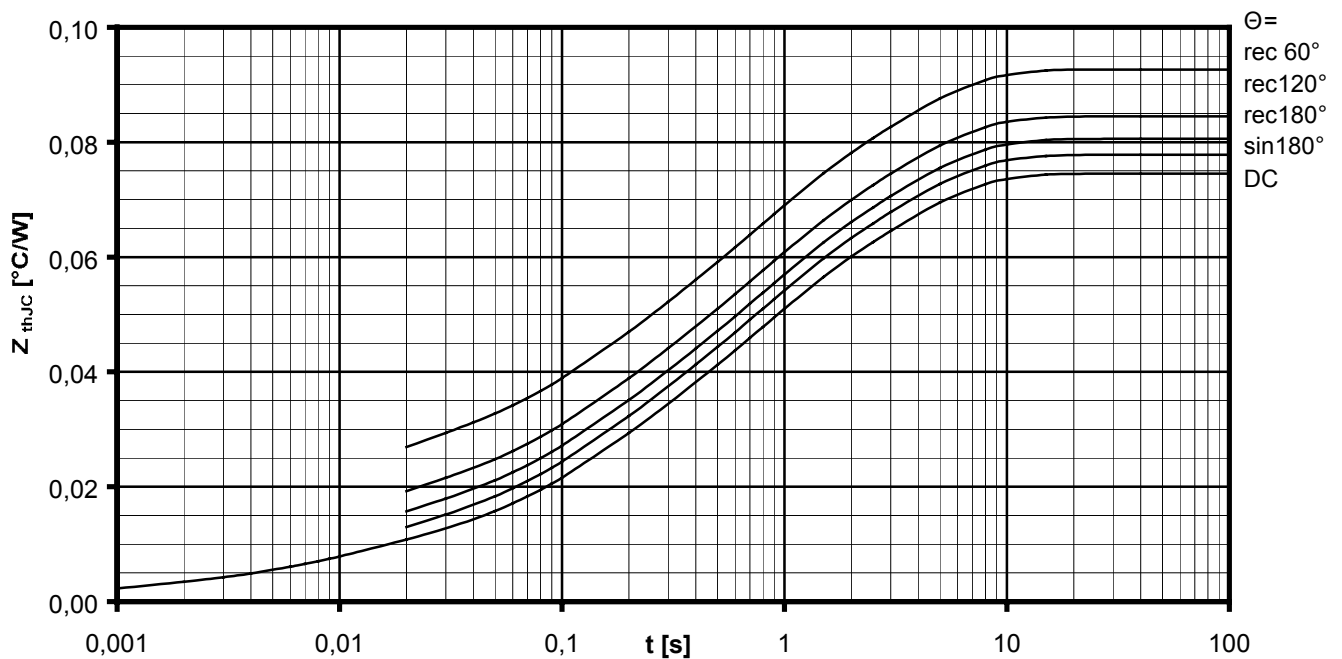
DZ


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

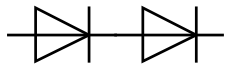
| Pos. n | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------------|----------|---------|---------|--------|--------|---|---|
| $R_{thn} [^{\circ}C/W]$ | 0,00194 | 0,00584 | 0,01465 | 0,0254 | 0,0267 | | |
| $T_n [s]$ | 0,000732 | 0,00824 | 0,108 | 0,57 | 3 | | |

Analytische Funktion / Analytical function:

$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} \left(1 - e^{-\frac{t}{\tau_n}} \right)$$


Transienter innerer Wärmewiderstand je Zweig / Transient thermal impedance per arm $Z_{thJC} = f(t)$

 Parameter: Stromflußwinkel Θ / Current conduction angle Θ


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Rectifier Diode Module
DZ540N

Natürliche Kühlung / Natural cooling
 3 Module pro Kühler / 3 modules per heatsink
 Kühler / Heatsink type: KM17 (120W)

Analytische Elemente des transienten Wärmewiderstandes Z_{thCA}
Analytical elements of transient thermal impedance Z_{thCA}

| Pos. n | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------------|---------|--------|-------|---|---|---|---|
| $R_{thn} [^{\circ}C/W]$ | 0,01176 | 0,0412 | 0,717 | | | | |
| $T_n [s]$ | 3,19 | 28,3 | 1370 | | | | |

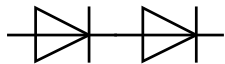
Verstärkte Kühlung / Forced cooling
 3 Module pro Kühler / 3 modules per heatsink
 Kühler / Heatsink type: KM17 (Papst 4650)

Analytische Elemente des transienten Wärmewiderstandes Z_{thCA}
Analytical elements of transient thermal impedance Z_{thCA}

| Pos. n | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------------|--------|--------|-------|---|---|---|---|
| $R_{thn} [^{\circ}C/W]$ | 0,0075 | 0,0435 | 0,239 | | | | |
| $T_n [s]$ | 6,4 | 31,8 | 497 | | | | |

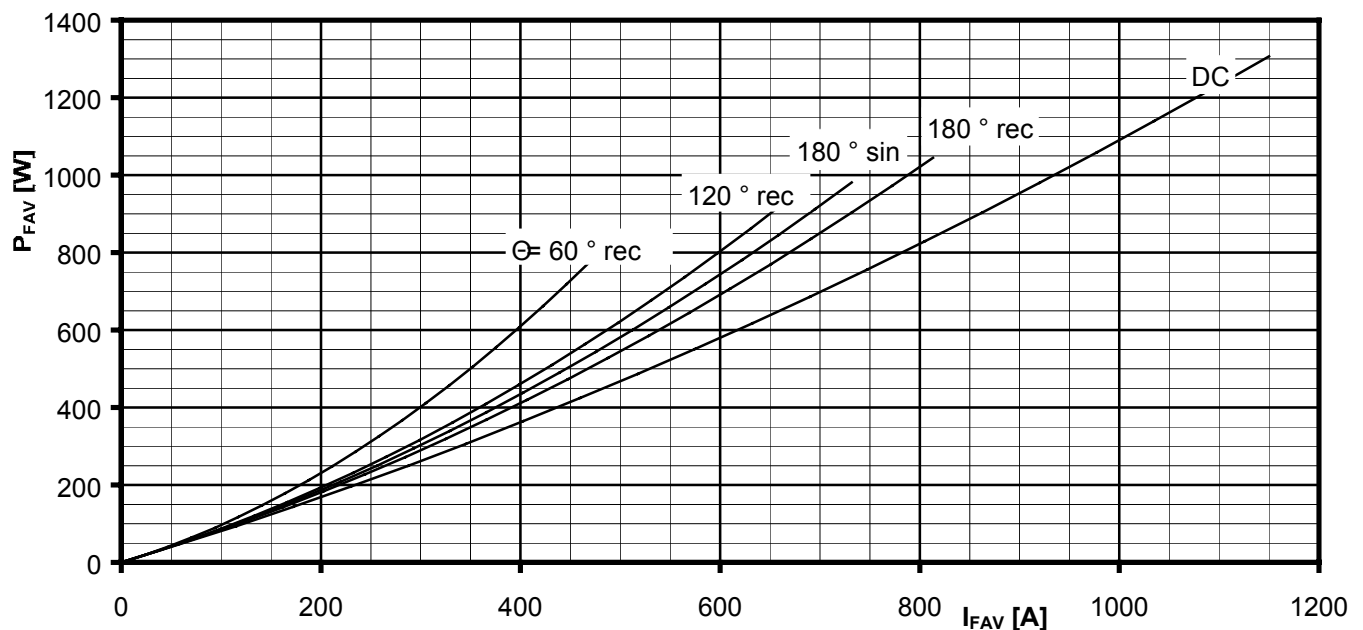
Analytische Funktion / Analytical function:

$$Z_{thCA} = \sum_{n=1}^{n_{max}} R_{thn} \left(1 - e^{-\frac{t}{T_n}} \right)$$



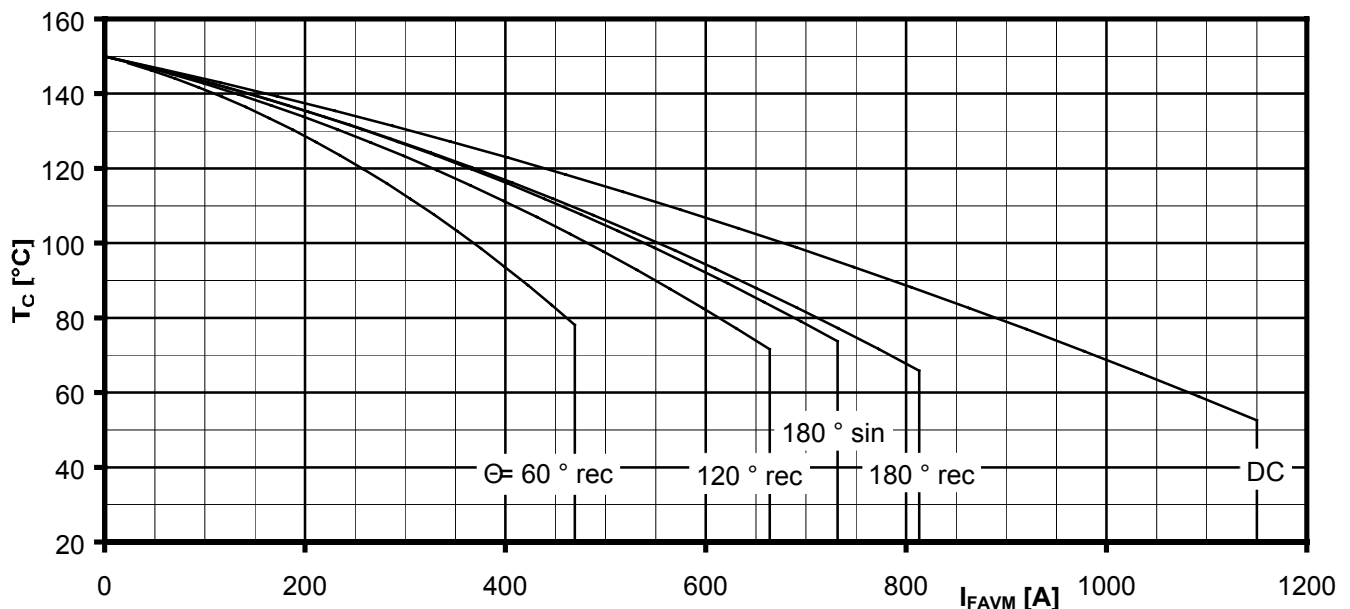
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Rectifier Diode Module

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Durchlassverlustleistung je Zweig / On-state power loss per arm $P_{FAV} = f(I_{FAV})$

Parameter: Stromflußwinkel / Current conduction angle Θ



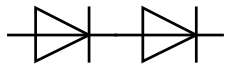
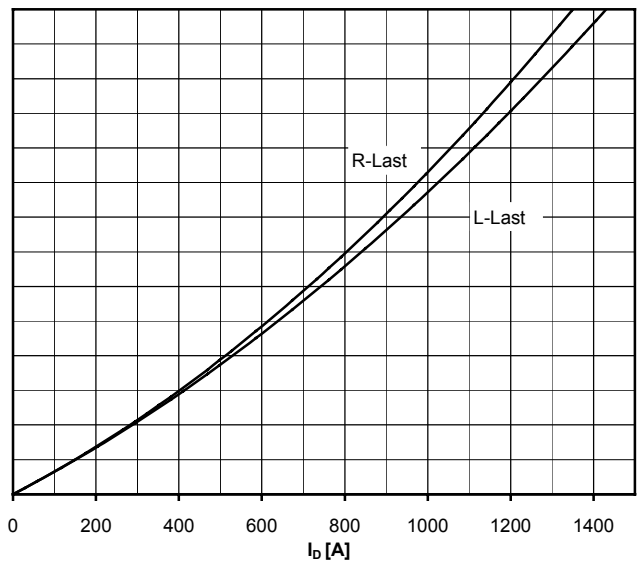
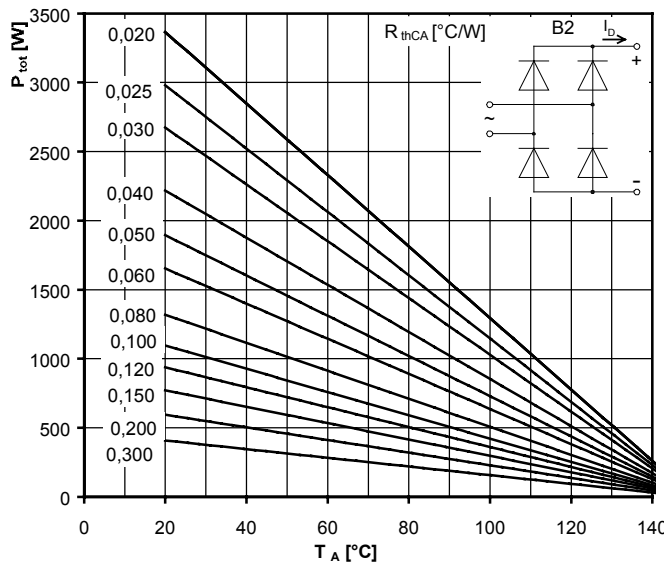
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_C = f(I_{FAVM})$

Strombelastung je Zweig / Current load per arm

Berechnungsgrundlage P_{TAV} (Schaltverluste gesondert berücksichtigen)

Calculation base P_{TAV} (switching losses should be considered separately)

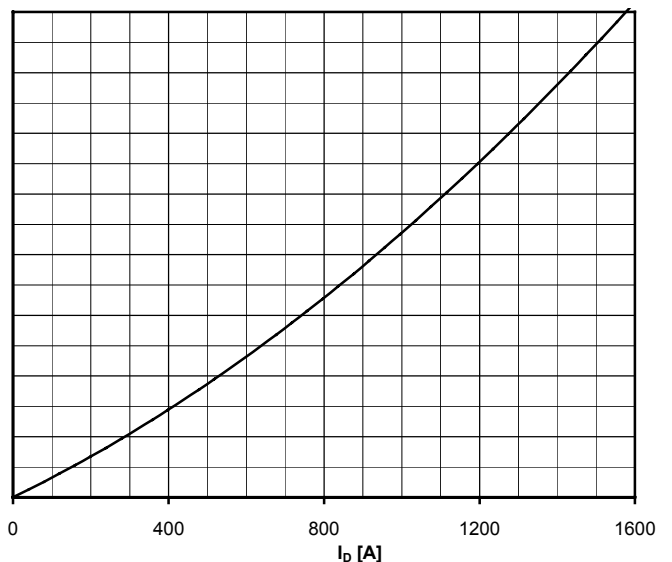
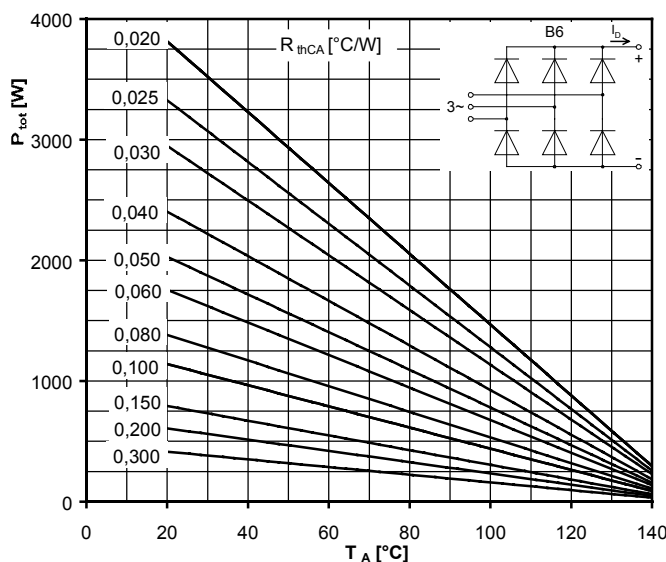
Parameter: Stromflußwinkel Θ / Current conduction angle Θ

**Netz-Dioden-Modul**
Rectifier Diode Module**DZ540N****Höchstzulässiger Ausgangsstrom / Maximum rated output current I_D**

B2- Zweipuls-Brückenschaltung / Two-pulse bridge circuit

Gesamtverlustleistung der Schaltung / Total power dissipation at circuit P_{tot}

Parameter:

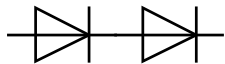
Wärmewiderstand zwischen den Gehäusen und Umgebung / Thermal resistance cases to ambient R_{thCA} **Höchstzulässiger Ausgangsstrom / Maximum rated output current I_D**

B6- Sechspuls-Brückenschaltung / Six-pulse bridge circuit

Gesamtverlustleistung der Schaltung / Total power dissipation at circuit P_{tot}

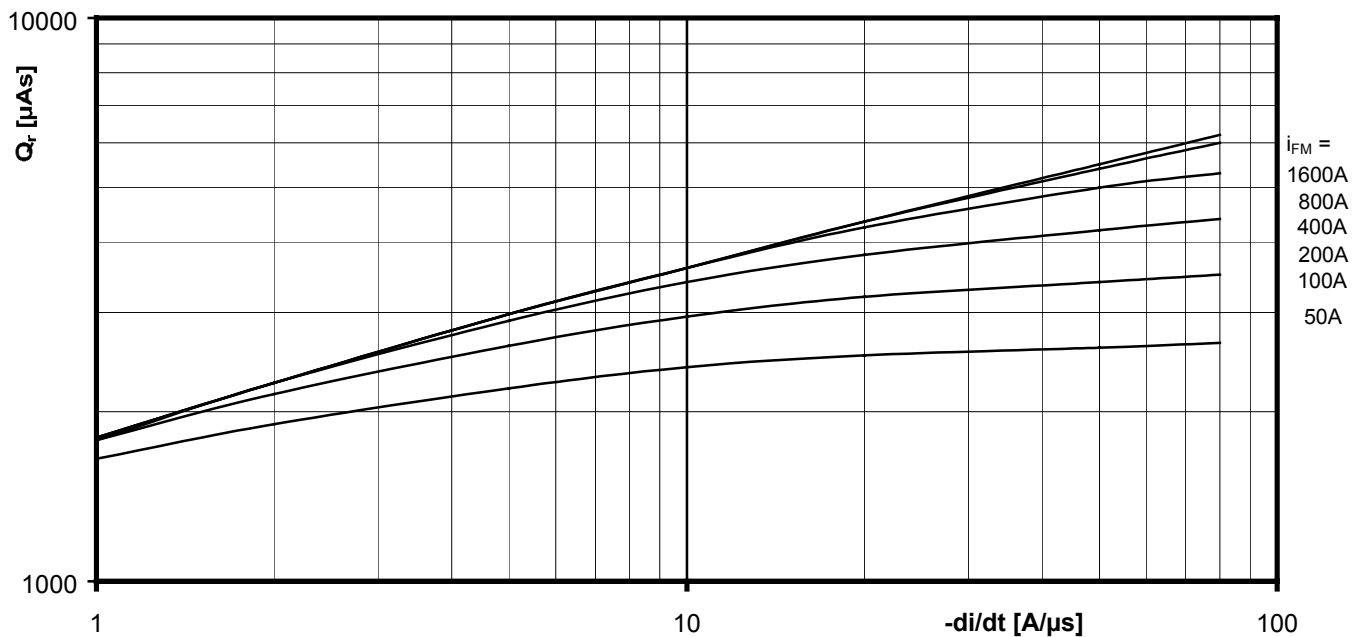
Parameter:

Wärmewiderstand zwischen den Gehäusen und Umgebung / Thermal resistance cases to ambient R_{thCA}



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Rectifier Diode Module

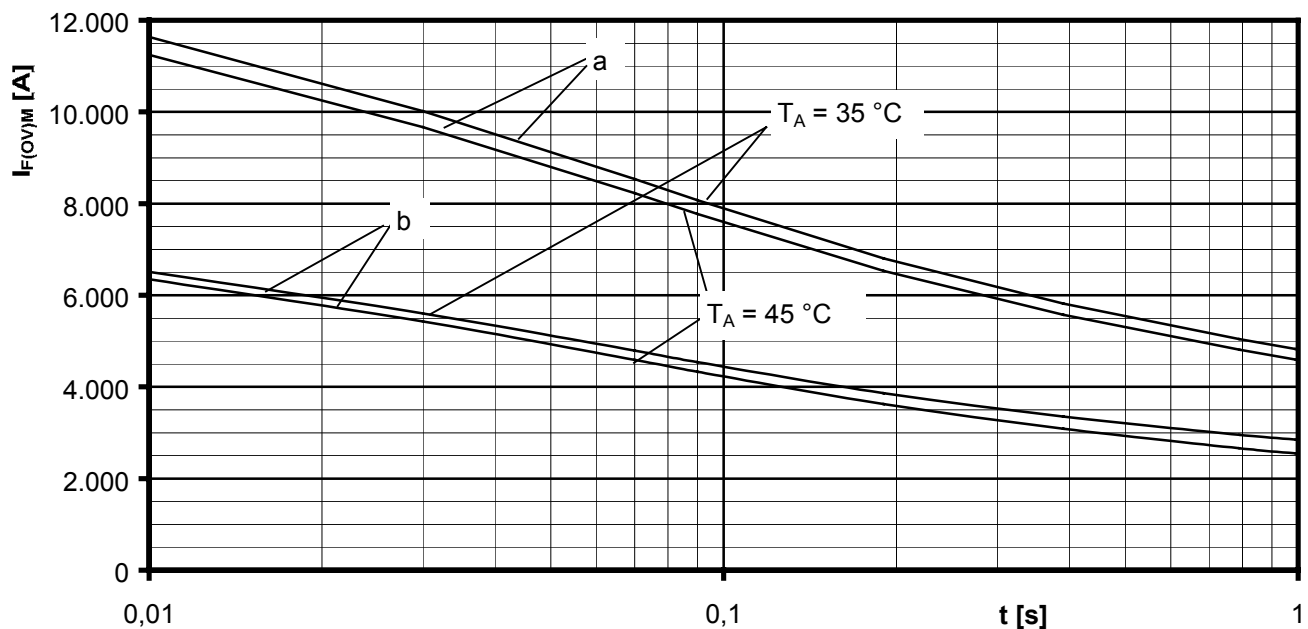
DZ540N



Sperrverzögerungsladung / Recovered charge $Q_r = f(-di/dt)$

$$T_{vj} = T_{vjmax}, V_R \leq 0,5 V_{RRM}, V_{RM} = 0,8 V_{RRM}$$

Parameter: Durchlaßstrom / On-state current i_{FM}



Grenzstrom je Zweig / Maximum overload on-state current per arm $I_{F(OV)M} = f(t)$, $V_{RM} = 0,8 V_{RRM}$

a: Leerlauf / No-load conditions

b: Vorlaststrom je Zweig / Pre-load current per arm $I_{FAV(vor)} = I_{FAVM}$

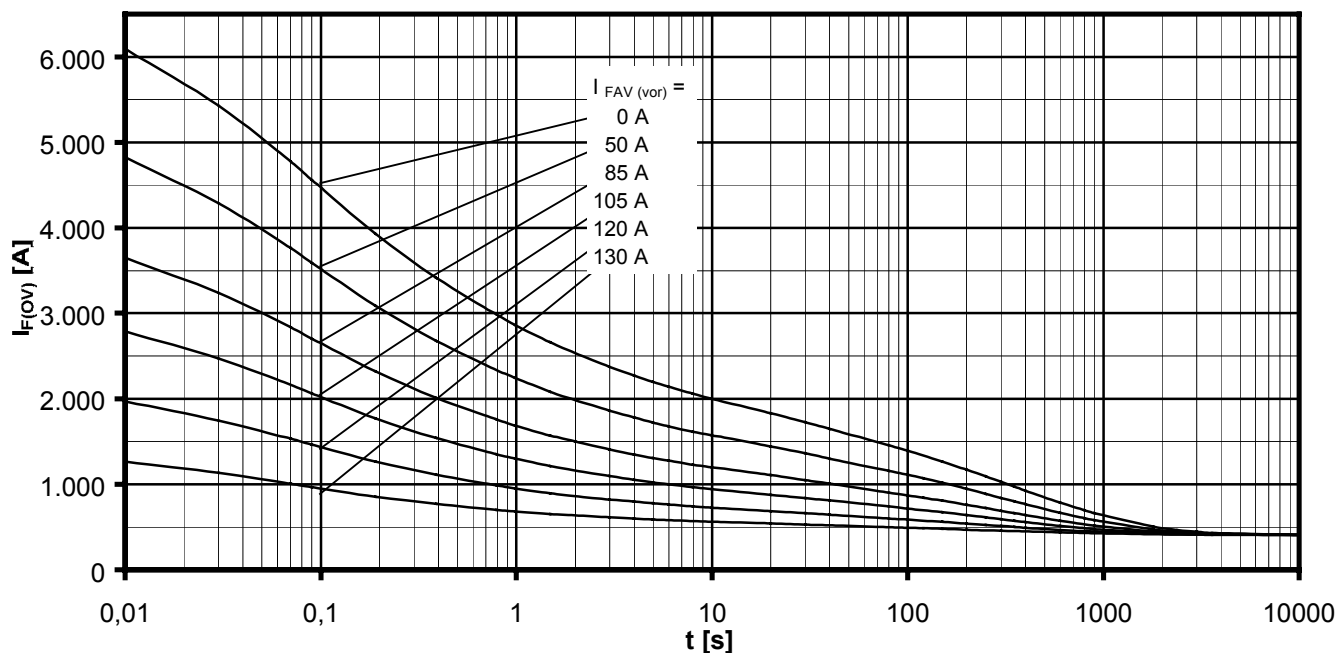
$T_a = 35^\circ\text{C}$, verstärkte Luftkühlung / Forced air cooling Kühlkörper / Heatsink type: KM17 (Papst 4650)

$T_a = 45^\circ\text{C}$, natürliche Luftkühlung / Natural air cooling Kühlkörper / Heatsink type: KM17 (120W)



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DZ540N

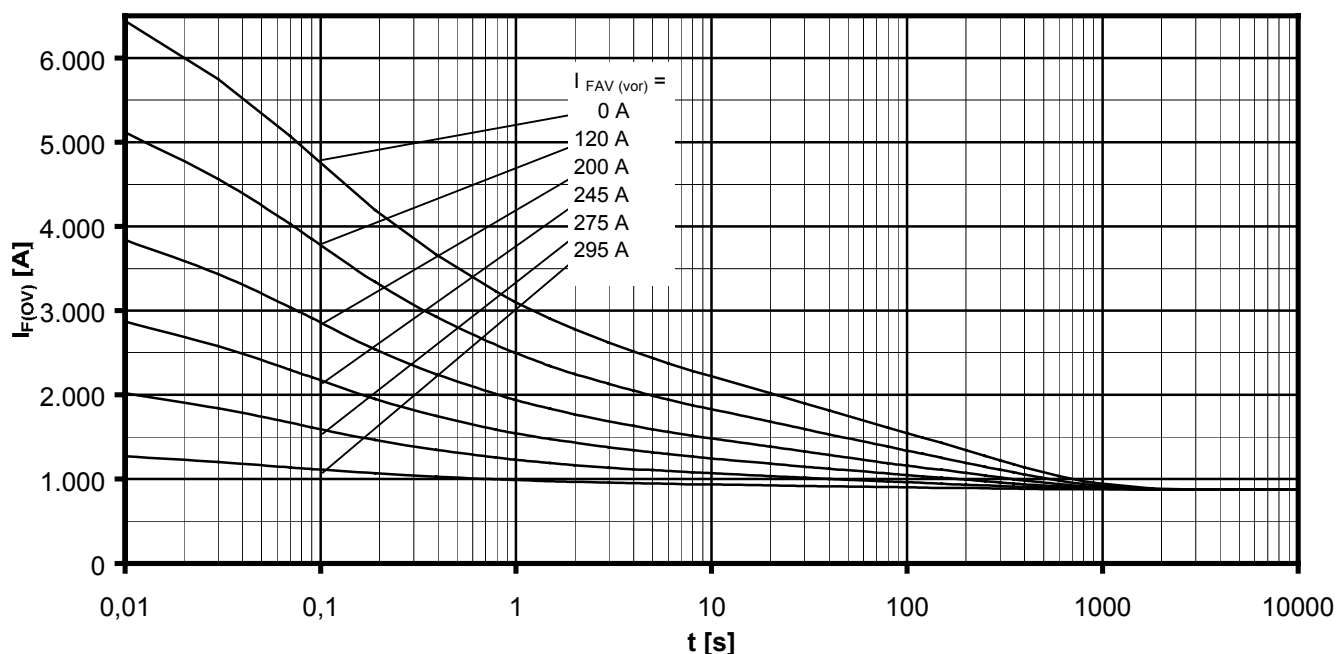


Überstrom je Zweig / Overload on-state current $I_{F(ov)}$

B6- Sechspuls-Brückenschaltung, 120° Rechteck / Six-pulse bridge circuit, 120° rectangular

Kühlkörper / Heatsink type KM17 (120W) Natürliche Kühlung bei / Natural cooling at $T_A = 45^\circ\text{C}$

Parameter: Vorlaststrom je Zweig / Pre-load current per arm $I_{FAV(vor)}$



Überstrom je Zweig / Overload on-state current $I_{F(ov)}$

B6- Sechspuls-Brückenschaltung, 120° Rechteck / Six-pulse bridge circuit 120° rectangular

Kühlkörper / Heatsink type KM17 (Papst 4650) Verstärkte Kühlung bei / Forced cooling at $T_A = 35^\circ\text{C}$

Parameter: Vorlaststrom je Zweig / Pre-load current per arm $I_{FAV(vor)}$