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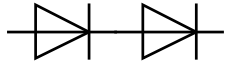


تهران پاساژ امجد طبقه 1 واحد 16



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Netz-Dioden-Modul
Rectifier Diode Module**DD104N**

DD104N

DD104N..K..-K

ND104N

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} | 1200 1600 | 1400 1800 | V V |
| Stoßspitzensperrspannung non-repetitive peak reverse voltage | $T_{vj} = +25^{\circ}\text{C} \dots T_{vj \max}$ | V_{RSM} | 1300 1700 | 1500 1900 | V V |
| Durchlaßstrom-Grenzeffektivwert maximum RMS on-state current | | I_{FRMSM} | | 160 | A |
| Dauergrenzstrom average on-state current | $T_C = 100^{\circ}\text{C}$ | I_{FAVM} | | 104 | 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} | | 2.900 2.500 | 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 | | 42.000 31.250 | A^2s A^2s |

Charakteristische Werte / Characteristic values

| | | | | | |
|--|--|------------|------|------------|----------------------------|
| Durchlaßspannung on-state voltage | $T_{vj} = T_{vj \max}, i_F = 300 \text{ A}$ | v_F | max. | 1,4 | V |
| Schleusenspannung threshold voltage | $T_{vj} = T_{vj \max}$ | $V_{(TO)}$ | | 0,7 | V |
| Ersatzwiderstand slope resistance | $T_{vj} = T_{vj \max}$ | r_T | | 2,1 | $\text{m}\Omega$ |
| Sperrstrom reverse current | $T_{vj} = T_{vj \max}, V_R = V_{RRM}$ | i_R | max. | 20 | 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} | | 3,0 2,5 | kV kV |

Thermische Eigenschaften / Thermal properties

| | | | | | |
|--|--|--------------------|------|----------------------------------|--|
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Modul / per Module, $\Theta = 180^{\circ} \sin$ pro Zweig / per arm, $\Theta = 180^{\circ} \sin$ pro Modul / per Module, DC pro Zweig / per arm, DC | R_{thJC} | max. | 0,195 0,390 0,185 0,370 | $^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$ |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro Modul / per Module pro Zweig / per arm | R_{thCH} | max. | 0,05 0,10 | $^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$ |
| 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: | 29.04.03 |
| approved by: | M. Leifeld | revision: | 1 |



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Rectifier Diode Module

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Mechanische Eigenschaften / Mechanical properties

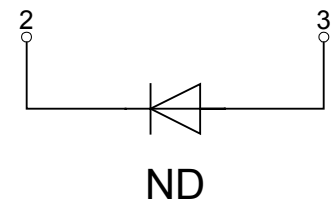
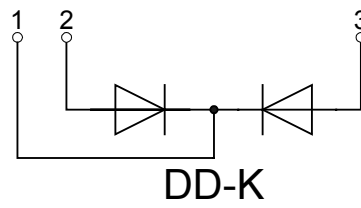
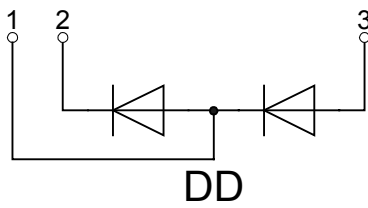
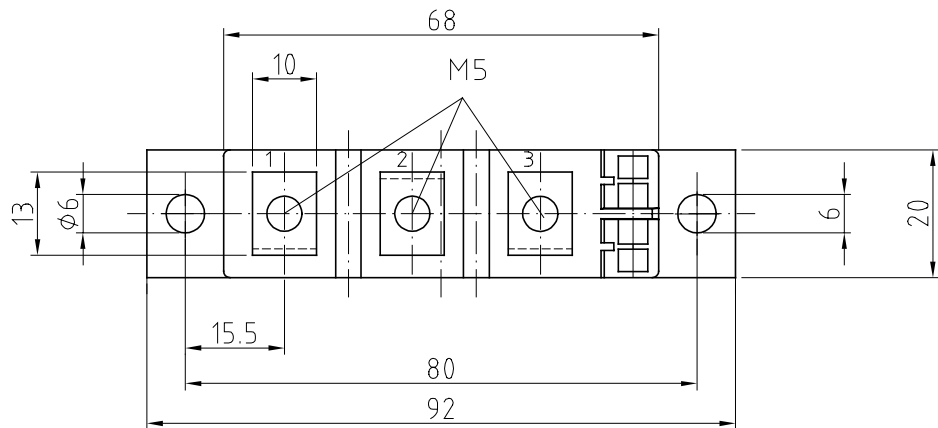
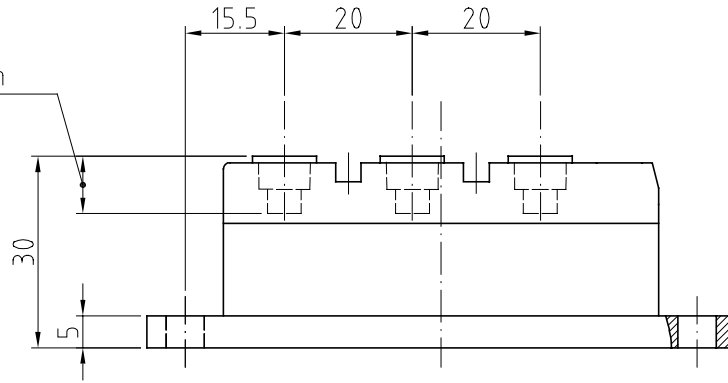
| | | | | |
|---|---------------------|----|-------------------|------------------|
| Gehäuse, siehe Anlage case, see annex | | | Seite 3 page 3 | |
| Si-Element mit Druckkontakt Si-pellet with pressure contact | | | | |
| Innere Isolation internal insulation | | | AIN | |
| Anzugsdrehmoment für mechanische Anschlüsse mounting torque | Toleranz $\pm 15\%$ | M1 | 4 | Nm |
| Anzugsdrehmoment für elektrische Anschlüsse terminal connection torque | Toleranz $\pm 10\%$ | M2 | 4 | Nm |
| Gewicht weight | | G | typ. 160 | g |
| Kriechstrecke creepage distance | | | 15 | mm |
| Schwingfestigkeit vibration resistance | f = 50 Hz | | 50 | m/s ² |
|  | file-No. | | E 83336 | |



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screwing depth
max. 9,0

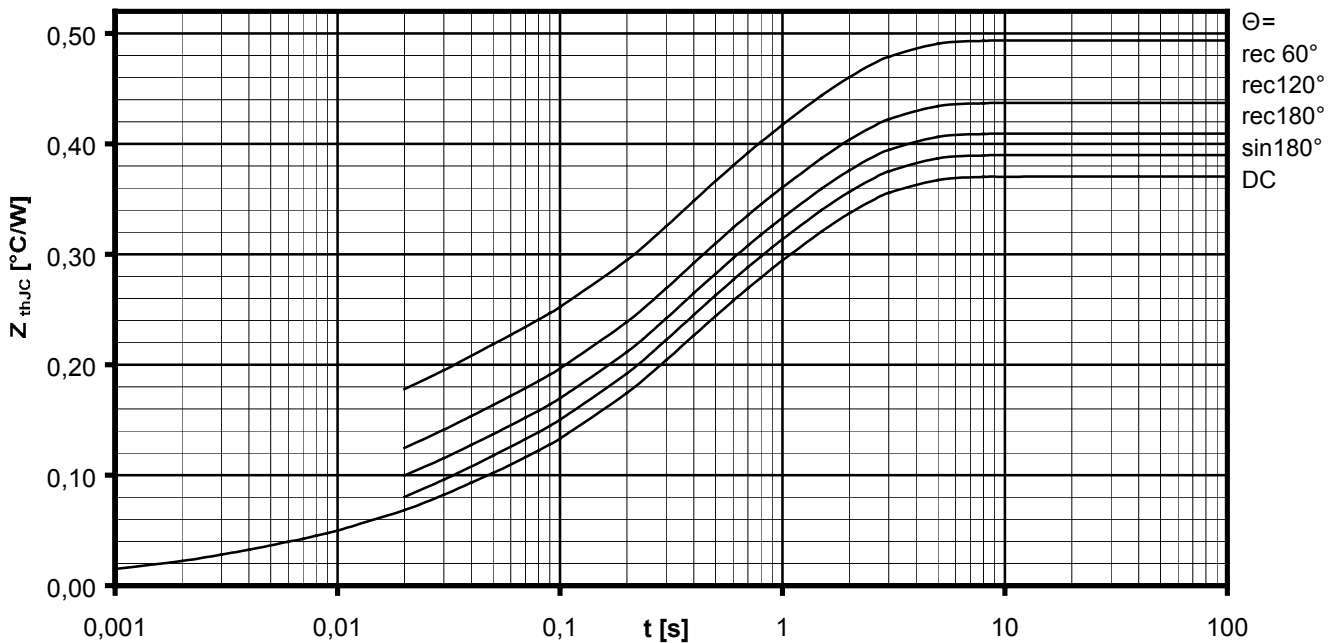


Netz-Dioden-Modul
Rectifier Diode Module**DD104N**
Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC
Analytical elements of transient thermal impedance Z_{thJC} for DC

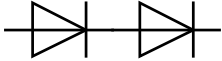
| Pos. n | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|---------|---------|--------|-------|-------|---|---|
| R_{thn} [°C/W] | 0,005 | 0,0195 | 0,0518 | 0,128 | 0,166 | | |
| T_n [s] | 0,00004 | 0,00223 | 0,022 | 0,235 | 1,24 | | |

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

Netz-Dioden-Modul
Rectifier Diode Module**DD104N**

Natürliche Kühlung / Natural cooling
3 Module pro Kühler / 3 modules per heatsink
Kühler / Heatsink type: KM14 (50W)

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} [°C/W] | 0,007 | 0,141 | 0,119 | 2,133 | | | |
| T_n [s] | 0,701 | 4,72 | 42,5 | 910 | | | |

Verstärkte Kühlung / Forced cooling
3 Module pro Kühler / 3 modules per heatsink
Kühler / Heatsink type: KM14 (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} [°C/W] | 0,007 | 0,141 | 0,119 | 0,583 | | | |
| T_n [s] | 0,701 | 4,72 | 42,5 | 249 | | | |

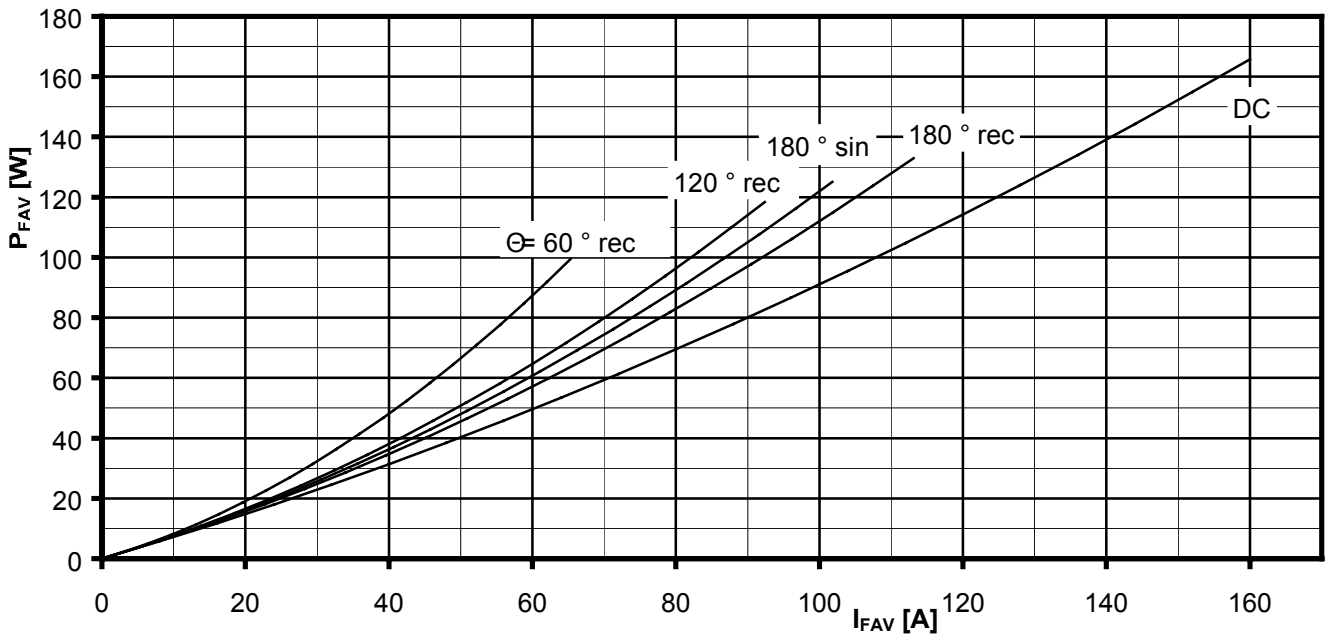
Analytische Funktion / Analytical function:

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



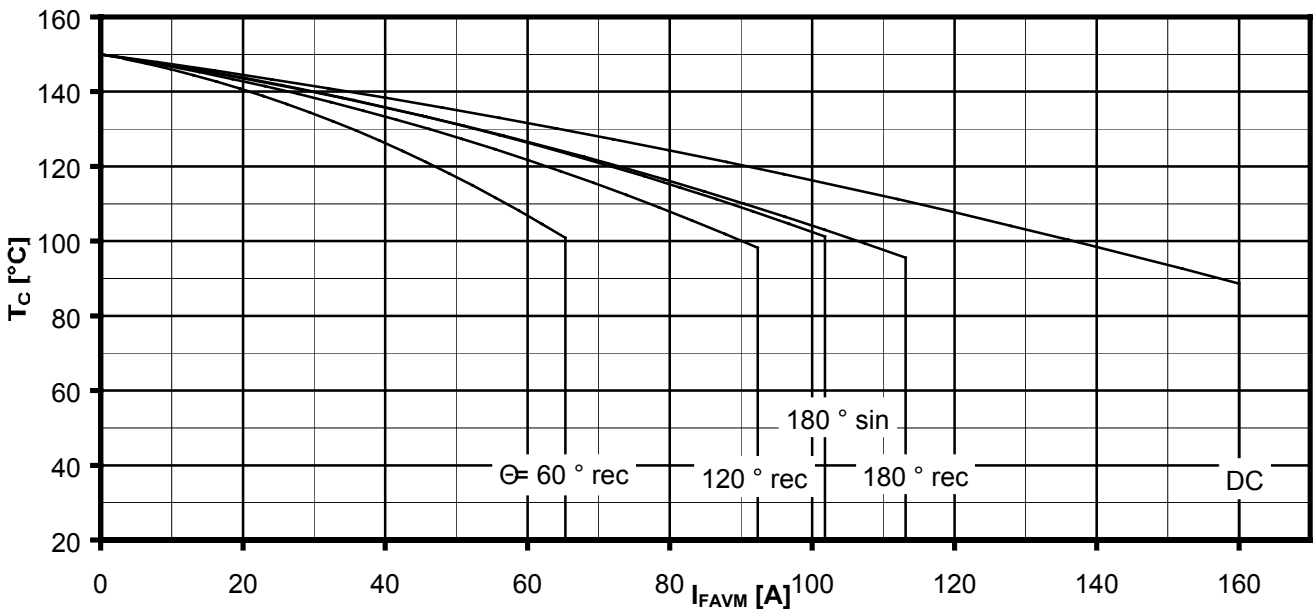
Netz-Dioden-Modul
Rectifier Diode Module

DD104N



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

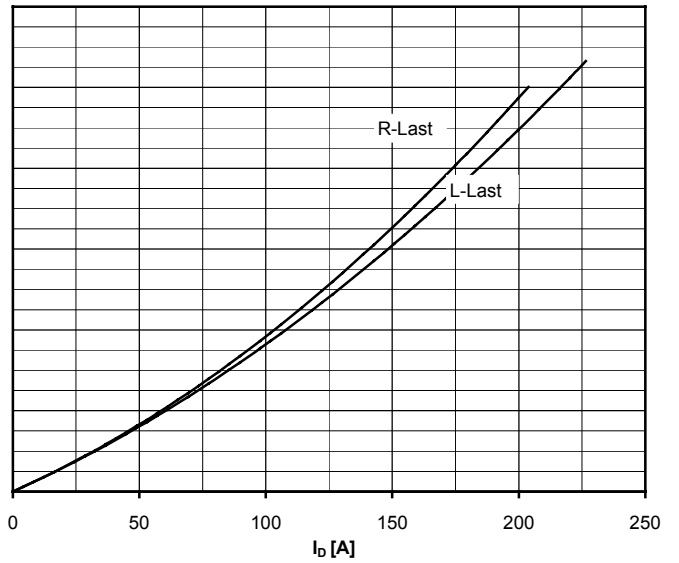
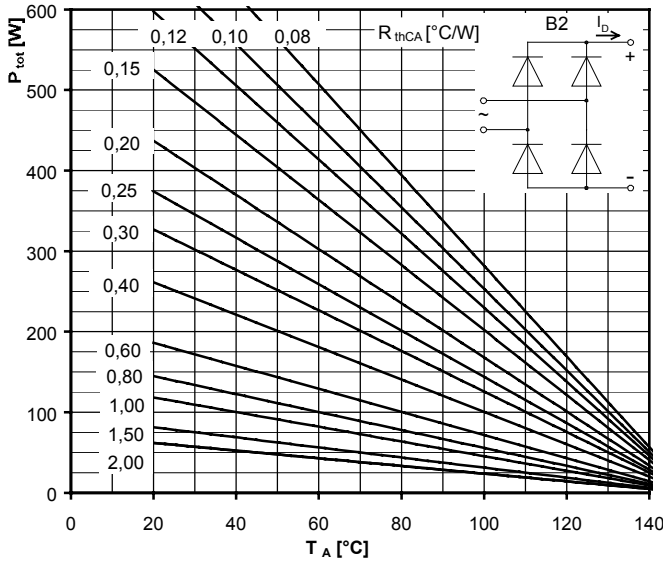
Berechnungsgrundlage P_{TAV}
Calculation base P_{TAV}

Parameter: Stromflußwinkel Θ / Current conduction angle Θ



**Netz-Dioden-Modul
Rectifier Diode Module**

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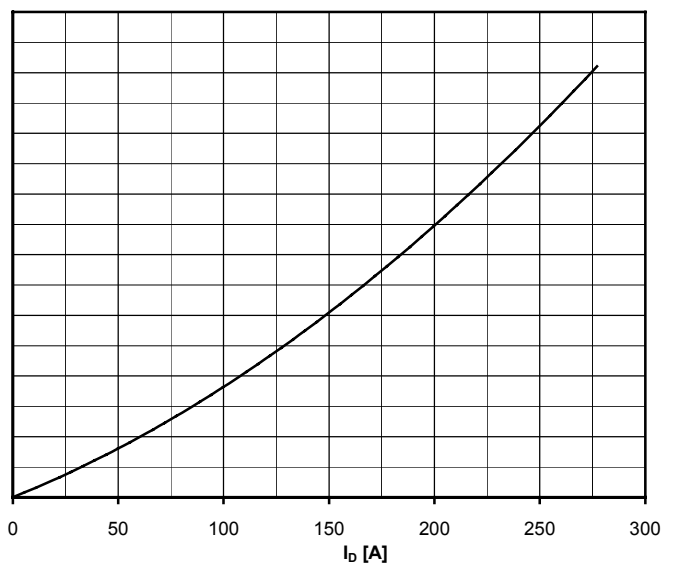
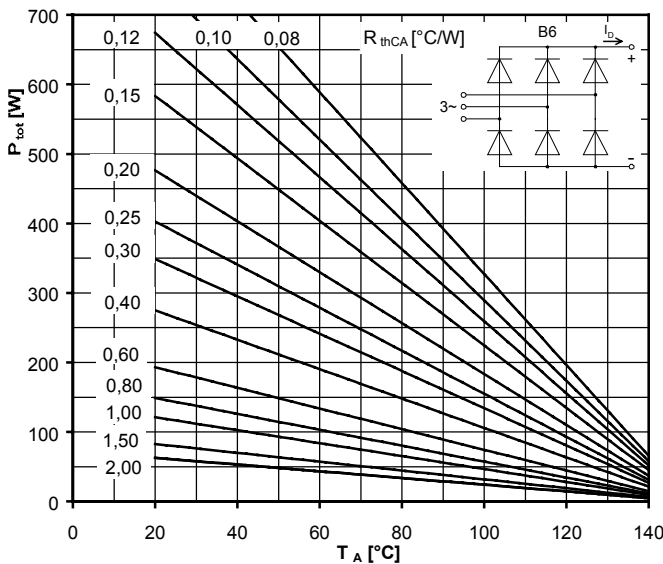
Höchstzulässiger Ausgangsstrom / Maximum rated output current I_b

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_b

B6- Sechspuls-Brückenschaltung / Six-pulse bridge circuit

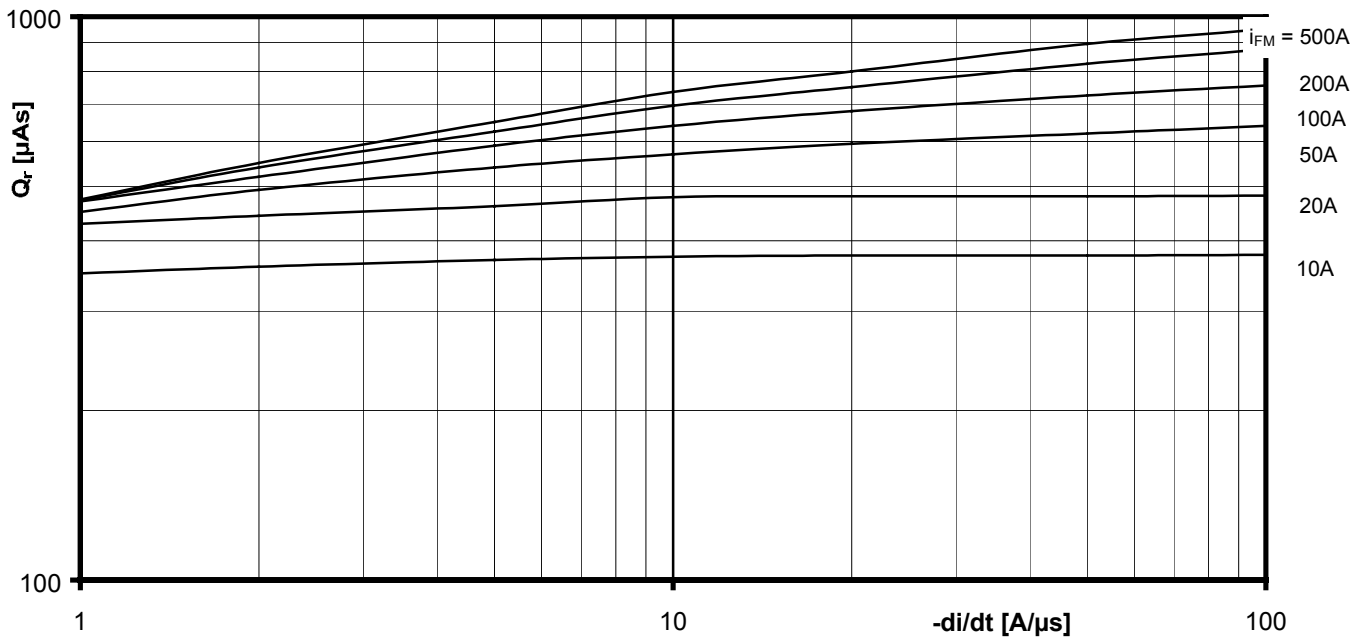
Gesamtverlustleistung der Schaltung / Total power dissipation at circuit P_{tot}

Parameter:

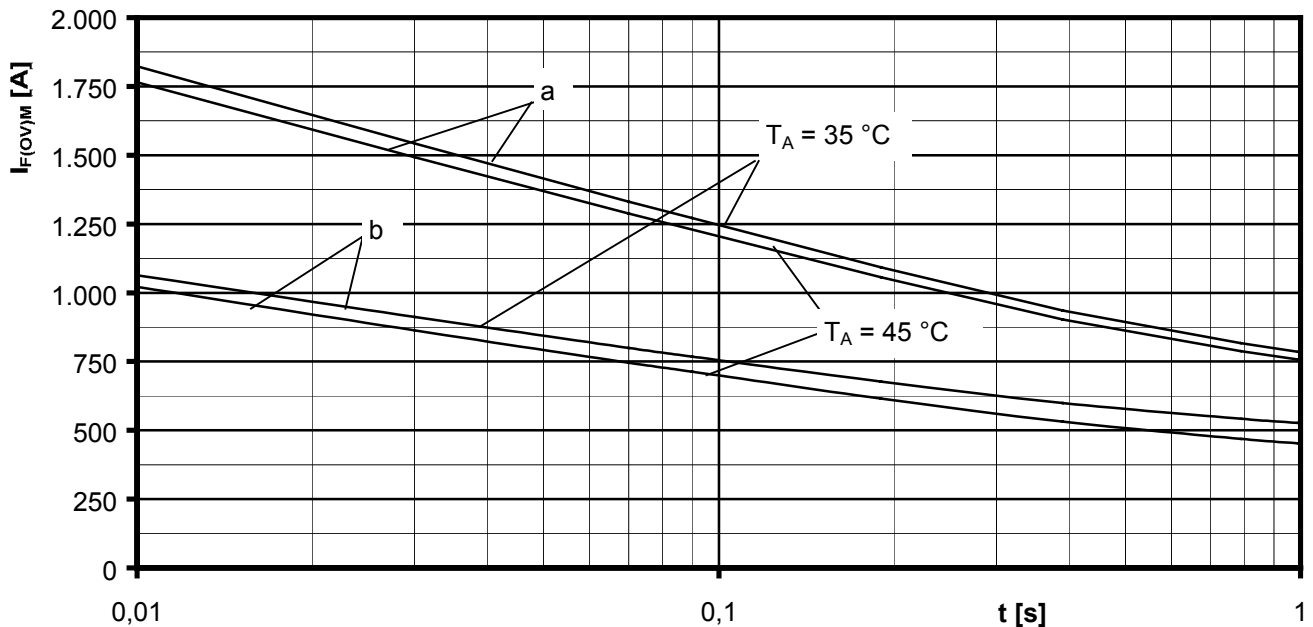
Wärmewiderstand zwischen den Gehäusen und Umgebung / Thermal resistance cases to ambient R_{thCA}

Netz-Dioden-Modul
Rectifier Diode Module

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

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

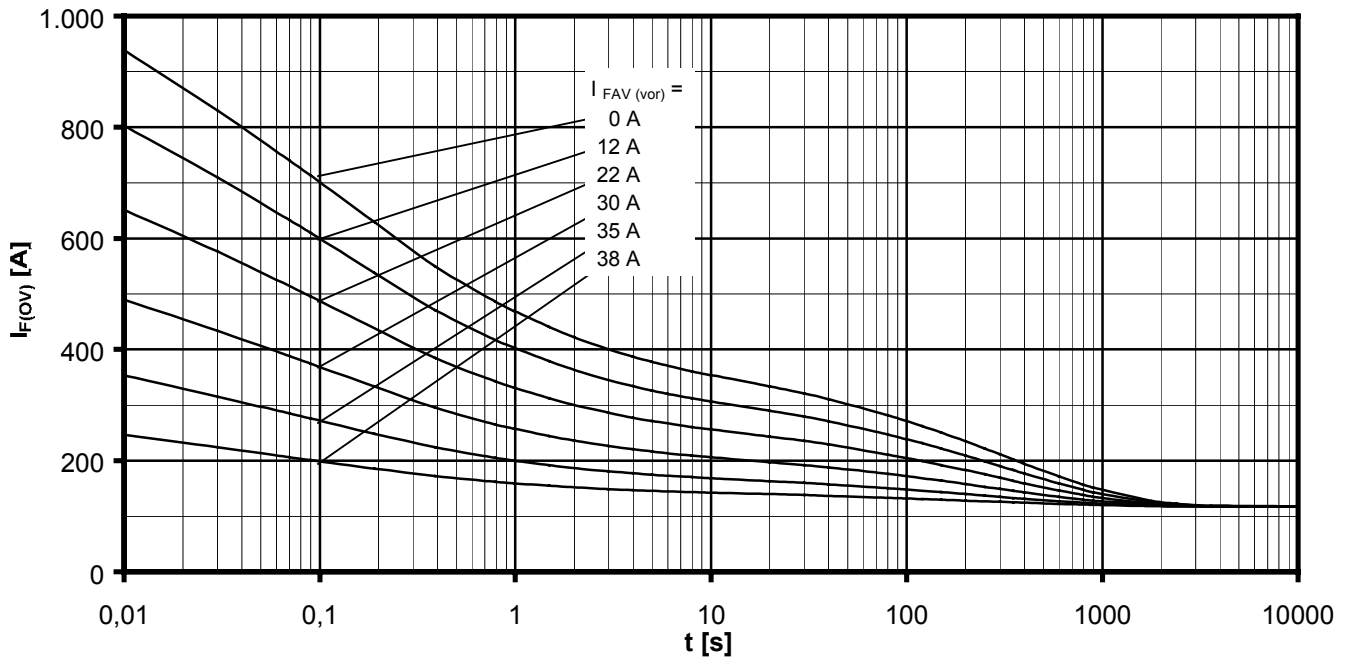
Parameter: Durchlaßstrom / On-state current i_{FM} Grenzstrom je Zweig / Maximum overload on-state current per arm $I_{F(OV)M} = f(t), V_{RM} = 0,8 V_{RRM}$

a: Leerlauf / No-load conditions

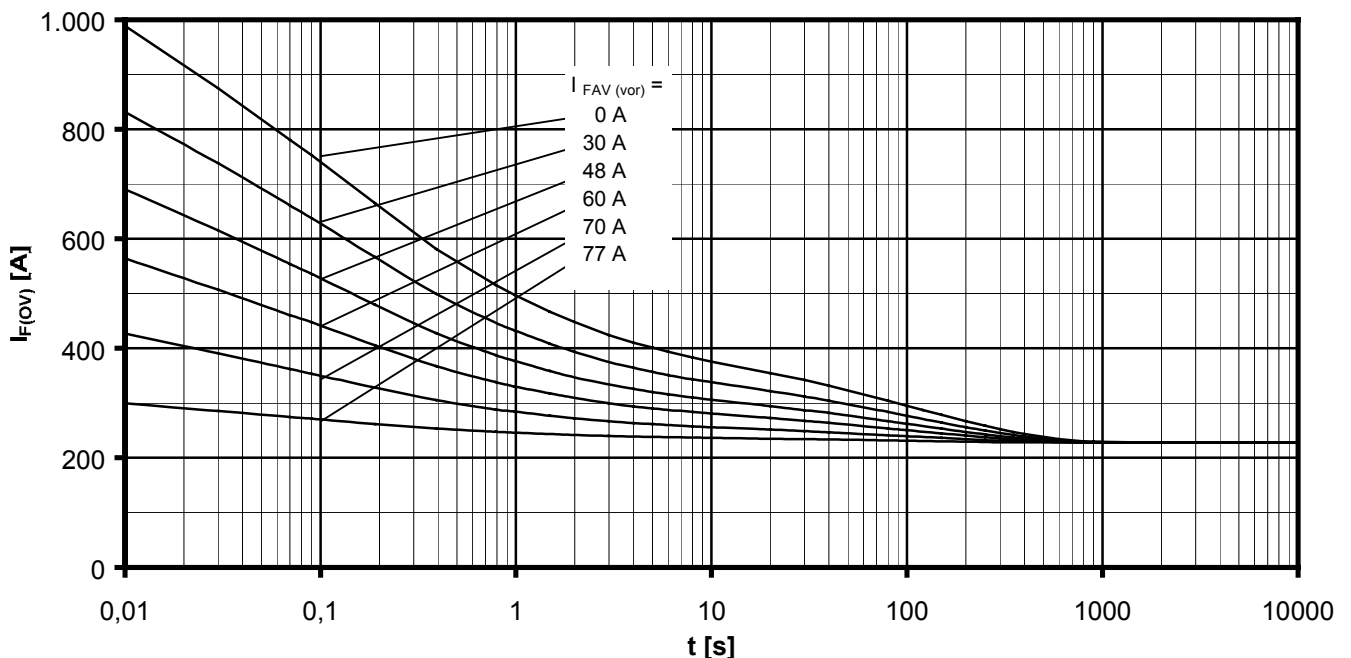
b: Vorlaststrom je Zweig / Pre-load current per arm $I_{FAV(vor)} = I_{FAVM}$ $T_A = 35^\circ\text{C}$, verstärkte Luftkühlung / Forced air cooling Kühlkörper / Heatsink type: KM14 (Papst 4650) $T_A = 45^\circ\text{C}$, natürliche Luftkühlung / Natural air cooling Kühlkörper / Heatsink type: KM14 (50W)

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Rectifier Diode Module

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

Kühlkörper / Heatsink type KM14 (50W) Natürliche Kühlung bei / Natural cooling at $T_A = 45^\circ\text{C}$ Parameter: Vorlaststrom je Zweig / Pre-load current per arm $I_{FAV(vor)}$ 

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

Kühlkörper / Heatsink type KM14 (Papst 4650) Verstärkte Kühlung bei / Forced cooling at $T_A = 35^\circ\text{C}$ Parameter: Vorlaststrom je Zweig / Pre-load current per arm $I_{FAV(vor)}$

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