
**Netz-Dioden-Modul**  
**Rectifier Diode Module**
**DD98N**

DD98N

DD98N..K..K

**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 2200 2500	V V
Stoßspitzensperrspannung non-repetitive peak reverse voltage	$T_{vj} = +25^{\circ}\text{C} \dots T_{vj \max}$	$V_{RSM}$	2100 2300 2600	V V
Durchlaßstrom-Grenzeffektivwert maximum RMS on-state current		$I_{FRMSM}$	160	A
Dauergrenzstrom average on-state current	$T_C = 100^{\circ}\text{C}$	$I_{FAVM}$	98	A
Stoßstrom-Grenzwert surge current	$T_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ $T_{vj} = T_{vj \max}, t_p = 10 \text{ ms}$	$I_{FSM}$	2.400 2.000	A A
Grenzlastintegral $I^2t$ -value	$T_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ $T_{vj} = T_{vj \max}, t_p = 10 \text{ ms}$	$I^2t$	28.800 20.000	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

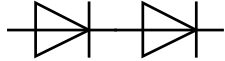
**Charakteristische Werte / Characteristic values**

Durchlaßspannung on-state voltage	$T_{vj} = T_{vj \max}, i_F = 300 \text{ A}$	$v_F$	max. 1,53	V
Schleusenspannung threshold voltage	$T_{vj} = T_{vj \max}$	$V_{(TO)}$	0,82	V
Ersatzwiderstand slope resistance	$T_{vj} = T_{vj \max}$	$r_T$	2	$\text{m}\Omega$
Sperrstrom reverse current	$T_{vj} = T_{vj \max}, V_R = V_{RRM}$	$i_R$	max. 25	$\text{mA}$
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	$\text{kV}$ $\text{kV}$

**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 max. 0,390 max. 0,185 max. 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 max. 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

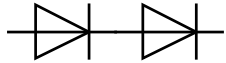


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**Mechanische Eigenschaften / Mechanical properties**

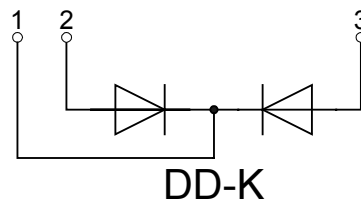
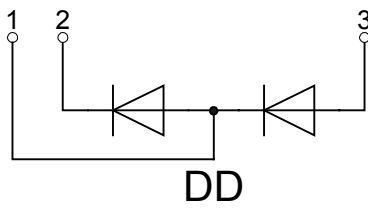
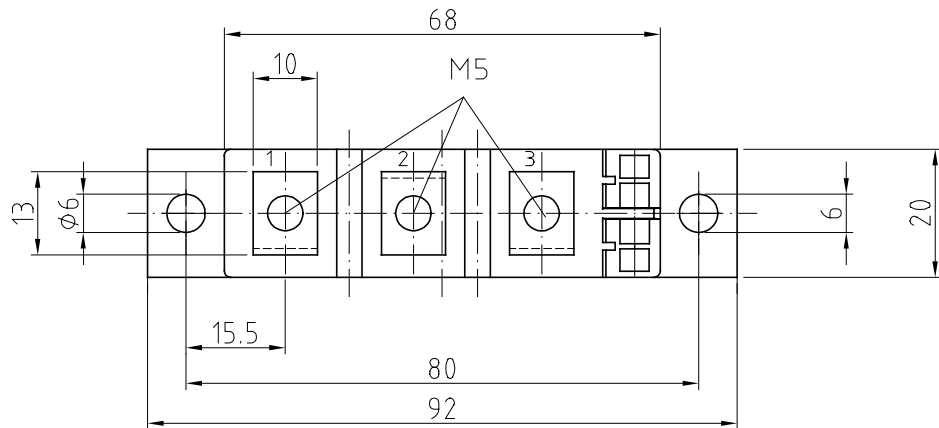
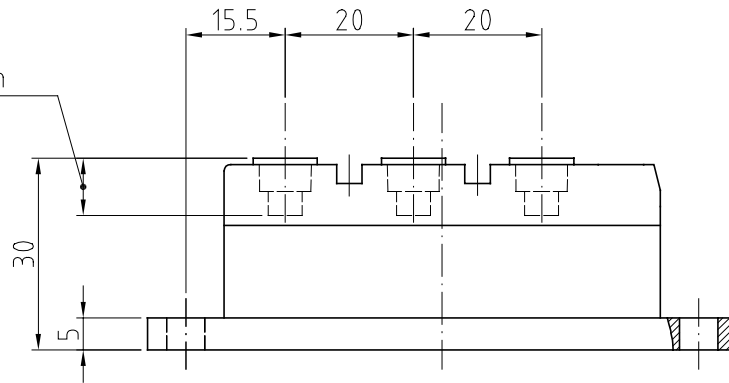
Gehäuse, siehe Anlage case, see annex			Seite 3 page 3	
Si-Element mit Druckkontakt Si-pellet with pressure contact				
Innere Isolation internal insulation			AIN	
Anzugsdrehmoment für mechanische Anschlüsse mounting torque	Toleranz $\pm 15\%$	M1	4	Nm
Anzugsdrehmoment für elektrische Anschlüsse terminal 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 <sup>2</sup>
	file-No.		E 83336	

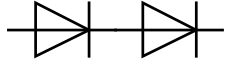


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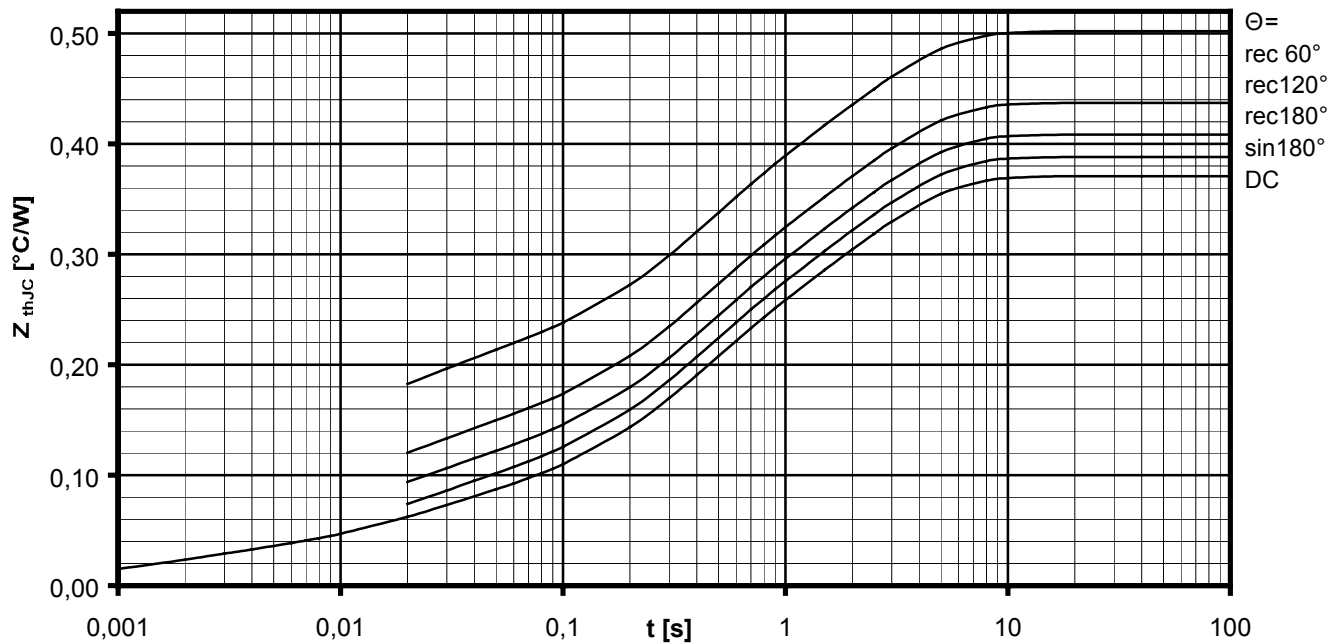
srewing depth  
max. 9,0



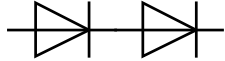
Netz-Dioden-Modul  
Rectifier Diode Module**DD98N**
**Analytische Elemente des transienten Wärmewiderstandes  $Z_{thJC}$  für DC**  
**Analytical elements of transient thermal impedance  $Z_{thJC}$  for DC**

Pos. n	1	2	3	4	5	6	7
$R_{thn}$ [°C/W]	0,0233	0,0433	0,134	0,17			
$T_n$ [s]	0,00137	0,0175	0,325	2,11			

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  $\Theta$  / Current conduction angle  $\Theta$

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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			

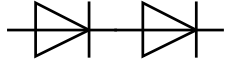
Verstärkte Kühlung / Forced cooling  
3 Module pro Kühler / 3 modules per heatsink  
Kühler / Heatsink type: KM14 (Papst 4650)

**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			

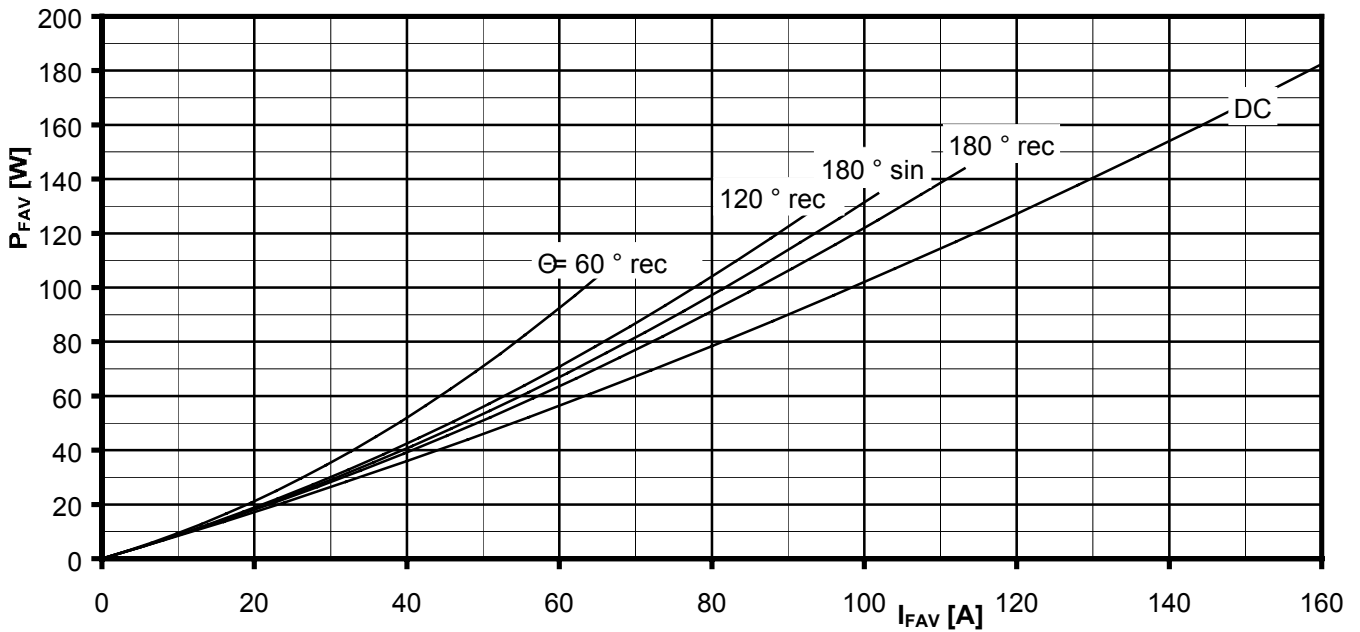
Analytische Funktion / Analytical function:

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



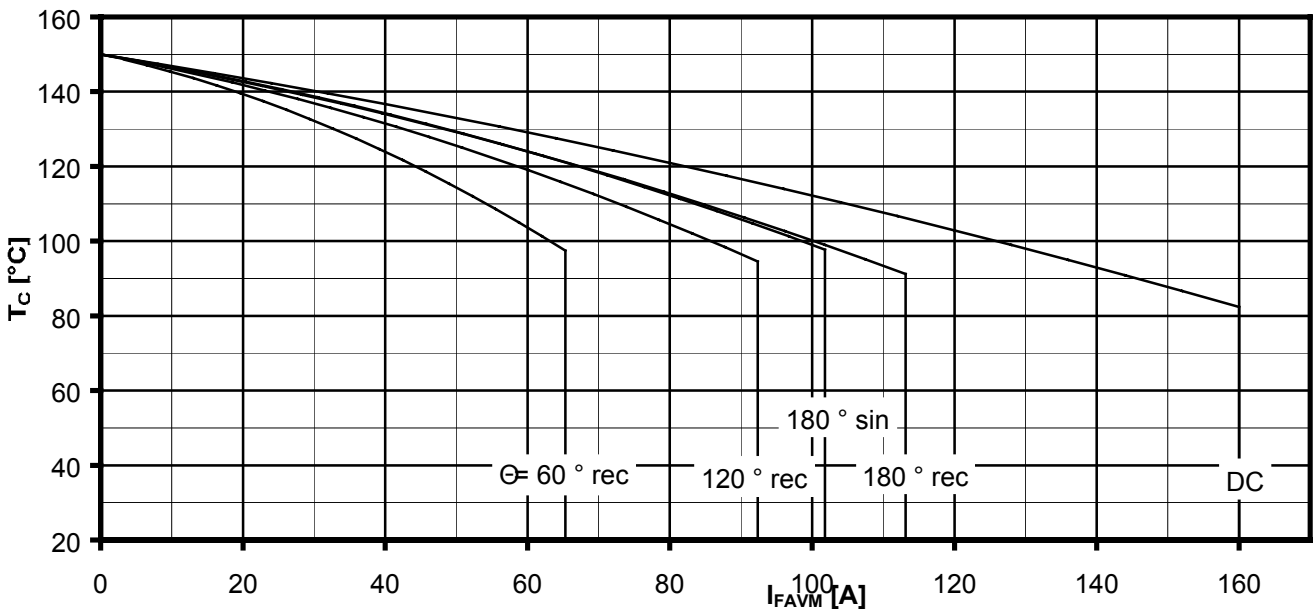
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Durchlassverlustleistung je Zweig / On-state power loss per arm  $P_{FAV} = f(I_{FAV})$

Parameter: Stromflußwinkel / Current conduction angle  $\Theta$

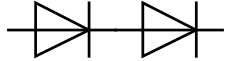


Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature  $T_C = f(I_{FAVM})$

Strombelastung je Zweig / Current load per arm

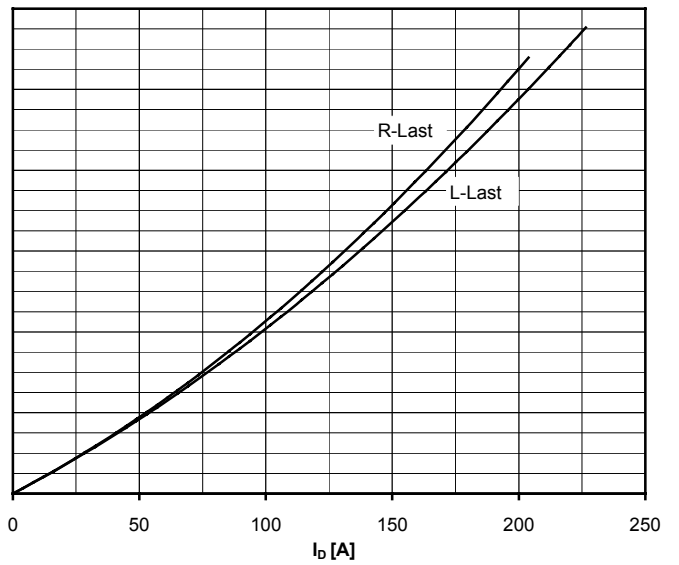
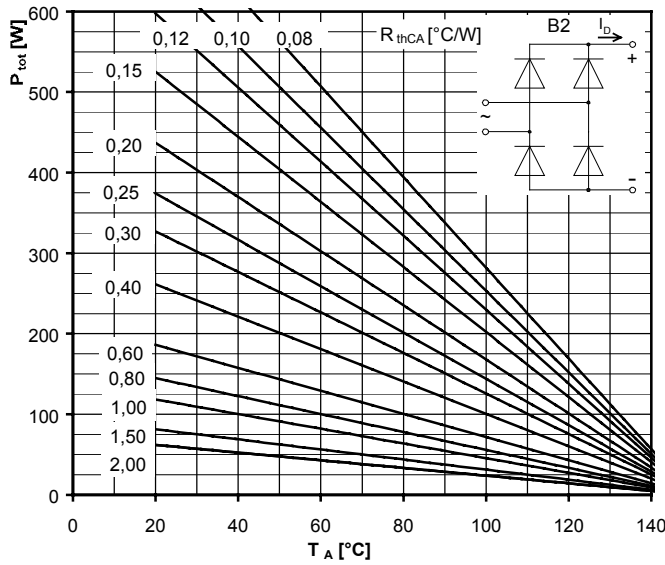
**Berechnungsgrundlage  $P_{TAV}$**  (Schaltverluste gesondert berücksichtigen)  
**Calculation base  $P_{TAV}$**  (switching losses should be considered separately)

Parameter: Stromflußwinkel  $\Theta$  / Current conduction angle  $\Theta$



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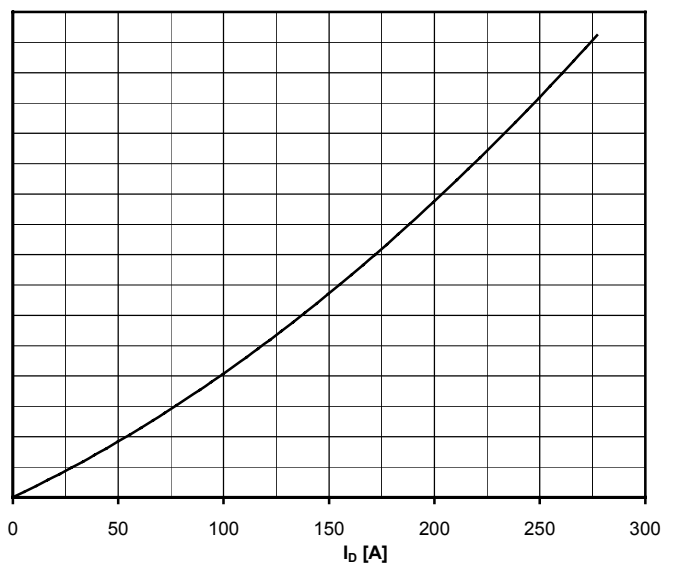
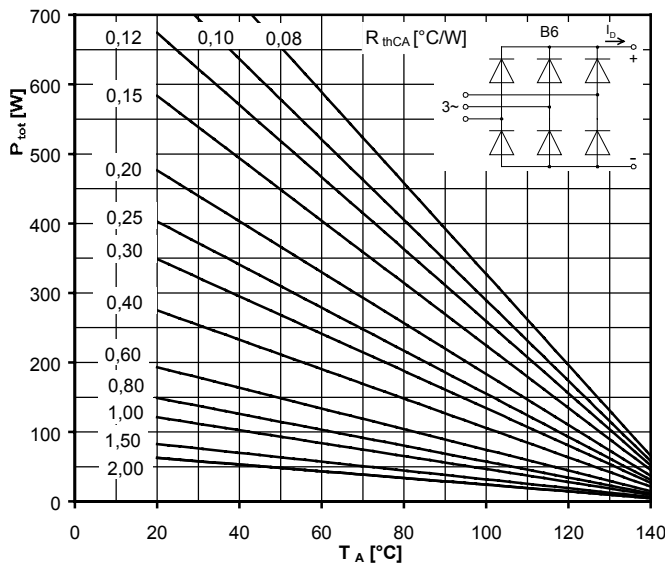
**Höchstzulässiger Ausgangsstrom / Maximum rated output current  $I_b$**

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  $R_{thCA}$



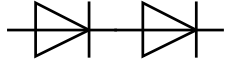
**Höchstzulässiger Ausgangsstrom / Maximum rated output current  $I_b$**

B6- Sechspuls-Brückenschaltung / Six-pulse bridge circuit

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

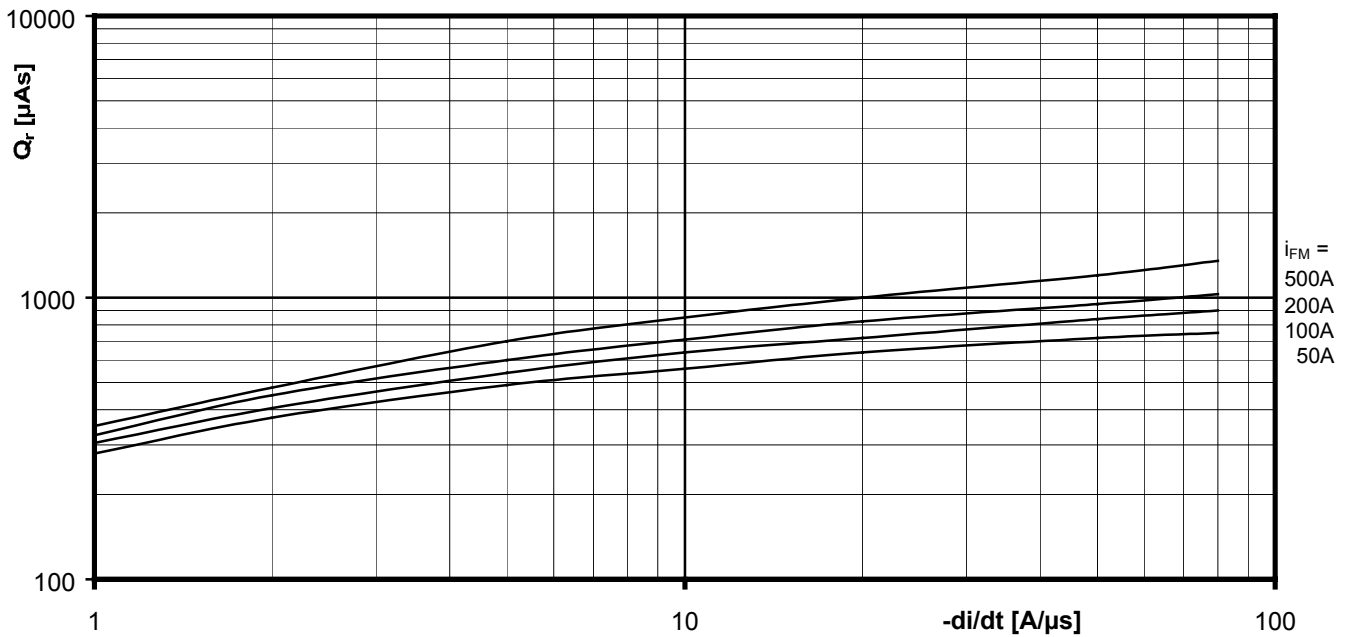
Parameter:

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



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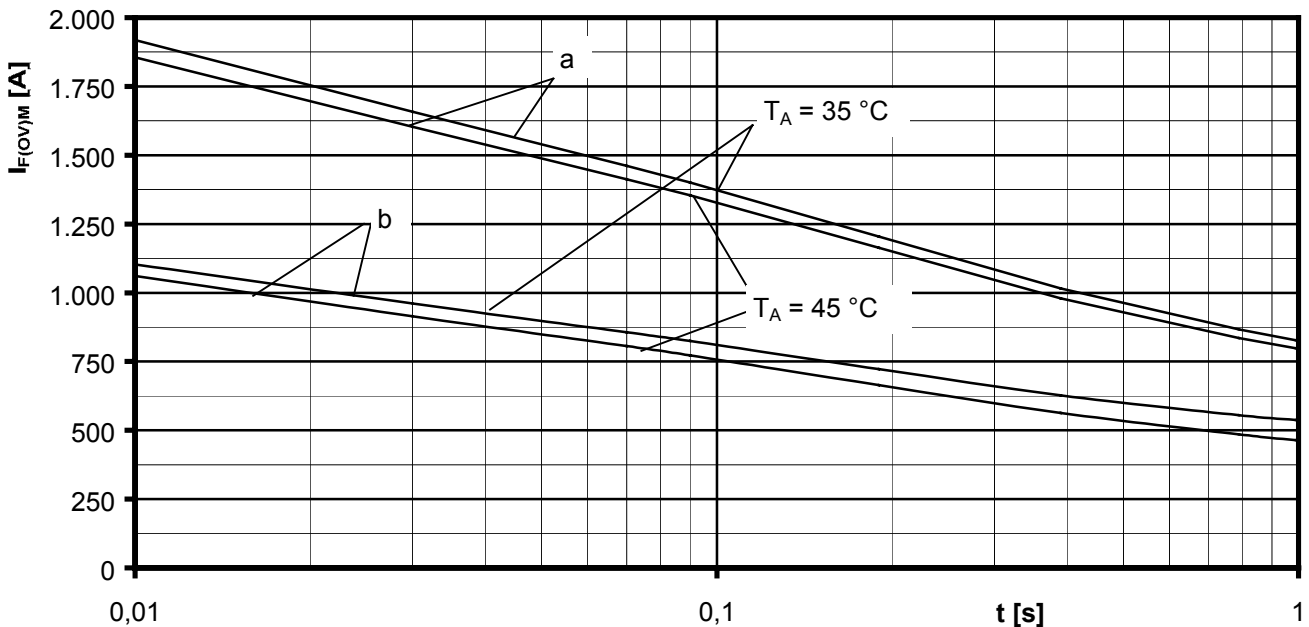
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Sperrverzögerungsladung / Recovered charge  $Q_r = f(-di/dt)$

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

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



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

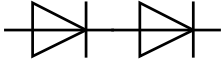
a: Leerlauf / No-load conditions

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

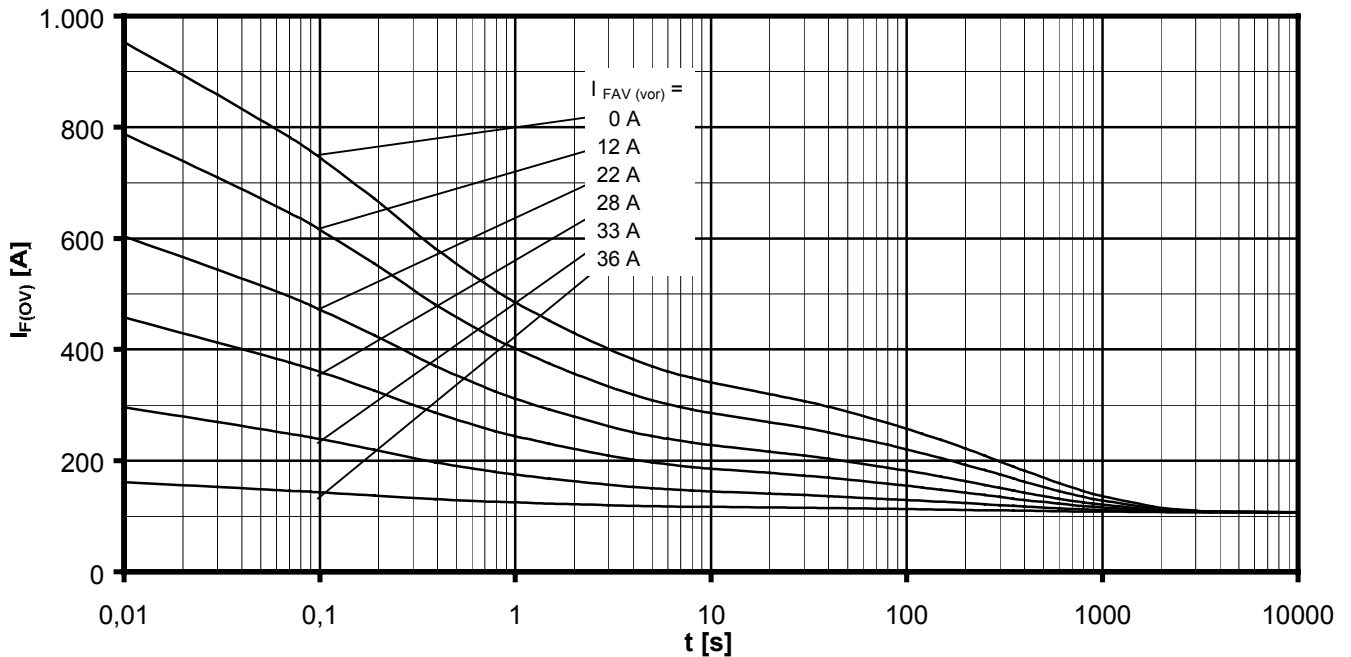
$T_a = 35^\circ\text{C}$ , verstärkte Luftkühlung / Forced air cooling    Kühlkörper / Heatsink type: KM14 (Papst 4650)

$T_a = 45^\circ\text{C}$ , natürliche Luftkühlung / Natural air cooling    Kühlkörper / Heatsink type: KM14 (50W)

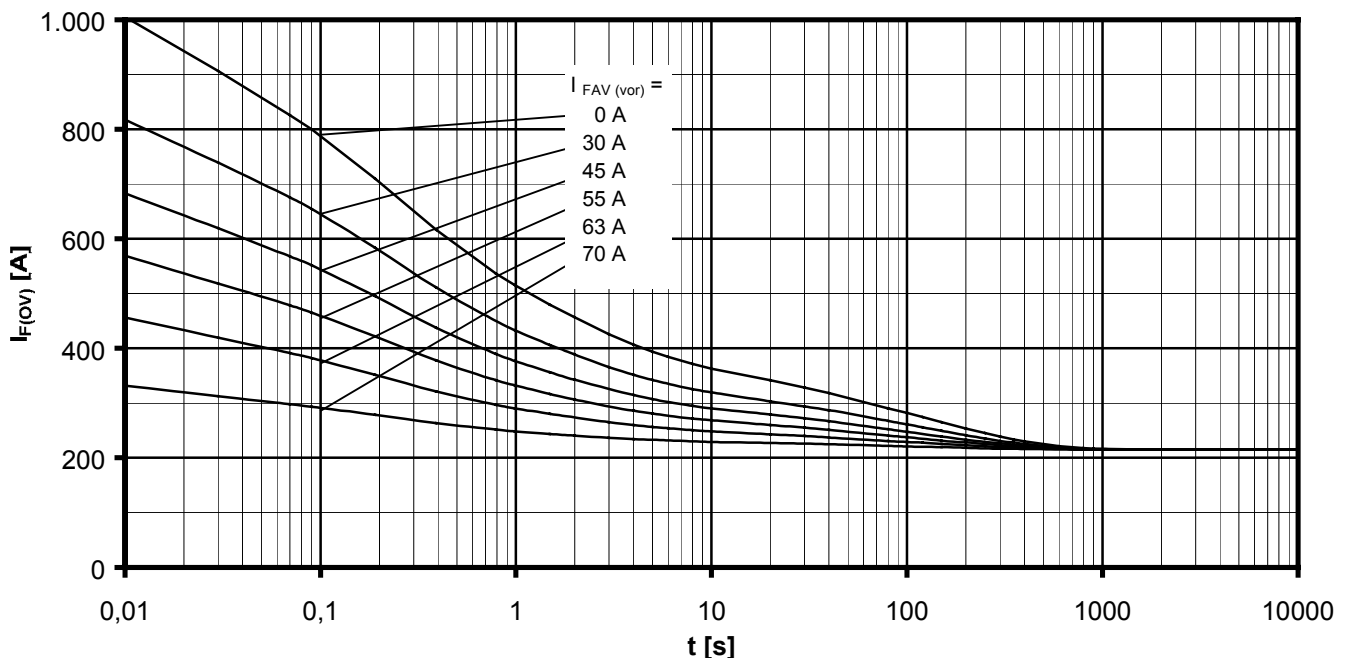


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Überstrom je Zweig / Overload on-state current  $I_{F(ov)}$ 

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

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  $I_{FAV(vor)}$