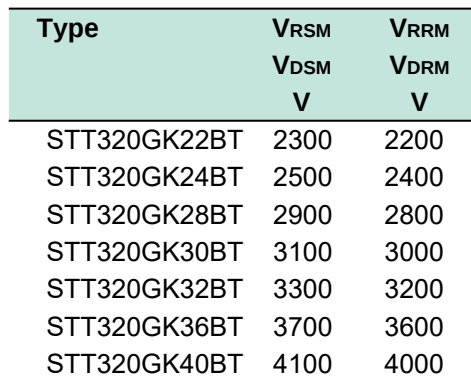


Thyristor-Thyristor Modules

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Thyristor-Thyristor Modules

Symbol	Test Conditions	Characteristic Values	Unit
I_{RRM}, I_{DRM}	$T_{VJ}=T_{VJM}; V_R=V_{RRM}; V_D=V_{DRM}$	≤ 60	mA
V_{TM}	$I_{TM}=960A; T_{VJ}=25^{\circ}C$	≤ 2.60	V
V_{TO}	For power-loss calculations only ($T_{VJ}=T_{VJM}$)	0.8	V
r_T		0.6	m Ω
V_{GT}	$V_D=6V; T_{VJ}=25^{\circ}C$ $T_{VJ}=-40^{\circ}C$	≤ 2 ≤ 2.6	V
I_{GT}	$V_D=6V; T_{VJ}=25^{\circ}C$ $T_{VJ}=-40^{\circ}C$	≤ 200 ≤ 250	mA
V_{GD}	$T_{VJ}=T_{VJM}; V_D=2/3V_{DRM}$	≤ 0.25	V
I_{GD}	$T_{VJ}=T_{VJM}; V_D=2/3V_{DRM}$	≤ 10	mA
I_L	$T_{VJ}=25^{\circ}C; t_p=30\mu s; V_D=6V$ $I_G=0.45A; di_G/dt=0.45A/\mu s$	≤ 1200	mA
I_H	$T_{VJ}=25^{\circ}C; V_D=6V; R_{GK}=\infty$	≤ 300	mA
t_{gd}	$T_{VJ}=25^{\circ}C; V_D=1/2V_{DRM}$ $I_G=0.5A; di_G/dt=0.5A/\mu s$	≤ 3	μs
t_q	$T_{VJ}=T_{VJM}; I_T=320A; t_p=200\mu s; -di/dt=10A/\mu s$ $V_R=100V; dv/dt=20V/\mu s; V_D=2/3V_{DRM}$	typ. 250	μs
Q_s	$T_{VJ}=T_{VJM}; I_T, I_F=320A; -di/dt=50A/\mu s$	≤ 650	μC
I_{RM}		≤ 235	A
R_{thJC}	per thyristor/diode; DC current per module	0.111 0.056	K/W
R_{thCH}	per thyristor/diode; DC current per module	0.040 0.020	K/W
d_s	Creeping distance on surface	12.7	mm
d_A	Creepage distance in air	9.6	mm
a	Maximum allowable acceleration	50	m/s ²

FEATURES

- * International standard package
- * Isolation voltage 4500 V~
- * Pressure Contacts Technology
- * UL File NO.E310749
- * RoHS Compliant

APPLICATIONS

- * Motor control
- * Power converter
- * Heat and temperature control for industrial furnaces and chemical processes
- * Lighting control
- * Contactless switches

ADVANTAGES

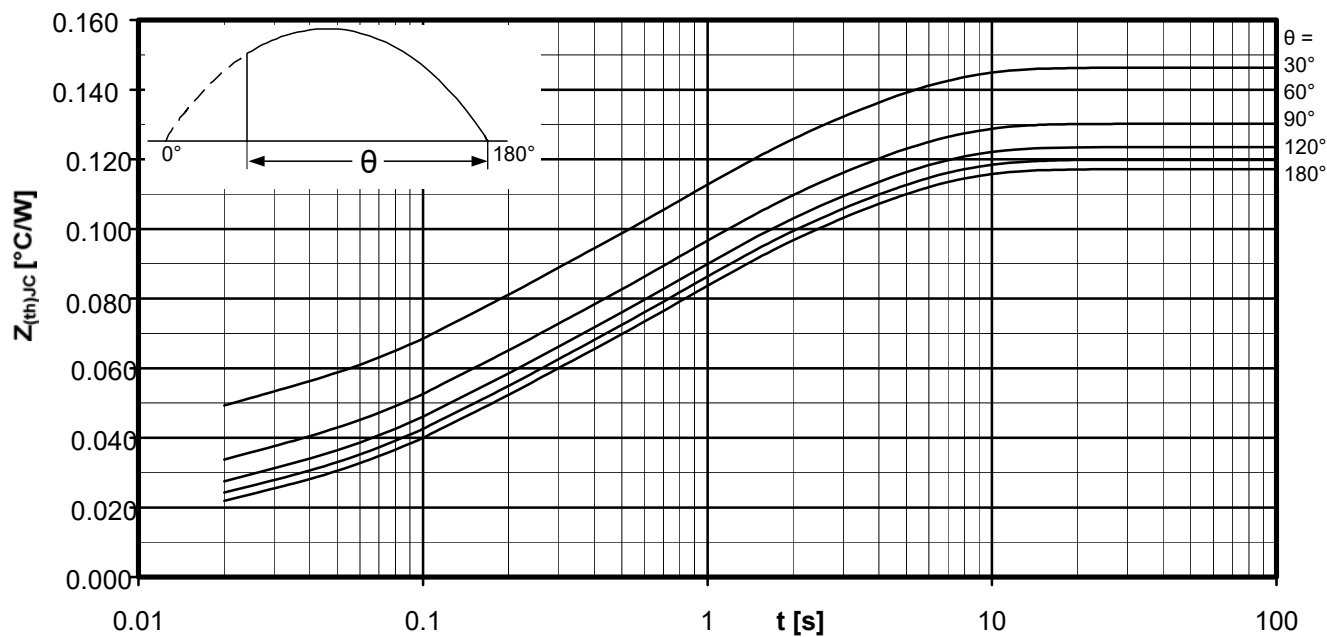
- * Space and weight savings
- * Simple mounting
- * Improved temperature and power cycling
- * Reduced protection circuits



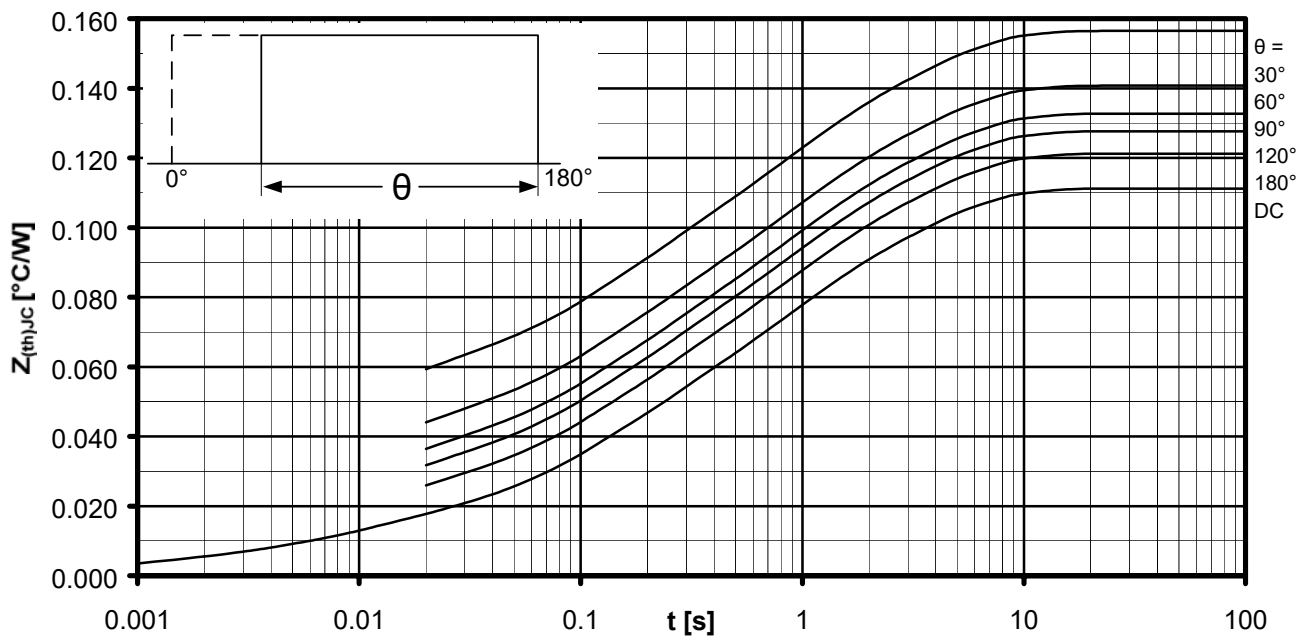
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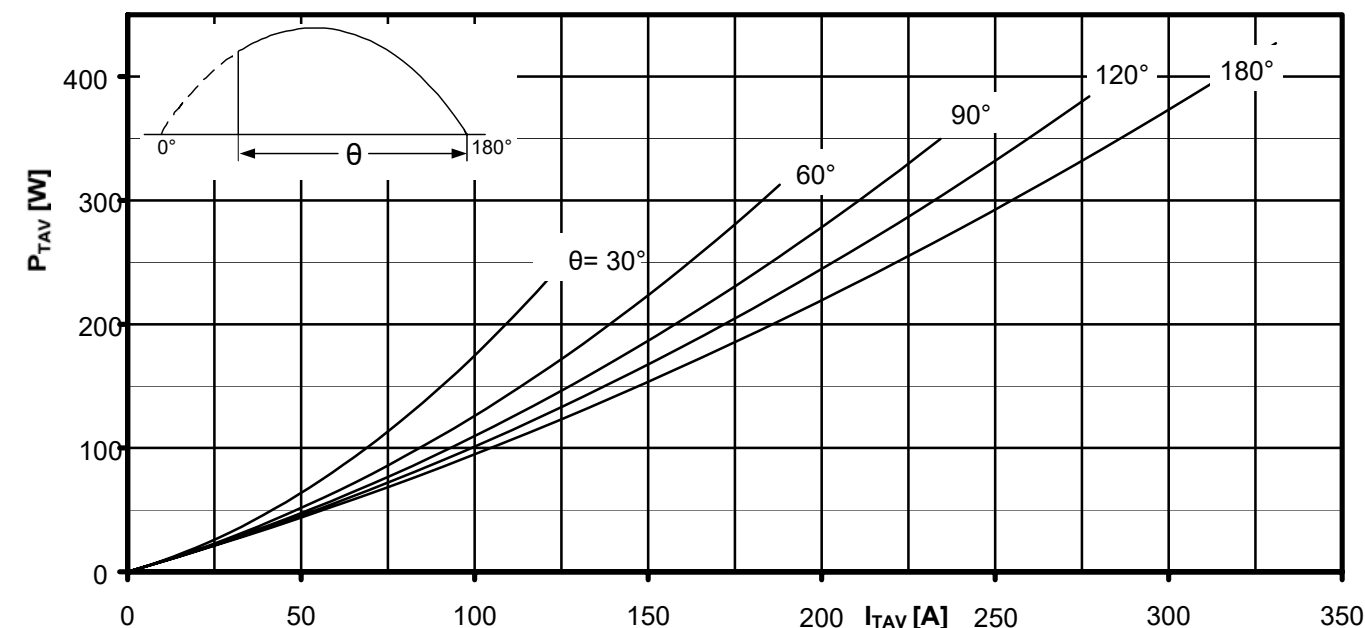
Transient thermal impedance per arm $Z_{thJC} = f(t)$
Sinusoidal current
Parameter: Current conduction angle θ



Transient thermal impedance per arm $Z_{thJC} = f(t)$
Rectangular current
Parameter: Current conduction angle θ

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Thyristor-Thyristor Modules

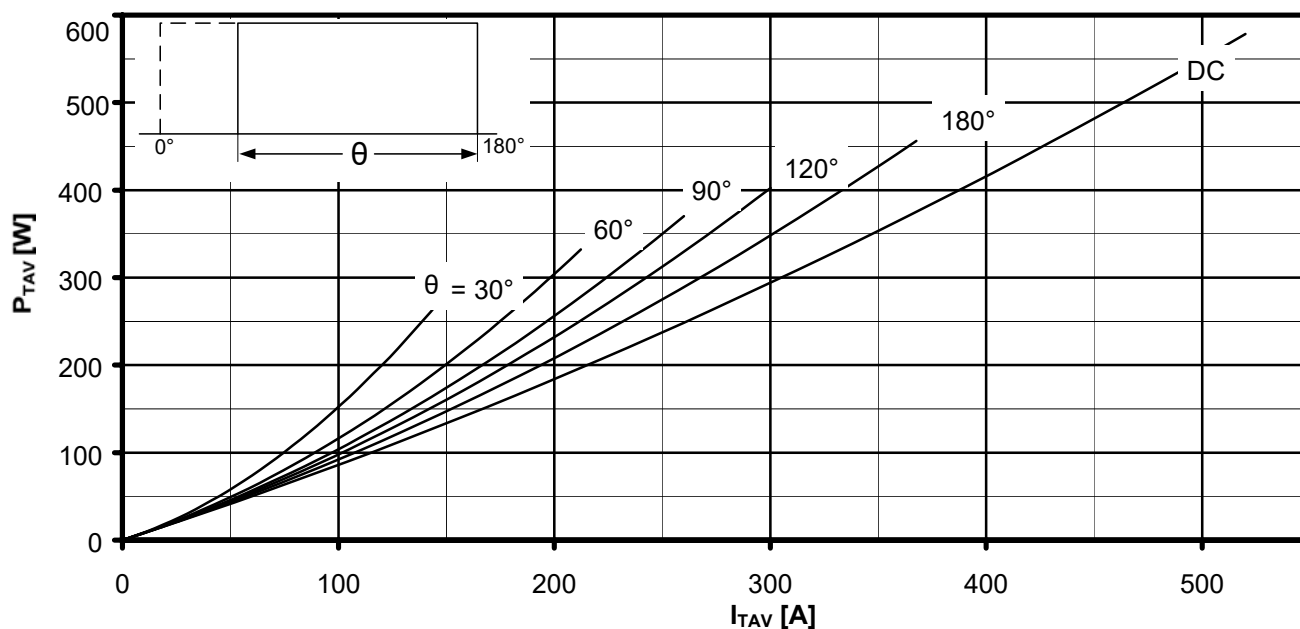


On-state power loss per arm $P_{TAV} = f(I_{TAV})$

Sinusoidal current
Current load per arm

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

Parameter: Current conduction angle θ



On-state power loss per arm $P_{TAV} = f(I_{TAV})$

Rectangular current Current load per arm

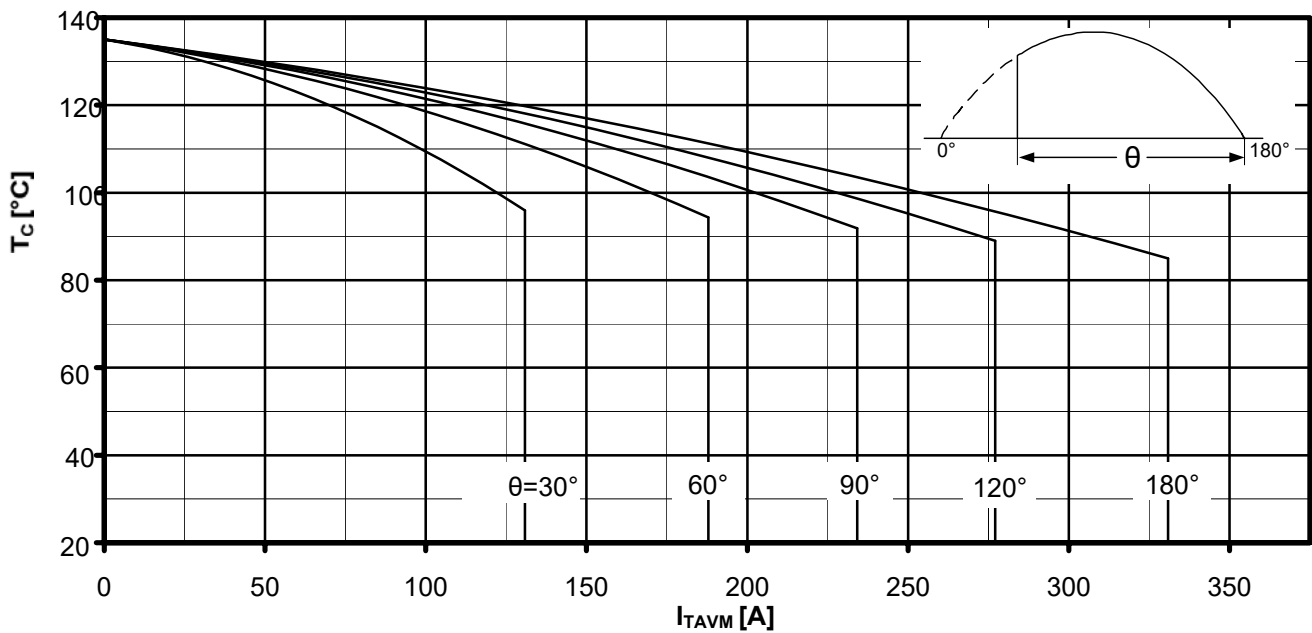
Calculation base P_{TAV} (switching losses should be considered separately)

Parameter: Current conduction angle θ

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Thyristor-Thyristor Modules

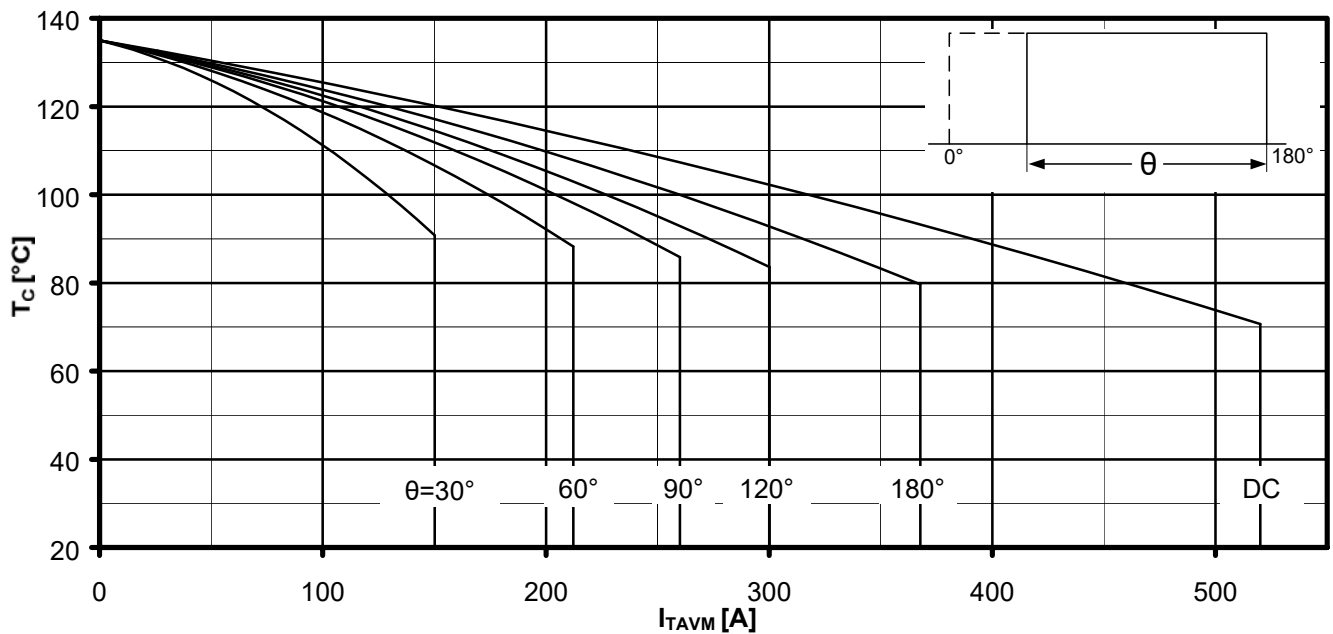


Maximum allowable case temperature $T_c = f(I_{TAVM})$

Sinusoidal current Current load per arm

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

Parameter: Current conduction angle θ



Maximum allowable case temperature $T_c = f(I_{TAVM})$

Rectangular current Current load per arm

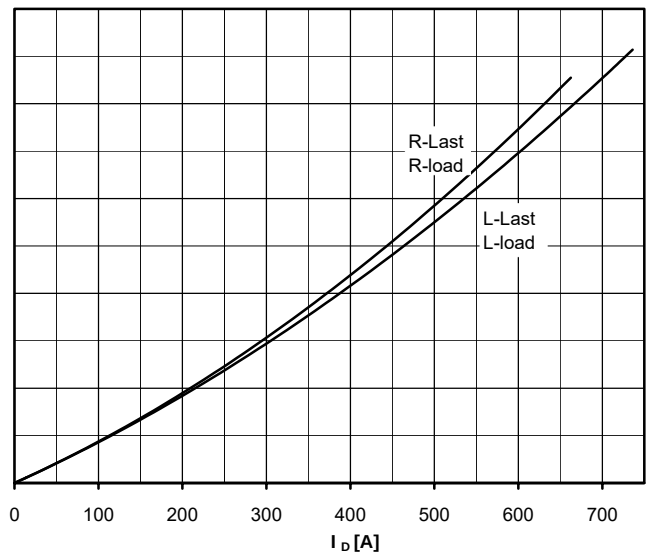
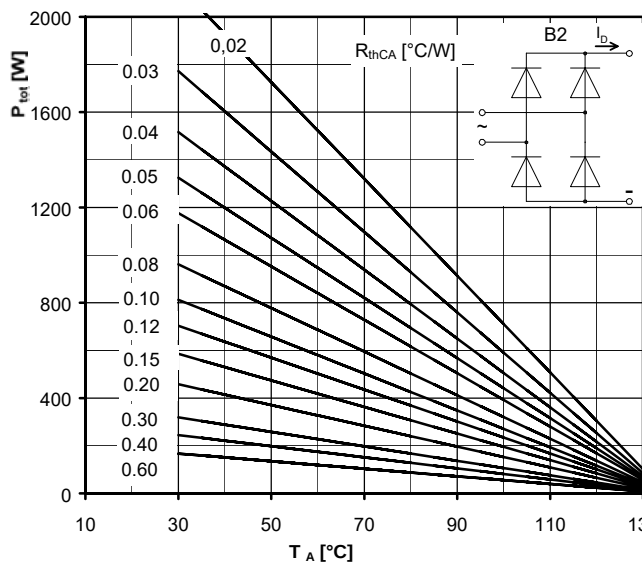
Calculation base P_{TAV} (switching losses should be considered separately)

Parameter: Current conduction angle θ

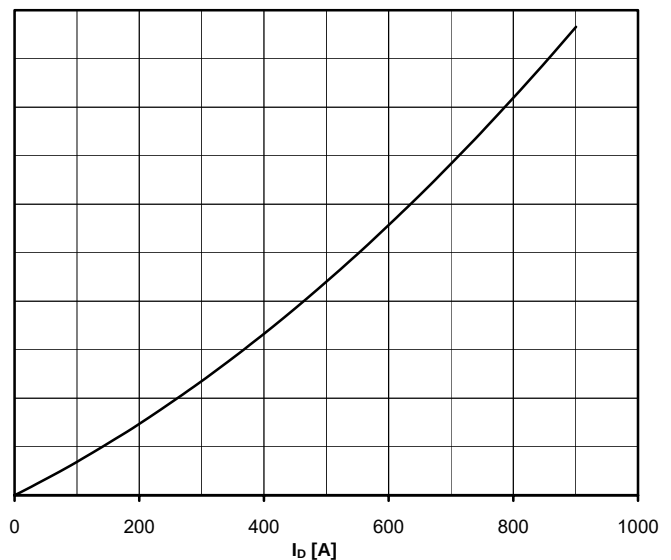
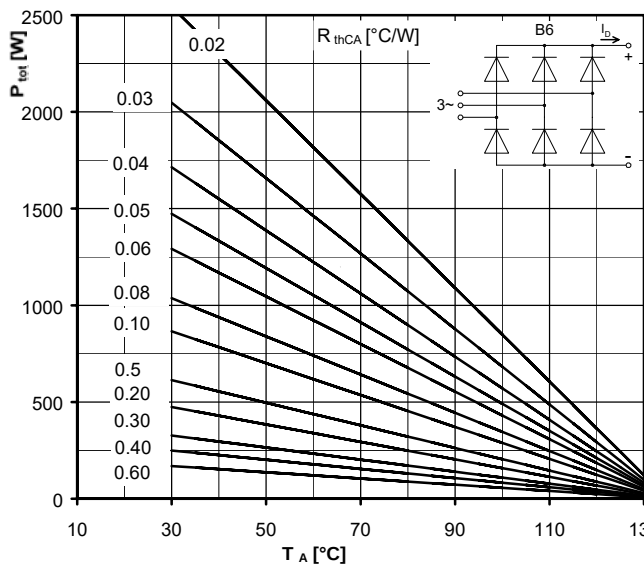
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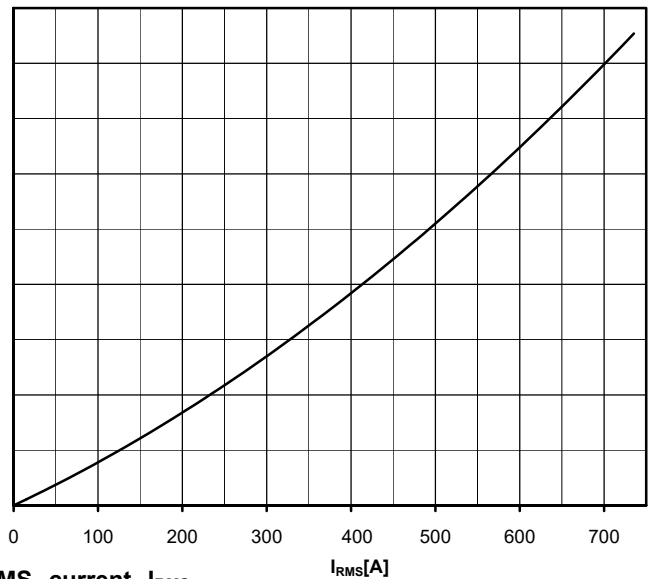
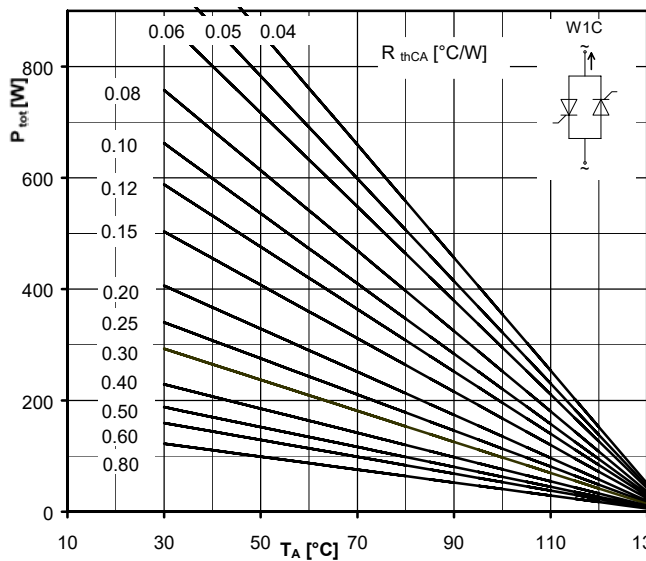
Maximum rated output current I_D
 Two-pulse bridge circuit
 Total power dissipation at circuit P_{tot}
 Parameter:
 Thermal resistance cases to ambient R_{thCA}



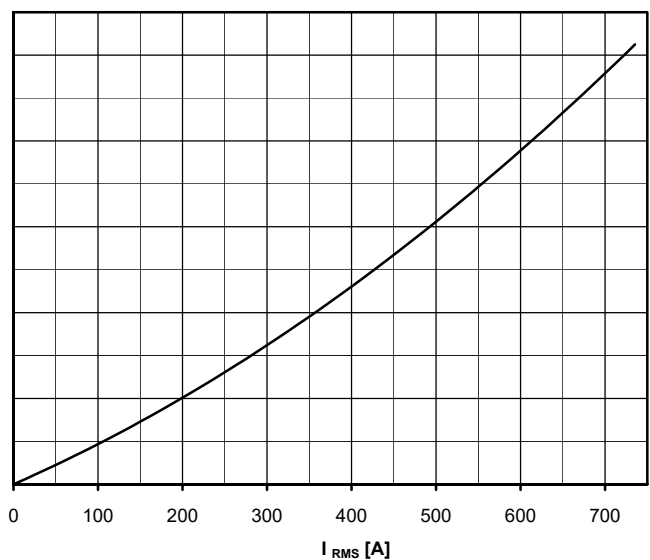
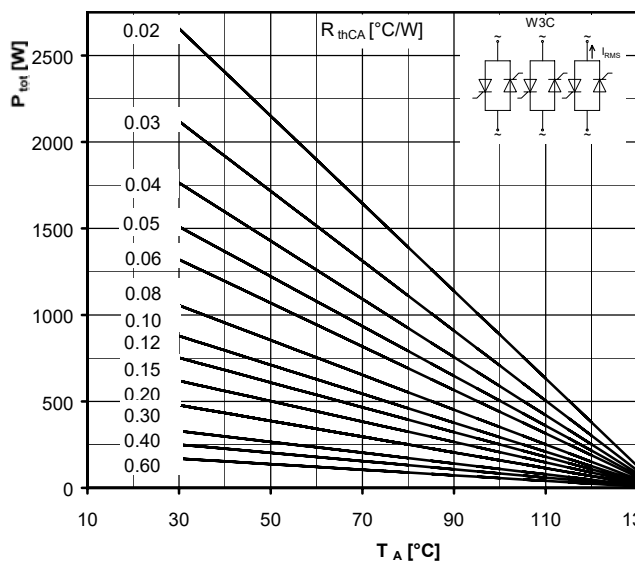
Maximum rated output current I_D
 Six-pulse bridge circuit
 Total power dissipation at circuit P_{tot}
 Parameter:
 Thermal resistance cases to ambient R_{thCA}

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Thyristor-Thyristor Modules



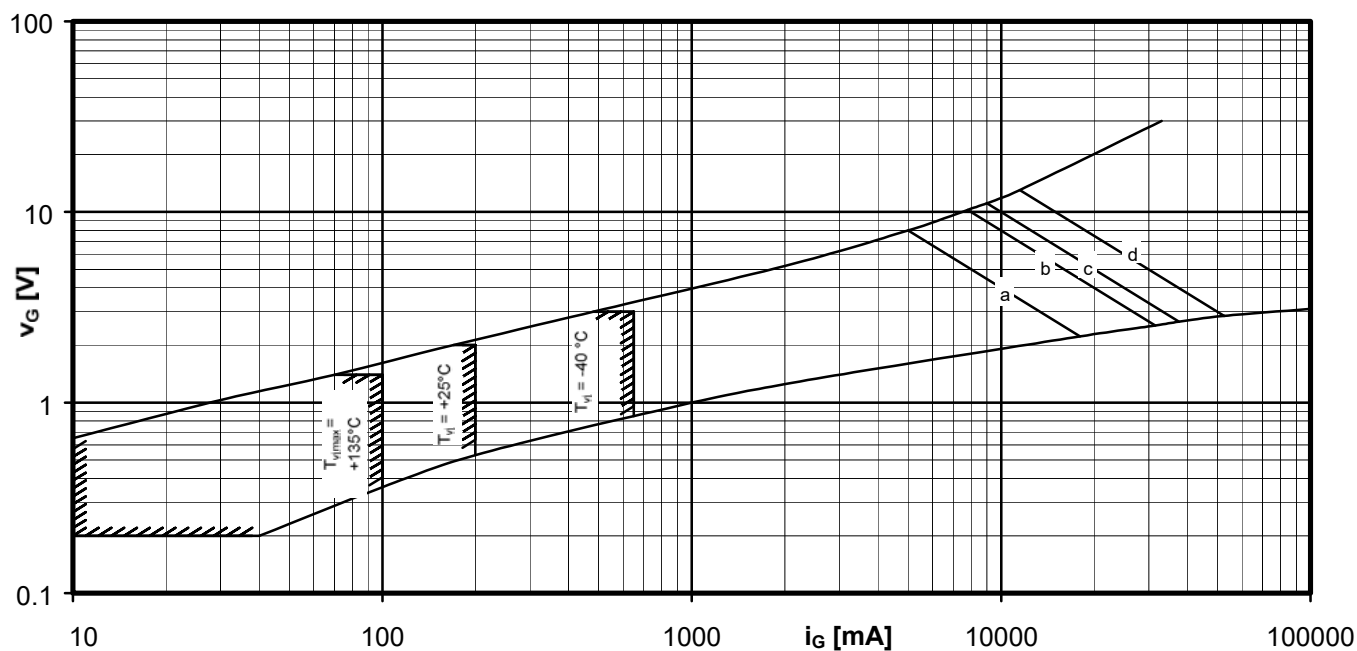
Maximum rated RMS current I_{RMS}
 Single-phase inverse parallel circuit
 Total power dissipation at circuit P_{tot}
 Parameter:
 Thermal resistance case to ambient R_{thCA}



Maximum rated RMS current I_{RMS}
 Three-phase inverse parallel circuit
 Total power dissipation at circuit P_{tot}
 Parameter:
 Thermal resistance cases to ambient R_{thCA}

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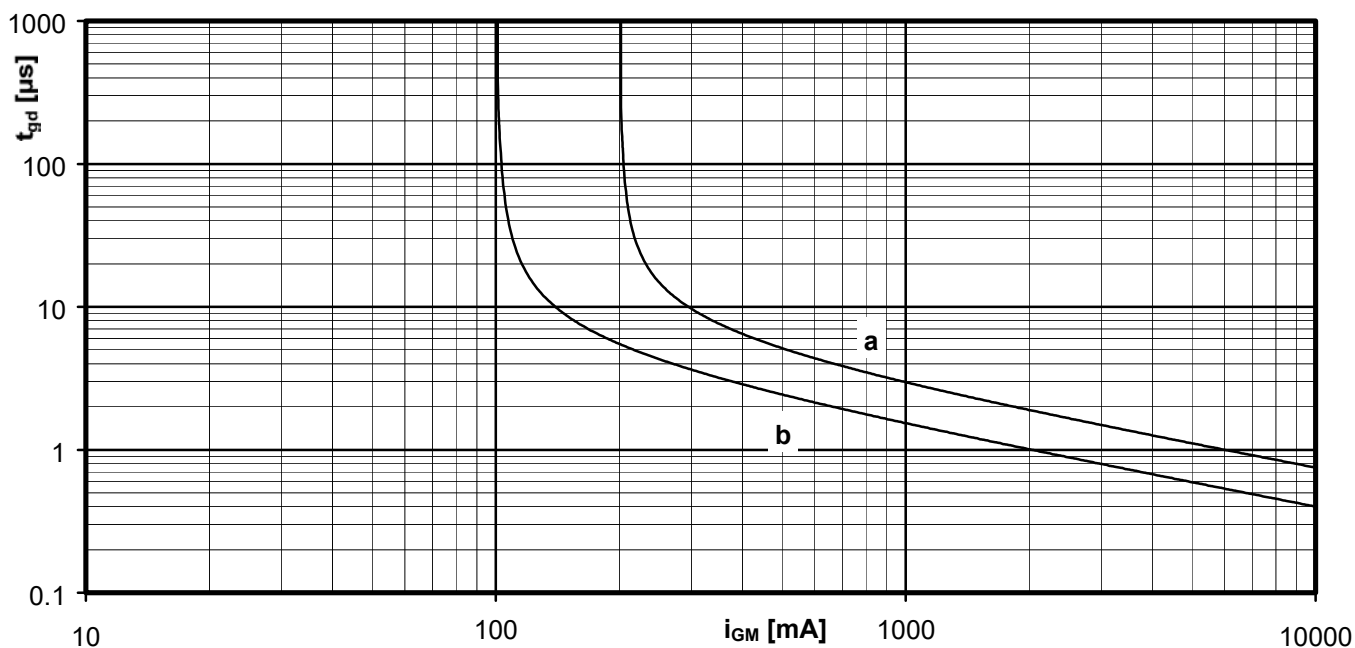
Thyristor-Thyristor Modules



Gate characteristic $v_G = f(i_G)$ with triggering area for $V_D = 6\text{ V}$

Maximum rated peak gate power dissipation $P_{GM} = f(t_g)$:

a - 40 W/10ms b - 80 W/1ms c - 100 W/0,5ms d - 150W/0,1ms



Gate controlled delay time $t_{gd} = f(i_G)$ $T_{vj} = 25^\circ\text{C}$,

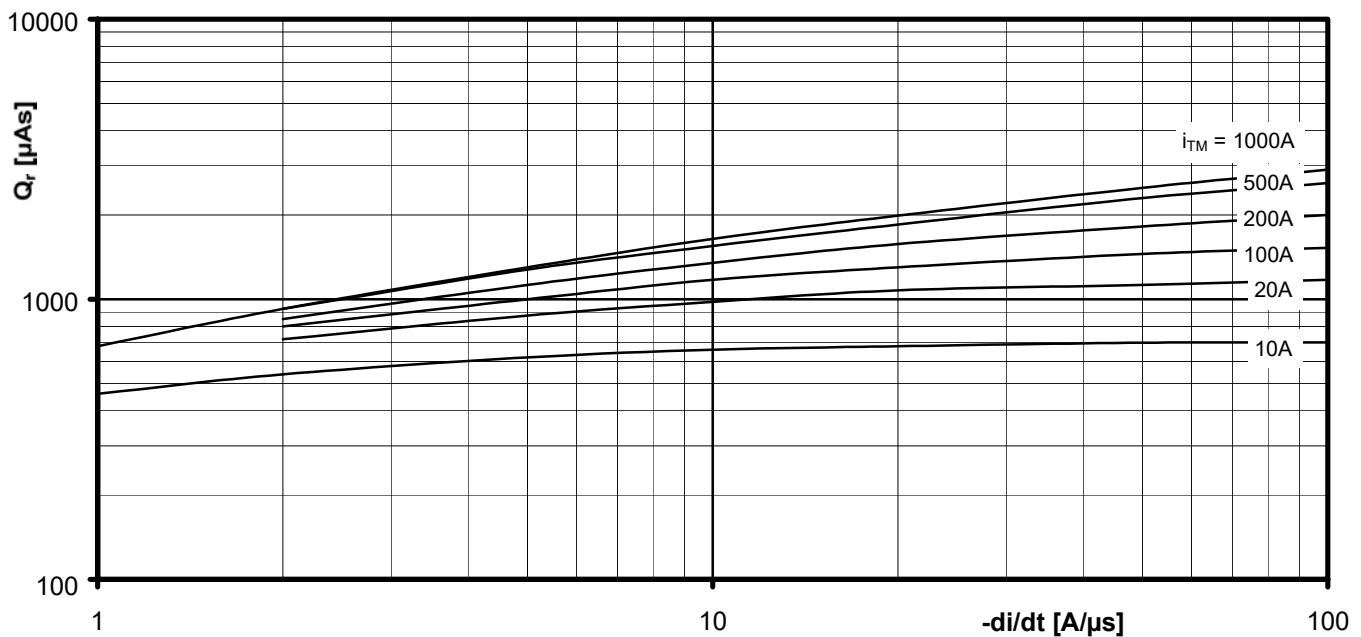
$di_G/dt = i_{GM}/1\mu\text{s}$

a - Limiting characteristic

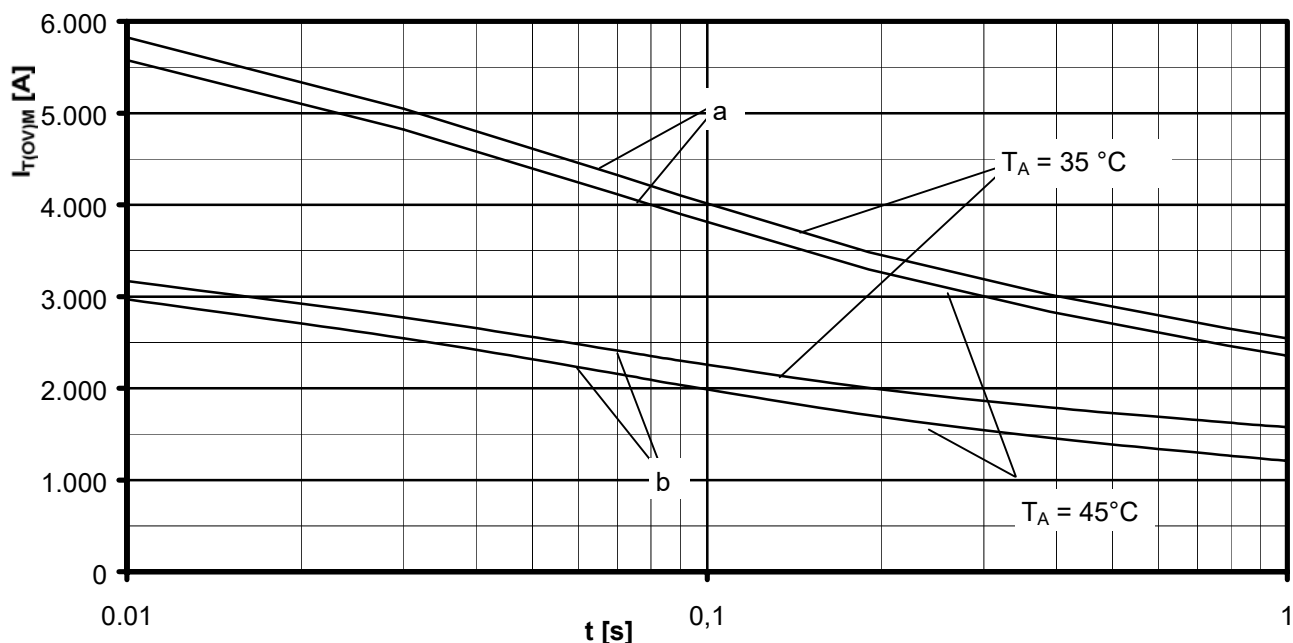
b - Typical characteristic

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Thyristor-Thyristor Modules



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: On-state current i_{TM}



Maximum overload on-state current $I_{T(OV)M} = f(t)$, $V_{RM} = 0,8 V_{RRM}$

a: No-load conditions

b: after load with I_{TAVM}

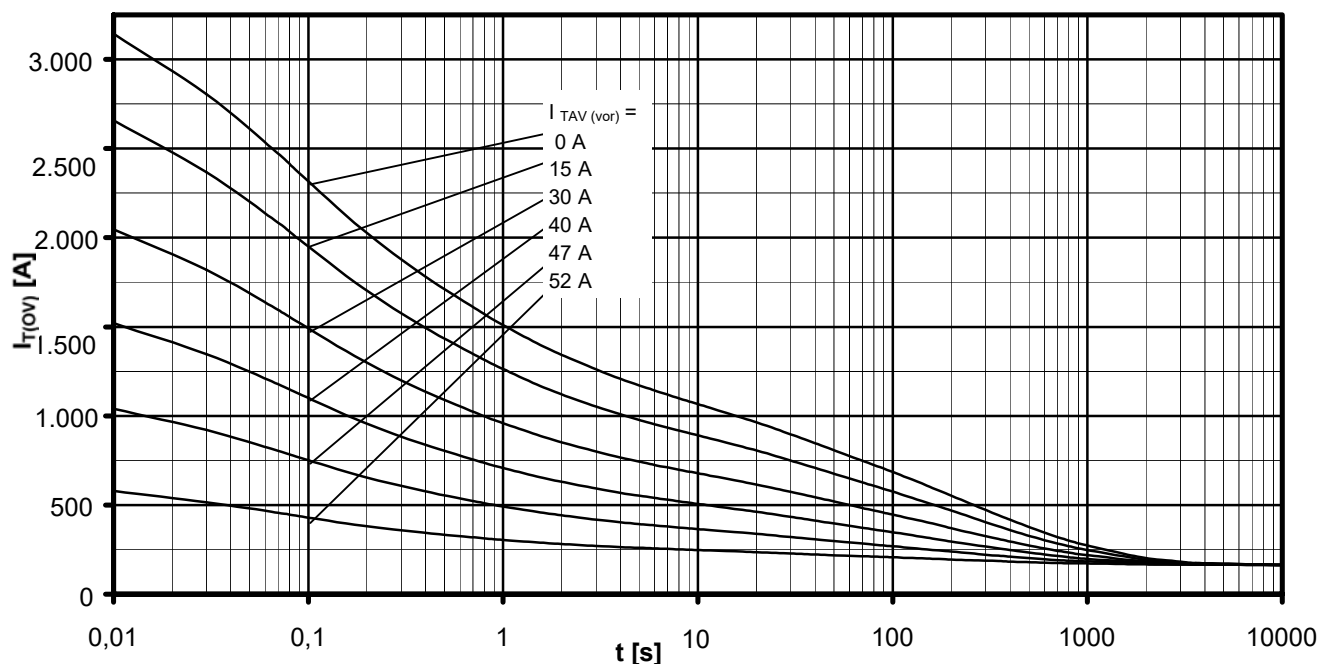
$T_A = 35^\circ C$, Forced air cooling

$T_A = 45^\circ C$, Natural air cooling

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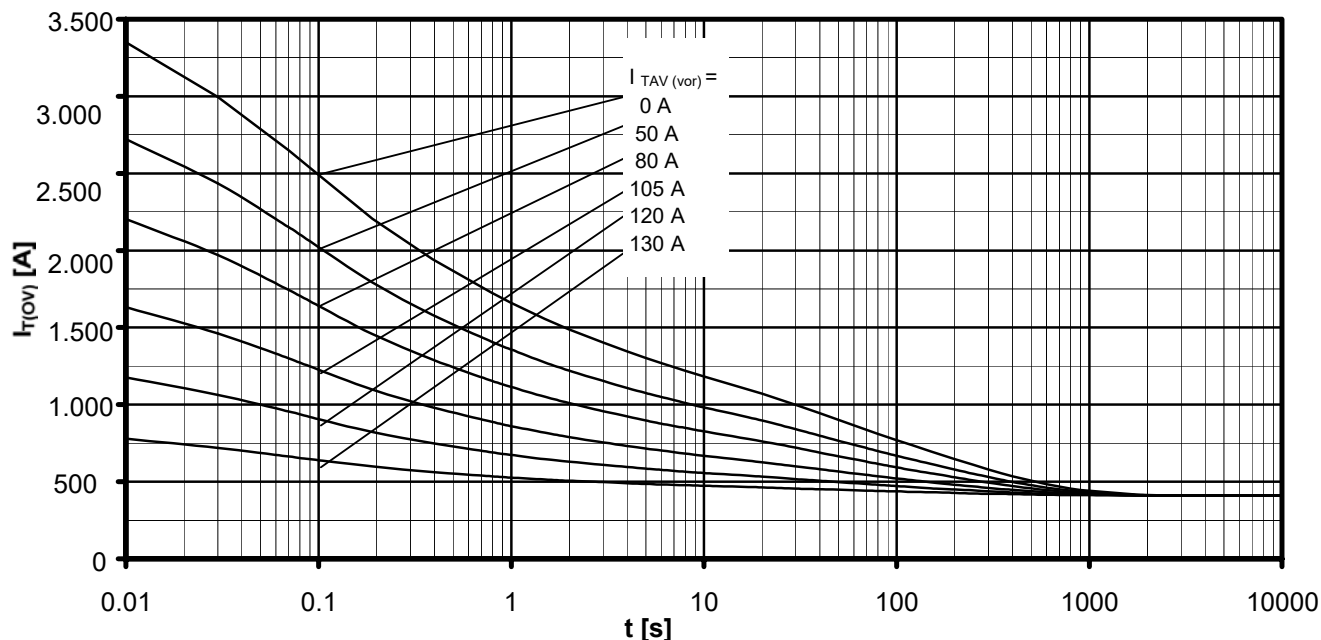


Overload on-state current $I_{T(ov)}$

Six-pulse bridge circuit, 120° rectangular

Heatsink type KM17 (45W) Natural cooling at $T_A = 45^\circ\text{C}$

Parameter: Pre-load current per arm $I_{TAV(vor)}$



Overload on-state current $I_{T(ov)}$

Six-pulse bridge circuit, 120° rectangular

Heatsink type KM17(45W) Forced cooling at $T_A = 35^\circ\text{C}$

C Parameter: Pre-load current per arm $I_{TAV(vor)}$

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