5SDF 12F3005

Old part no. DM 818-1200-30

Fast Recovery Diode

Properties

- Optimized recovery characteristics
- Industry standard housing

Applications

- suited for GTO applications
- Snubber diode
- Freewheeling diode

Key Parameters

V_{RRM}	=	3 000	V
I_{FAVm}	=	1 256	A
I_{FSM}	=	19 000	A
V_{TO}	=	1.195	V
r_T	=	0.245	mΩ

Types

	V_{RRM}
5SDF 12F3005 **5SDF 12F2505**	**3 000 V** **2 500 V**
Conditions:	*T_j = -40 ÷ 125 °C, half sine waveform, f = 50 Hz*

Mechanical Data

F_m	**Mounting force**	**22 ± 2 kN**
m	**Weight**	**0.49 kg**
D_S	**Surface creepage distance**	**33 mm**
D_a	**Air strike distance**	**20 mm**

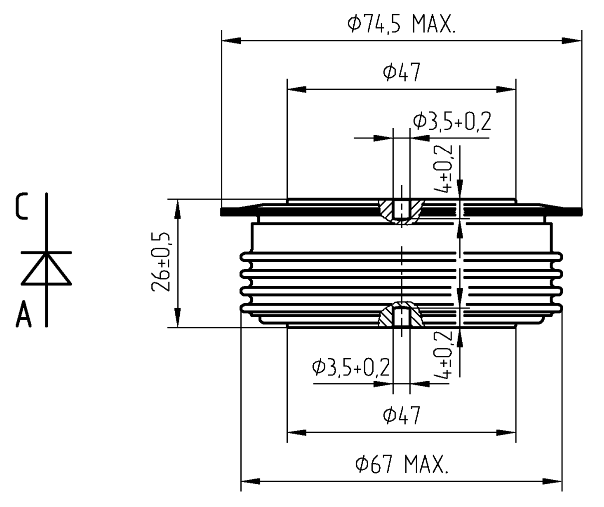

Fig. 1 Case

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Maximum Ratings			*Maximum Limits*	*Unit*
V_{RRM}	**Repetitive peak reverse voltage** *T_j = -40 ÷ 125 °C*	**5SDF 12F3005** **5SDF 12F2505**	**3 000** **2 500**	**V**
I_{FAVm}	**Average forward current** *T_c = 85 °C*		**1 256**	**A**
I_{FRMS}	**RMS forward current** *T_c = 85 °C*		**1 973**	**A**
I_{RRM}	**Repetitive reverse current** *$V_R = V_{RRM}$*		**50**	**mA**
I_{FSM}	**Non repetitive peak surge current** *V_R = 0 V, half sine pulse*	*t_p = 8.3 ms*	**20 300**	**A**
		t_p = 10 ms	**19 000**	**A**
I^2t	**Limiting load integral** *V_R = 0 V, half sine pulse*	*t_p = 8.3 ms*	**1 710 000**	**A^2s**
		t_p = 10 ms	**1 805 000**	**A^2s**
T_{jmin} - T_{jmax}	**Operating temperature range**		**-40 ÷ 125**	**°C**
T_{STG}	**Storage temperature range**		**-40 ÷ 125**	**°C**

Unless otherwise specified T_j = 125 °C

Characteristics		***Value***			***Unit***
		min	***typ***	***max***	
V_{T0}	**Threshold voltage**			**1.195**	**V**
r_T	**Forward slope resistance** I_{F1} = 1 885 A, I_{F2} = 5 655 A			**0.245**	**mΩ**
V_{FM}	**Maximum forward voltage** I_{FM} = 2 000 A			**1.690**	**V**
Q_{rr}	**Recovered charge** V_R = 100 V, I_{FM} = 1000 A, di/dt = -80 A/µs		**500**	**700**	**µC**
I_{rrM}	**Reverse recovery maximum current** *the same conditions as at* Q_{rr}		**160**	**230**	**A**
t_{rr}	**Reverse recovery time** *the same conditions as at* Q_{rr}			**5.0**	**µs**
S	**Soft factor,** $S = t_s / t_f$ I_{FM} = 1 000 A, di_F/dt = -200 A/µs, V_R = 400 V		**2.0**		**-**
I_{rrM}	**Reverse recovery maximum current** *the same conditions as at S*			**400**	**A**
V_{rrM}	**Reverse recovery maximum voltage** *the same conditions as at S*			**1 100**	**V**

Unless otherwise specified T_j = 125 °C

Thermal Parameters			*Value*	*Unit*
R_{thjc}	**Thermal resistance junction to case**	*double side cooling*	**15**	**K/kW**
		anode side cooling	**24**	
		cathode side cooling	**40**	
R_{thch}	**Thermal resistance case to heatsink**	*double side cooling*	**4**	**K/kW**
		single side cooling	**8**	

Transient Thermal Impedance

Analytical function for transient thermal impedance

$$Z_{thjc} = \sum_{i=1}^{5} R_i (1 - \exp(-t / \tau_i))$$

Conditions:
F_m = 22 ± 2 kN, Double side cooled

Correction for periodic waveforms

180°	**sine:**	**1.3**	**K/kW**
180°	**rectangular:**	**1.7**	**K/kW**
120°	**rectangular:**	**2.9**	**K/kW**
60°	**rectangular:**	**4.8**	**K/kW**

i	1	2	3	4	5
τ_i (s)	0.6937	0.2040	0.0452	0.0040	0.0005
R_i(K/kW)	6.04	3.83	3.76	1.31	0.07

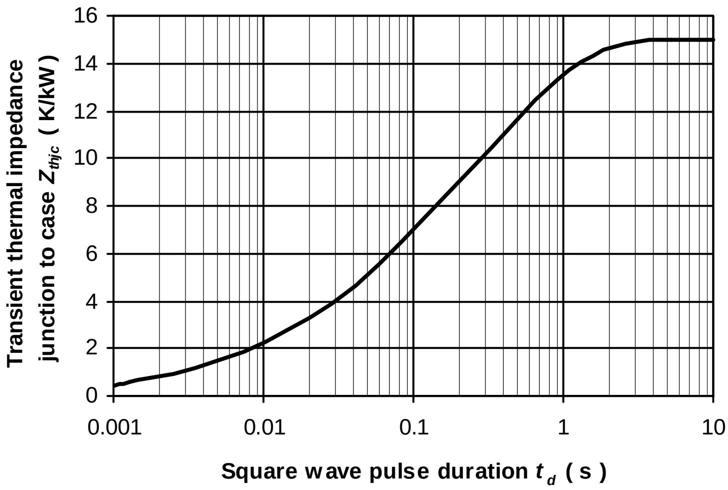

Fig. 2 Dependence transient thermal impedance junction to case on square pulse

Forward Characteristics

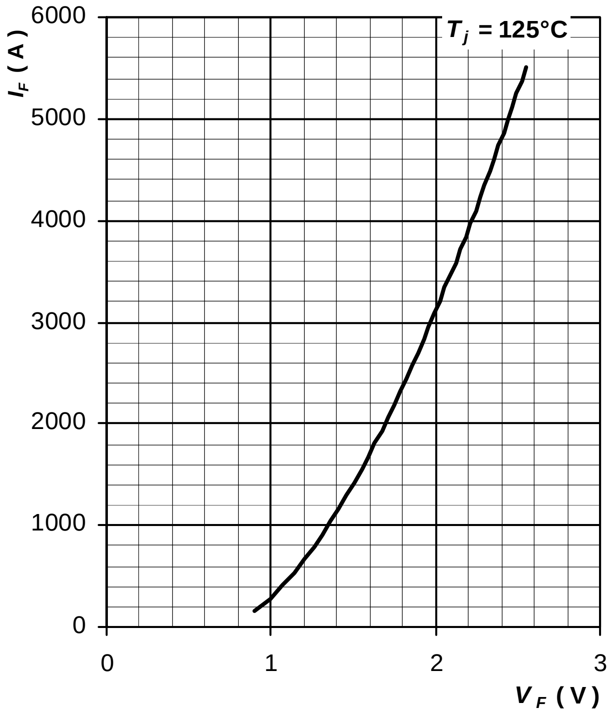

Fig. 3 Maximum forward voltage drop characteristics

Surge Characteristics

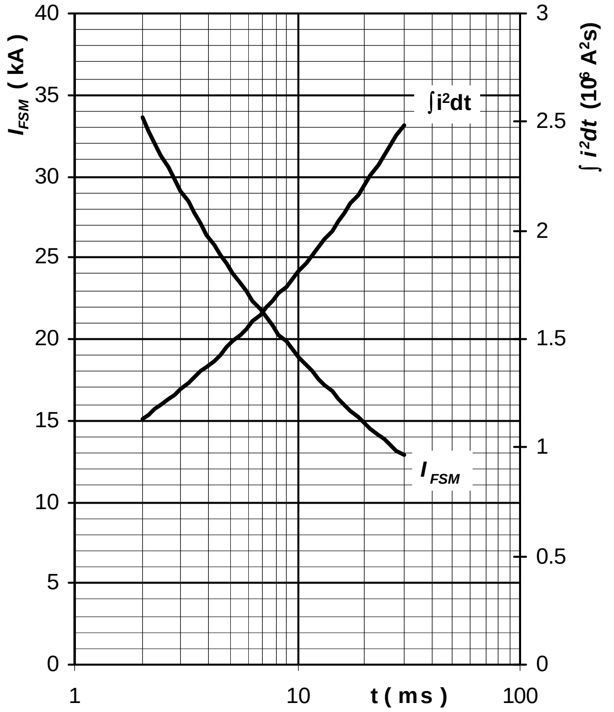

Fig. 4 Surge forward current vs. pulse length, half sine wave, single pulse, V_R = 0 V, $T_j = T_{jmax}$

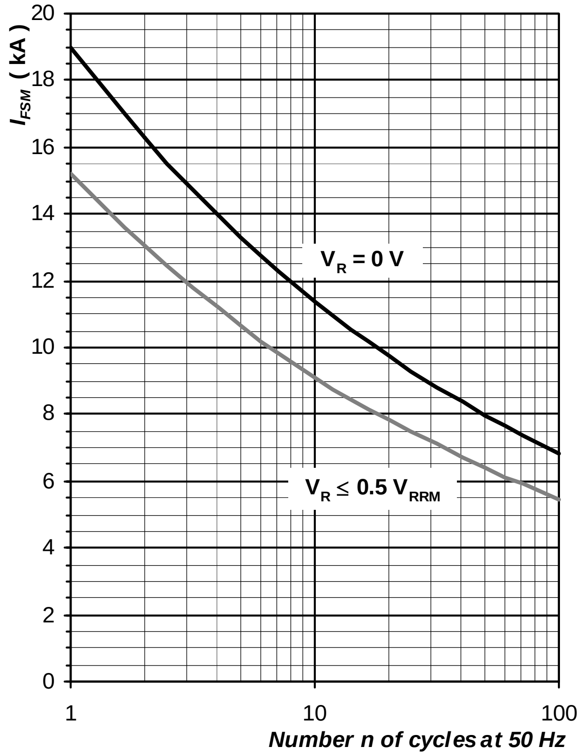

Fig. 5 Surge forward current vs. number of pulses, half sine wave, $T_j = T_{jmax}$

Power Loss and Maximum Case Temperature Characteristics

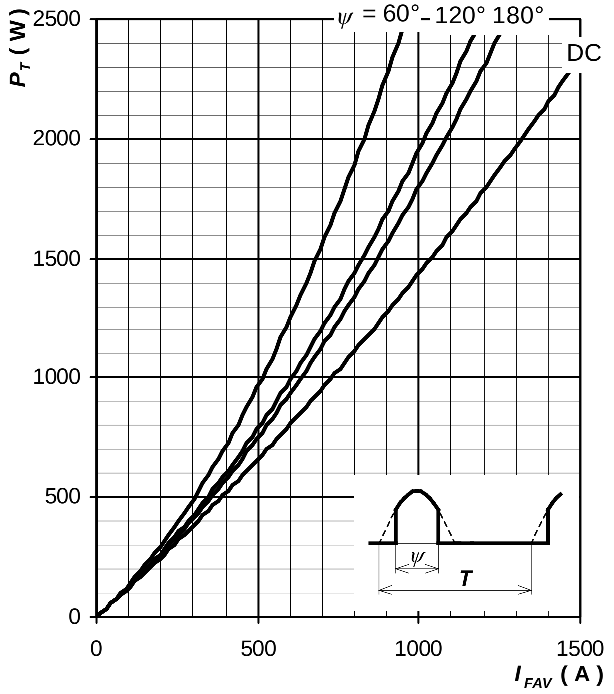

Fig. 6 Forward power loss vs. average forward current, sine waveform, f = 50 Hz, T = 1/f

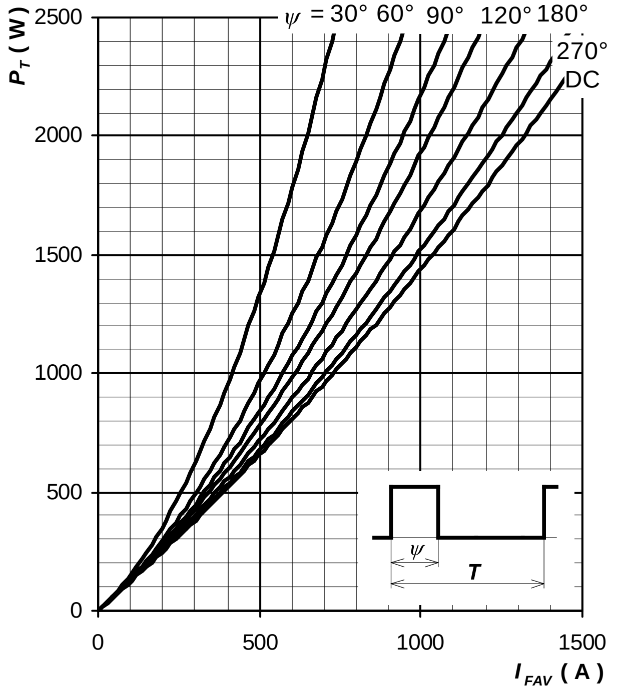

Fig. 7 Forward power loss vs. average forward current, square waveform, f = 50 Hz, T = 1/f

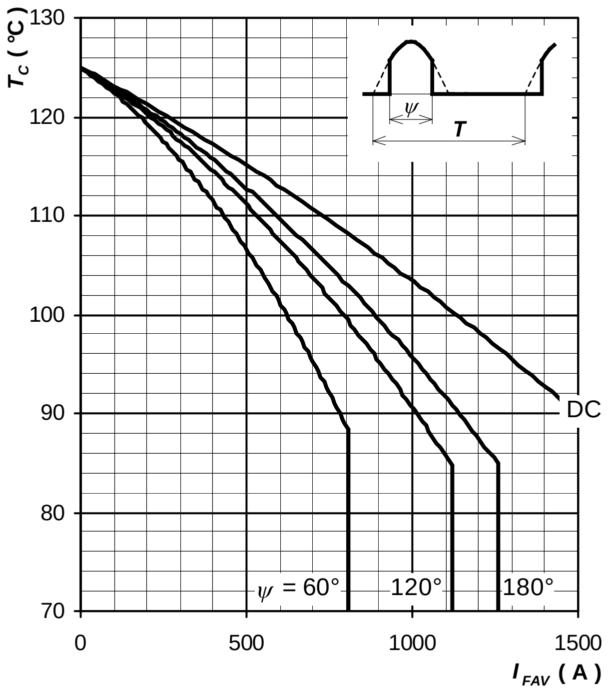

Fig. 8 Max. case temperature vs. aver. forward current, sine waveform, f = 50 Hz, T = 1/f

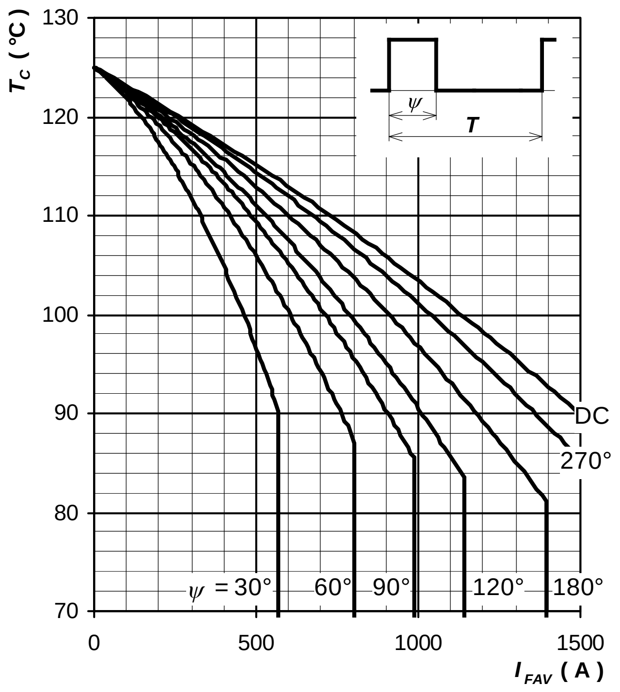

Fig. 9 Max. case temperature vs. aver. forward current, square waveform, f = 50 Hz, T = 1/f

Note 2: Figures number 6 ÷ 9 have been calculated without considering any forward and reverse recovery losses. They are valid for f = 50 or 60 Hz operation.

Forward Recovery Characteristics

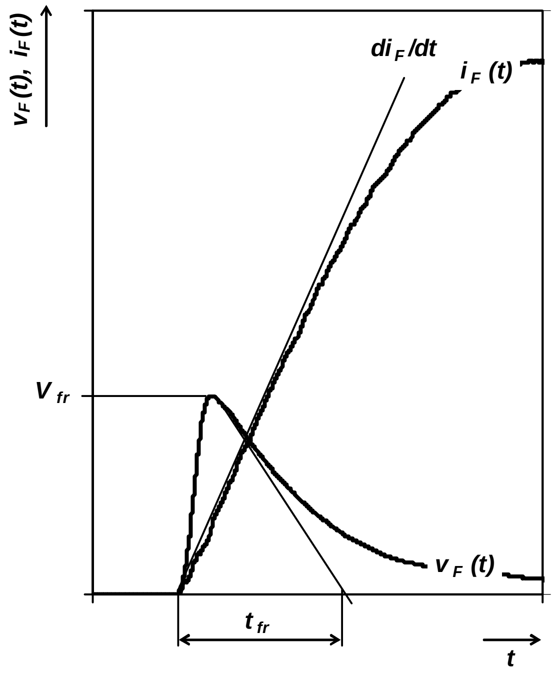

Fig. 10 Typical forward recovery voltage waveform when the diode is turned on with high di_F/dt

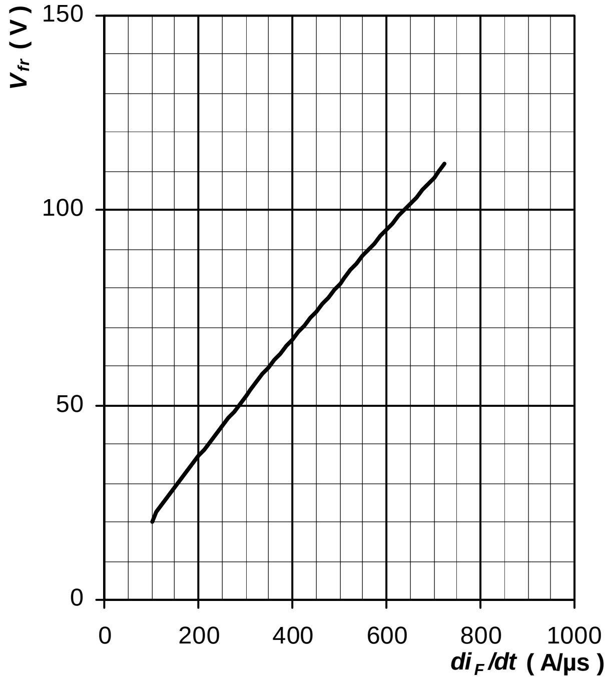

Fig. 11 Max. forward recovery voltage vs. rate of rise of forward current, trapezoid pulse, $T_j = T_{jmax}$, $t_{fr} \leq 10$ µs

Reverse Recovery Characteristics

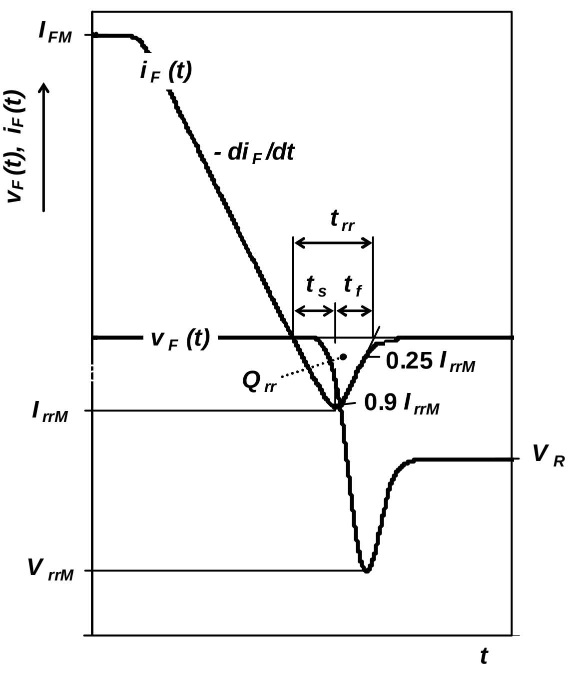

Fig. 12 Typical waveforms and definition of symbols at reverse recovery of a diode, inductive switching without RC snubber

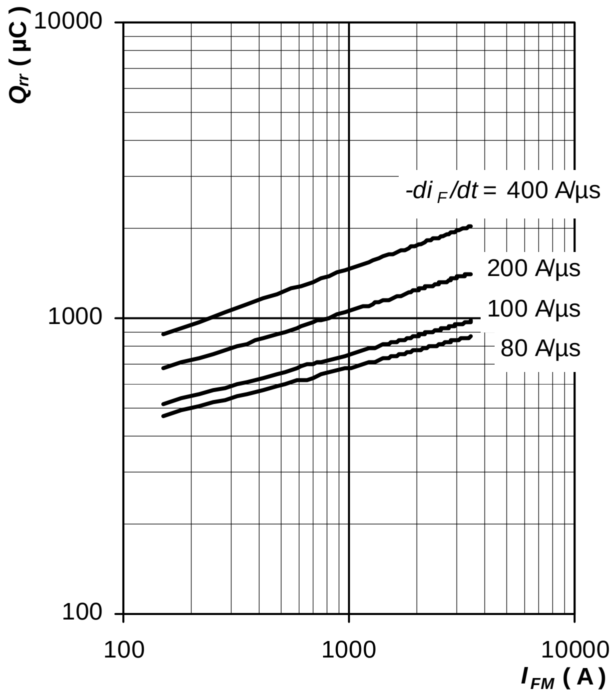

Fig. 13 Max. recovered charge vs. forward current, trapezoid pulse, $T_j = T_{jmax}$

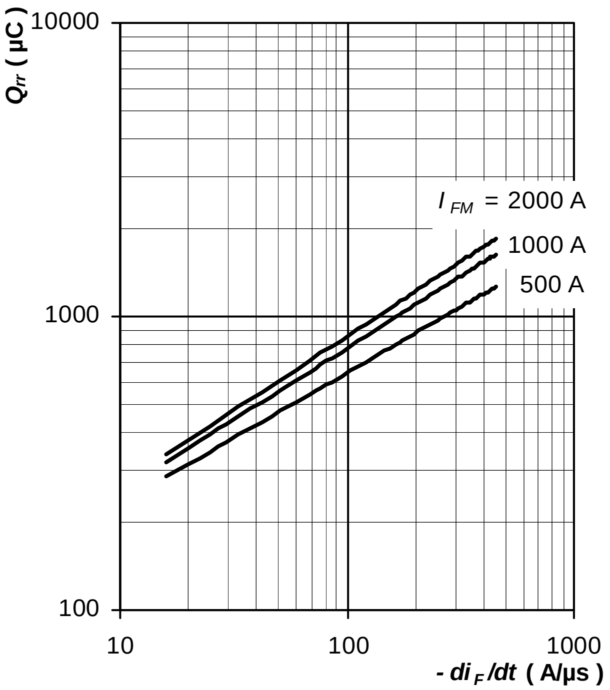

Fig. 14 Max. recovered charge vs. rate of fall of forward current, trapezoid pulse, $T_j = T_{jmax}$

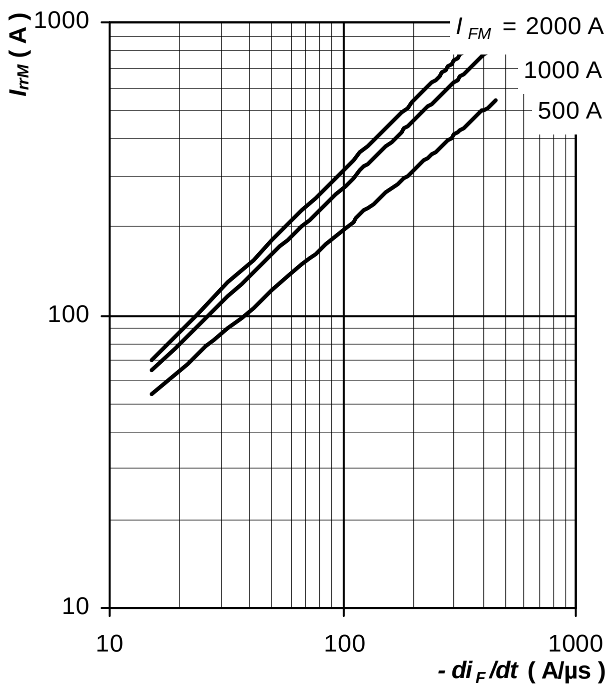

Fig. 15 Max. reverse recovery current vs. rate of fall of forward current, trapezoid pulse, $T_j = T_{jmax}$

Notes: