

Optimum power handling
 Low on-state and switching losses
 Designed for traction and industrial
 applications

Rectifier Stud Diode Type D271-500-12

Mean on-state current	I_{FAV}	500 A
Repetitive peak reverse voltage	V_{RRM}	1000 ÷ 1200V
V_{RRM}	1000	1200
Voltage code		
T_{jv} , °C	- 60 ÷ 190	

MAXIMUM ALLOWABLE RATINGS

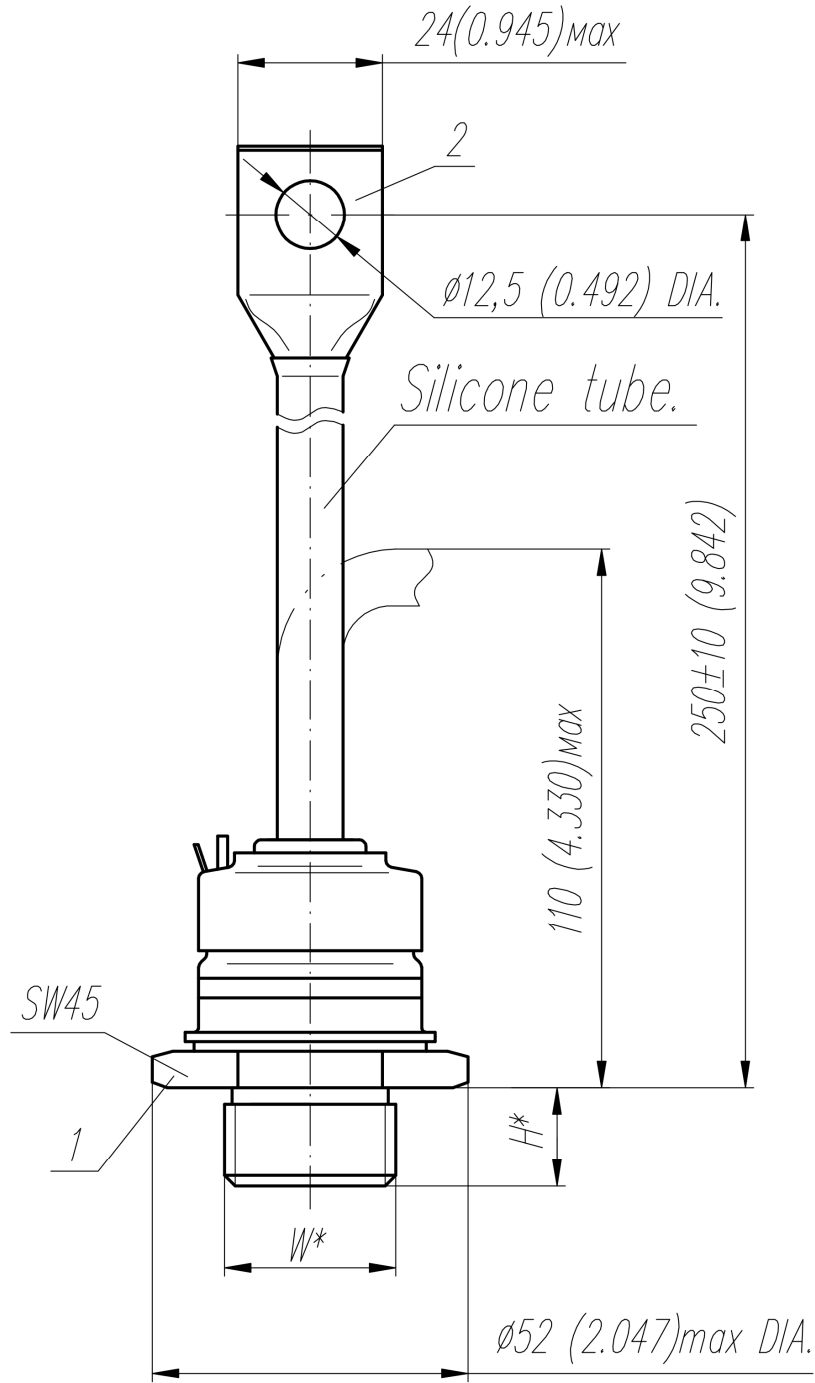
Symbols and parameters		Units	Values	Test conditions
ON-STATE				
I_{FAV}	Average forward current	A	500 685	$T_c=133\text{ °C}$; $T_c=100\text{ °C}$; 180° half-sine wave; 50 Hz
I_{FRMS}	RMS forward current	A	785	$T_c=133\text{ °C}$; 180° half-sine wave; 50 Hz
I_{FSM}	Surge forward current	kA	15.0 17.0	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; 50 Hz ($t_p=10\text{ ms}$); single pulse; $V_R=0\text{ V}$;
			16.0 18.0	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; 60 Hz ($t_p=8.3\text{ ms}$); single pulse; $V_R=0\text{ V}$;
I^2t	Safety factor	$A^2s\cdot 10^3$	1125 1445	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; 50 Hz ($t_p=10\text{ ms}$); single pulse; $V_R=0\text{ V}$;
			1060 1340	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; 60 Hz ($t_p=8.3\text{ ms}$); single pulse; $V_R=0\text{ V}$;
BLOCKING				
V_{RRM}	Repetitive peak reverse voltages	V	1000÷1200	$T_{j\min} < T_j < T_{j\max}$; 180° half-sine wave; 50 Hz;
V_{RSM}	Non-repetitive peak reverse voltages	V	1100÷1300	$T_{j\min} < T_j < T_{j\max}$; 180° half-sine wave; 50 Hz;single pulse;
V_R	Reverse continuous voltages	V	$0.75\cdot V_{RRM}$	$T_j=T_{j\max}$;
THERMAL				
T_{stg}	Storage temperature	°C	- 60 ÷ 190	
T_j	Operating junction temperature	°C	- 60 ÷ 190	
MECHANICAL				
M	Tightening torque	Nm	25 ÷ 35	
a	Acceleration	m/s^2	100	

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions
ON-STATE				
V_{FM}	Peak forward voltage, max	V	1.40	$T_j=25\text{ }^\circ\text{C}; I_{FM}=1570\text{ A}$
$V_{F(TO)}$	Forward threshold voltage, max	V	0.80	$T_j=T_{j\text{ max}}$ $0.5\pi I_{FAV} < I_T < 1.5\pi I_{FAV}$
r_T	Forward slope resistance, max	m Ω	0.500	
BLOCKING				
I_{RRM}	Repetitive peak reverse current, max	mA	70	$T_j=T_{j\text{ max}}$ $V_R=V_{RRM}$
Q_{rr}	Total recovered charge(50% chord), max	μC	1000	$T_j=T_{j\text{ max}}; I_{FM}=500\text{ A};$ $di_R/dt=-10\text{ A}/\mu\text{s};$ $V_R=100\text{ V}$
t_{rr}	Reverse recovery time, max	μs	17	
I_{rrM}			12	
THERMAL				
R_{thjc}	Thermal resistance, junction to case, max	$^\circ\text{C}/\text{W}$	0.0800	Direct current
MECHANICAL				
w	Weight, typ	g	470	
D_s	Surface creepage distance	mm (inch)	12.4 (4.882)	
D_a	Air strike distance	mm (inch)	12.4 (4.882)	

	27	5		1	
1	2	3	4	5	6

1. D — Rectifier Diode
2. Design version
3. Average forward current, A
4. Polarity: X – Cathode to Stud; Anode to Stud – no symbol
5. Voltage code
6. Ambient conditions: N – normal; T – tropical



Type of screw	W	H
Metric Screw	M24x1,5 – 8g	19

Polarity		Example of code designation	Reference designation	Colors	
				Anode	Cathode
Normal	Anode to stud	D271-500-12		-	Red tube
Reverse	Cathode to stud	D271-500X-12		Black tube	-

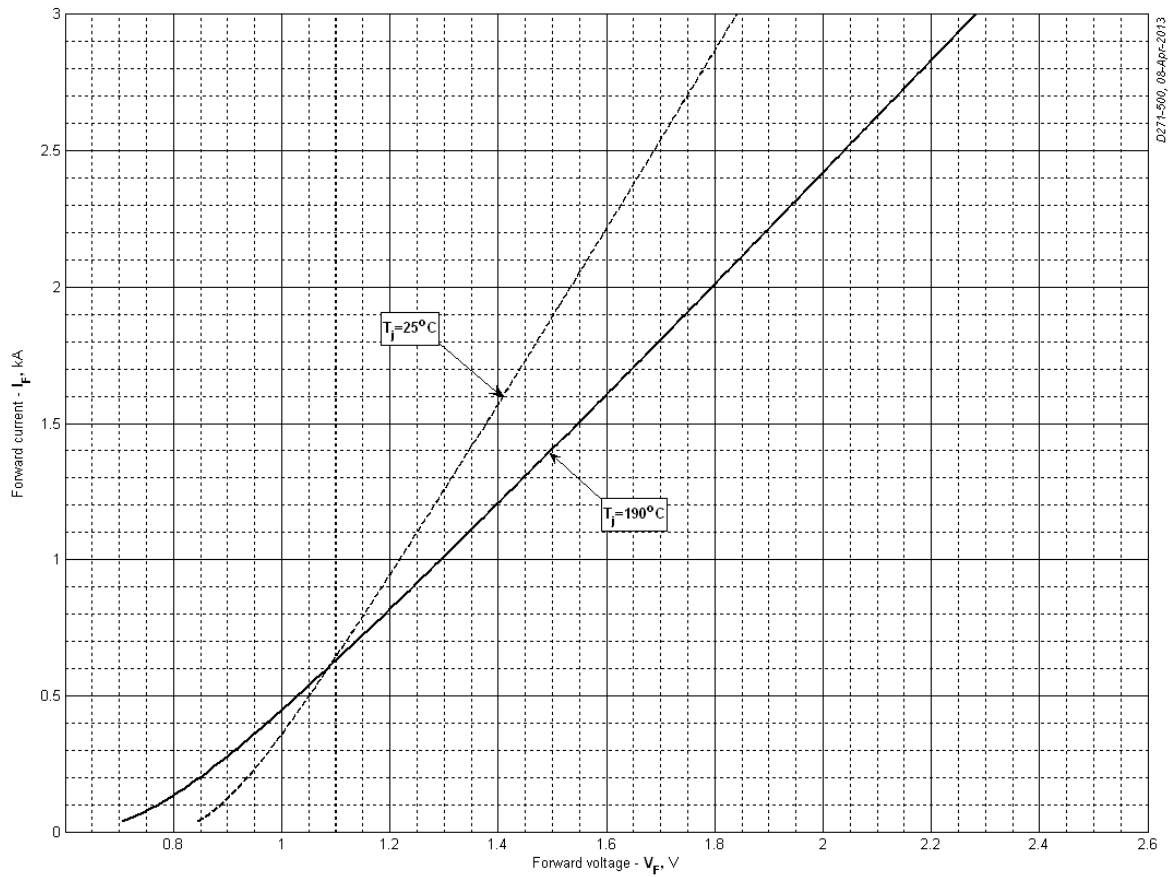


Fig 1 –

Analytical function for Forward characteristic:

$$V_F = A + B \cdot i_F + C \cdot \ln(i_F + 1) + D \cdot \sqrt{i_F}$$

	Coefficients for max curves	
	$T_j = 25^\circ\text{C}$	$T_j = T_{j,\text{max}}$
A	0.788475	0.616853
B	0.267221	0.425287
C	-0.167458	-0.260178
D	0.279123	0.433671

Forward characteristic model (see Fig. 1

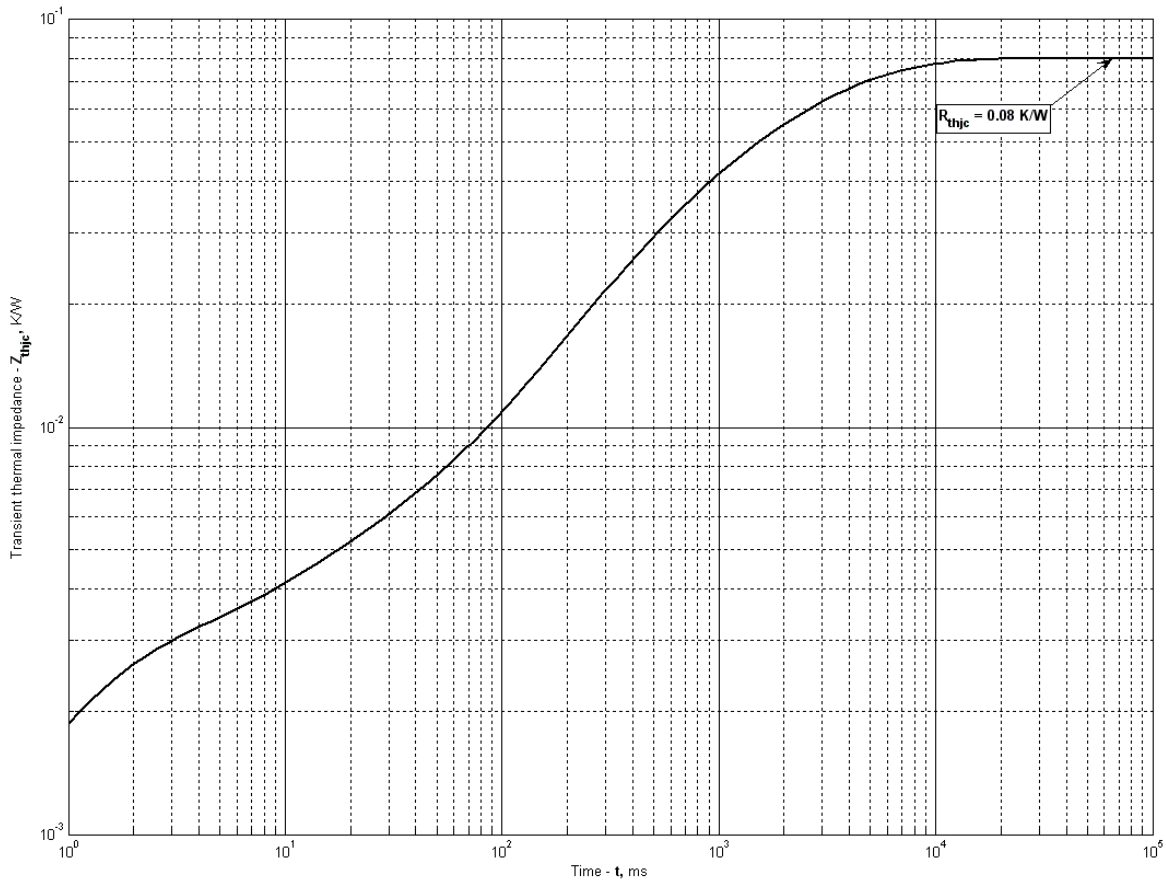


Fig 2 –

Analytical function for Transient thermal impedance junction to case Z_{thjc} for DC:

$$Z_{thjc} = \sum_{i=1}^n R_i \left(1 - e^{-\frac{t}{\tau_i}} \right)$$

Where $i = 1$ to n , n is the number of terms in the series.

t = Duration of heating pulse in seconds.

Z_{thjc} = Thermal resistance at time t .

R_i = Amplitude of p_{th} term.

τ_i = Time constant of r_{th} term.

DC

R_i , K/W	0.01836	0.02733	0.01495	0.001445	0.002488	0.01543
τ_i	4.627	2.249	0.3406	0.01043	0.0009112	0.9081

Transient thermal impedance junction to case Z_{thjc} model (see Fig. 2)

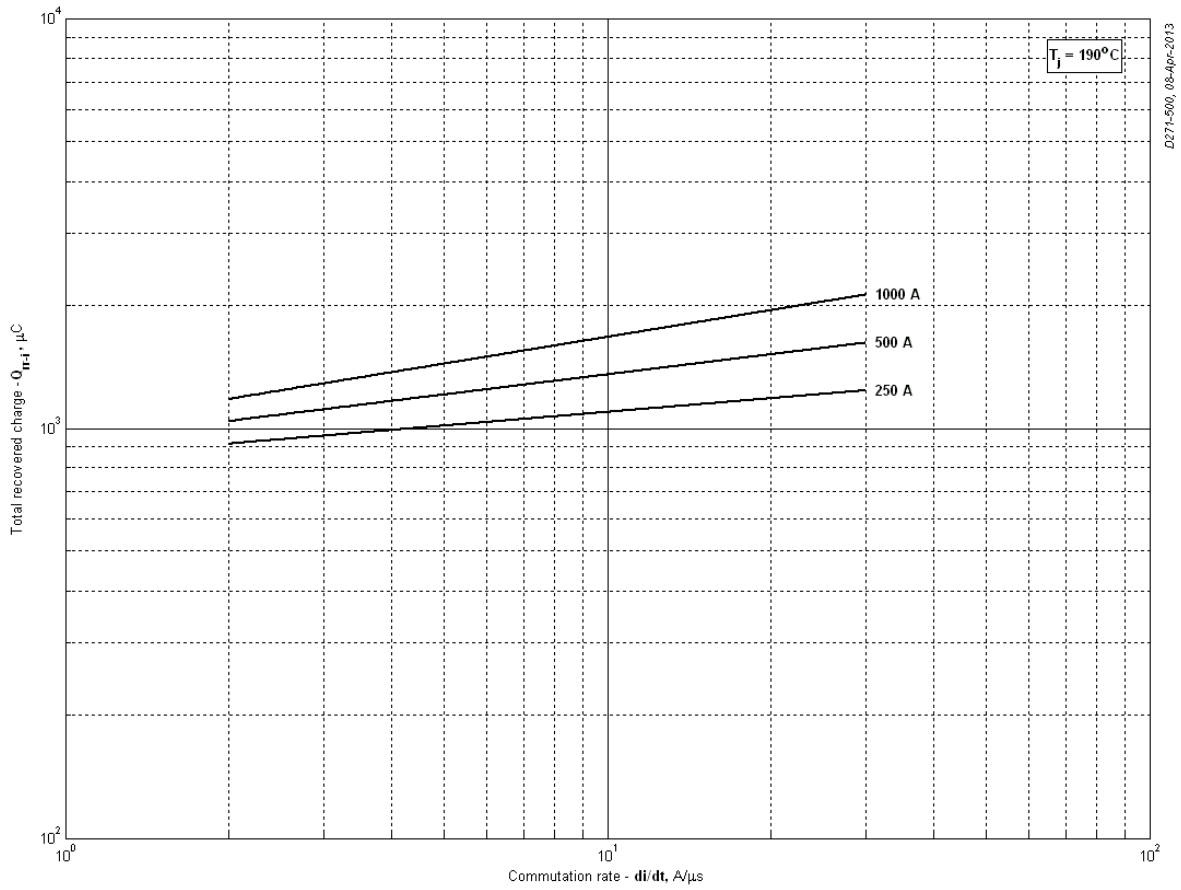


Fig 3 Total recovered charge(integral), Q_{rr-i}

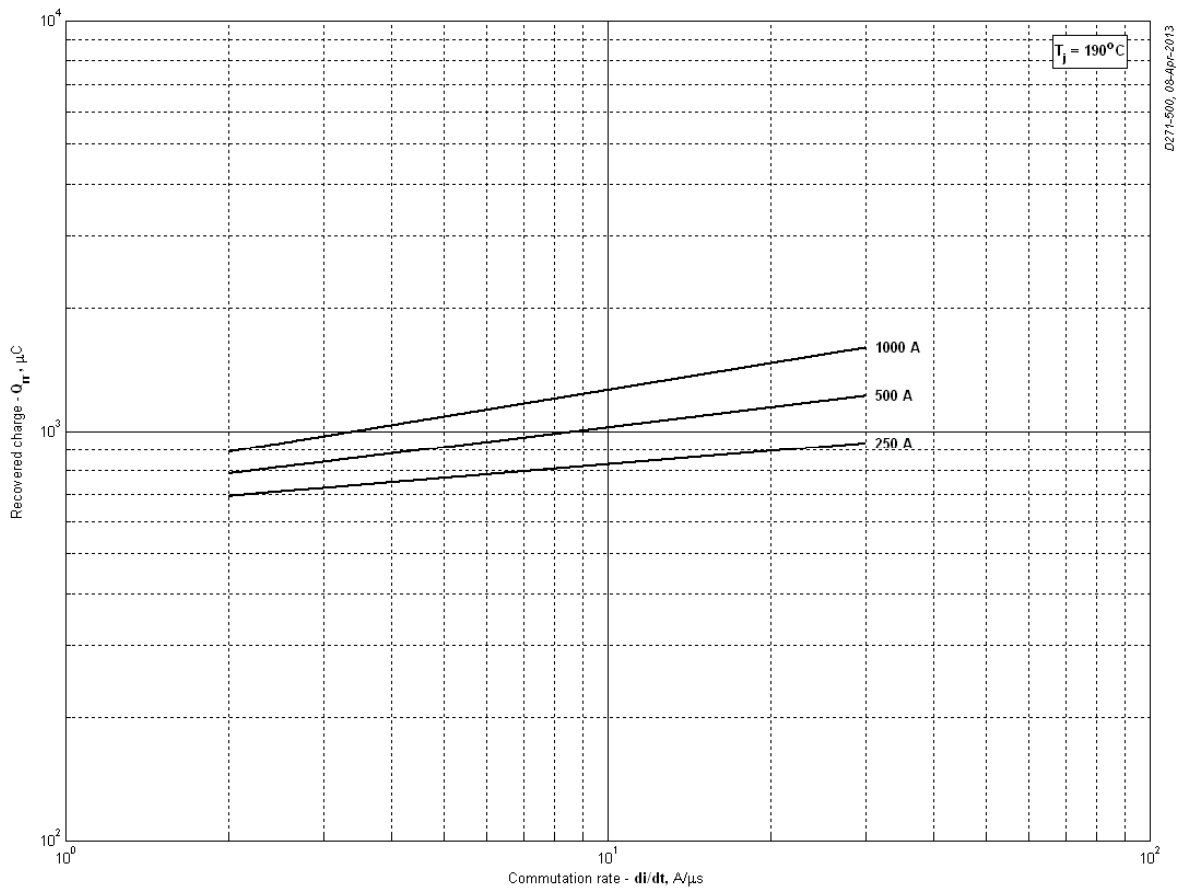


Fig 4 Total recovered charge(50% chord), Q_{rr}

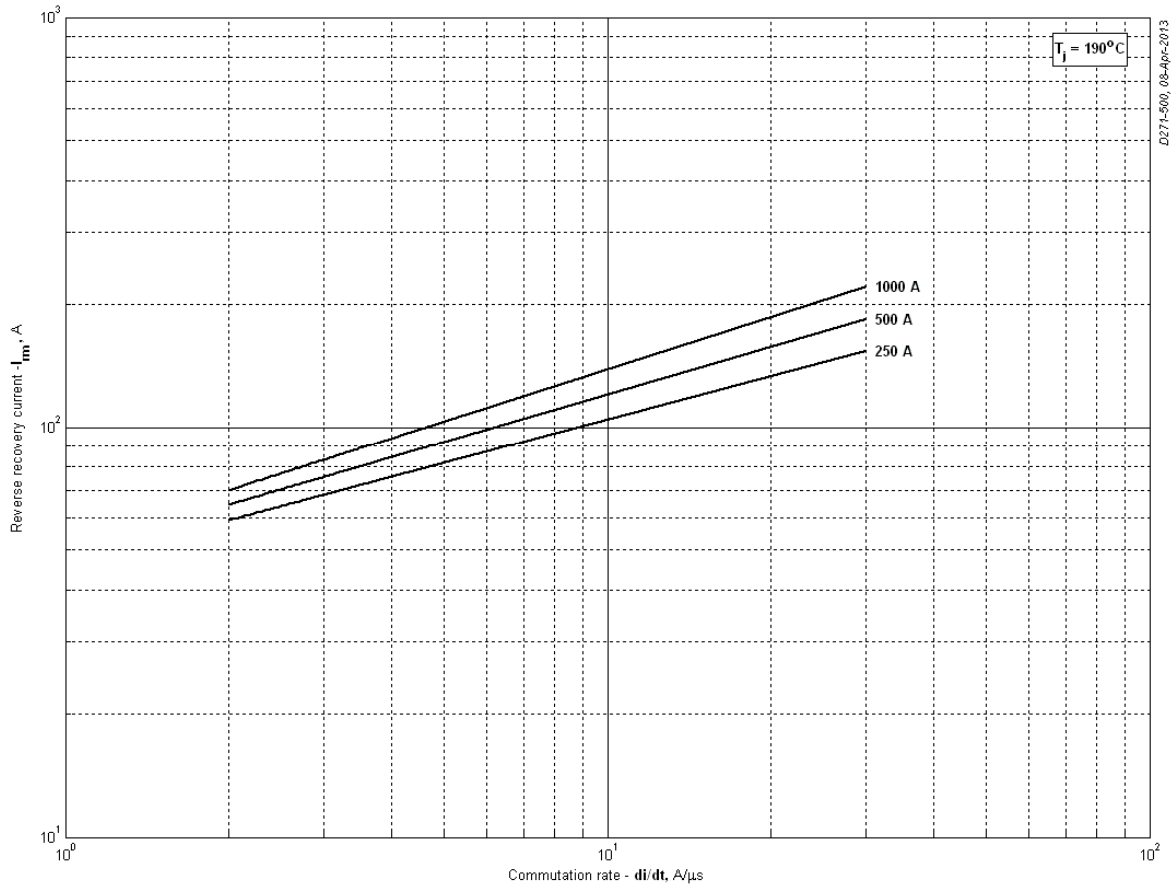


Fig 5 Peak reverse recovery current, I_{rm}

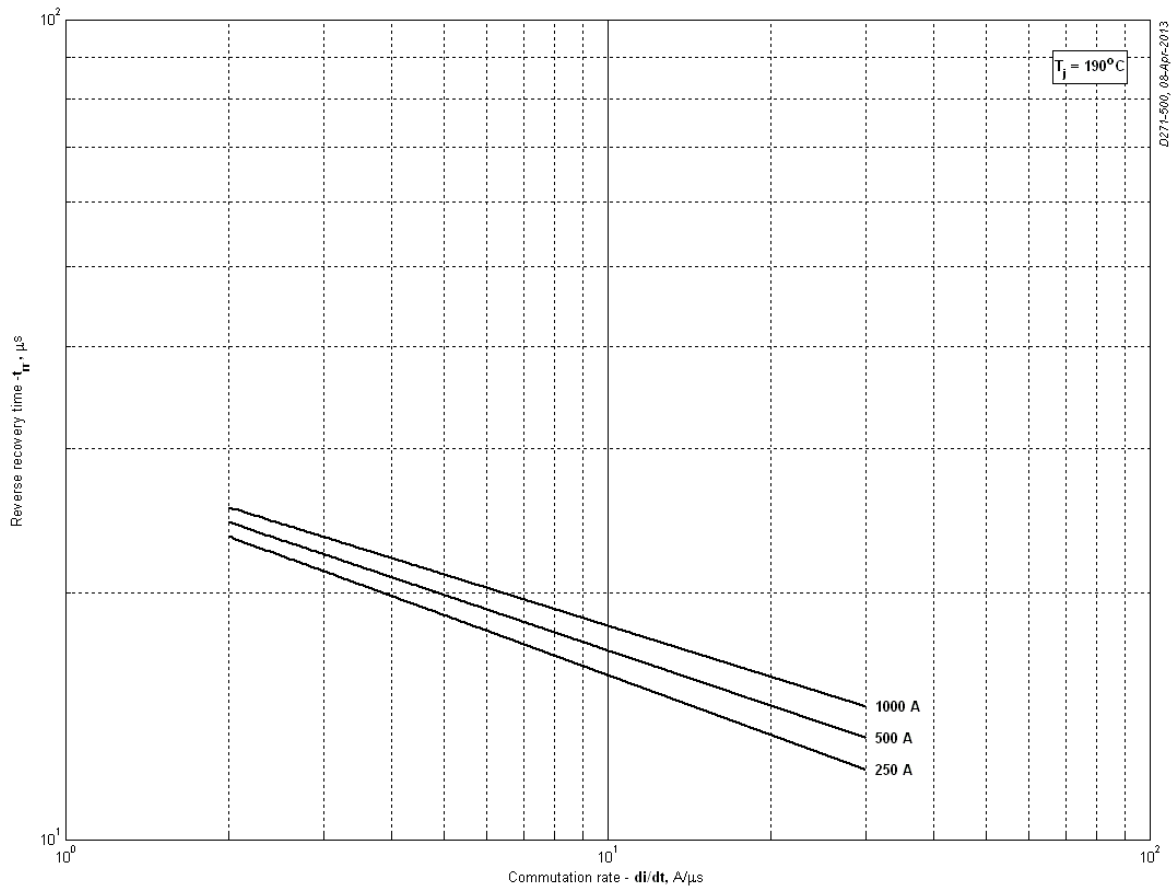
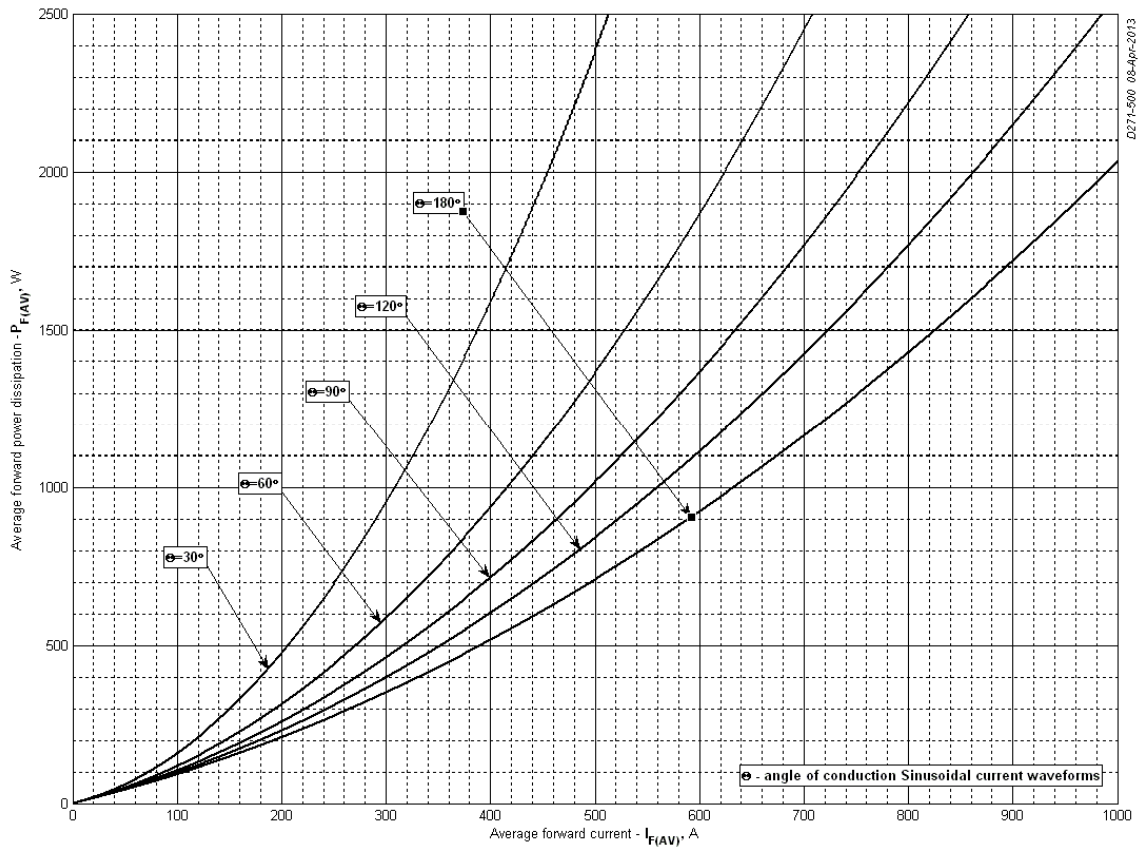
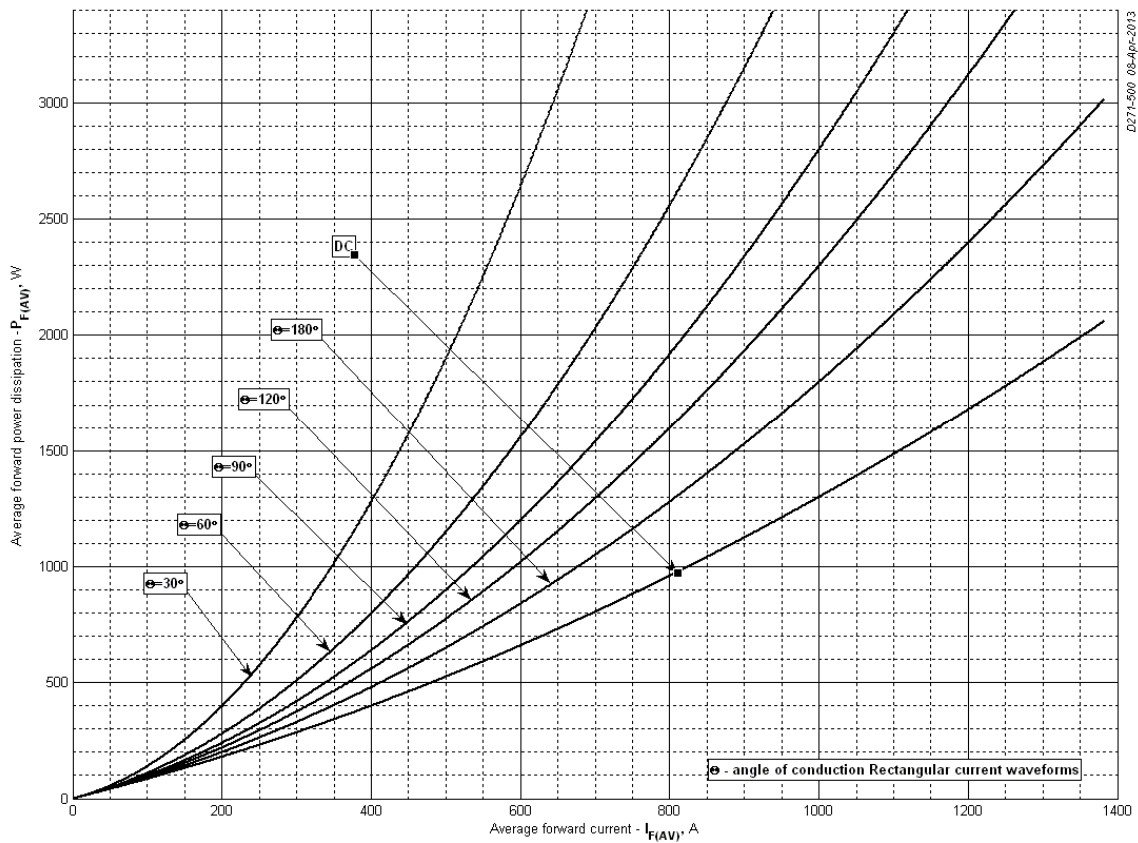


Fig 6 Recovery time, t_{rr}



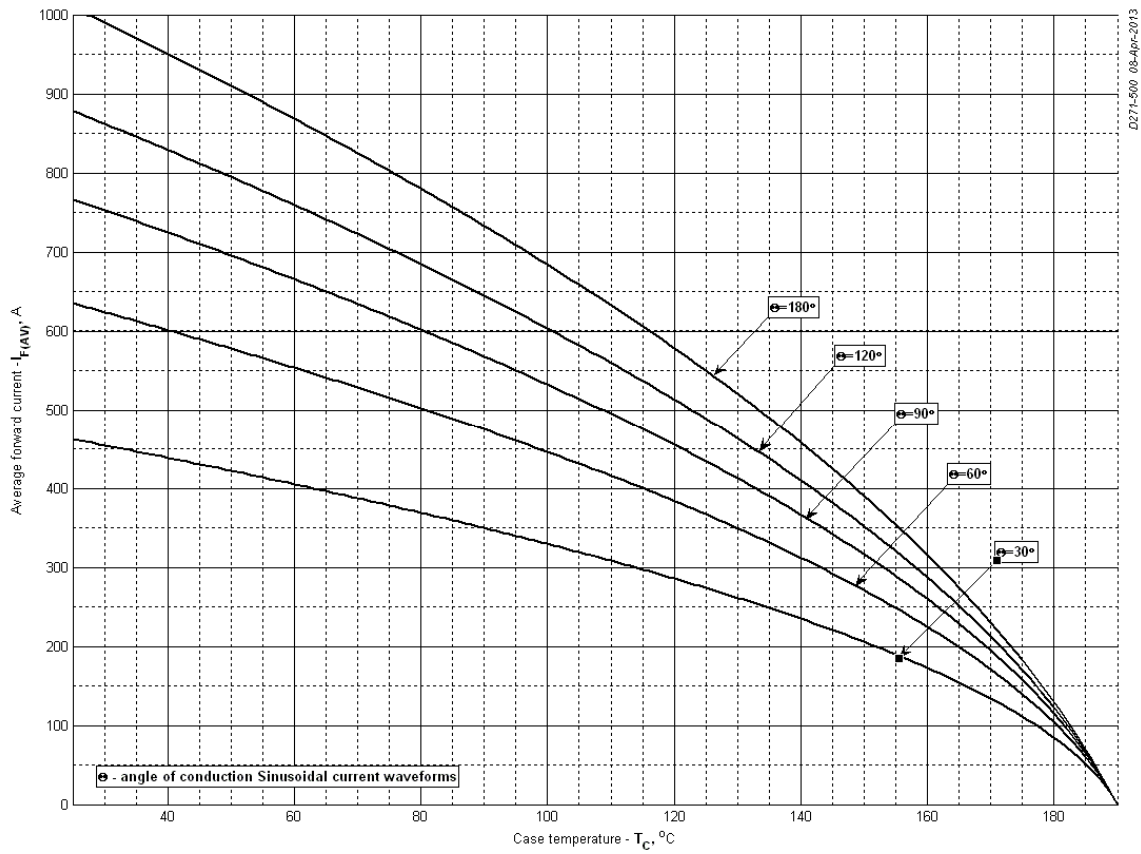
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Fig 7 Mean forward power dissipation P_{FAV} vs. Mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)



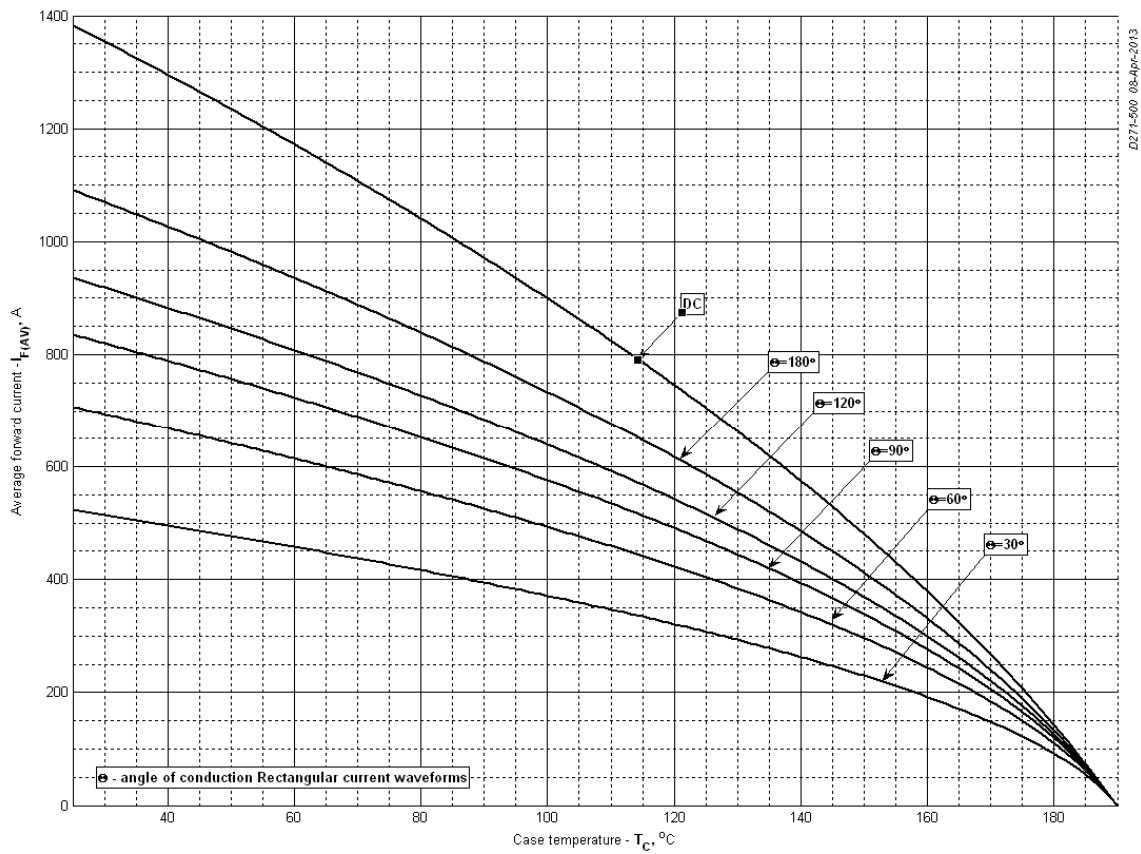
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Fig 8 – Mean forward power dissipation P_{FAV} vs. Mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)



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Fig 9 – Mean forward current I_{FAV} vs. Case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)



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Fig 10 Mean forward current I_{FAV} vs. Case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

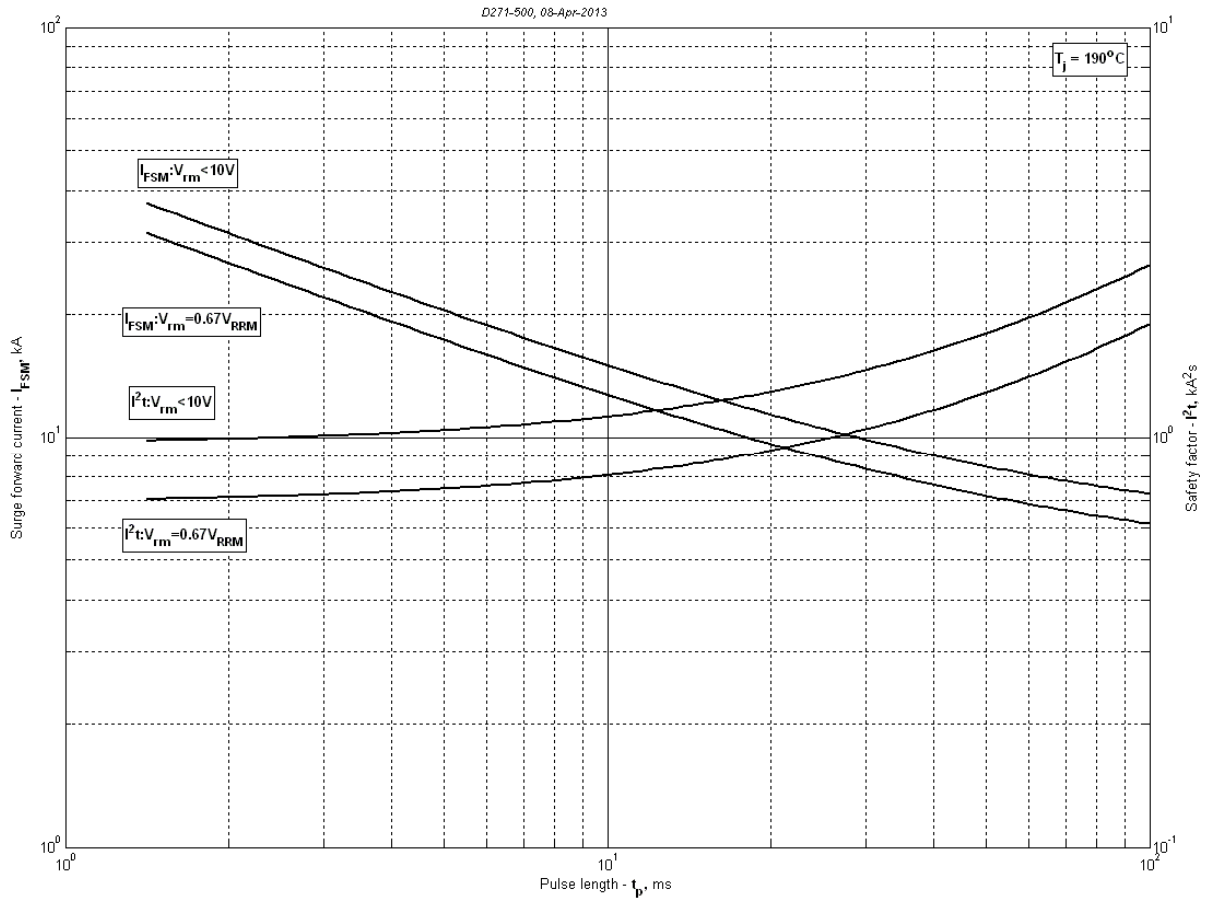


Fig 11 – Maximum surge and I^2t ratings

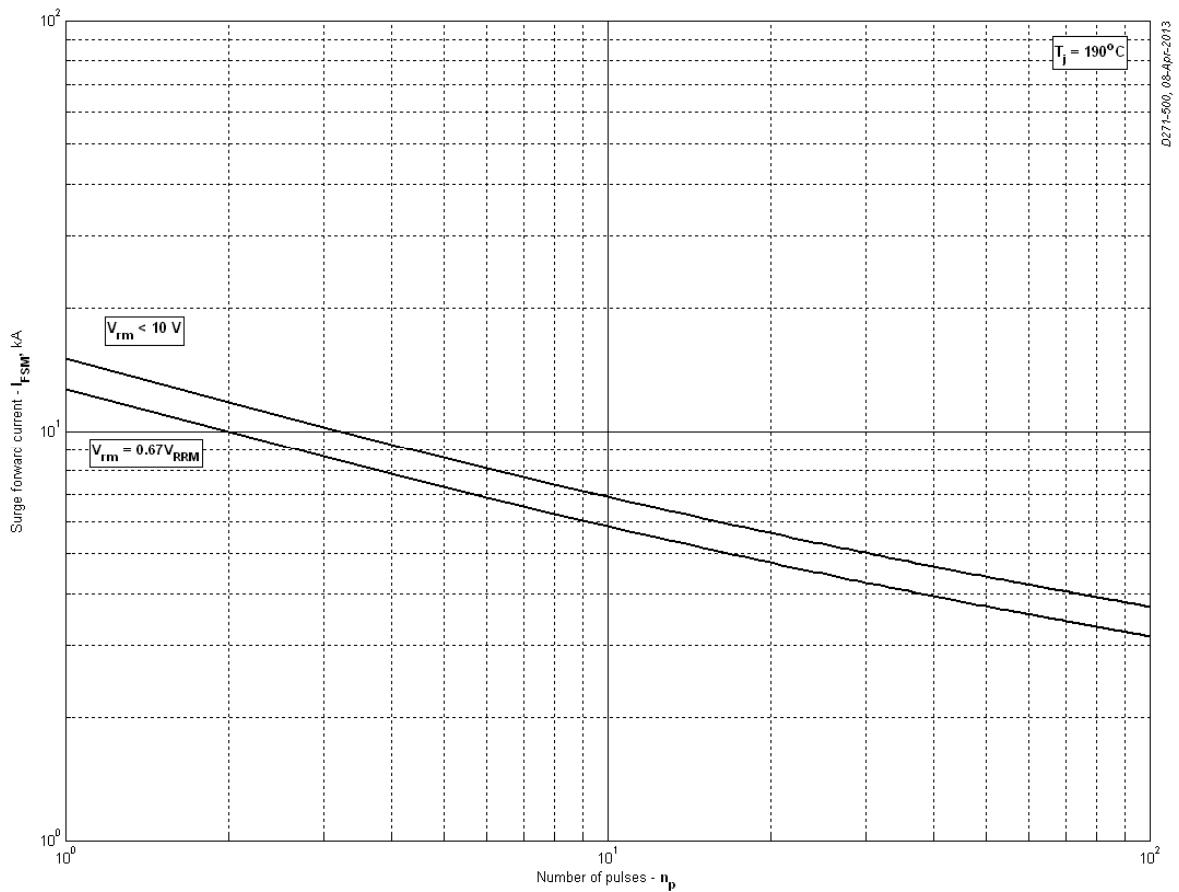


Fig 12