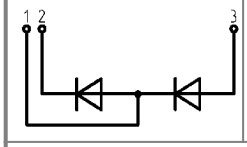
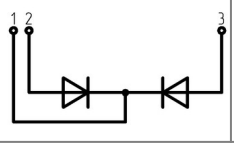
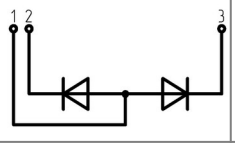
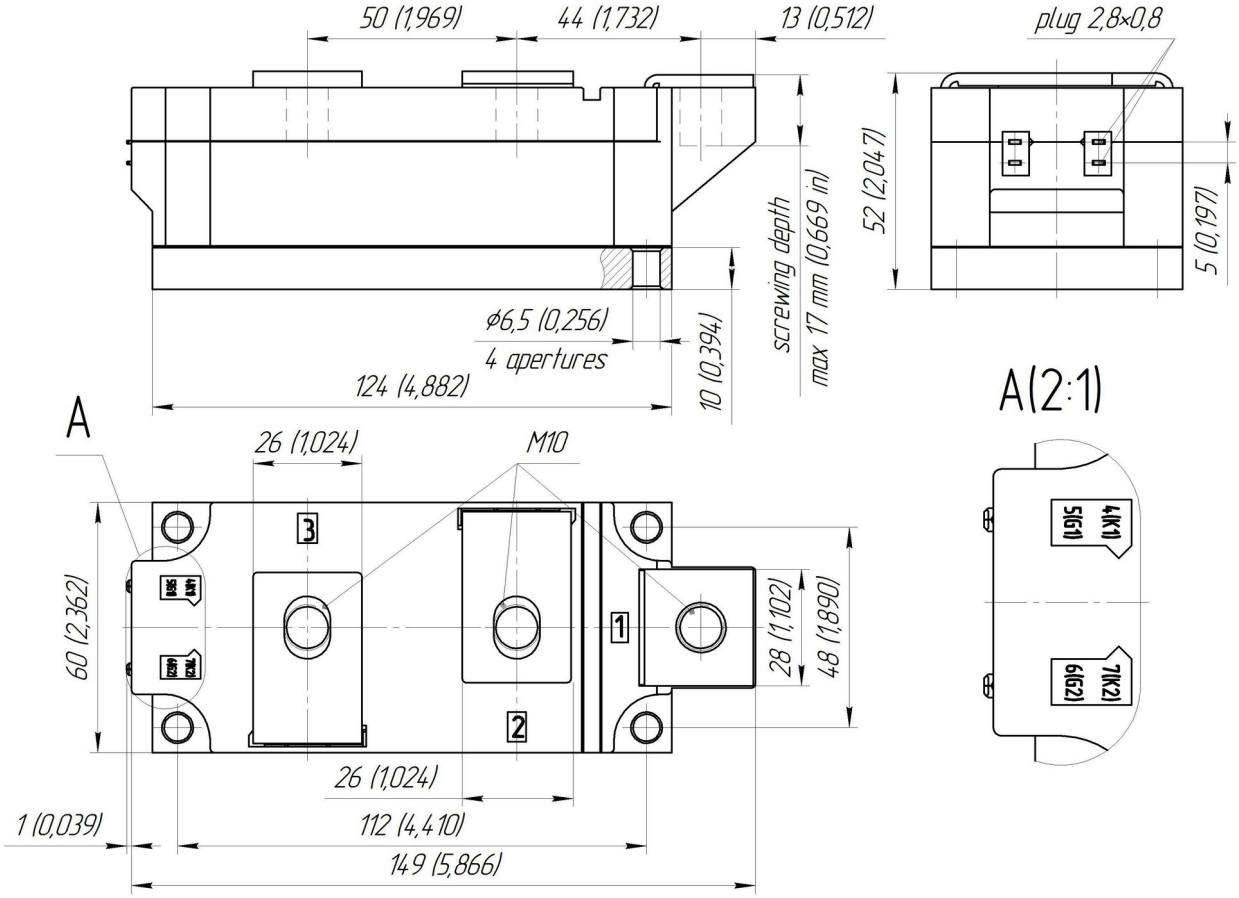
AS ENERGI

5ì2ŘŜ Modules
MDx-660-18-A2

Average forward current				I_{FAV}		660 A		
Repetitive peak reverse voltage				V_{RRM}		1000...1800 V		
V_{RRM}, V	1000	1100	1200	1300	1400	1500	1600	1800
Voltage code	10	11	12	13	14	15	16	18
T_j, °C	–40...+150							

MD3		MD4		MD5	
					



MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{FAV}	Maximum allowable average forward current	A	660	T_c=100 °C; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	1036		
I_{FSM}	Surge forward current	kA	19.0 22.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			20.0 23.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=8.3 ms; single pulse; V_R=0 V;
I^2t	Safety factor	$A^2s\cdot10^3$	1800 2400	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			1600 2100	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=8.3 ms; single pulse; V_R=0 V;
BLOCKING					
V_{RRM}	Repetitive peak reverse voltages	V	1000...1800	$T_{j\,min}$< T_j <$T_{j\,max}$; 180° half-sine wave; 50 Hz;	
V_{RSM}	Non-repetitive peak reverse voltages	V	1100...1900	$T_{j\,min}$< T_j <$T_{j\,max}$; 180° half-sine wave; single pulse;	
V_R	Reverse continuous voltages	V	0.6·V_{RRM}	T_j=$T_{j\,max}$;	
THERMAL					
T_{stg}	Storage temperature	°C	–40...+50		
T_j	Operating junction temperature	°C	–40...+150		
$T_{c\,op}$	Operating temperature	°C	–40...+125		
MECHANICAL					
a	Acceleration under vibration	m/s^2	50		

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V_{FM}	Peak forward voltage, max	V	1.40	T_j=25 °C; I_{FM}=1978 A	
$V_{F(TO)}$	Forward threshold voltage, max	V	0.78	T_j=$T_{j\,max}$; 0.5 π I_{FAV} < I_T < 1.5 π I_{FAV}	
r_T	Forward slope resistance, max	mΩ	0.230		
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	50 3.00	T_j=$T_{j\,max}$ T_j=25 °C	V_R=V_{RRM}
SWITCHING					
Q_{rr}	Total recovered charge, max	μC	1750	T_j=$T_{j\,max}$; I_{TM}=660 A; di_R/dt=-10 A/μs; V_R=100 V	
t_{rr}	Reverse recovery time, max	μs	24		
I_{rr}	Reverse recovery current, max	A	146		
THERMAL					
R_{thjc}	Thermal resistance, junction to case				
	per module	°C/W	0.0325	180° half-sine wave, 50 Hz	
	per arm	°C/W	0.0650		
	per module	°C/W	0.0310	DC	
	per arm	°C/W	0.0620		
R_{thch}	Thermal resistance, case to heatsink				
	per module	°C/W	0.0100		
	per arm	°C/W	0.0200		
INSULATION					
V_{ISOL}	Insulation test voltage	kV	3.00	Sine wave, 50 Hz; RMS	t=60 sec
			3.60		t=1 sec

MECHANICAL				
M_1	Mounting torque (M6)[1)]	Nm	6.00	Tolerance ± 15%
M_2	Terminal connection torque (M10)[1)]	Nm	12.00	Tolerance ± 15%
m	Weight, max	g	1500	

PART NUMBERING GUIDE	NOTES
MD 3 - 660 - 18 - A2 - N 1 2 3 4 5 6 1. MD - Rectifier Diode 2. Circuit Schematic: 3 – serial connection 4 – common Cathode 5 – common Anode 3. Average Forward Current, A 4. Voltage Code 5. Package Type (M.A2) 6. Ambient Conditions: N – Normal	[1)] The screws must be lubricated

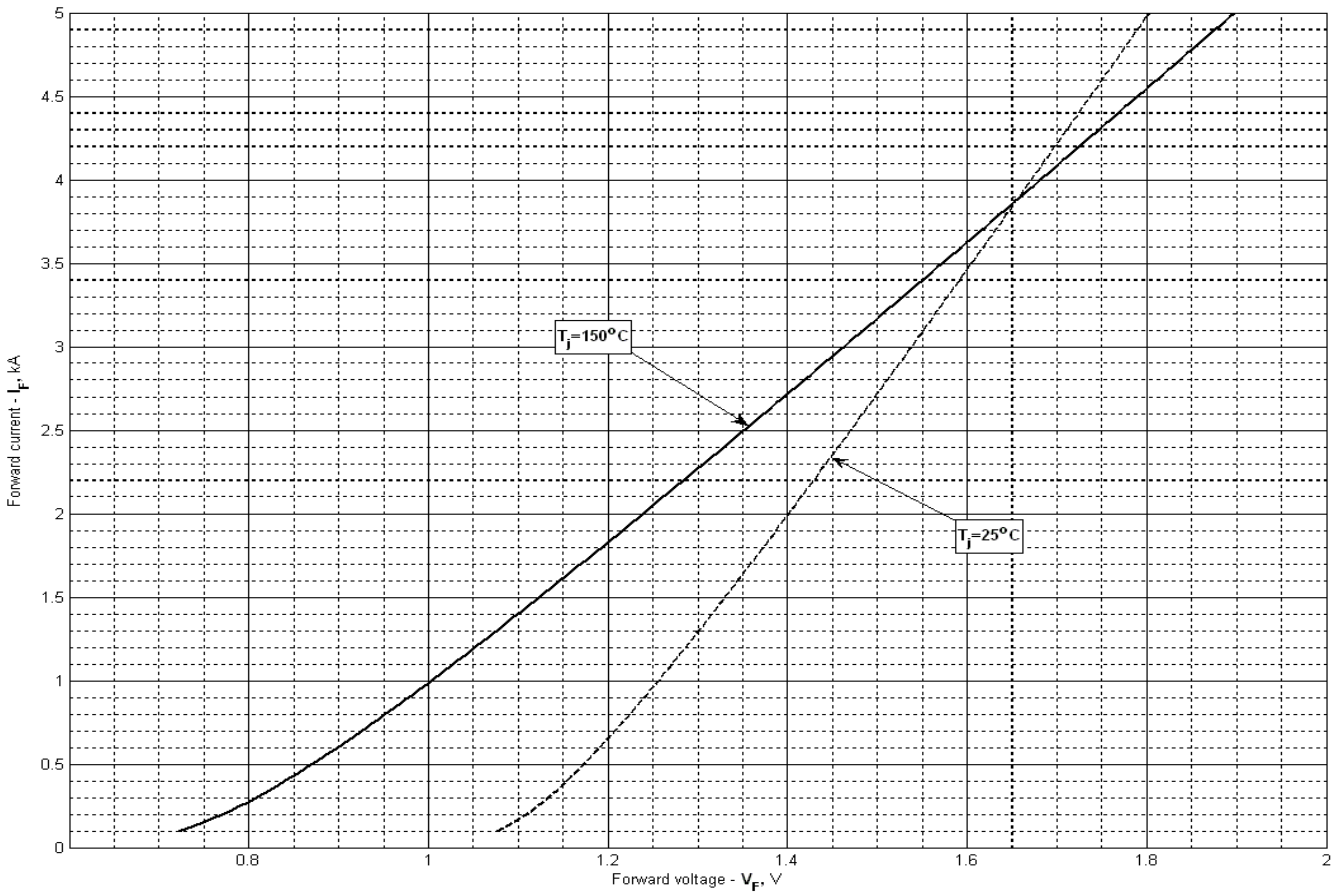


Fig 1 – On-state characteristics of Limit device

Analytical function for On-state 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°C	$T_j = T_{j\,max}$
A	0.997101	0.606247
B	0.095326	0.164879
C	-0.153566	-0.217982
D	0.270074	0.383360

On-state characteristic model (see Fig. 1)

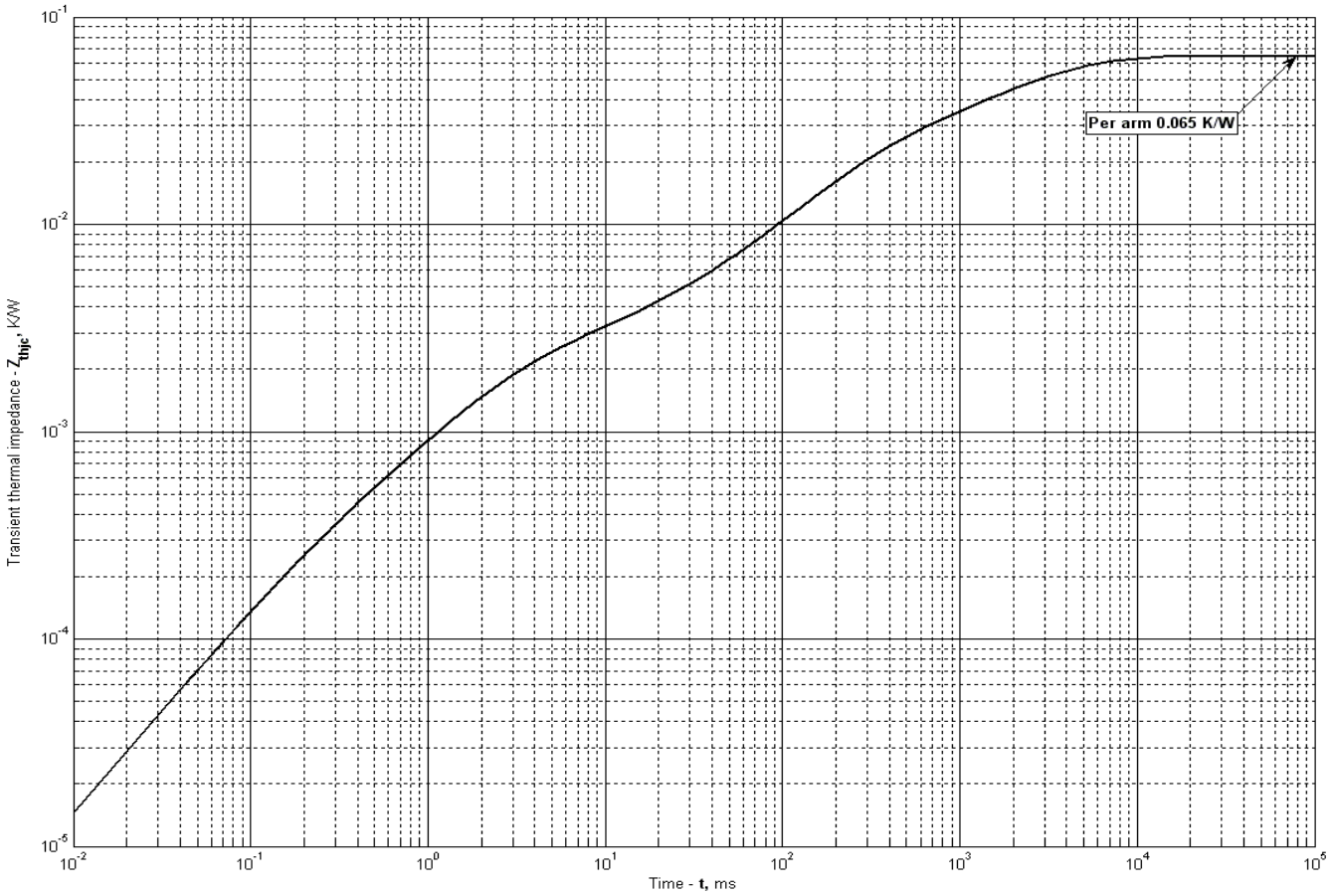


Fig 2 – Transient thermal impedance

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 constatnt of r_{th} term.

i	1	2	3	4	5	6
R_i, K/W	0.0344	0.0112	0.01635	0.0006528	0.001791	0.0001363
τ_i, s	3.132	1.000	0.2335	0.01038	0.002348	0.0002448

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

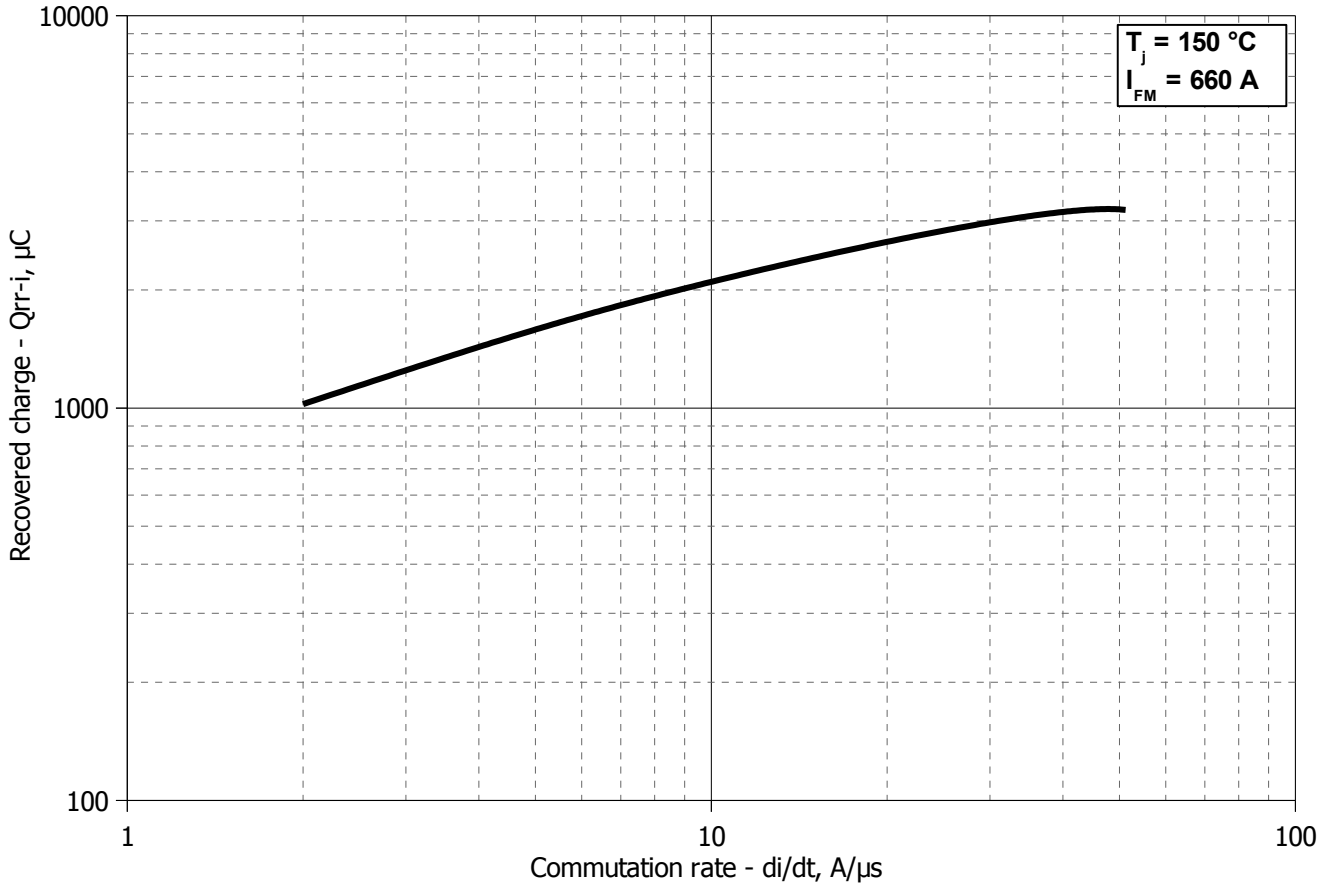


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

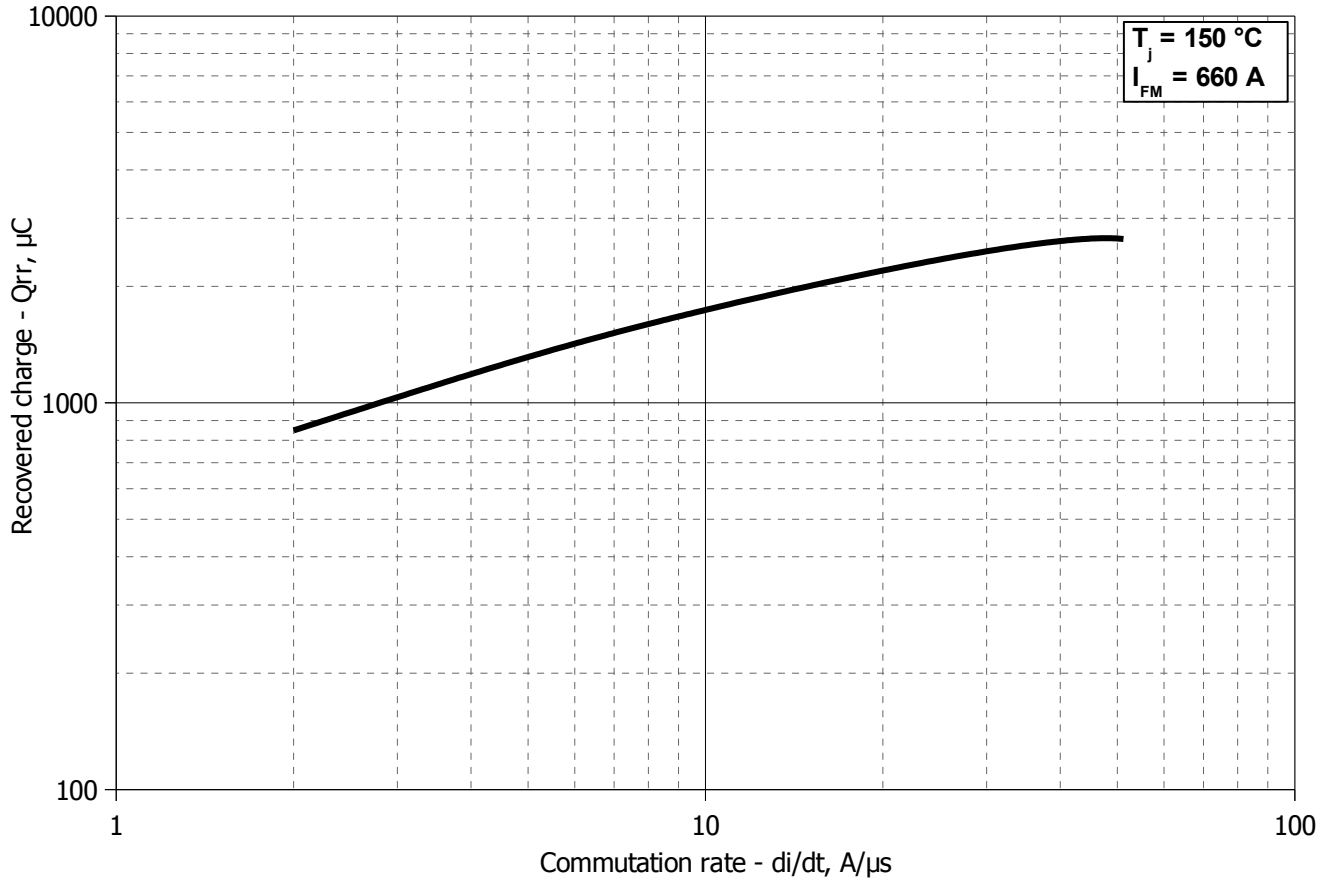


Fig 4 - Recovered charge, Q_{rr} (25% chord)

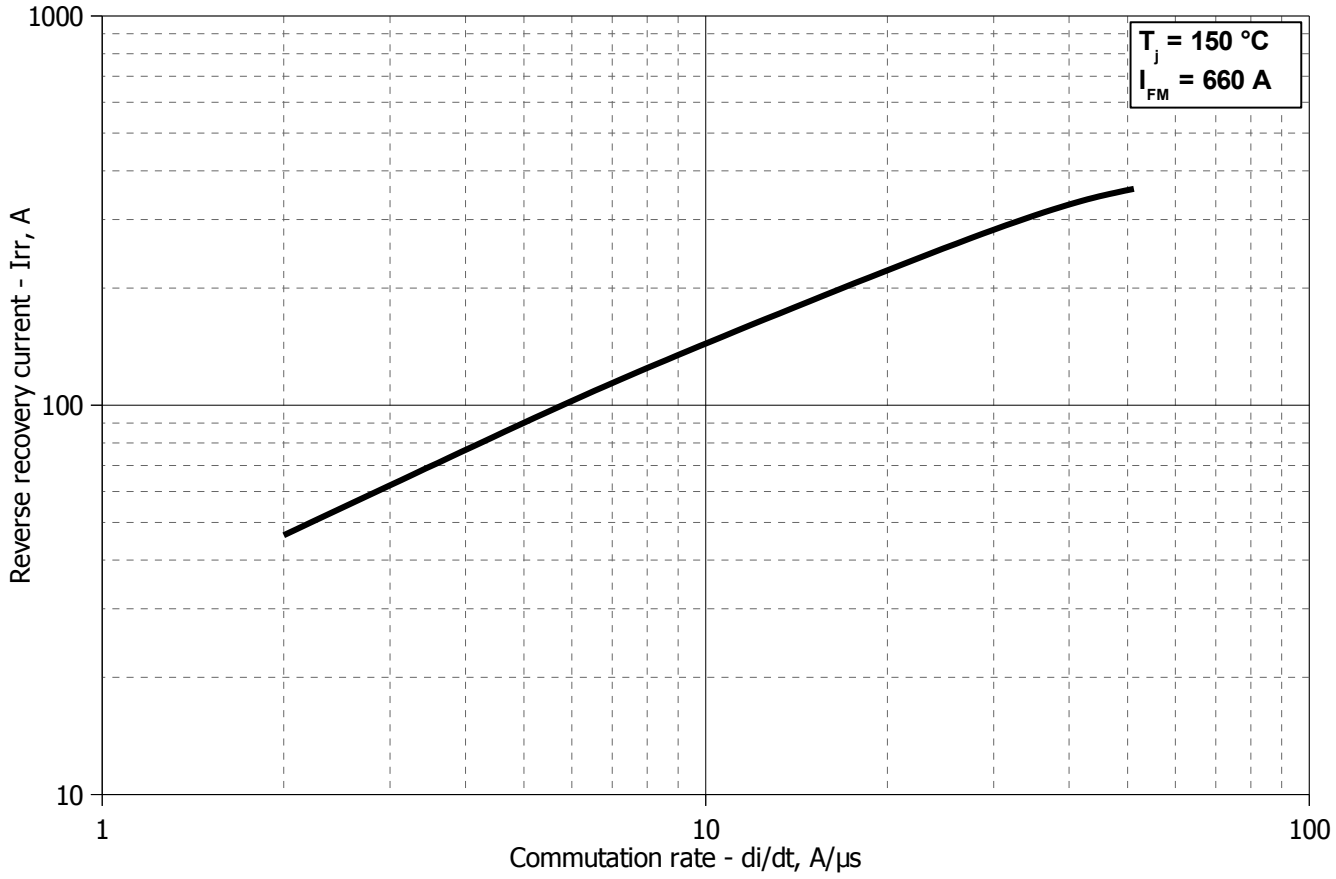


Fig 5 – Peak reverse recovery current, I_{rr}

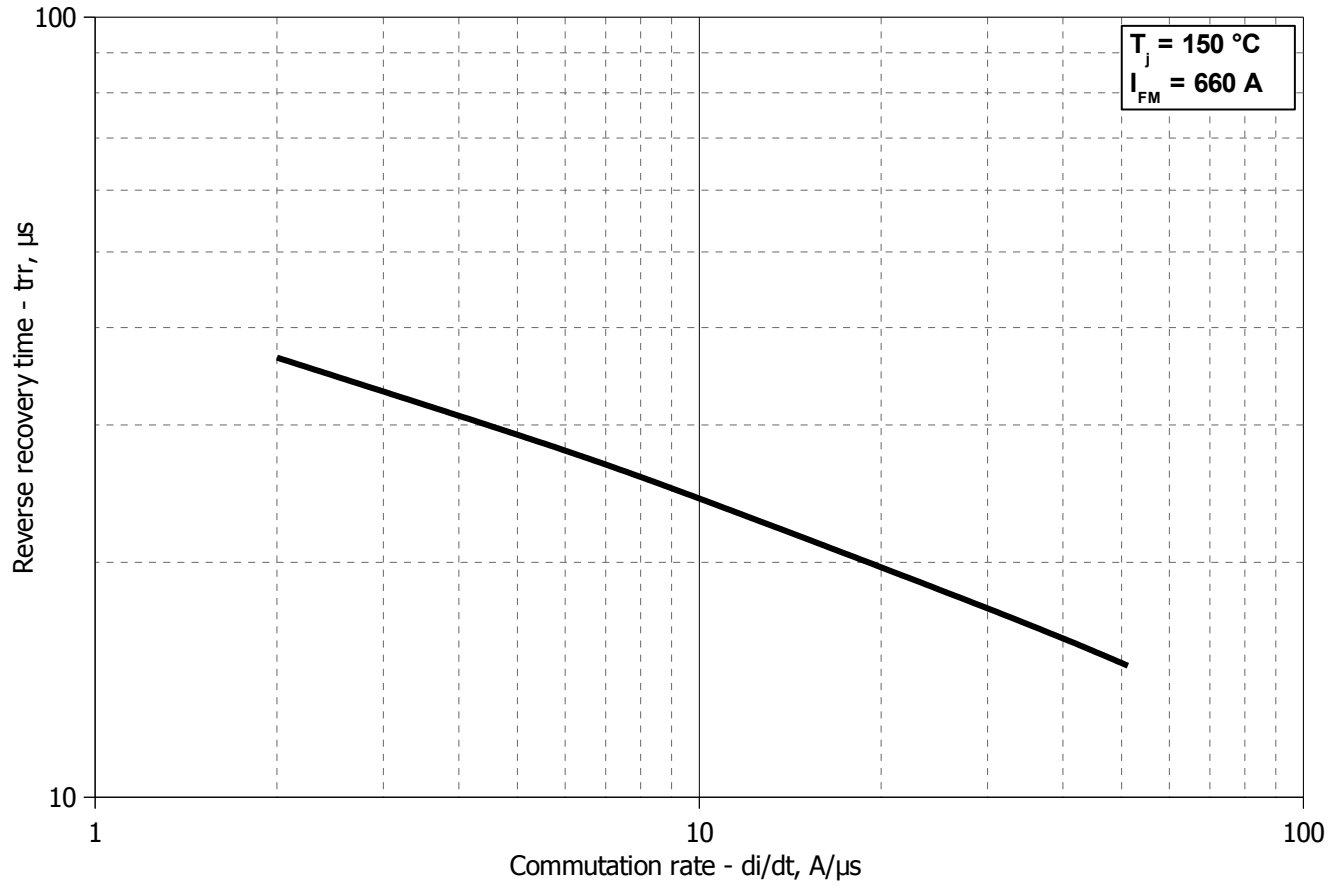


Fig 6 – Maximum recovery time, t_{rr} (25% chord)

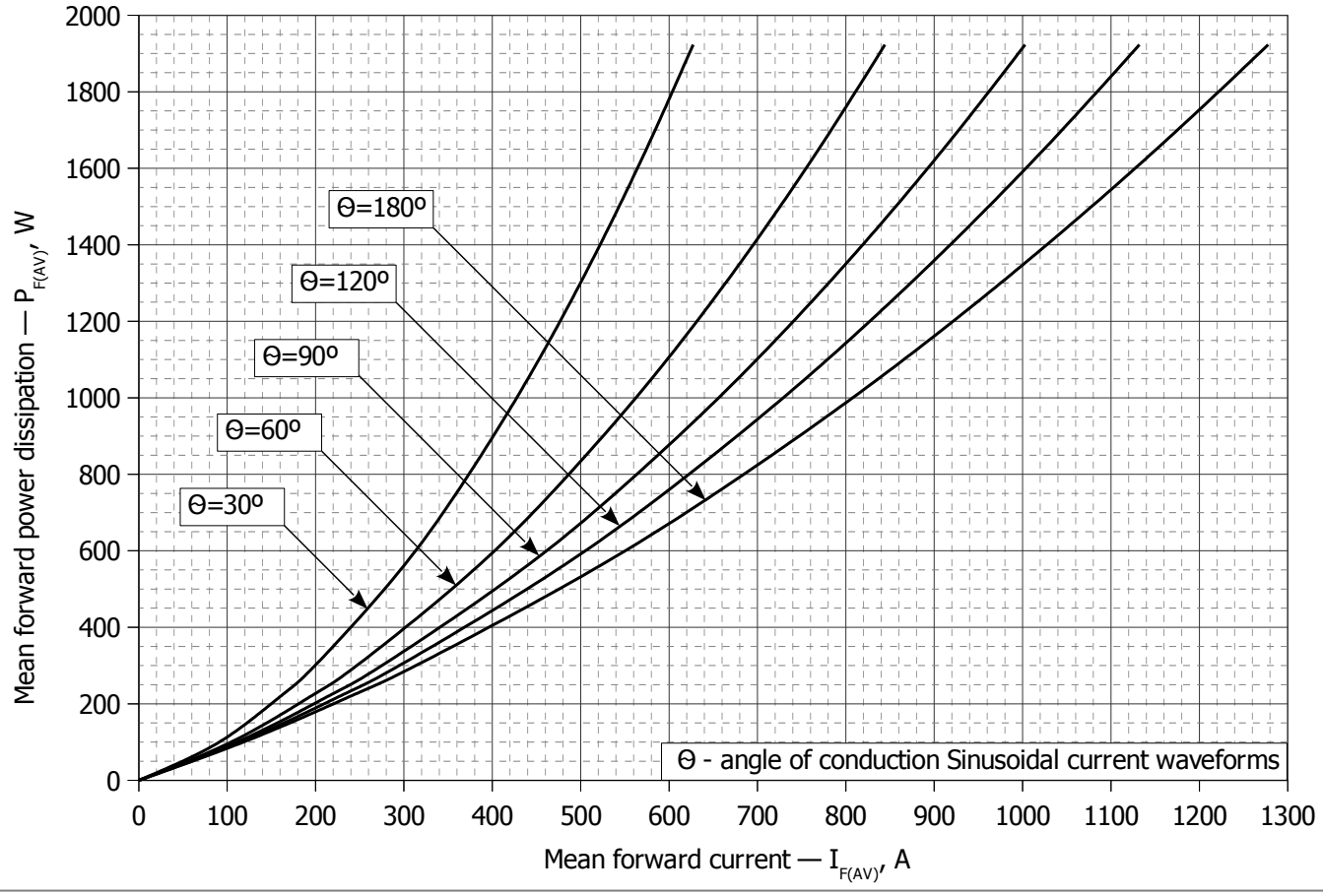


Fig 7 – On-state power loss (sinusoidal current waveforms)

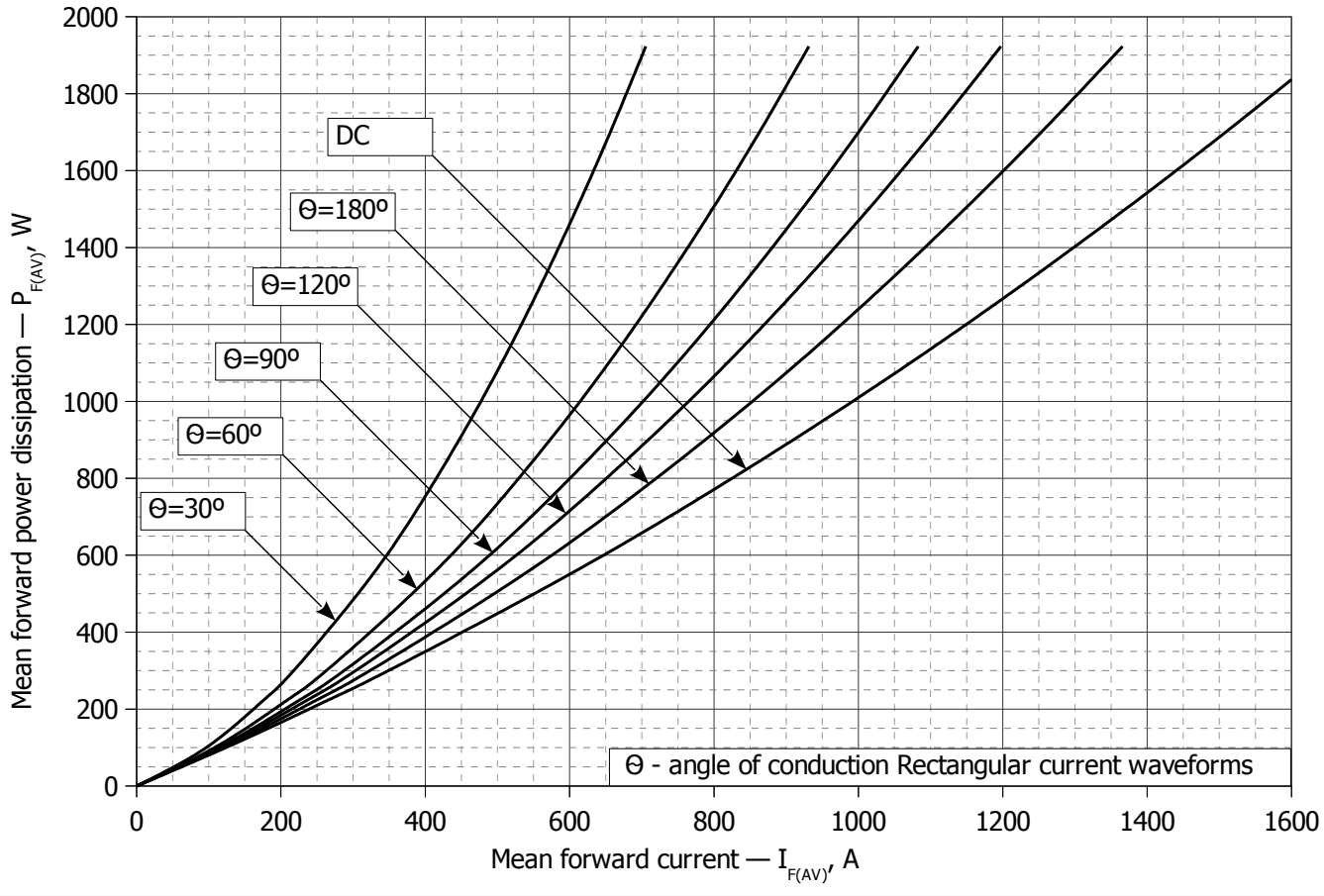


Fig 8 – On-state power loss (rectangular current waveforms)

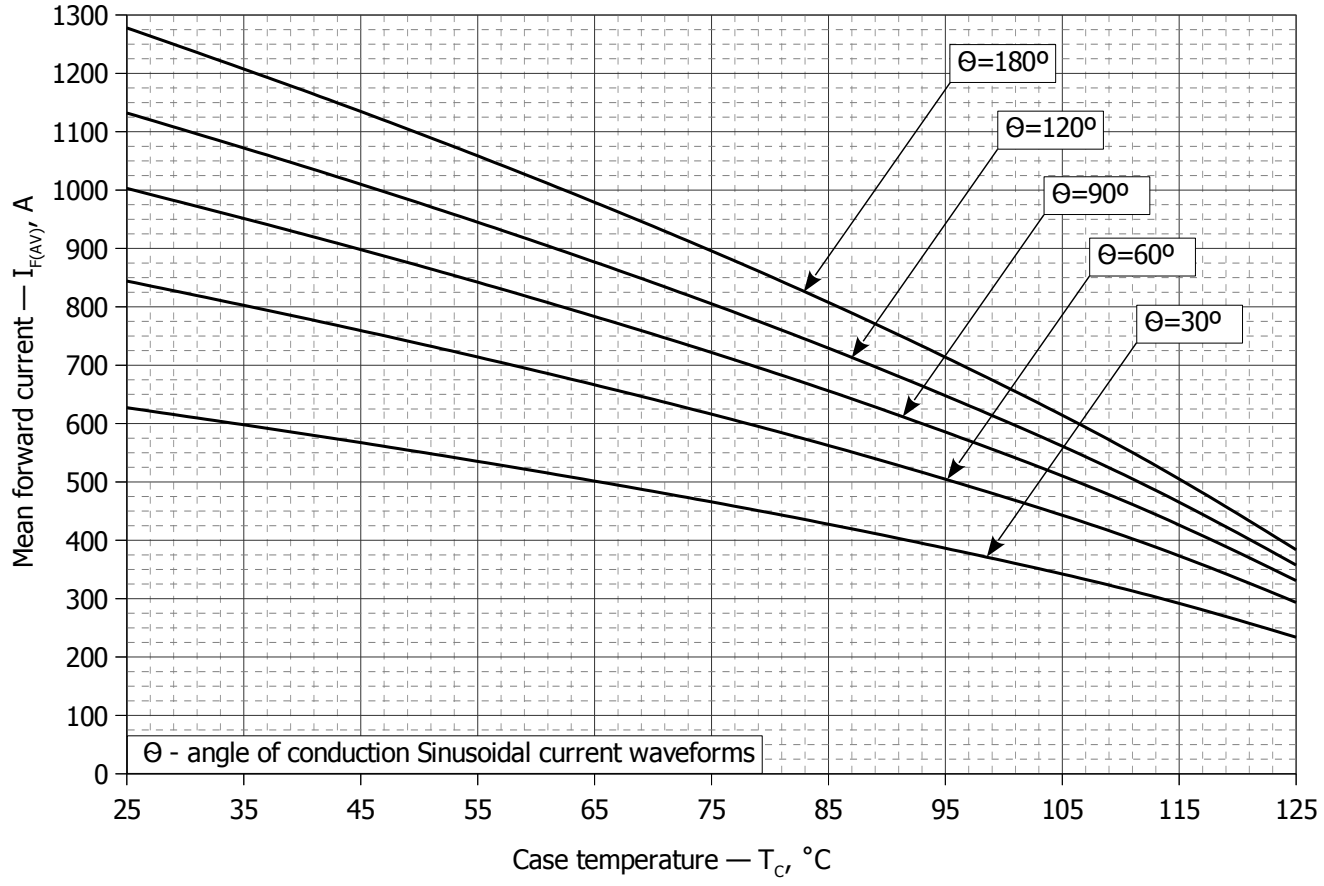


Fig 9 – Maximum case temperature DSC (sinusoidal current waveforms)

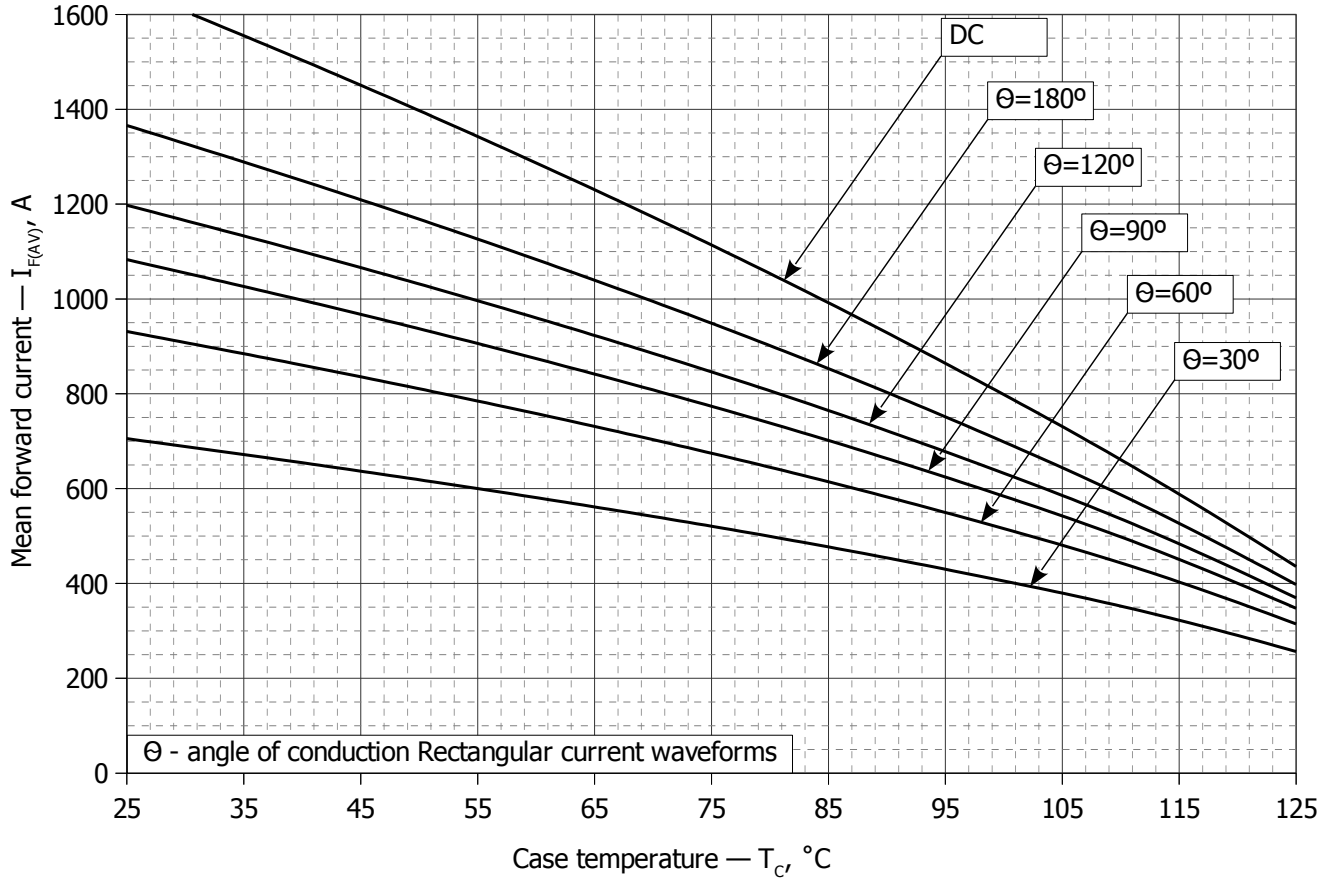


Fig 10 – Maximum case temperature DSC (rectangular current waveforms)

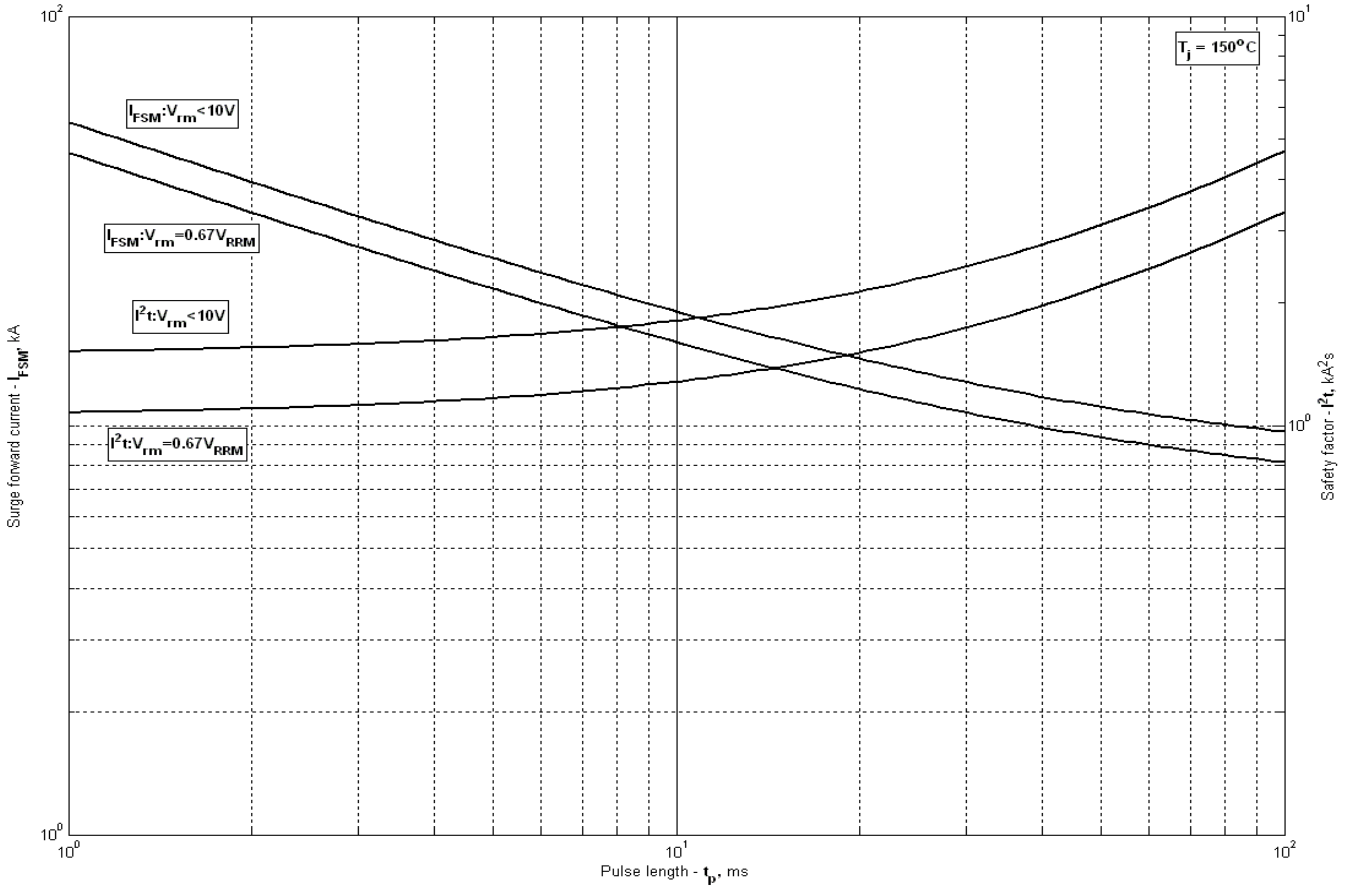


Fig 11 – Maximum surge and I^2t ratings

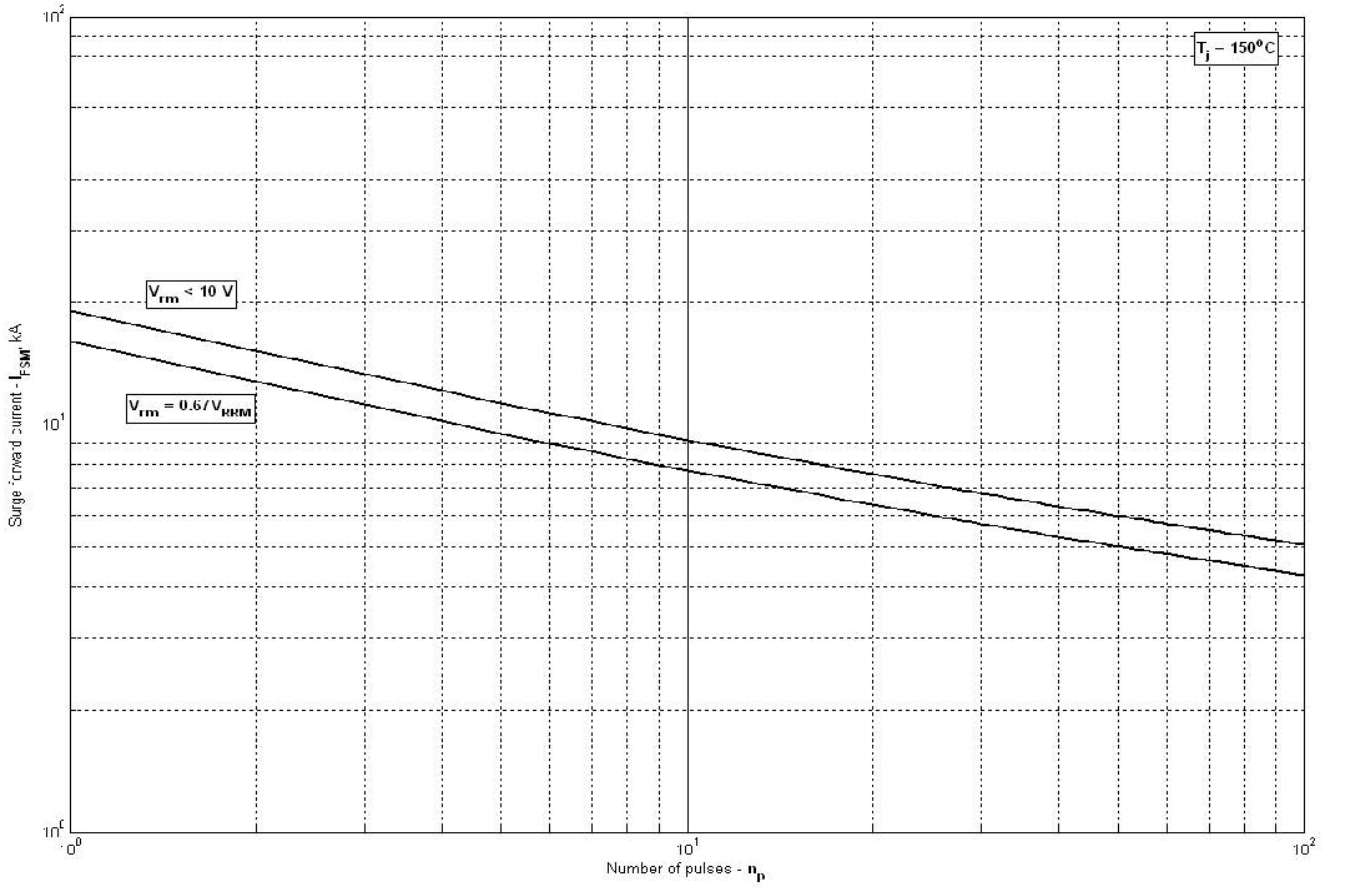


Fig 12 – Maximum surge ratings