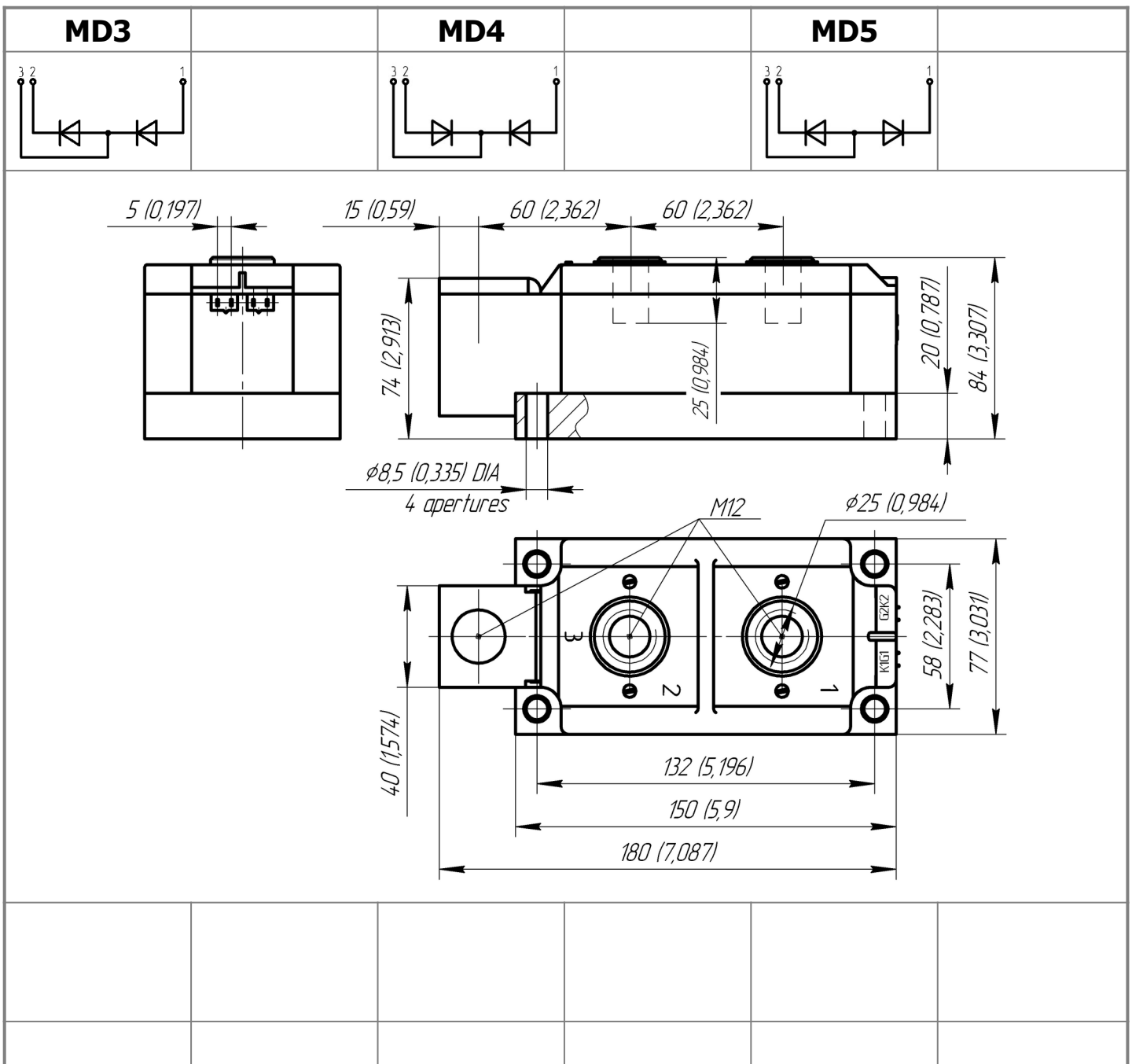




Double Diode Module
For Phase Control
MDx-1000-28-D

Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

Average forward current		I_{FAV}		1000 A	
Repetitive peak reverse voltage		V_{RRM}		2000 ÷ 2800 V	
V_{RRM}, V	2000	2200	2400	2600	2800
Voltage code	20	22	24	26	28
$T_j, ^\circ C$	- 40 ÷ 150				




All dimensions in millimeters (inches)

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{FAV}	Average forward current	A	1000 885	$T_c=91\text{ }^\circ\text{C}$; $T_c=100\text{ }^\circ\text{C}$; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	1570	$T_c=91\text{ }^\circ\text{C}$; 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	32.0 37.0	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V}$;
			34.0 39.0	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_R=0\text{ V}$;
I^2t	Safety factor	$A^2s\cdot 10^3$	5100 6800	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V}$;
			4700 6300	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_R=0\text{ V}$;
BLOCKING					
V_{RRM}	Repetitive peak reverse voltages	V	2000÷2800	$T_{j\min} < T_j < T_{j\max}$; 180° half-sine wave; 50 Hz;	
V_{RSM}	Non-repetitive peak reverse voltages	V	2100÷2900	$T_{j\min} < T_j < T_{j\max}$; 180° half-sine wave; single pulse;	
V_R	Reverse continuous voltages	V	$0.6\cdot V_{RRM}$	$T_j=T_{j\max}$;	
THERMAL					
T_{stg}	Storage temperature	°C	- 40 ÷ 50		
T_j	Operating junction temperature	°C	- 40 ÷ 150		
$T_{c\text{ op}}$	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	1.38	$T_j=25\text{ }^\circ\text{C}$; $I_{FM}=3140\text{ A}$	
$V_{F(TO)}$	Forward threshold voltage, max	V	0.80	$T_j=T_{j\max}$;	
r_T	Forward slope resistance, max	$m\Omega$	0.150	$0.5\pi I_{FAV} < I_T < 1.5\pi I_{FAV}$	
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	70	$T_j=T_{j\max}$; $V_R=V_{RRM}$	
THERMAL					
R_{thjc}	Thermal resistance, junction to case			180° half-sine wave, 50 Hz	
	per module	°C/W	0.0250		
per arm	°C/W	0.0500			
R_{thch}	Thermal resistance, case to heatsink				
	per module	°C/W	0.0080		
	per arm	°C/W	0.0160		
INSULATION					
V_{ISOL}	Insulation test voltage	kV	3.00	Sine wave, 50 Hz;	t=60 sec
			3.60	RMS	t=1 sec
MECHANICAL					
M_1	Mounting torque (M8) ¹⁾	Nm	9.00	Tolerance ± 15%	
M_2	Terminal connection torque (M12) ¹⁾	Nm	18.00	Tolerance ± 15%	
w	Weight, max	g	4100		

PART NUMBERING GUIDE						NOTES				
MD	3	-	1000	-	28	-	D	-	N	¹⁾ The screws must be lubricated
1	2		3		4		5		6	
1. MD - Rectifier Diode 2. Circuit Schematic 3. Average Forward Current, A 4. Voltage Code 5. Package Type (M.D) 6. Ambient Conditions: N – Normal										
		UL certified file-No. E255404								

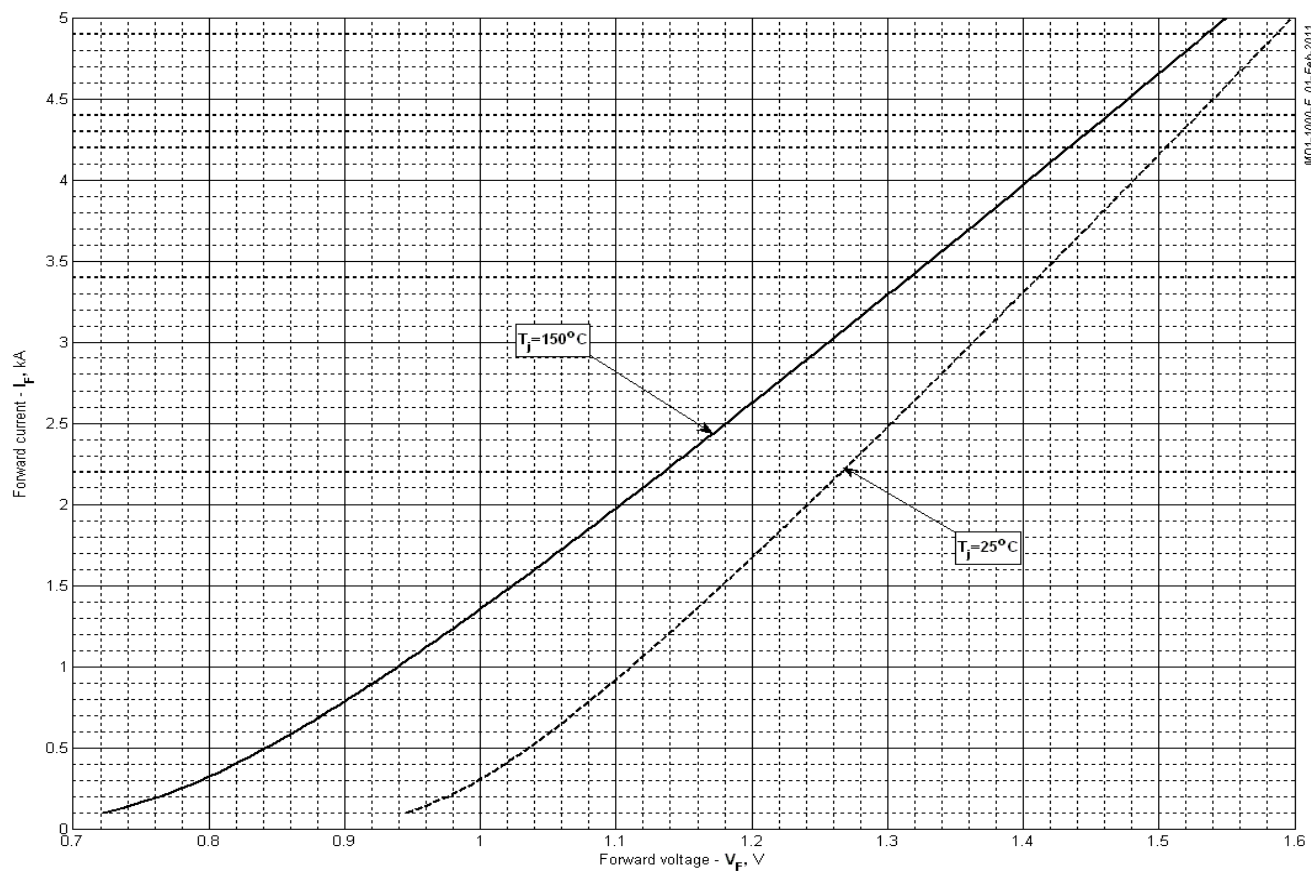


Fig 1 – On-state characteristics of Limit device

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	
	$T_j = 25^\circ\text{C}$	$T_j = T_{j\text{max}}$
A	0.867101	0.613247
B	0.080426	0.093879
C	-0.153566	-0.217982
D	0.270074	0.383360

On-state characteristic model (see Fig. 1)

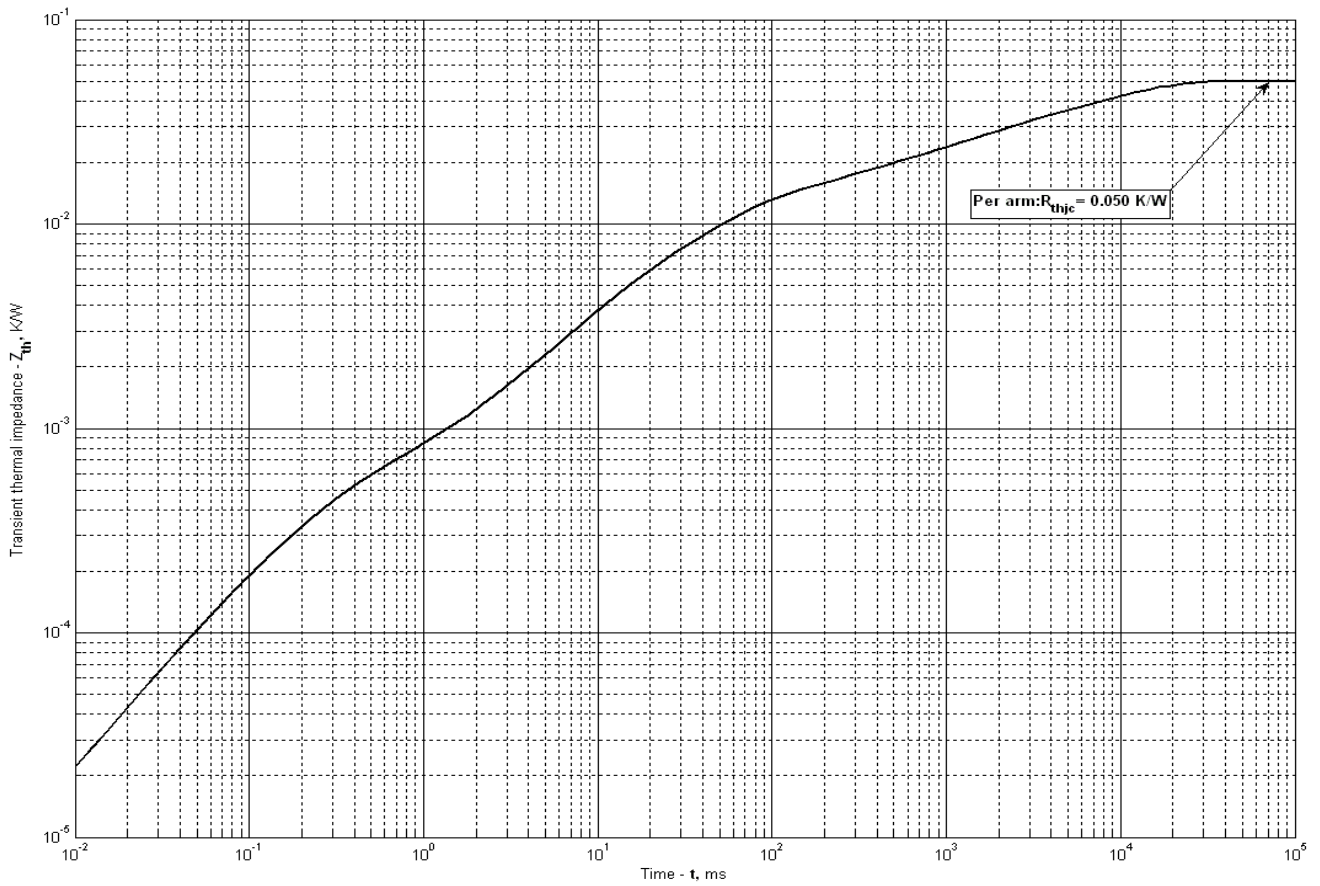


Fig 2 – Transient thermal impedance

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 constant of r_{th} term.

i	1	2	3	4	5	6
$R_i, K/W$	0.02506	0.009643	0.00348	0.009712	0.001719	0.0004399
τ_i, s	8.474	1.110	0.2289	0.04529	0.009524	0.0002414

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

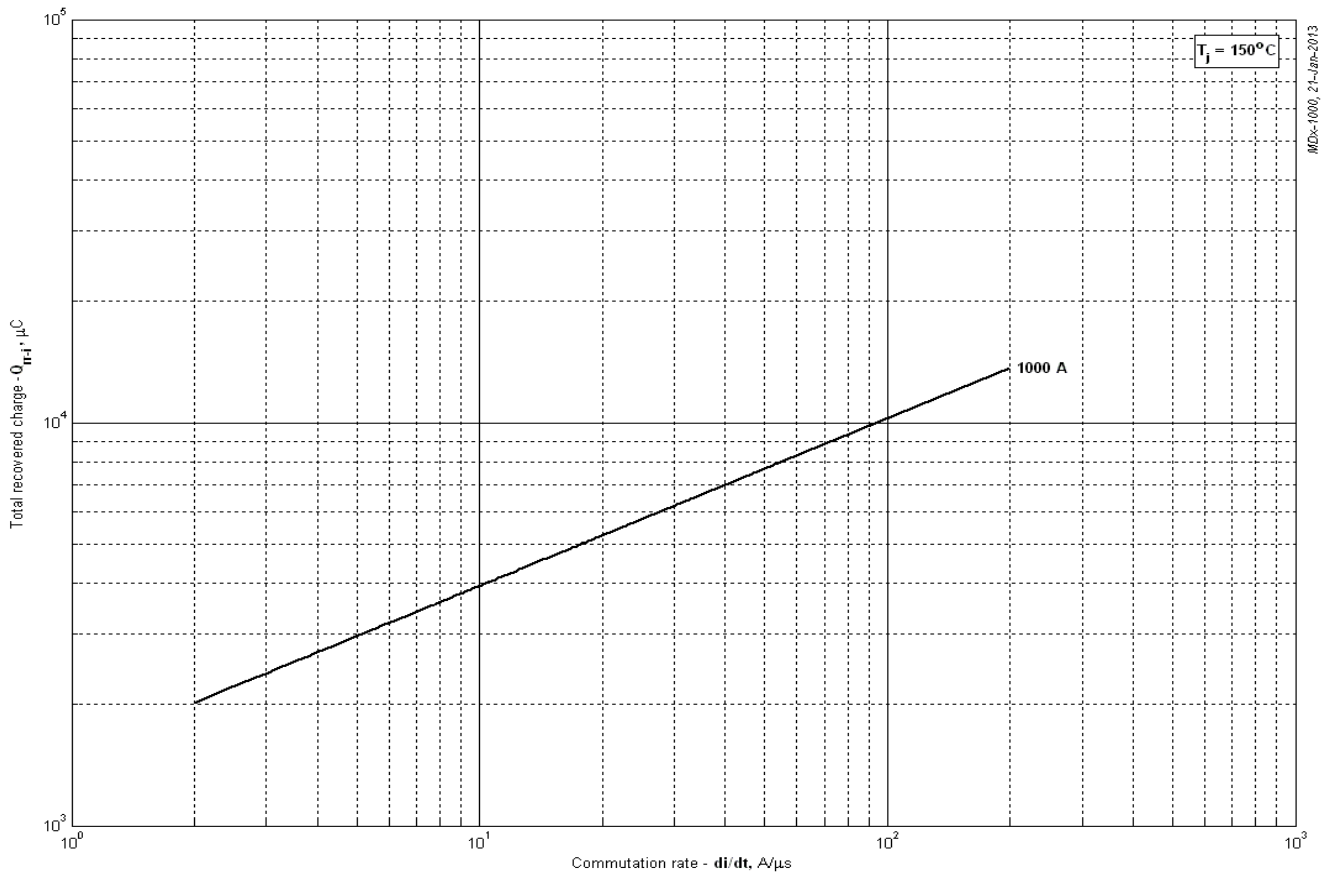


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

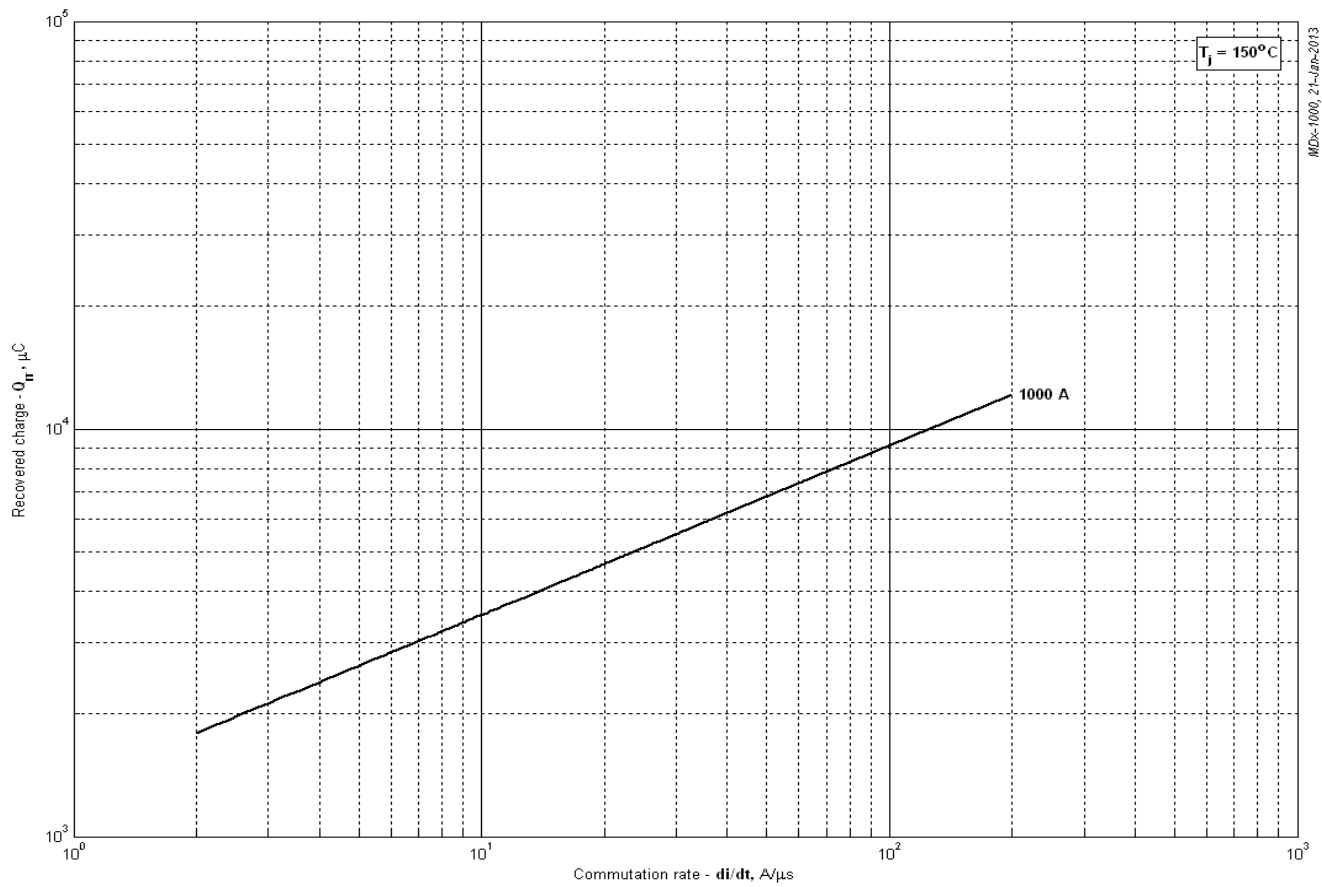


Fig 4 - Recovered charge, Q_{rr} (25% chord)

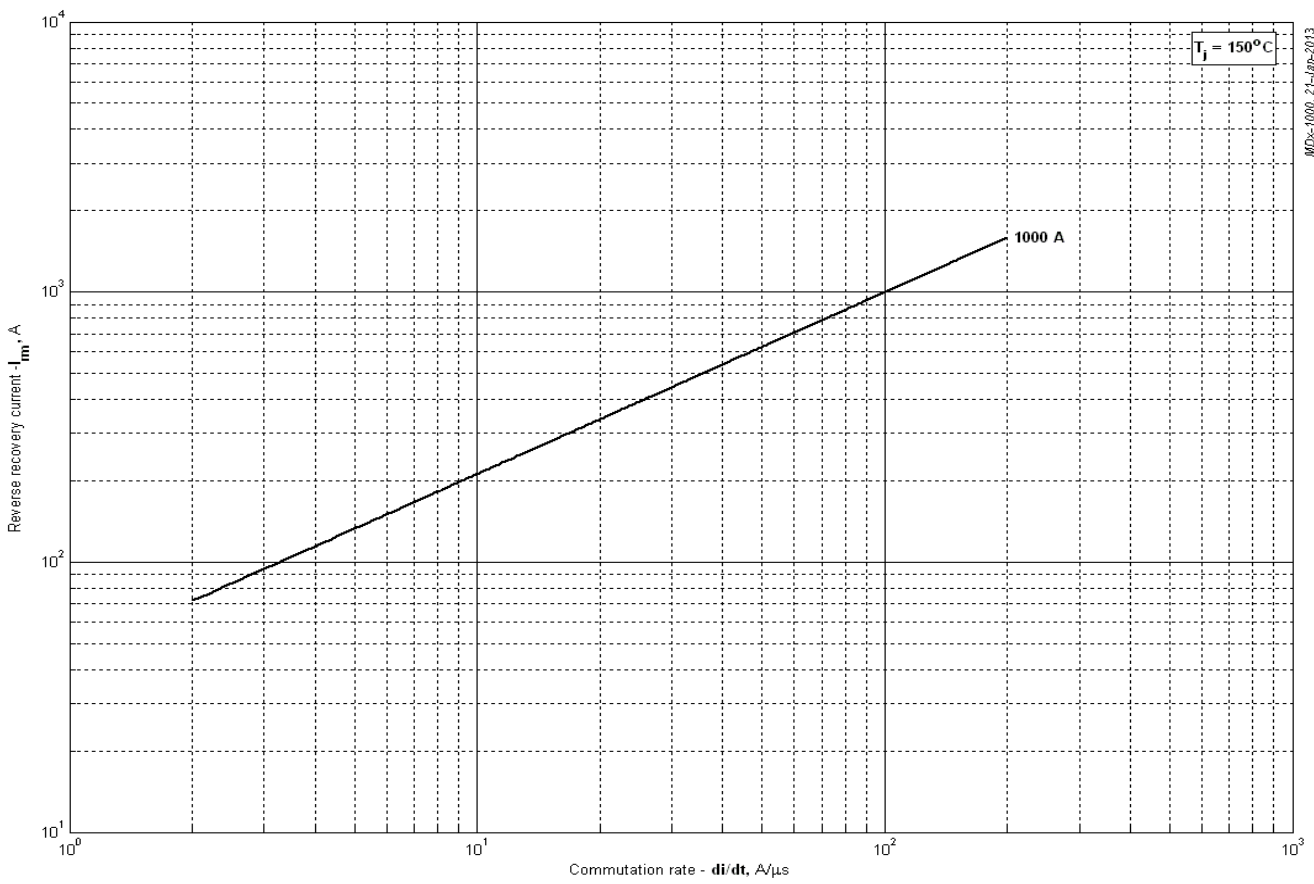


Fig 5 – Peak reverse recovery current, I_{rr}

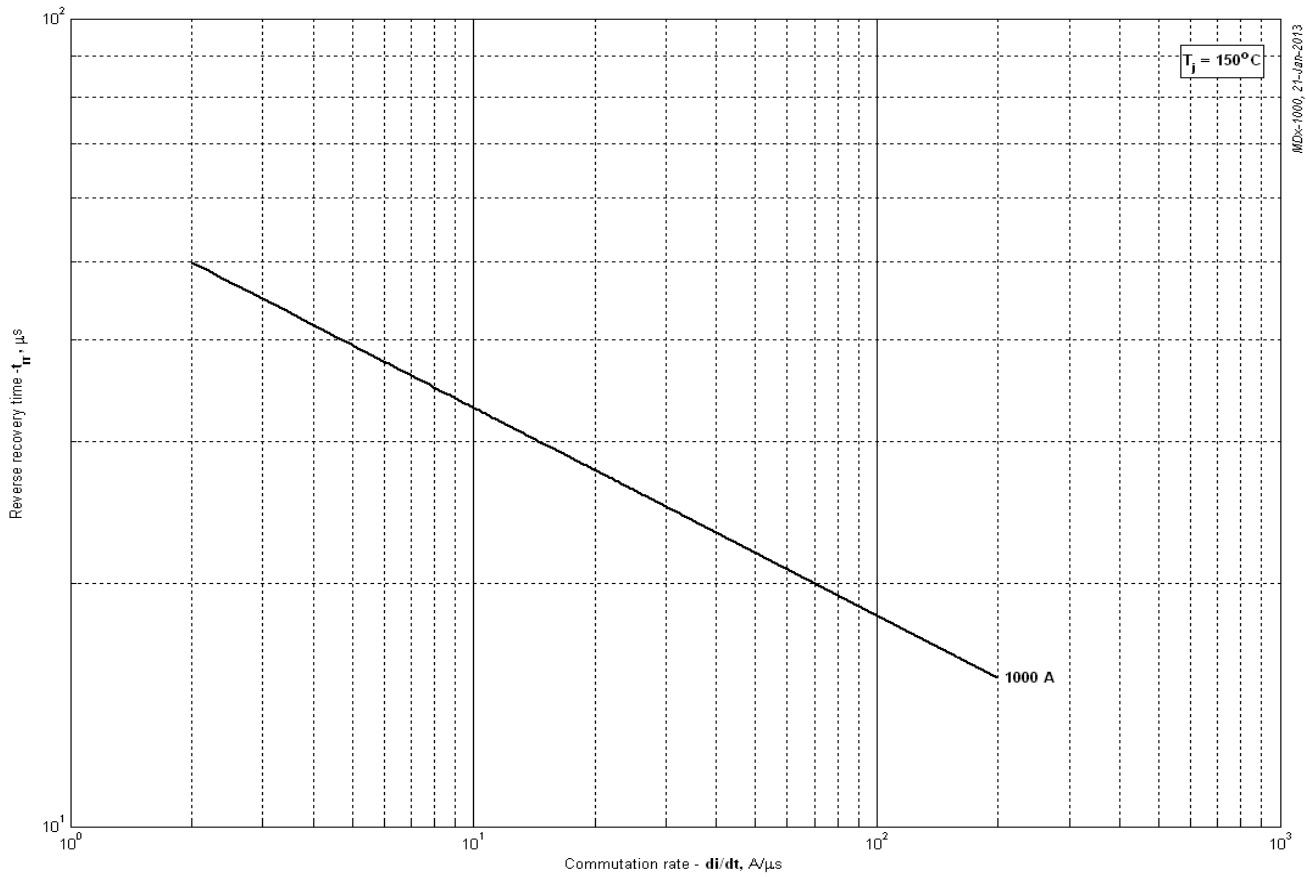


Fig 6 – Maximum recovery time, t_{rr} (25% chord)

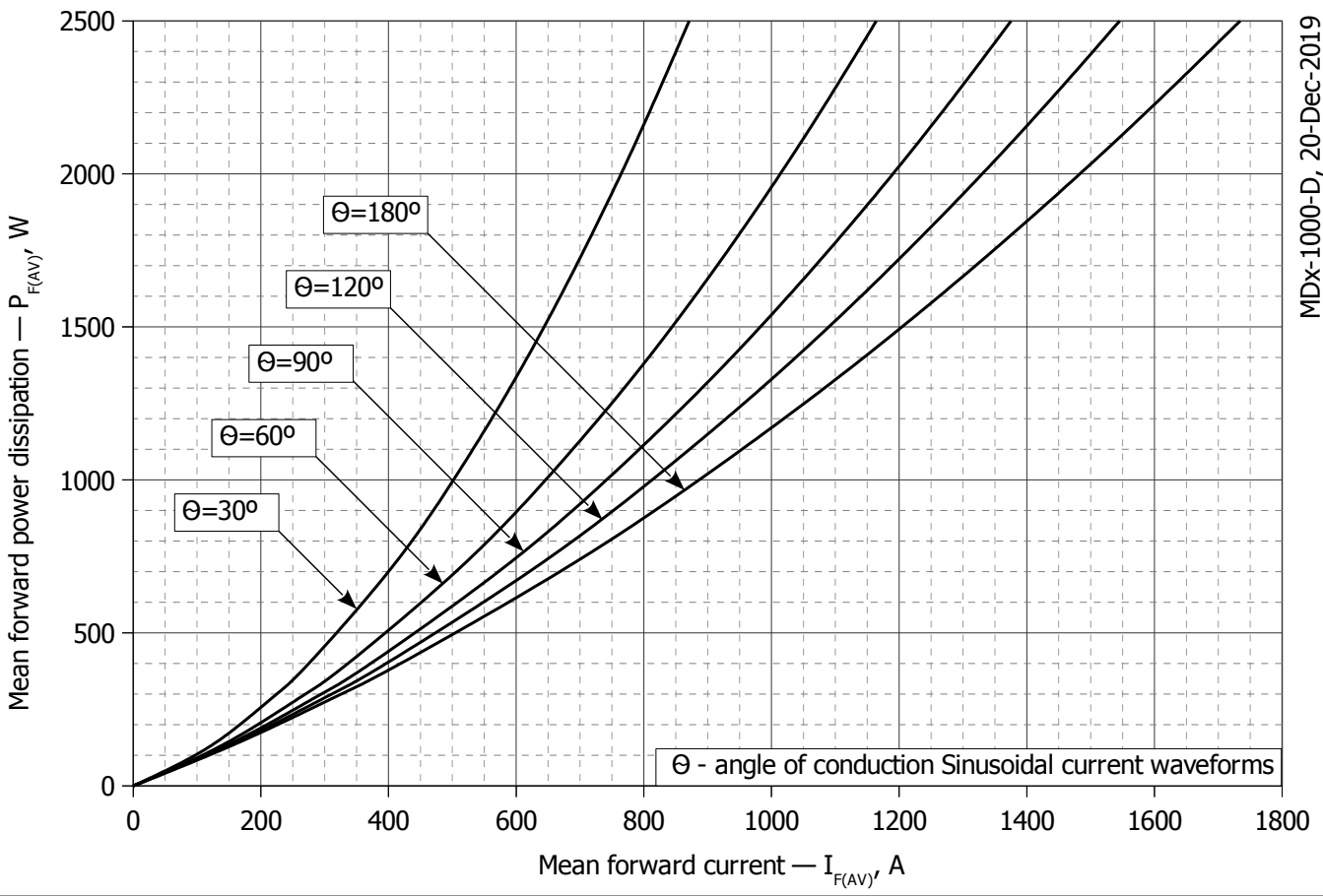


Fig 7 – On-state power loss (sinusoidal current waveforms)

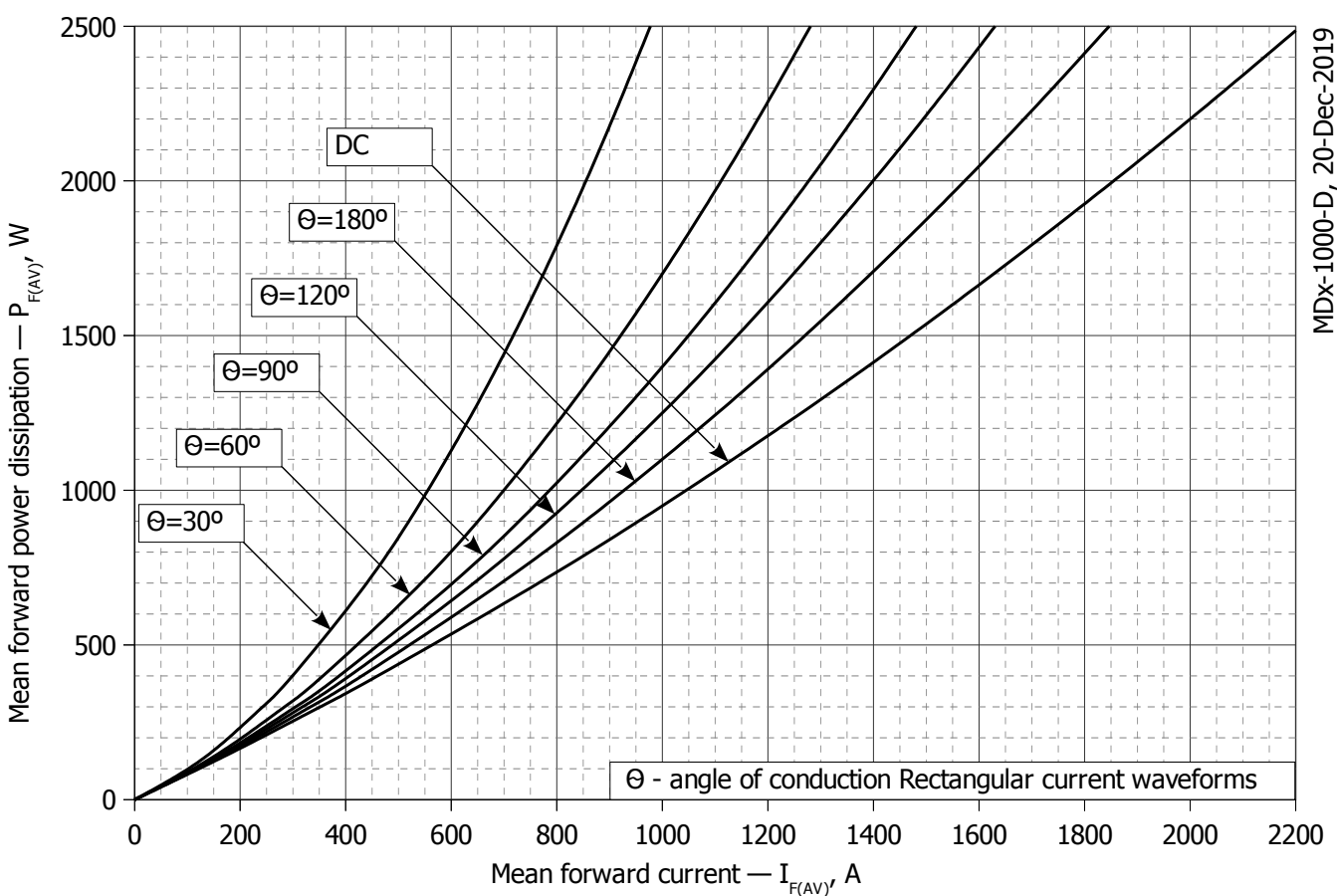


Fig 8 – On-state power loss (rectangular current waveforms)

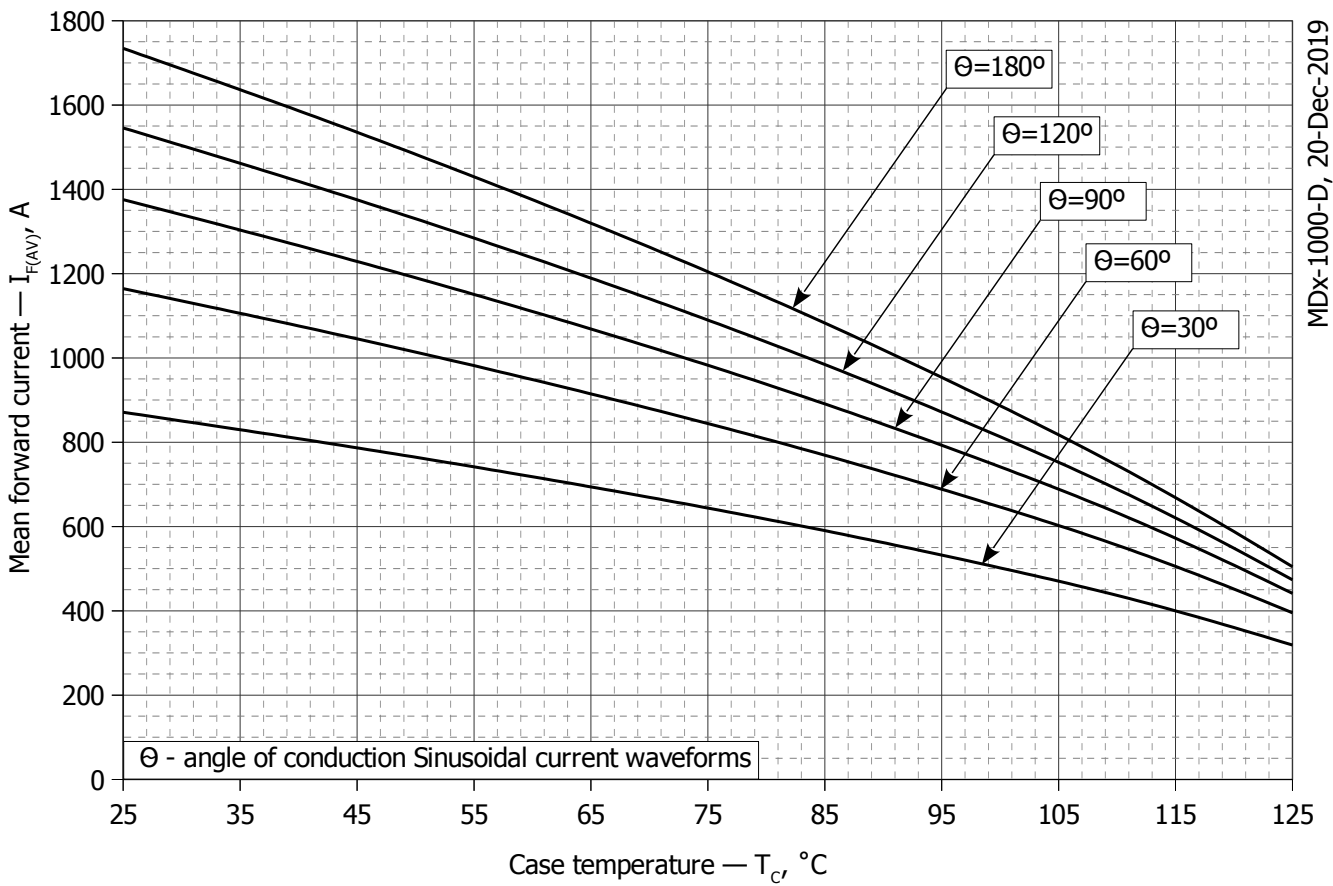


Fig 9 – Maximum case temperature DSC (sinusoidal current waveforms)

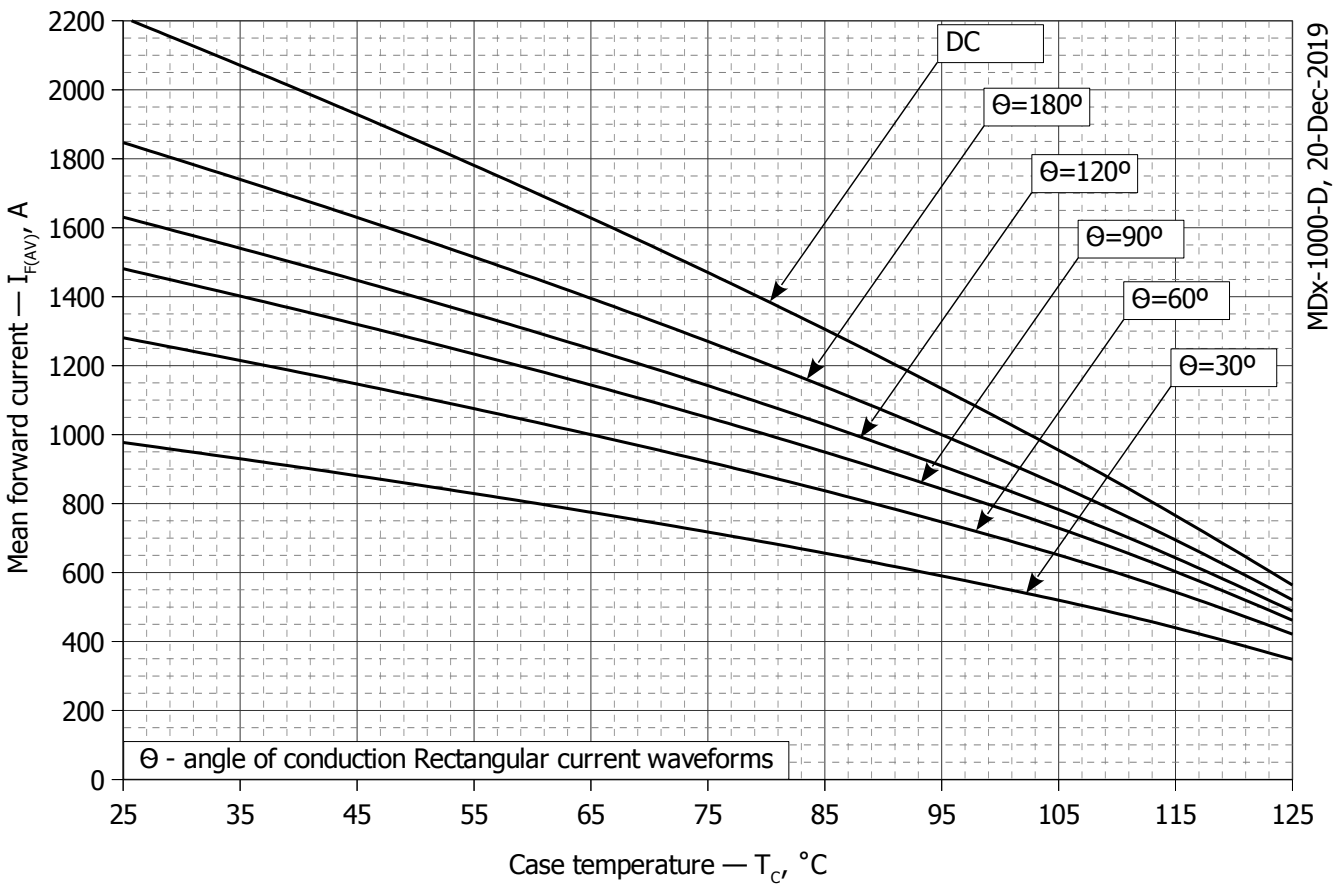


Fig 10 – Maximum case temperature DSC (rectangular current waveforms)

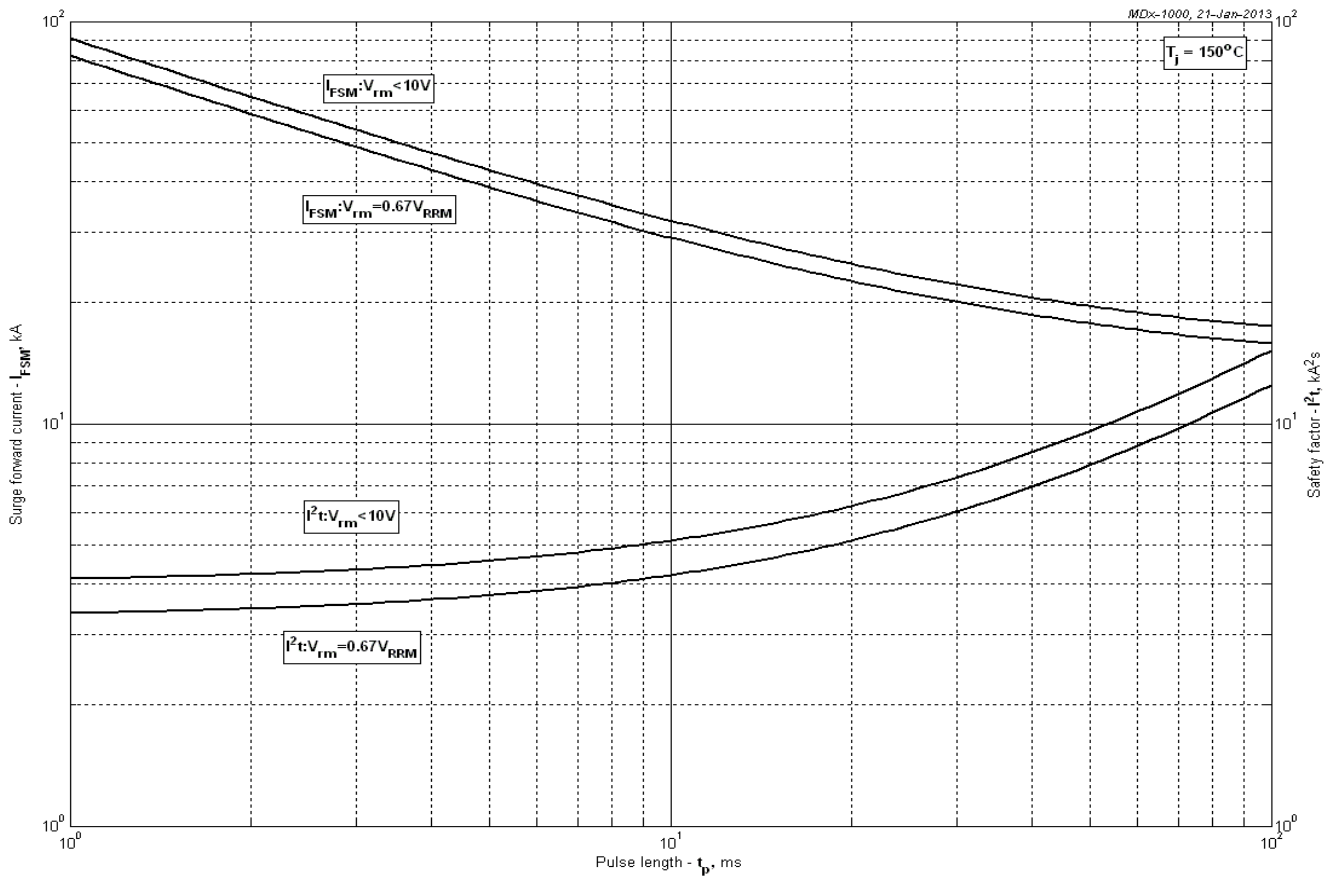


Fig 11 – Maximum surge and I^2t ratings

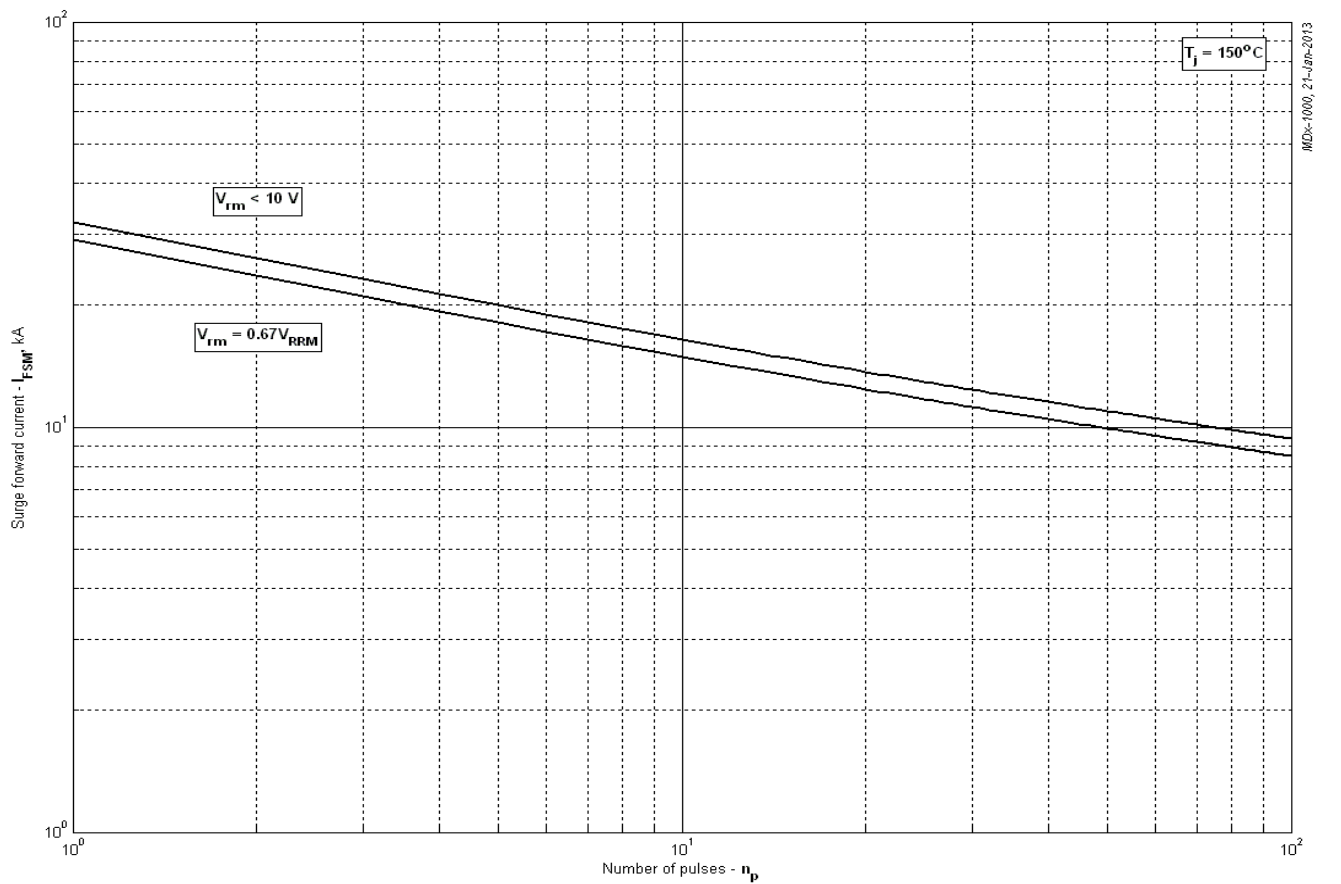


Fig 12 – Maximum surge ratings