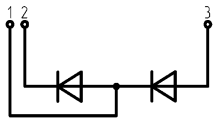
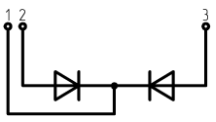
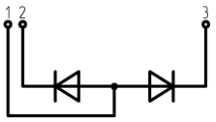
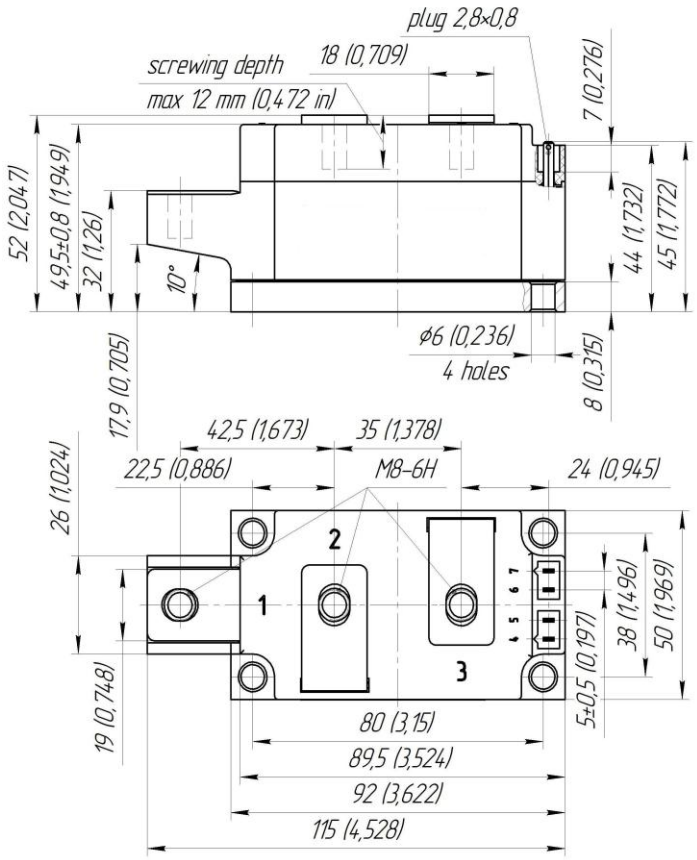
Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

Double Diode Module For Phase Control MDx-400-18-C1

Average forward current			I_{FAV}	400 A	
Repetitive peak reverse voltage			V_{RRM}	1000 ÷ 1800 V	
V_{RRM}, V	1000	1200	1400	1600	1800
Voltage code	10	12	14	16	18
T_j, °C	- 40 ÷ 150				

MD3		MD4		MD5	
					



All dimensions in millimeters (inches)

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{FAV}	Average forward current	A	400 445	T_c= 106 °C; T_c= 100 °C; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	628	T_c= 106 °C; 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	12.0 14.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 50 Hz (t_p=10 ms); single pulse; V_R=0 V;
			13.0 15.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 60 Hz (t_p=8.3 ms); single pulse; V_R=0 V;
I^2t	Safety factor	$A^2s{\cdot}10^3$	720 980	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 50 Hz (t_p=10 ms); single pulse; V_R=0 V;
			700 930	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 60 Hz (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; 50 Hz; single pulse;	
V_R	Reverse continuous voltages	V	0.75·V_{RRM}	T_j=$T_{j\,max}$;	
THERMAL					
T_{stg}	Storage temperature	°C	- 40 ÷ 125		
T_j	Operating junction temperature	°C	- 40 ÷ 150		
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	1.20	T_j=25 °C; I_{FM}=785 A
$V_{F(TO)}$	Forward threshold voltage, max	V	0.75	T_j=$T_{j\,max}$; 0.5 π I_{FAV} < I_T < 1.5 π I_{FAV}
r_T	Forward slope resistance, max	mΩ	0.250	
BLOCKING				
I_{RRM}	Repetitive peak reverse current, max	mA	30	T_j=$T_{j\,max}$; V_R=V_{RRM}
SWITCHING				
Q_{rr}	Total recovered charge, max	μC	1200	T_j=$T_{j\,max}$; I_{TM}=400 A; di_R/dt=-10 A/μs; V_R=100 V
t_{rr}	Reverse recovery time, max	μs	20	
I_{rrM}	Peak reverse recovery current, typ	A	120	
THERMAL				
R_{thjc}	Thermal resistance, junction to case			180° half-sine wave, 50 Hz
	per module	°C/W	0.0550	
	per arm	°C/W	0.1100	
R_{thch}	Thermal resistance, case to heatsink			
	per module	°C/W	0.0200	
	per arm	°C/W	0.0400	

INSULATION					
V_{ISOL}	Insulation test voltage	kV	3.00	Sine wave, 50 Hz; RMS	t=1 min
			3.60		t=1 sec
MECHANICAL					
M_1	Mounting torque (M5)[1)]	Nm	6.00	Tolerance ± 15%	
M_2	Terminal connection torque (M8)[1)]	Nm	9.00	Tolerance ± 15%	
w	Weight	g	800		

PART NUMBERING GUIDE

MD	3	-	400	-	18	-	C1	-	N
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.C1)
6. Ambient Conditions:
   N – Normal

NOTES

[1)] The screws must be lubricated

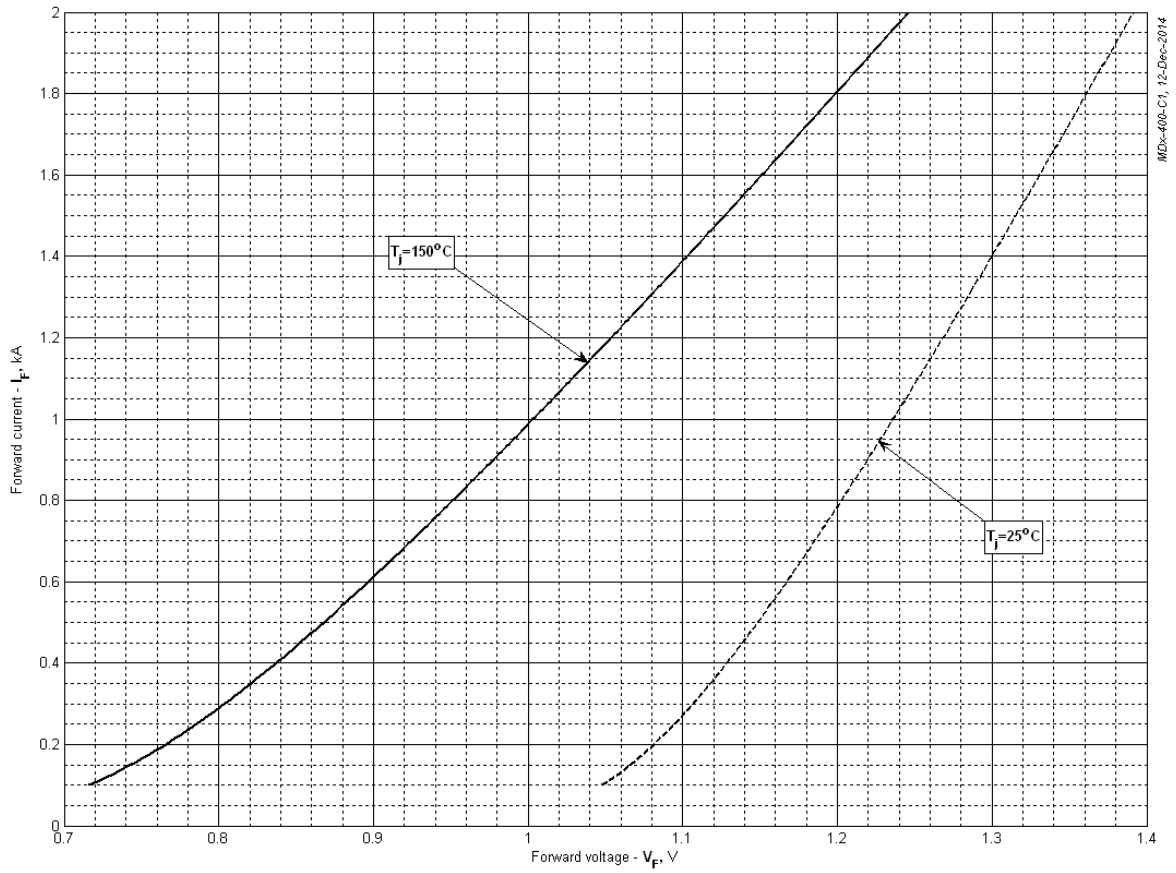


Fig 1 – On-state characteristics of Limit device

Analytical function for On-state characteristic:

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

	Coefficients for max curves	
	T_j = 25°C	$T_j = T_{j\,max}$
A	0.966957	0.599043
B	0.106743	0.173890
C	-0.157781	-0.223965
D	0.271640	0.385583

On-state characteristic model (see Fig. 1)

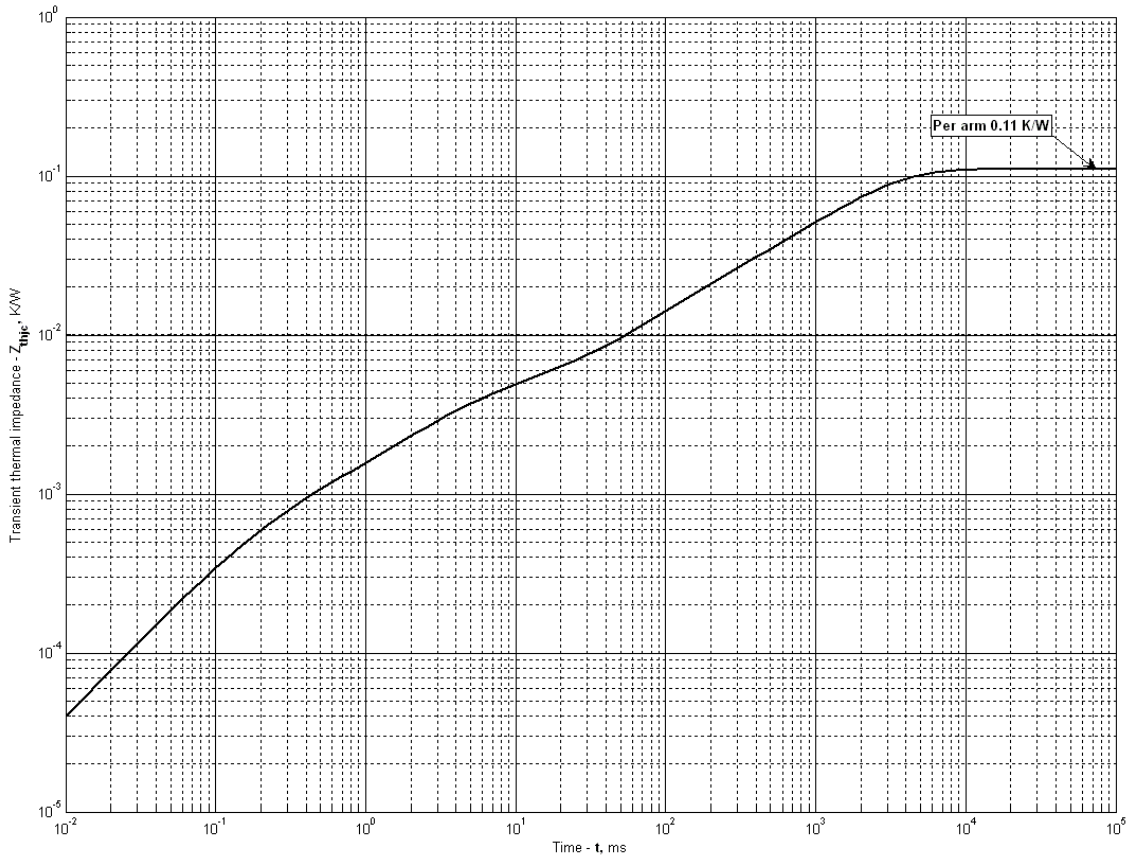


Fig 2 – Transient thermal impedance

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	0.1293	0.01314	0.02771	-0.05535	0.0528	0.002749
τ_i, s	2.823	1.393	0.3322	0.0611	0.05731	0.002173

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

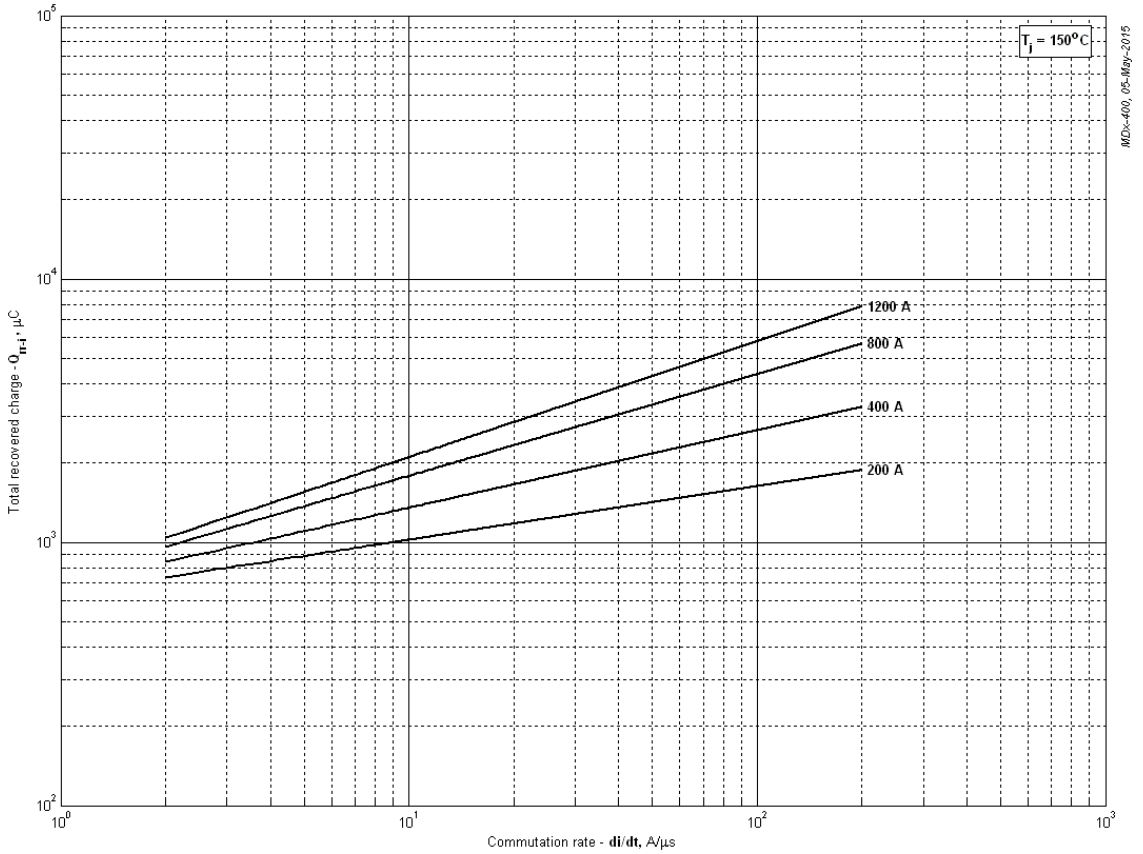


Fig 3 - Total recovered charge, Q_{rr-i} (integral)

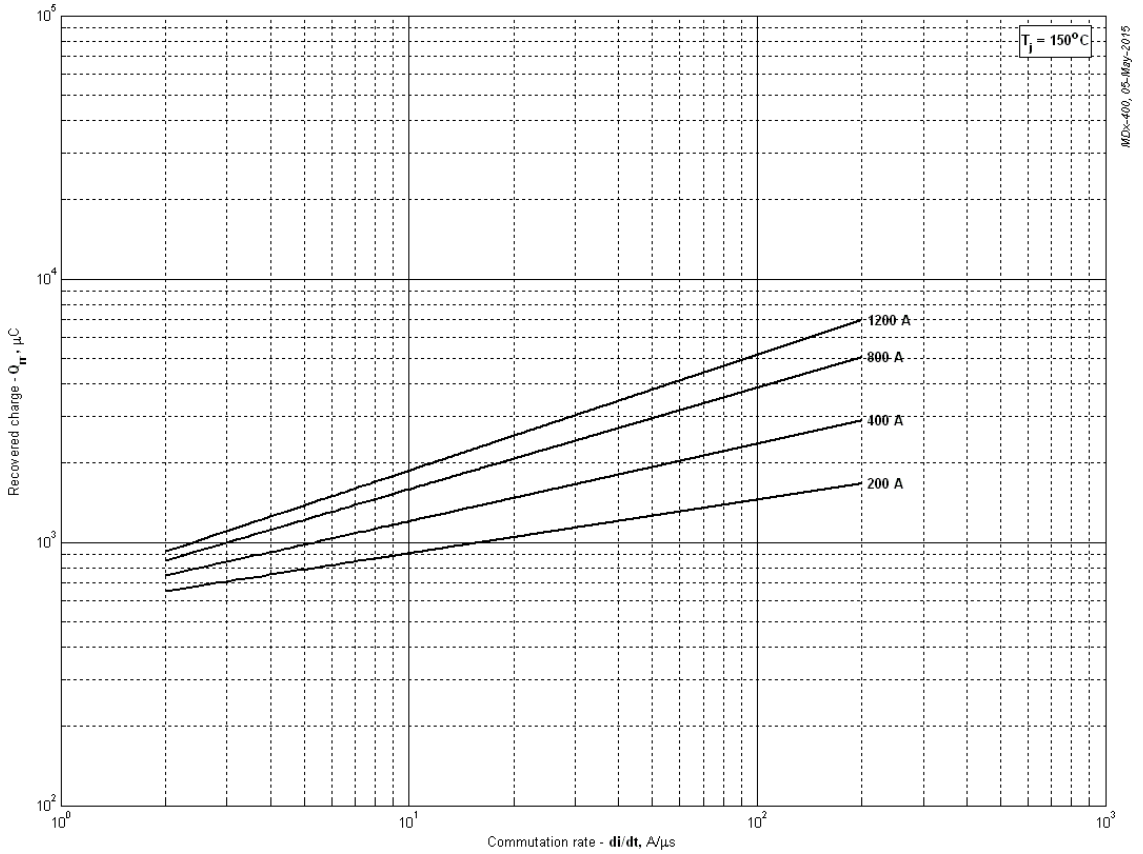


Fig 4 - Recovered charge, Q_{rr} (linear)

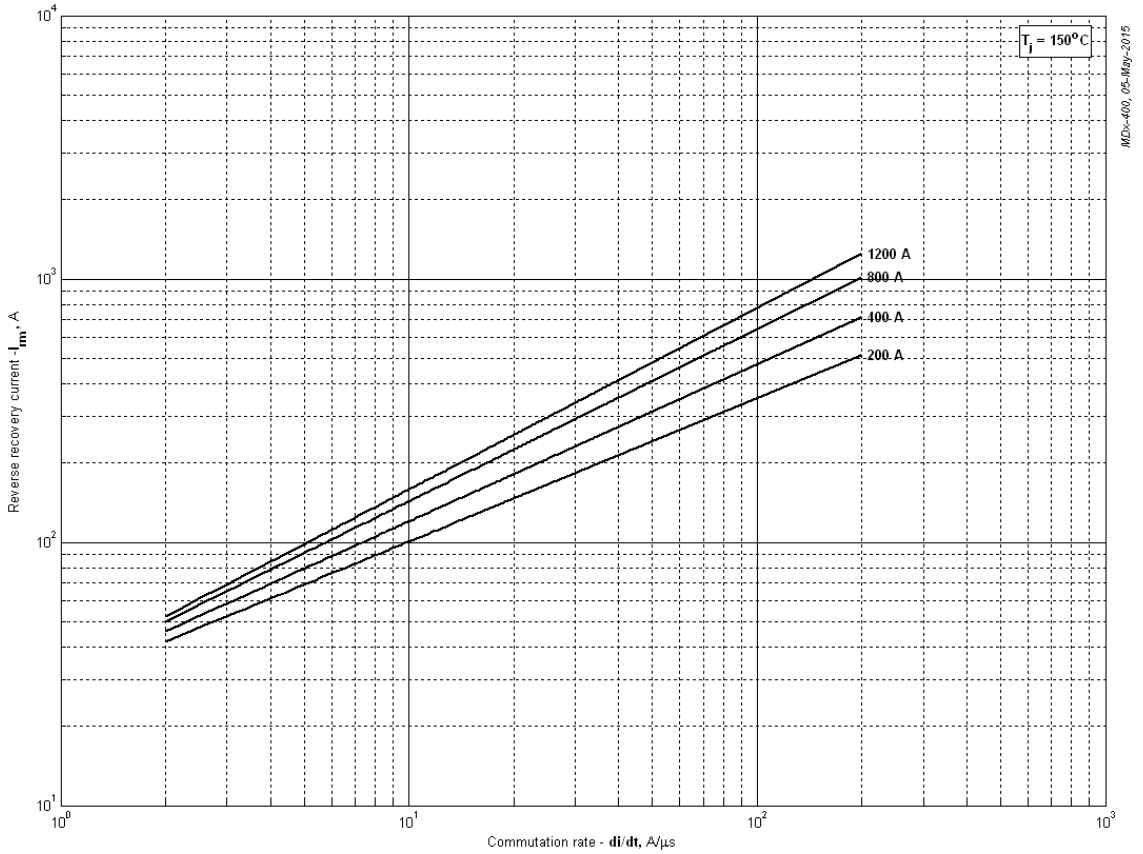


Fig 5 - Peak reverse recovery current, I_{rm}

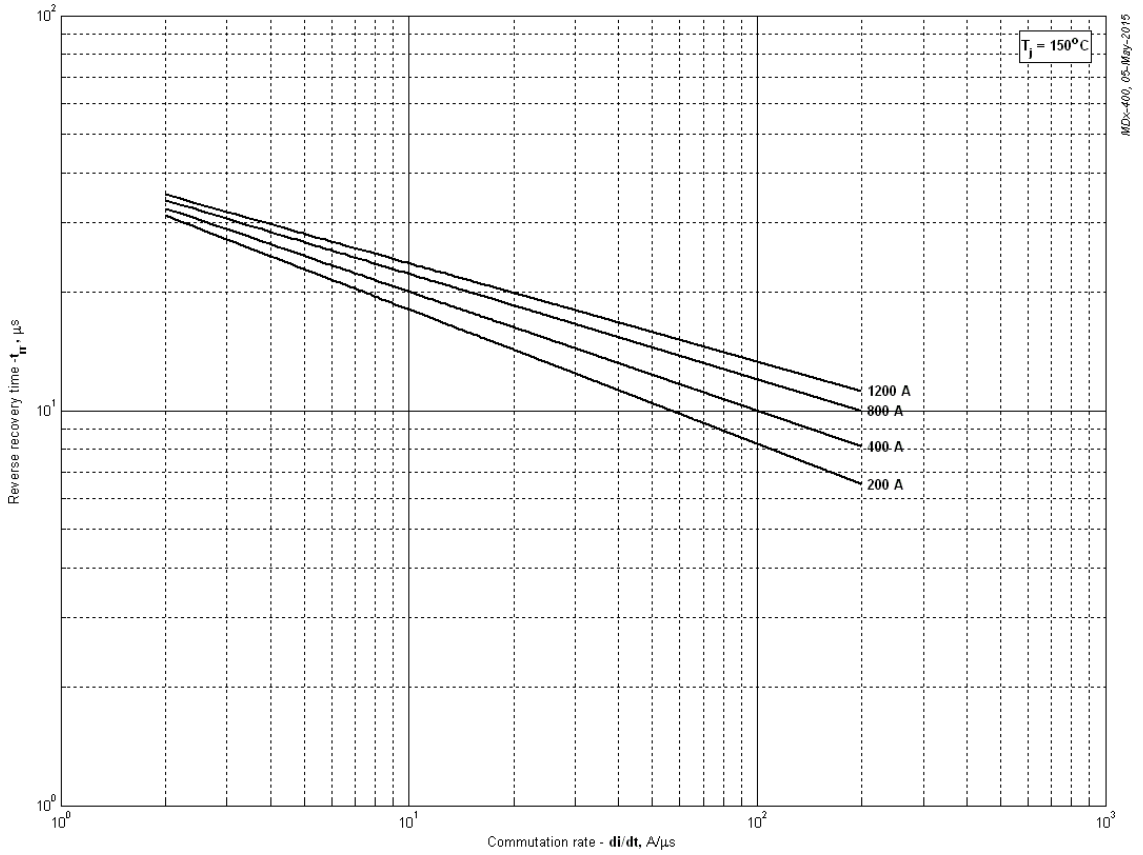


Fig 6 - Recovery time, t_{rr} (50% chord)

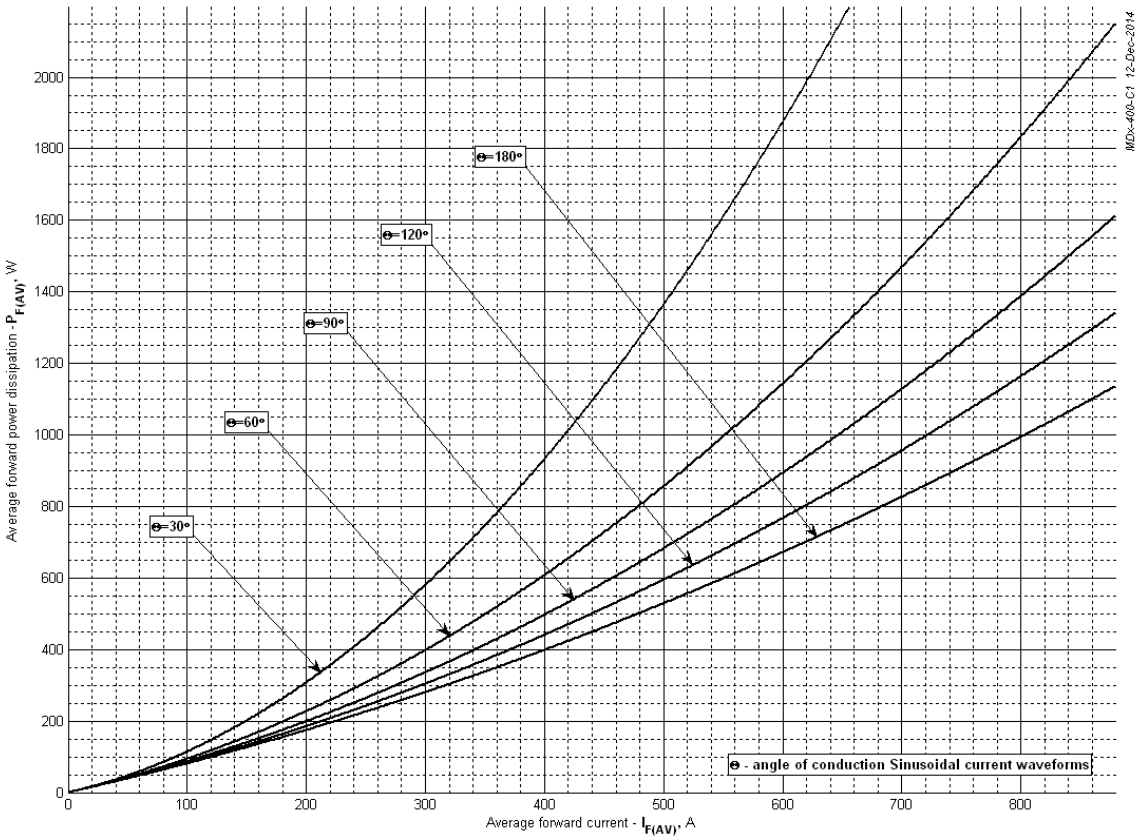


Fig 7 – On-state power loss (sinusoidal current waveforms)

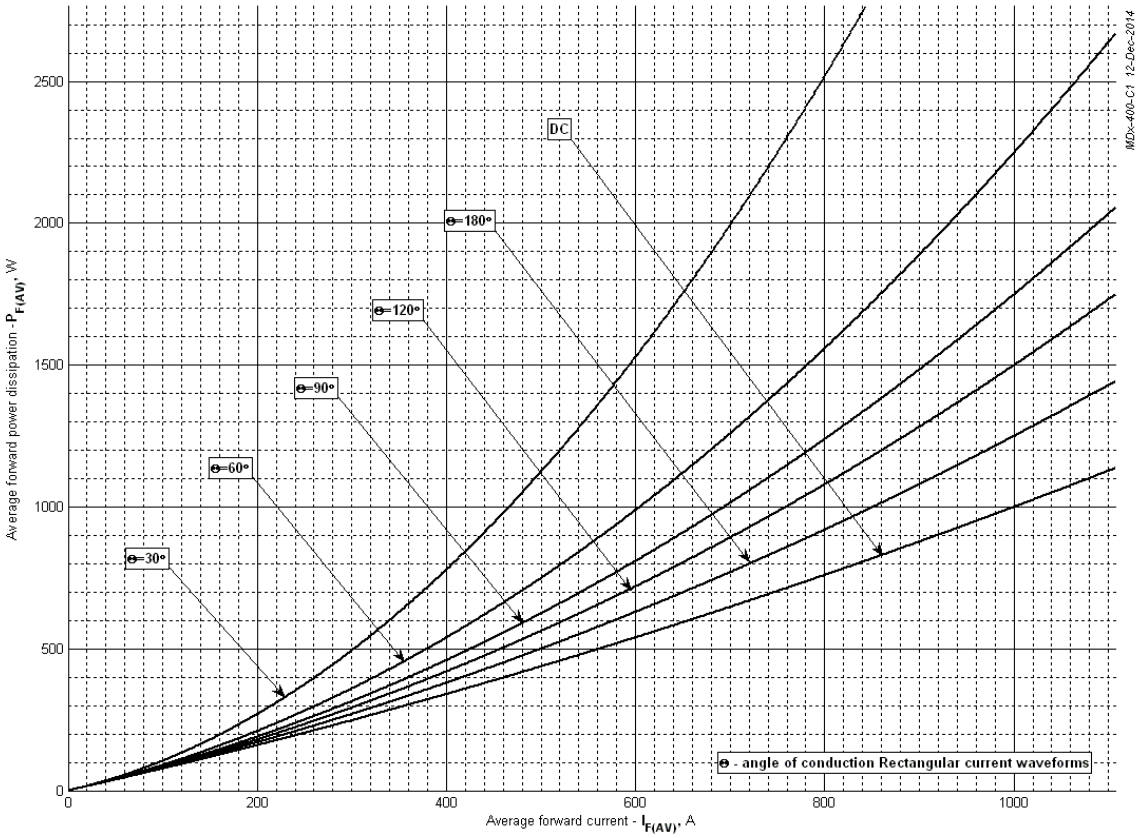


Fig 8 - On-state power loss (rectangular current waveforms)

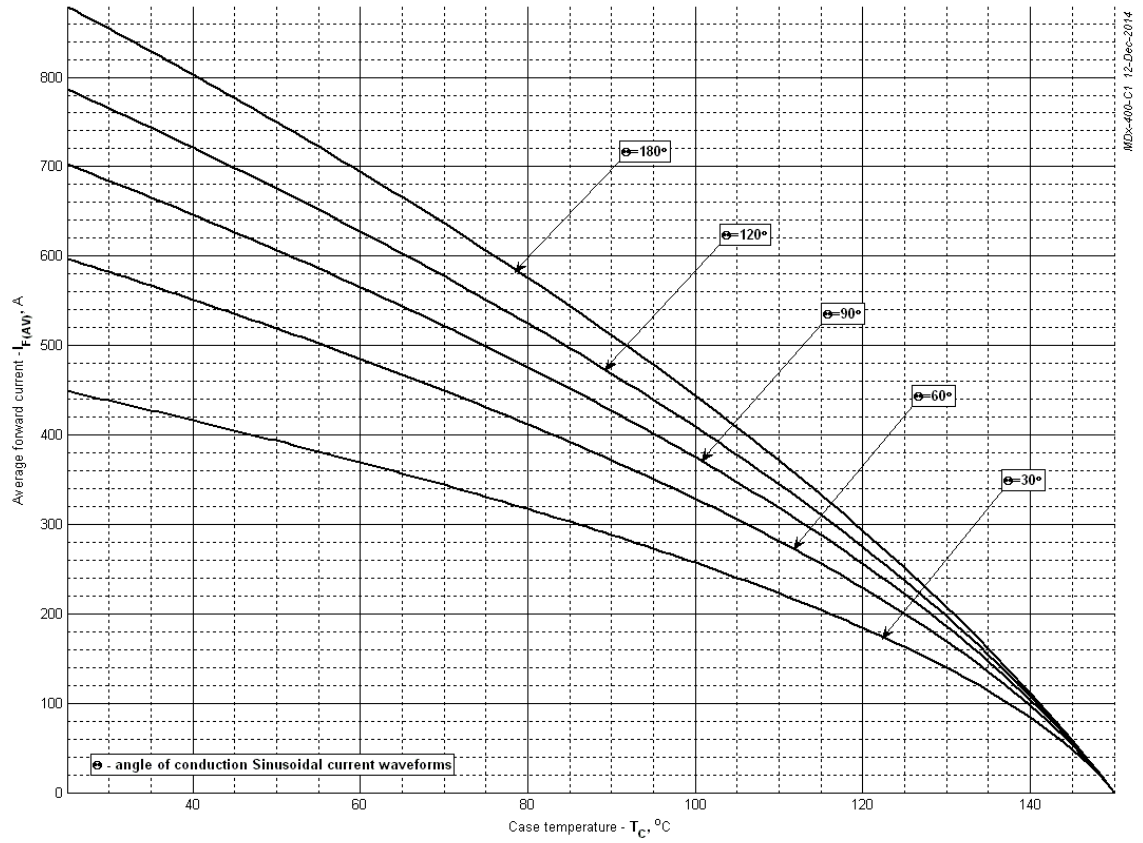


Fig 9 – Maximum case temperature (sinusoidal current waveforms)

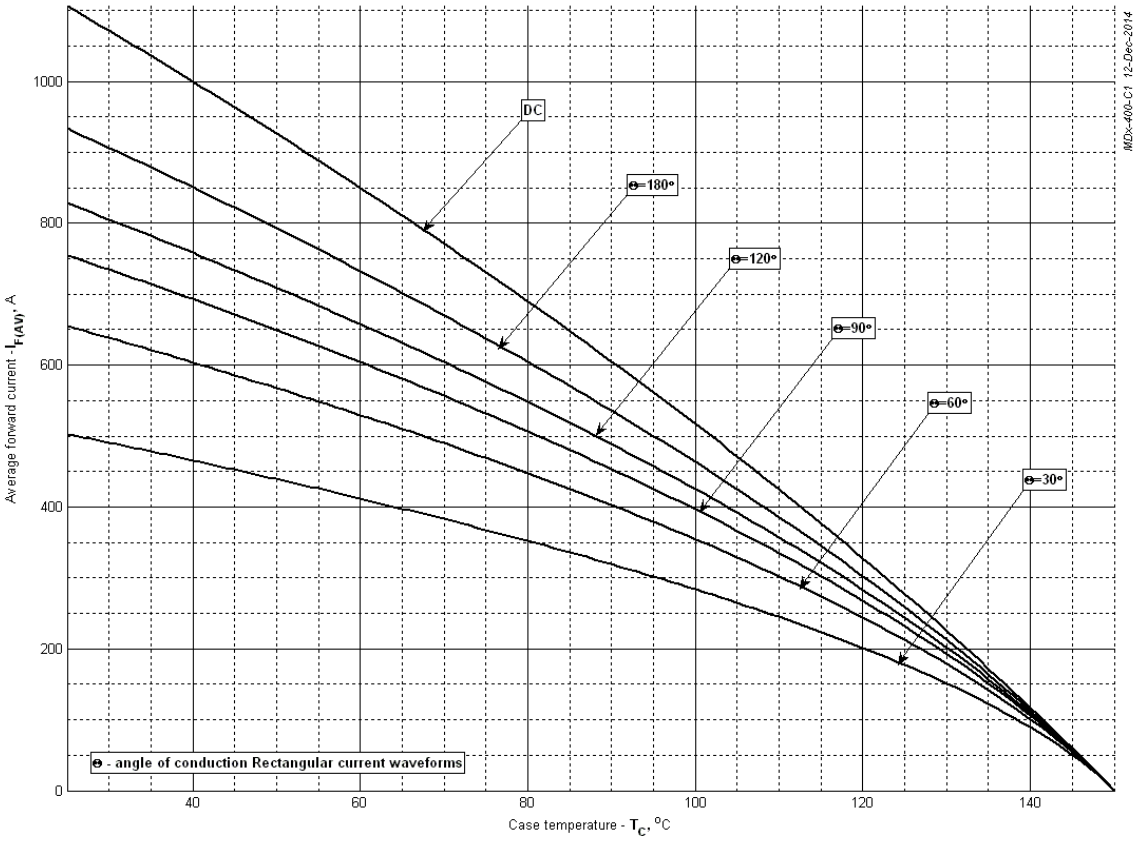


Fig 10 - Maximum case temperature (rectangular current waveforms)

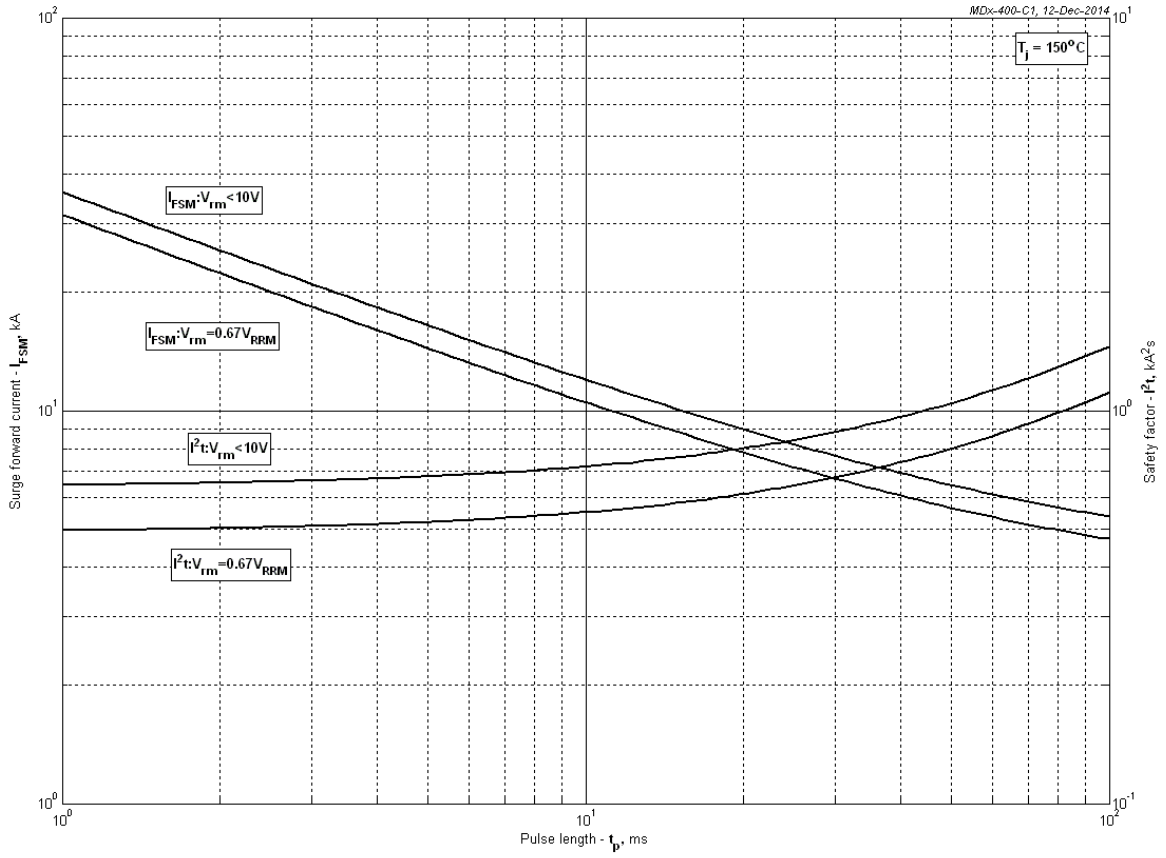


Fig 11 – Maximum surge and I^2t ratings

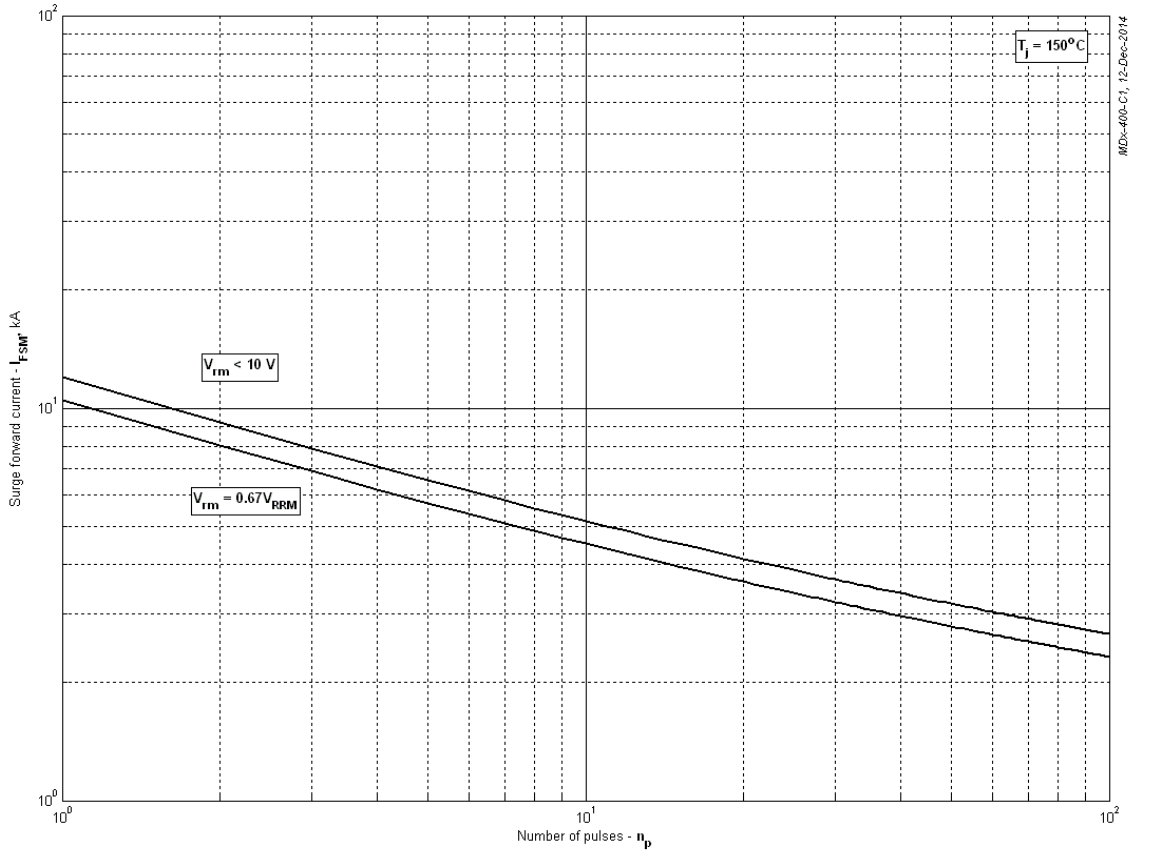


Fig 12 - Maximum surge ratings