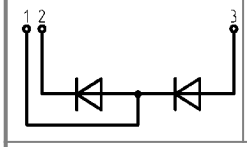
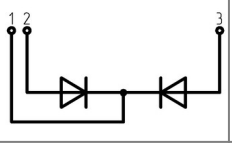
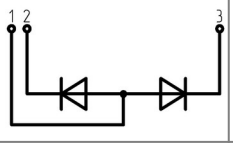
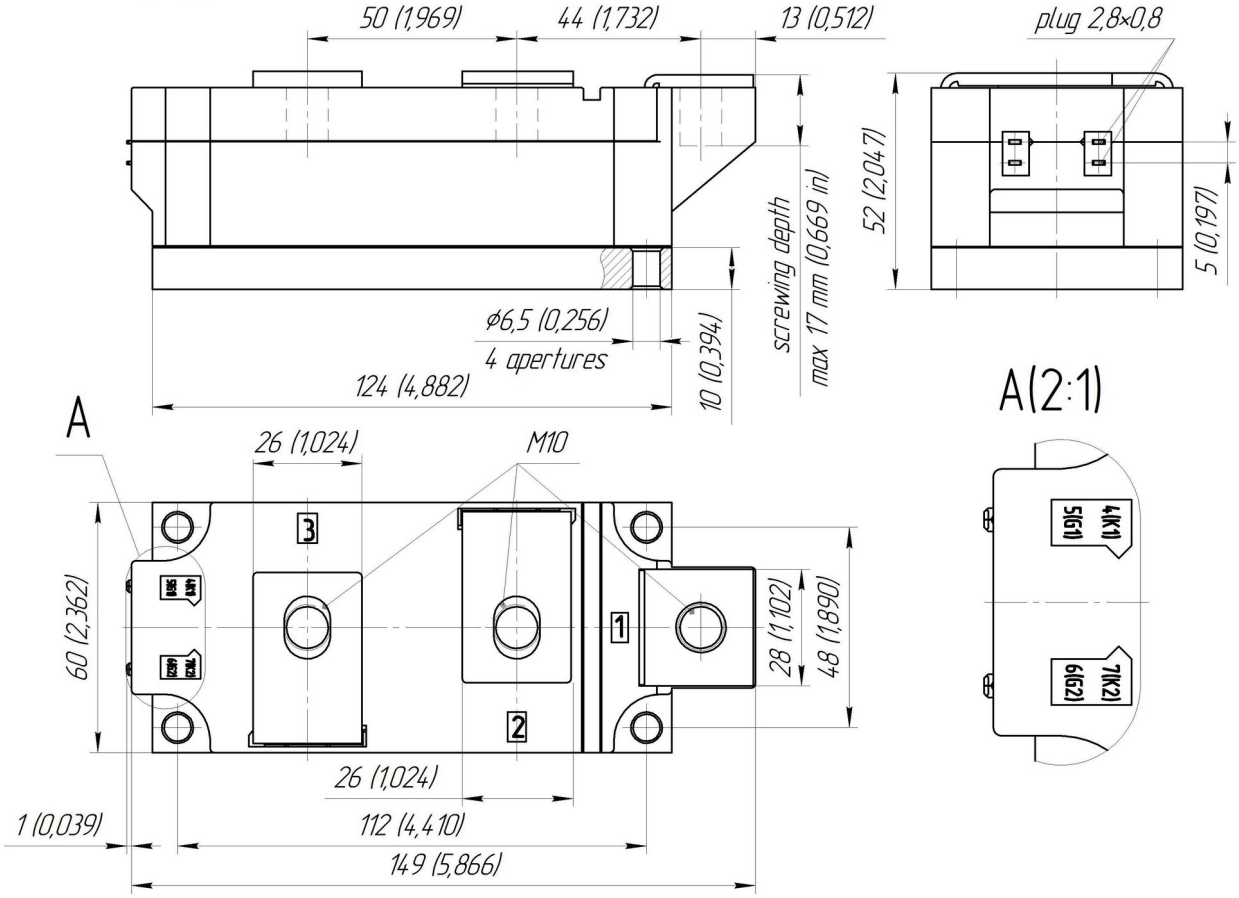
Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

Double Diode Module For Phase Control MDx-470-44-A2

Average forward current		I_{FAV}	470 A	
Repetitive peak reverse voltage		V_{RRM}	3800 ÷ 4400 V	
V_{RRM}, V	3800	4000	4200	4400
Voltage code	38	40	42	44
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	470	T_c=100 °C;	
I_{FRMS}	RMS forward current	A	740	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; 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; t_p=8.3 ms; single pulse; V_R=0 V;
I^2t	Safety factor	$A^2s\cdot10^3$	720 980	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 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; t_p=8.3 ms; single pulse; V_R=0 V;
BLOCKING					
V_{RRM}	Repetitive peak reverse voltages	V	3800÷4400	$T_{j\,min}$< T_j <$T_{j\,max}$; 180° half-sine wave; 50 Hz;	
V_{RSM}	Non-repetitive peak reverse voltages	V	3900÷4500	$T_{j\,min}$< 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	1.70	T_j=25 °C; I_{FM}=1256 A	
$V_{F(TO)}$	Forward threshold voltage, max	V	0.85	T_j=$T_{j\,max}$; 0.5 π I_{FAV} < I_T < 1.5 π I_{FAV}	
r_T	Forward slope resistance, max	mΩ	0.600		
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	50	T_j=$T_{j\,max}$; V_R=V_{RRM}	
SWITCHING					
Q_{rr}	Total recovered charge, max	µC	2730	T_j=$T_{j\,max}$; I_{TM}=470 A; di_R/dt=-5 A/µs; V_R=100 V	
t_{rr}	Reverse recovery time, max	µs	53		
I_{rrM}	Peak reverse recovery current, max	A	103		
THERMAL					
R_{thjc}	Thermal resistance, junction to case				
	per module	°C/W	0.0340	180° half-sine wave, 50 Hz	
	per arm	°C/W	0.0680		
	per module	°C/W	0.0325	DC	
	per arm	°C/W	0.0650		
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%
w	Weight, max	g	1500	

PART NUMBERING GUIDE

MD	3	-	470	-	44	-	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

NOTES

[1)] The screws must be lubricated

UL certified file-No. E255404

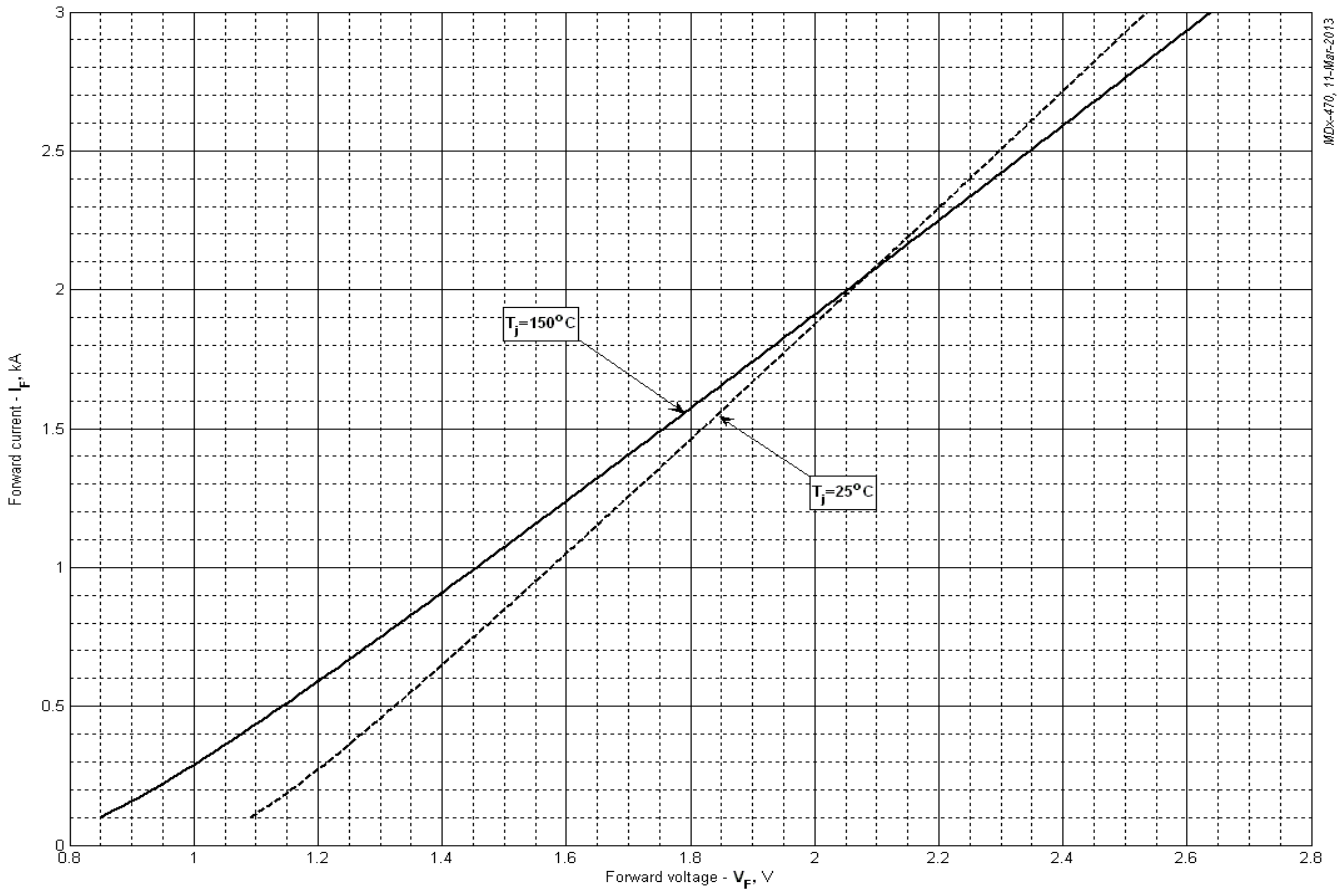


Fig 1 – On-state characteristics of Limit device

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°C	$T_j = T_{j\,max}$
A	0.978543	0.698294
B	0.434275	0.526807
C	-0.147491	-0.209359
D	0.264466	0.375400

On-state characteristic model (see Fig. 1).

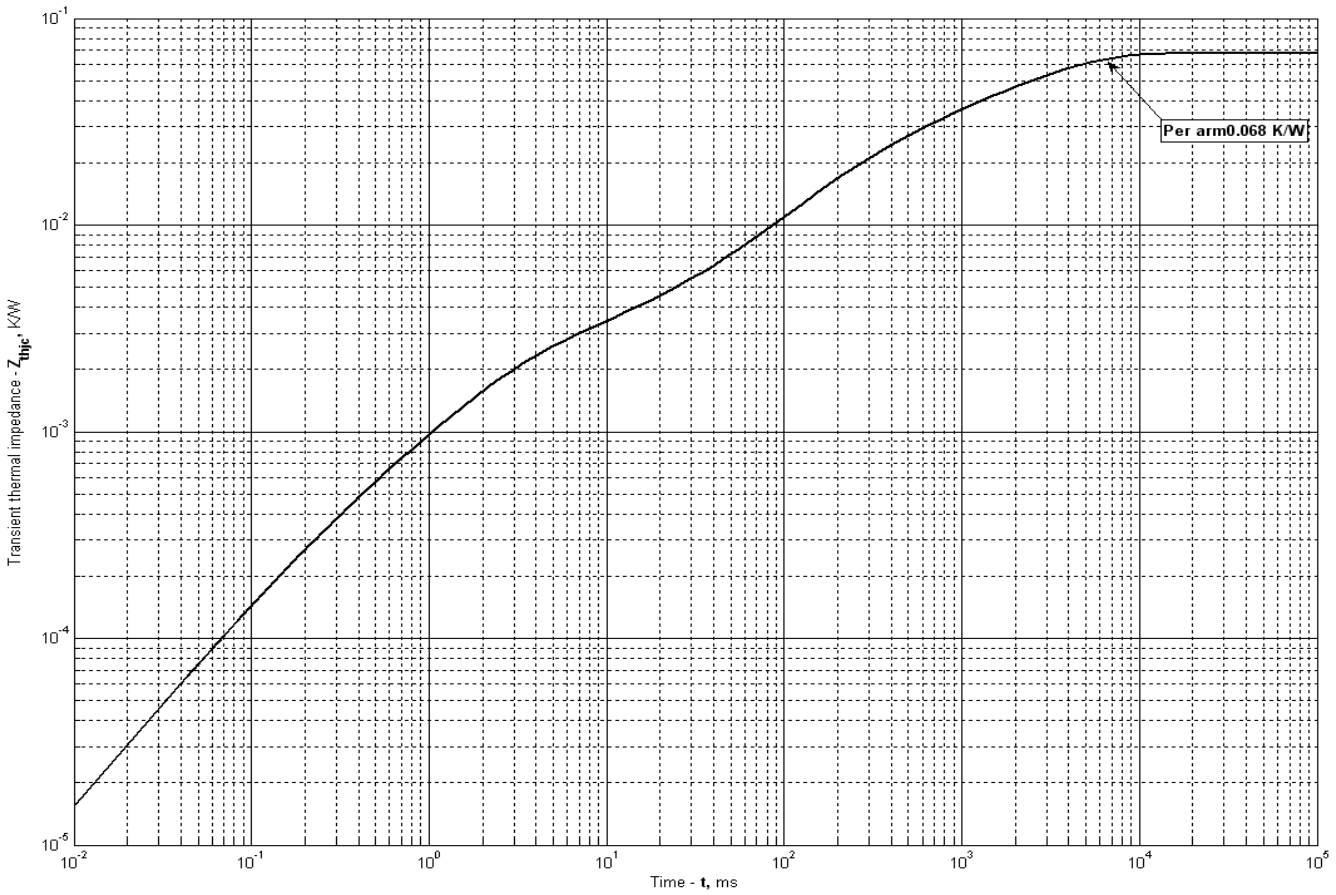


Fig 2 – Transient thermal impedance

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.

$\mathbf{Z_{thjc}}$ = Thermal resistance at time t.

$\mathbf{R_i}$ = Amplitude of p_{th} term.

τ_i = Time constatnt of r_{th} term.

i	1	2	3	4	5	6
$\mathbf{R_i}$, **K/W**	0.0385	0.01253	0.0144	0.0007273	0.001871	0.0001367
τ_i, **s**	3.124	0.8558	0.1999	0.009185	0.002295	0.000238

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

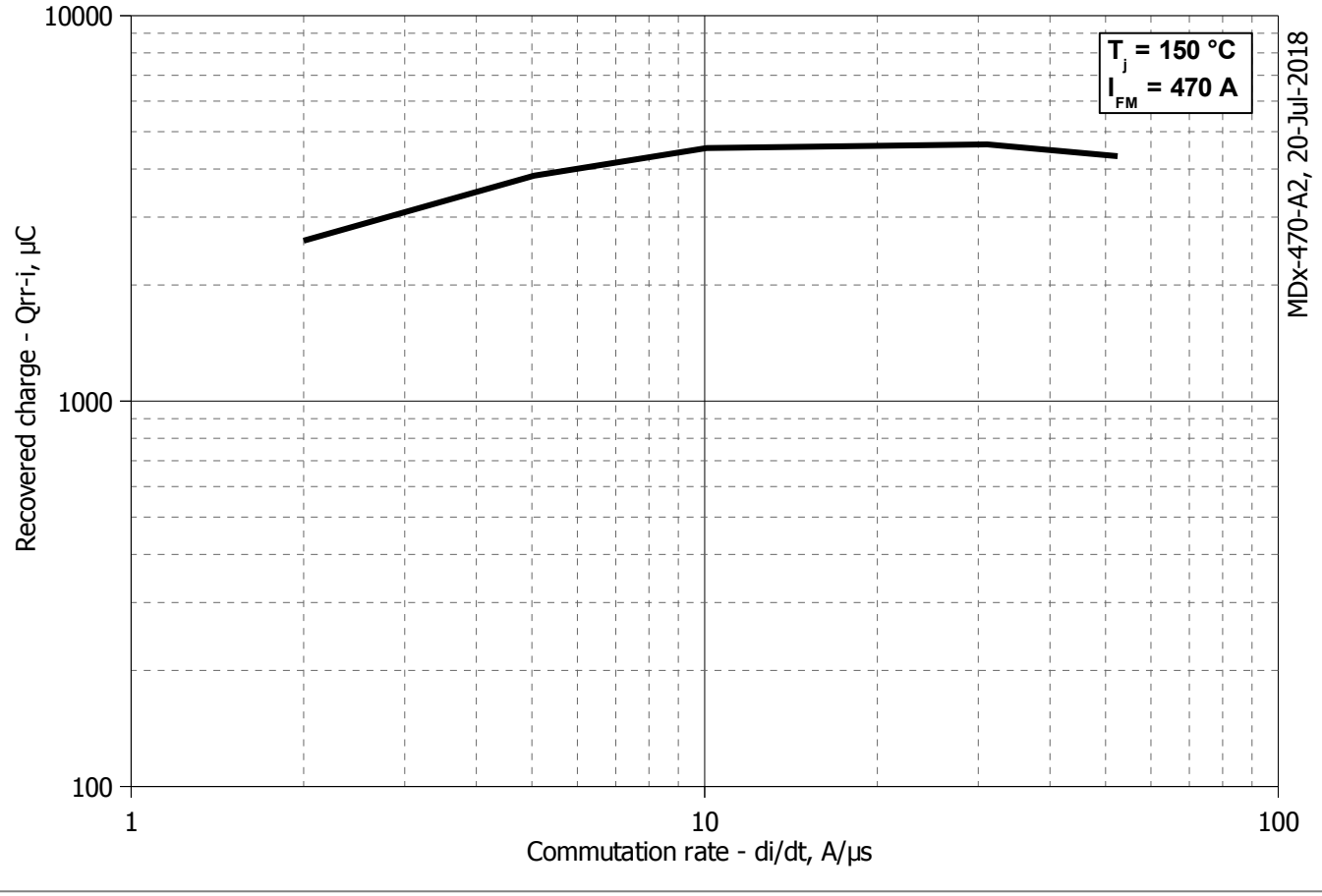


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

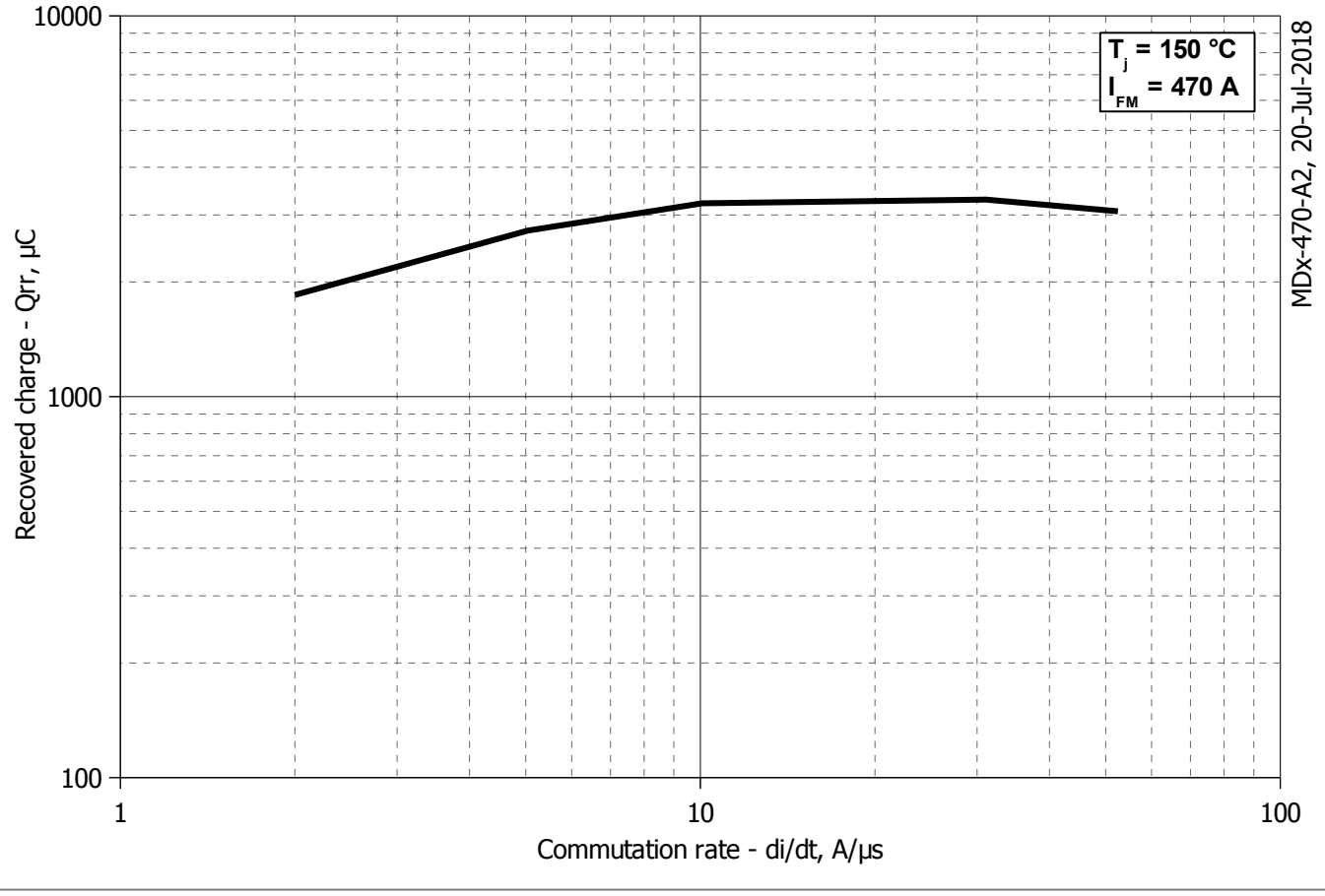


Fig 4 - Recovered charge, Q_{rr} (25% chord)

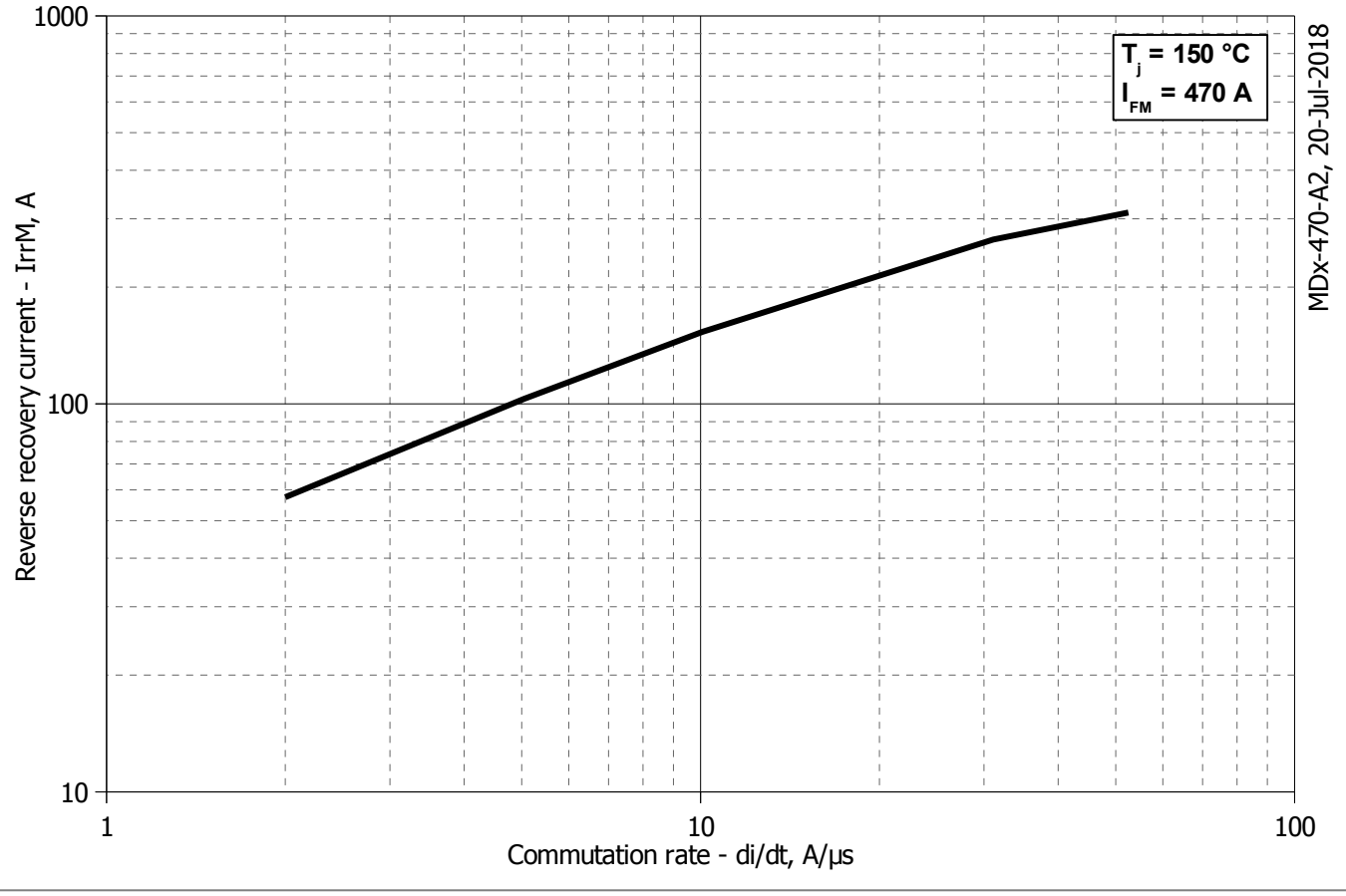


Fig 5 – Peak reverse recovery current, I_{rrM}

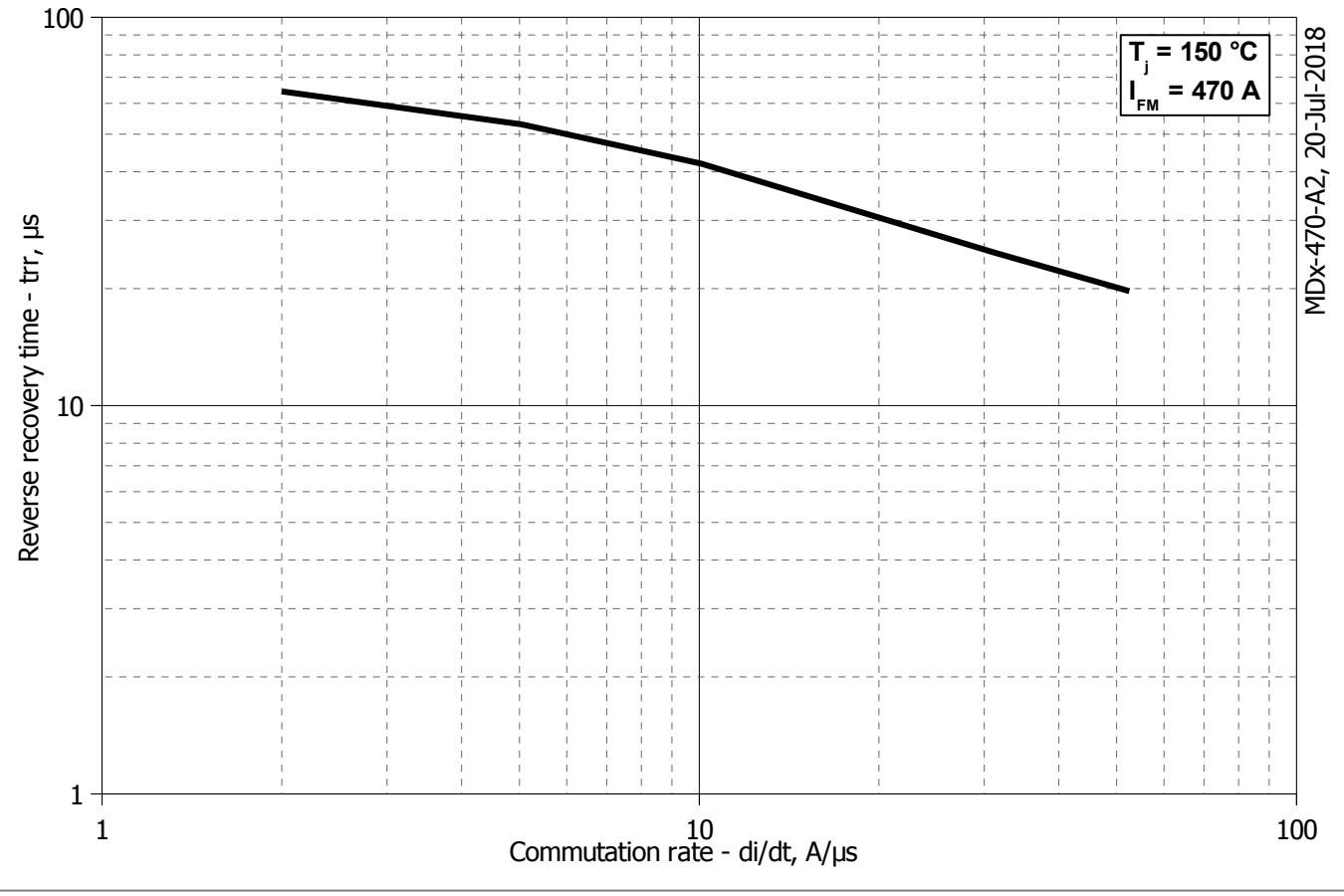


Fig 6 – Maximum recovery time, t_{rr} (25% chord)

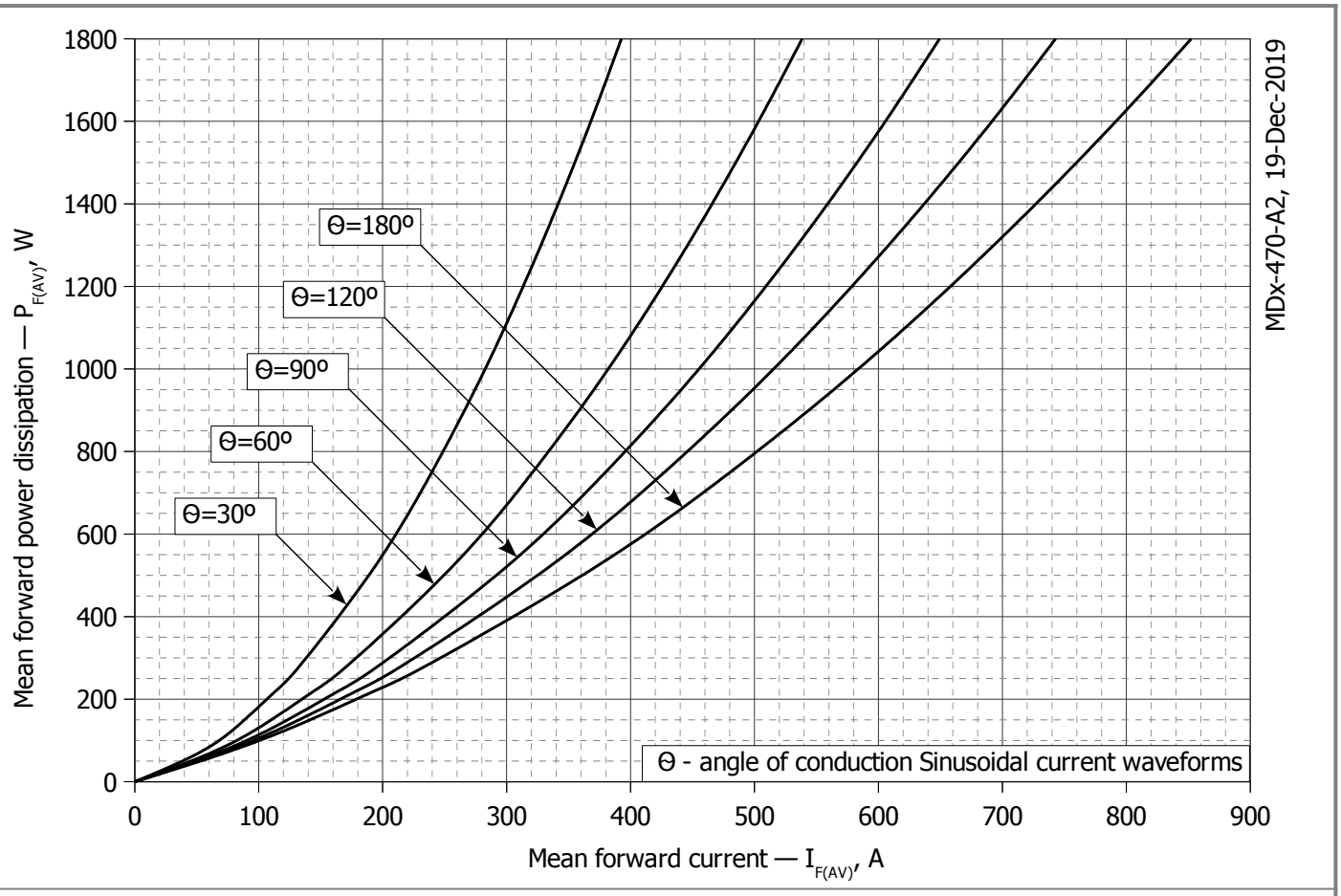


Fig 7 – On-state power loss (sinusoidal current waveforms)

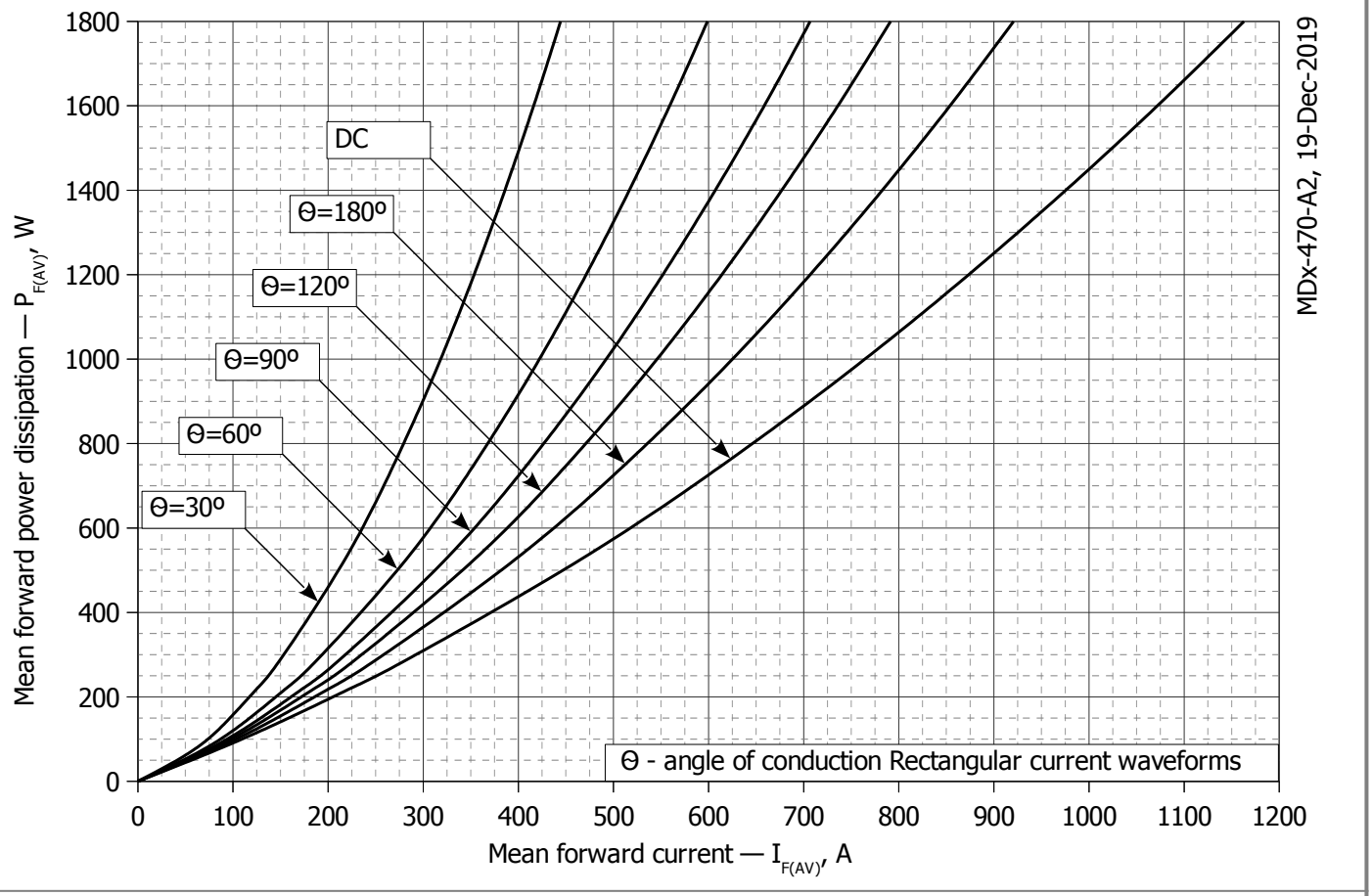


Fig 8 – On-state power loss (rectangular current waveforms)

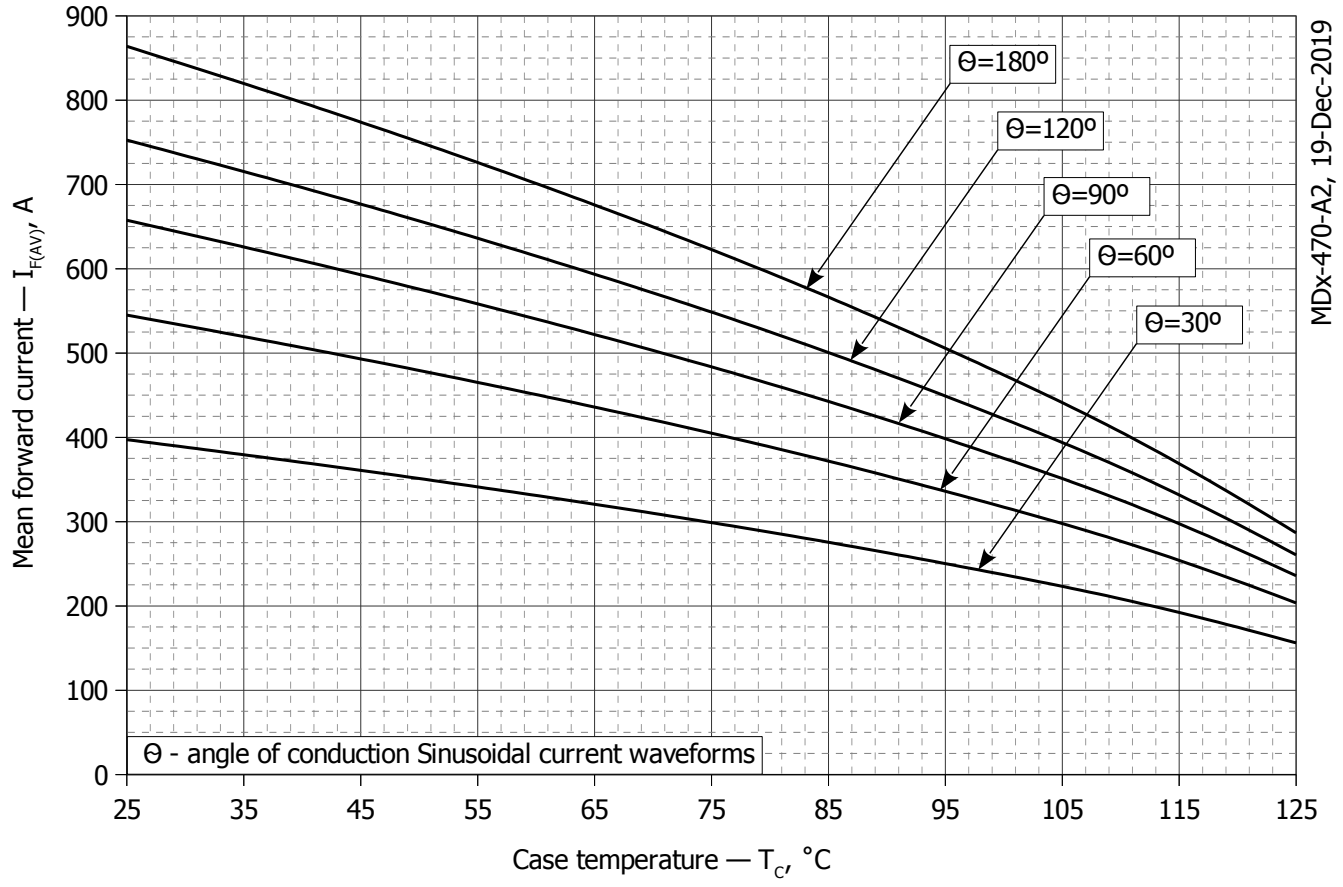


Fig 9 – Maximum case temperature DSC (sinusoidal current waveforms)

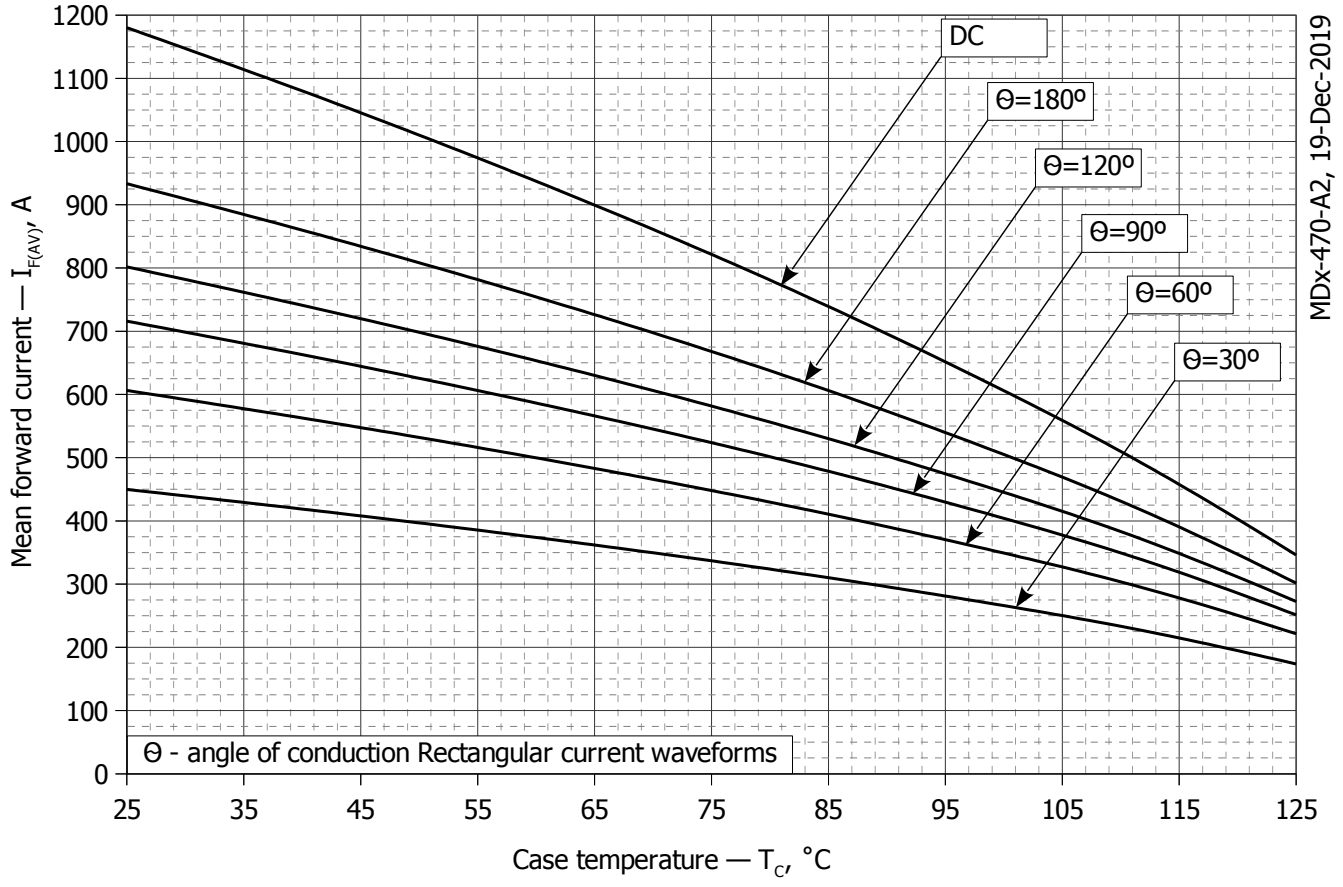


Fig 10 – Maximum case temperature DSC (rectangular current waveforms)

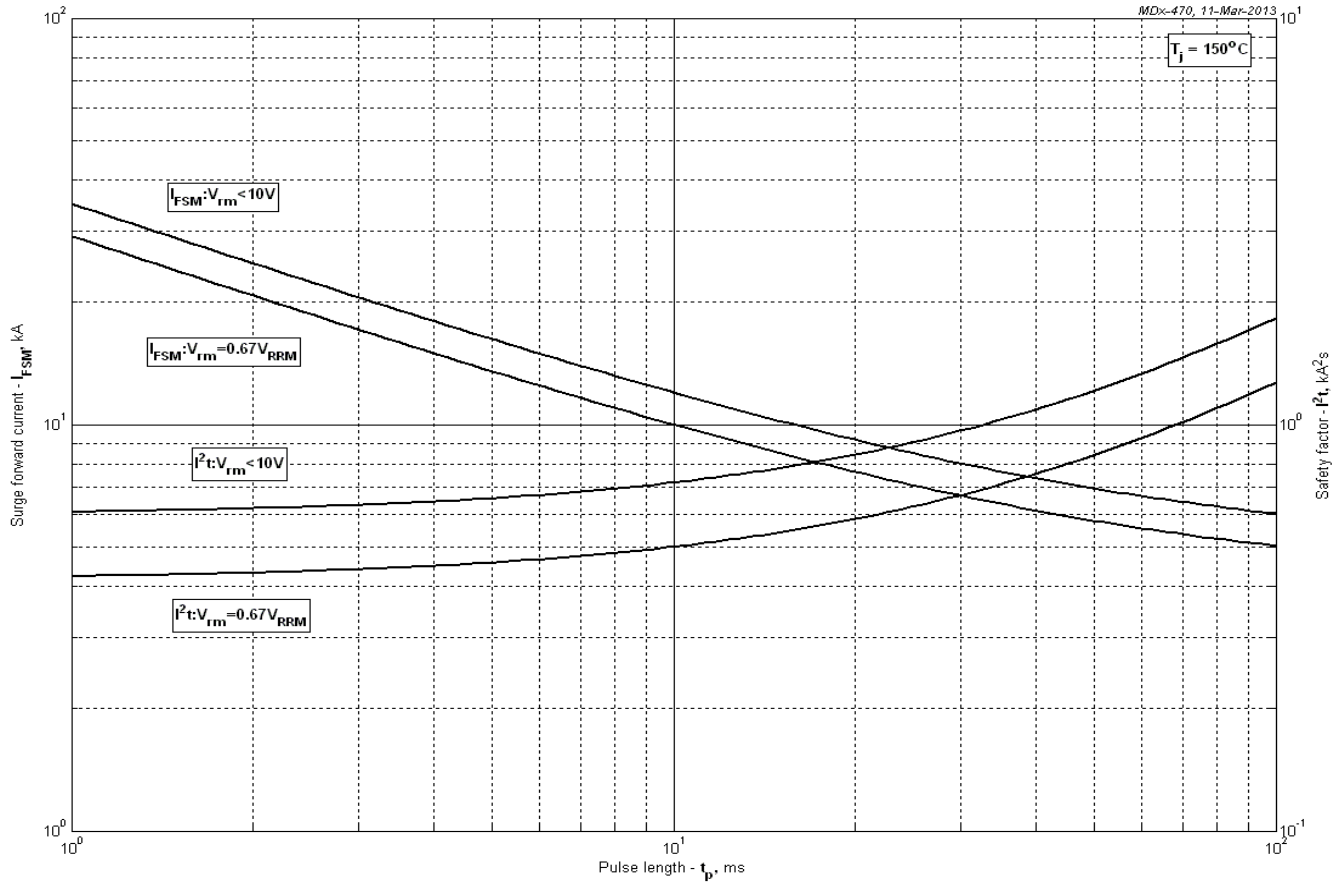


Fig 11 – Maximum surge and I^2t ratings

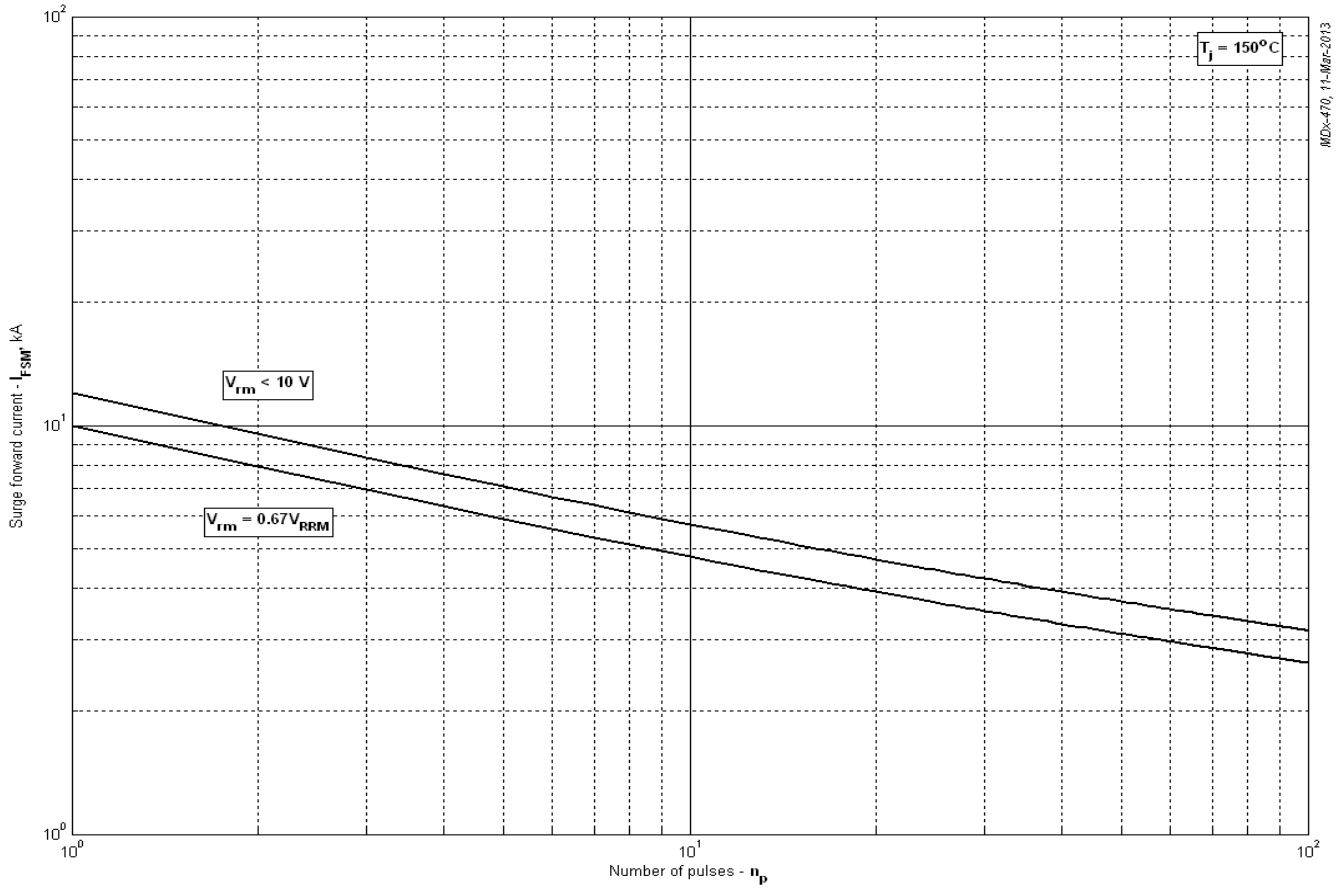


Fig 12 – Maximum surge ratings