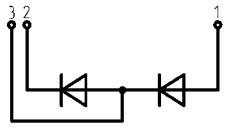
PROTON-ELECTROTEX
RUSSIA

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

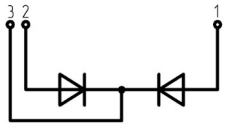
Double Diode Module
For Phase Control
MDx-1000-28-D

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, °C	–40...+150				

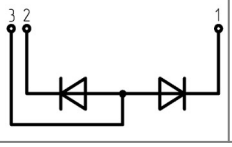
MD3

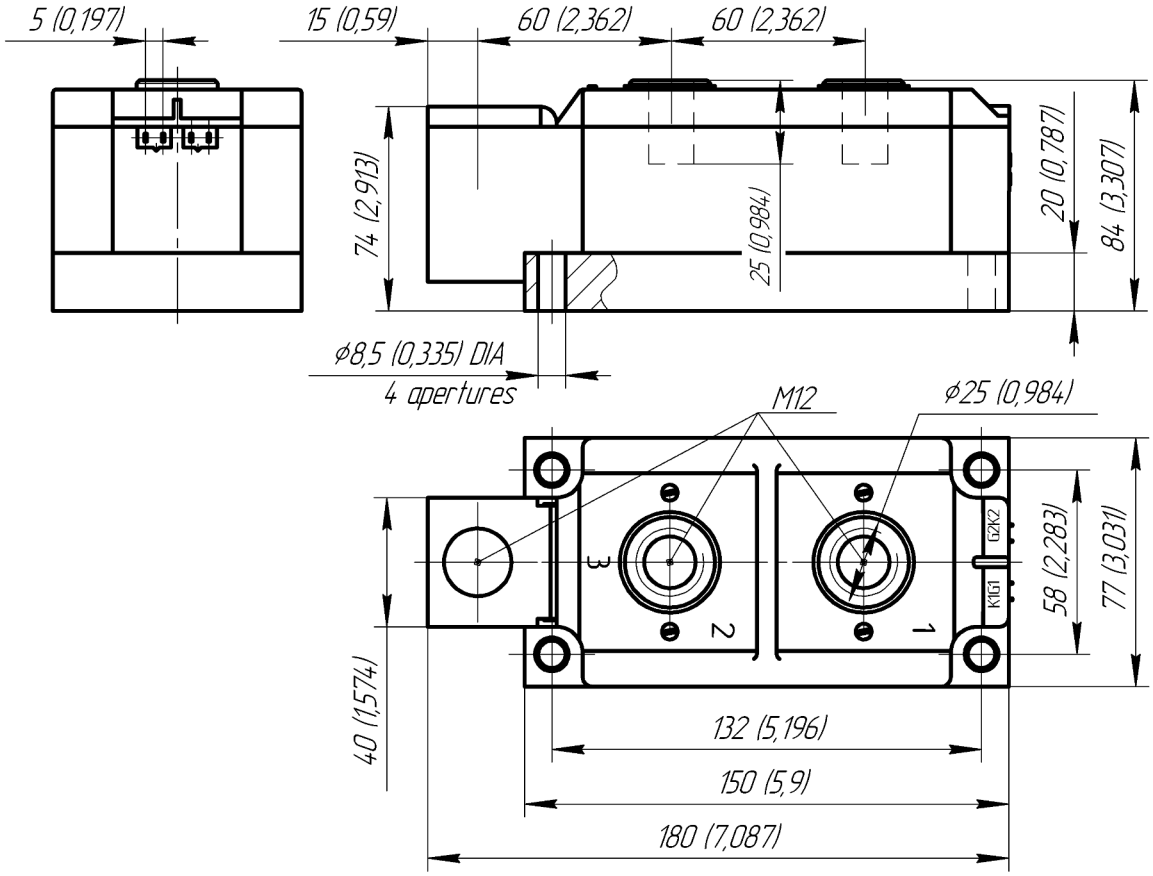


MD4



MD5





All dimensions in millimeters (inches)

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{FAV}	Maximum allowable average forward current	A	1000 799	T_c= 83 °C; T_c= 100 °C; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	1570	T_c= 83 °C; 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	36.0 41.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			38.0 44.0	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	$A^2s{\cdot}10^3$	6400 8400	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			5900 8000	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	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·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	1.38	T_j=25 °C; I_{FM}= 3140 A	
$V_{F(TO)}$	Forward threshold voltage, max	V	0.917	T_j=$T_{j\,max}$; 0.5 π I_{FAV} < I_T < 1.5 π I_{FAV}	
r_T	Forward slope resistance, max	mΩ	0.171		
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	70 4.00	T_j=$T_{j\,max}$ T_j=25 °C	V_R=V_{RRM}
SWITCHING					
Q_r	Recovered charge, max	µC	3720	T_j=$T_{j\,max}$; I_{FM}=I_{FAV}; di_R/dt=-10 A/µs; V_R=100 V	
t_{rr}	Reverse recovery time, max	µs	37		
I_{rr}	Reverse recovery current, max	A	201		
THERMAL					
R_{thjc}	Thermal resistance, junction to case				
	per module	°C/W	0.0250	180° half-sine wave, 50 Hz	
	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; RMS	t=60 sec
			3.60		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%
m	Weight, max	g	4100	

PART NUMBERING GUIDE

MD	3	-	1000	-	28	-	D	-	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.D)
6. Ambient Conditions:
   N – Normal

NOTES

[1)] The screws must be lubricated

The information contained herein is confidential and protected by Copyright.
In the interest of product improvement, Proton-Electrotex reserves the right to change data sheet without notice.

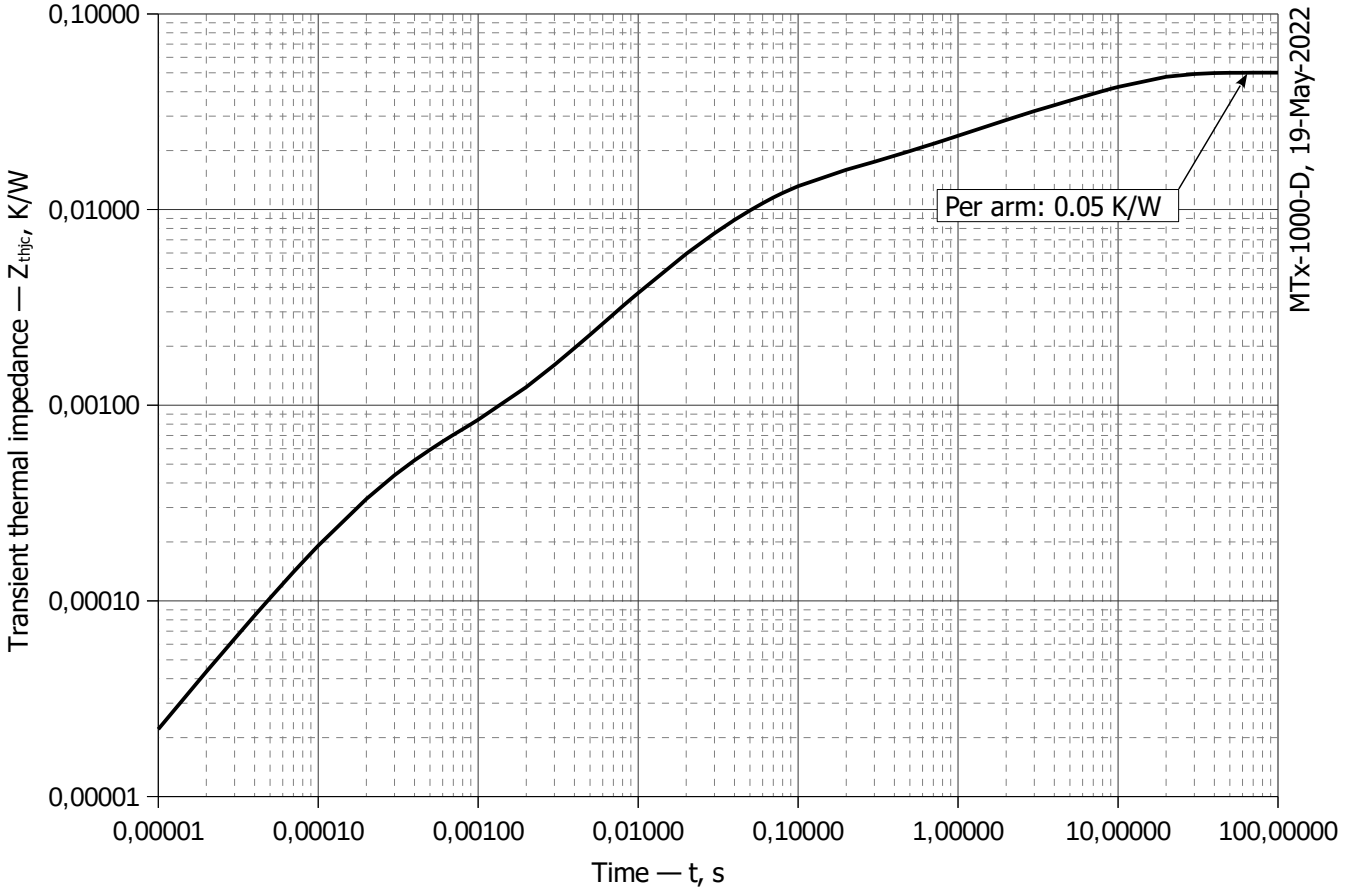


Fig 1 – Transient thermal impedance Z_{thjc} vs. time t

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.

DC

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	1.11	0.2289	0.04529	0.009524	0.0002414

Transient thermal impedance junction to case Z_{thjc} model (see Fig. 1)

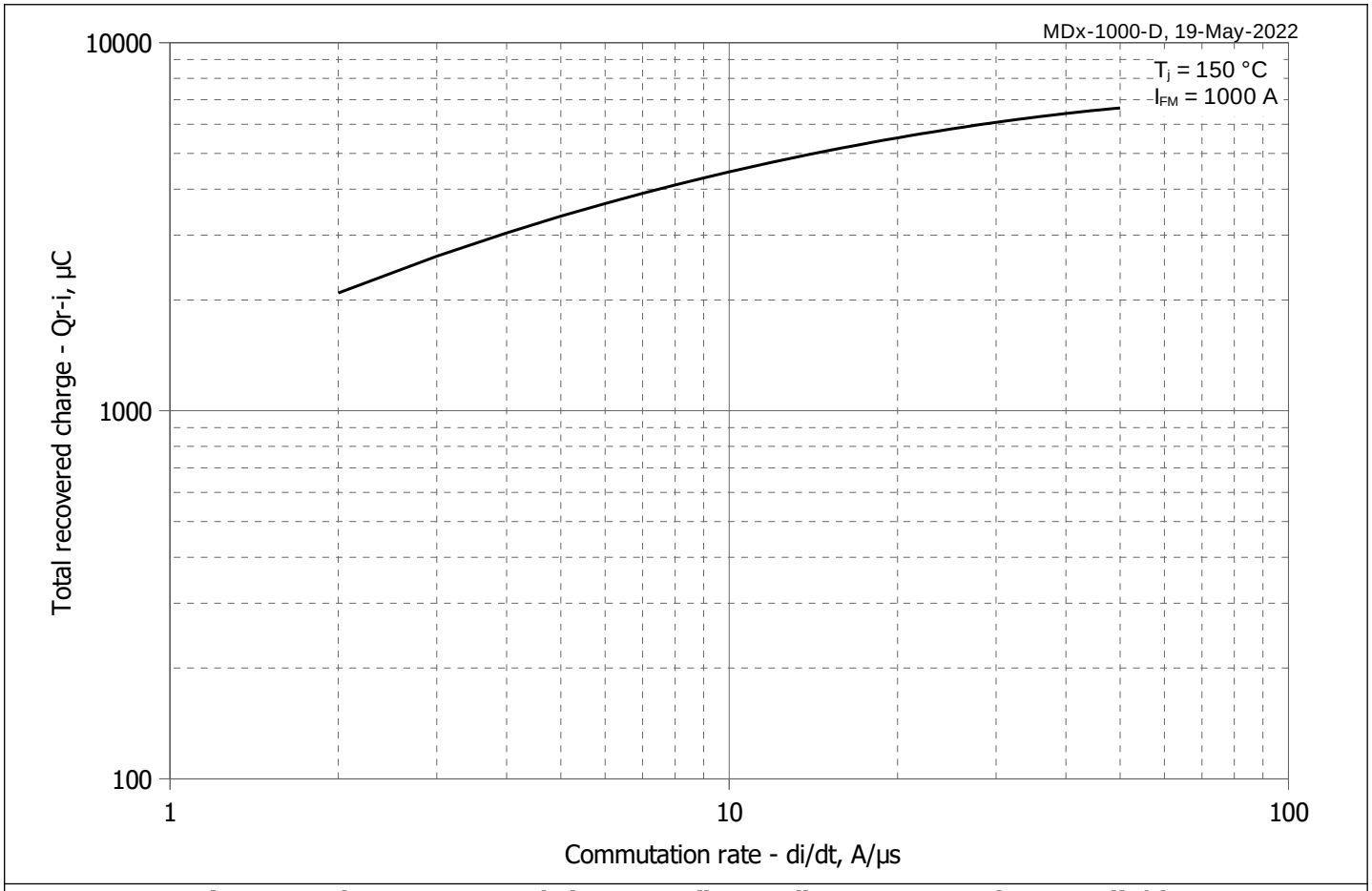


Fig 2 – Maximum recovered charge $Q_{r\text{-}i}$ (integral) vs. commutation rate di_R/dt

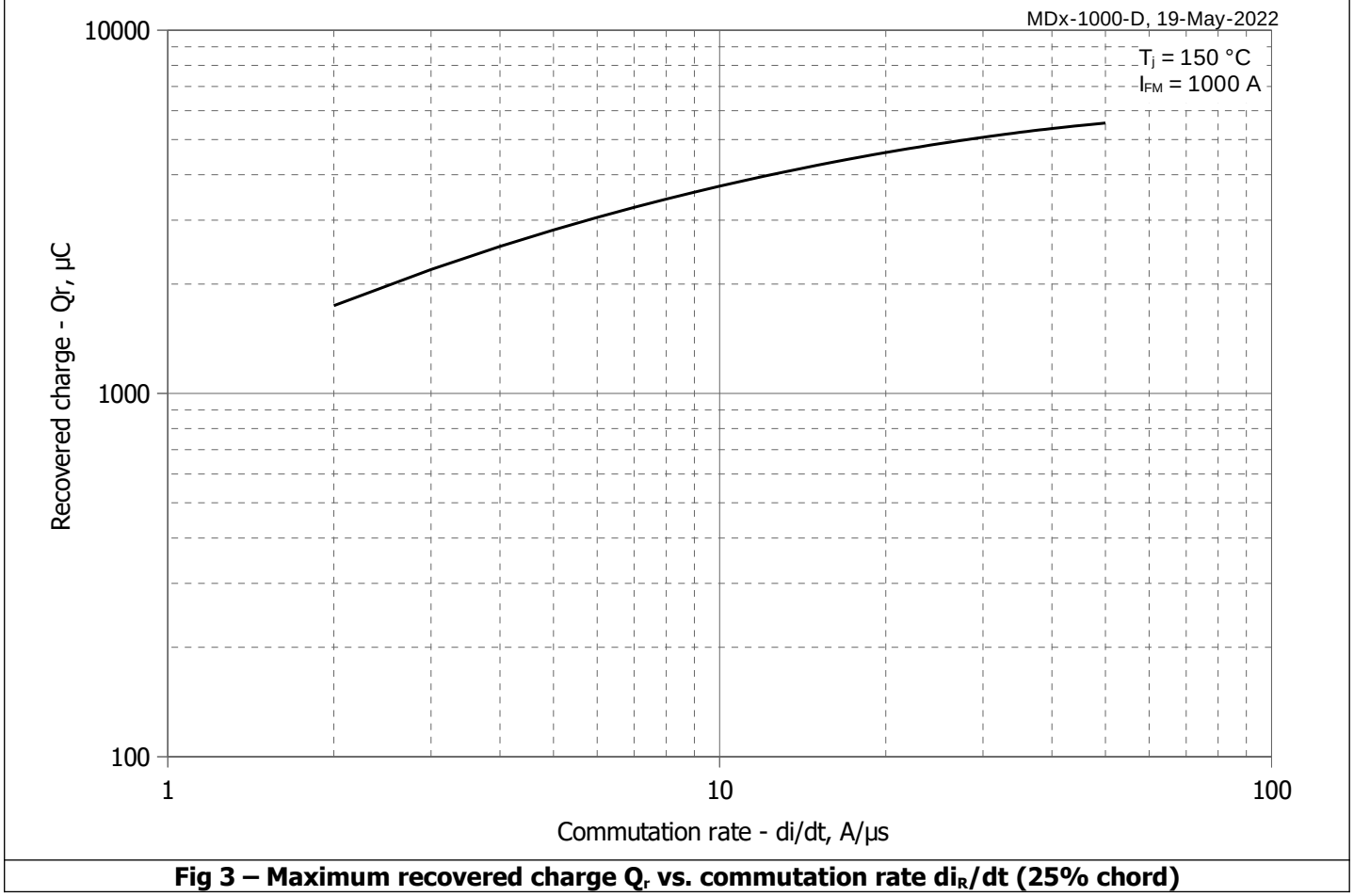


Fig 3 – Maximum recovered charge Q_r vs. commutation rate di_R/dt (25% chord)

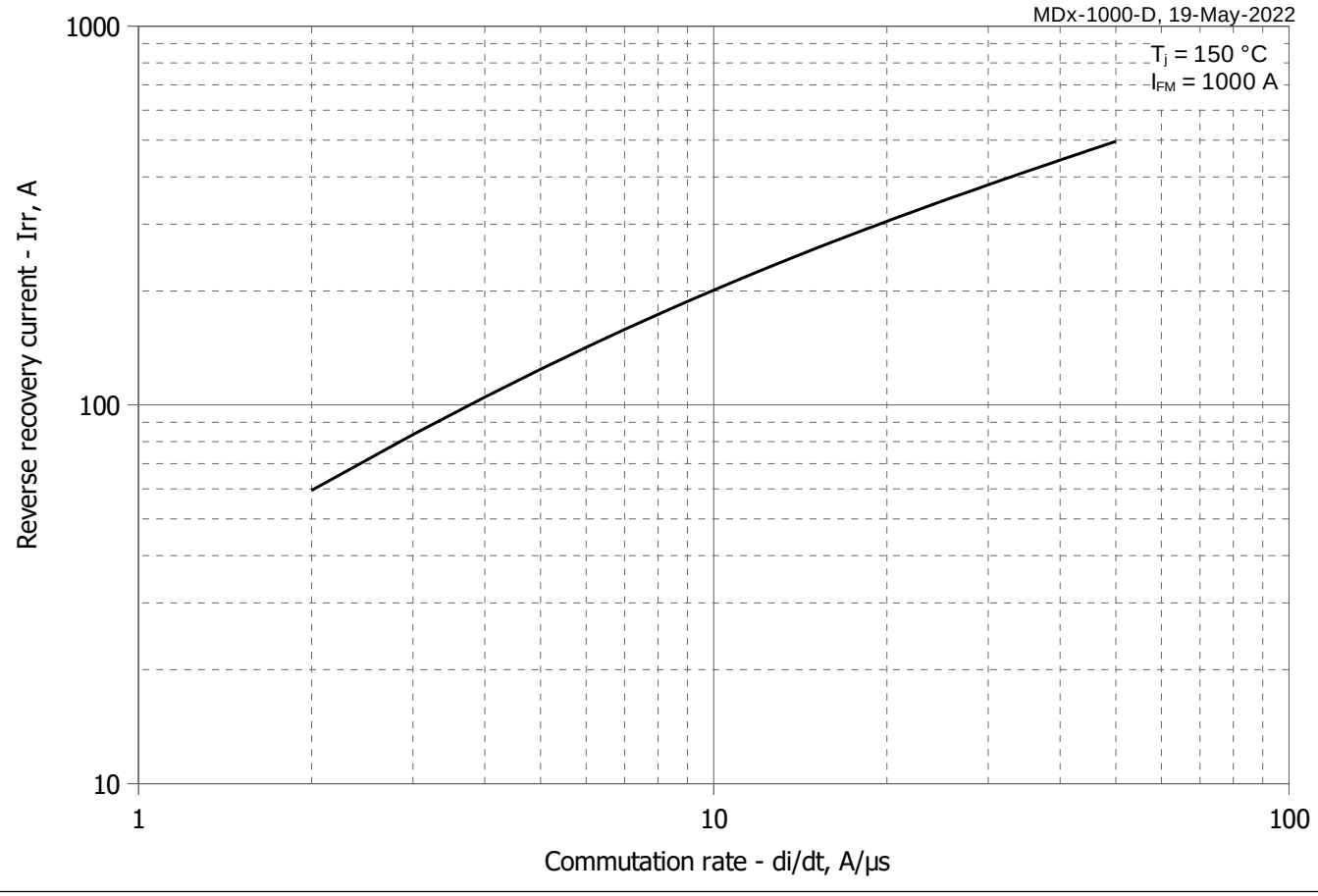


Fig 4 – Maximum reverse recovery current I_{rr} vs. commutation rate di_R/dt

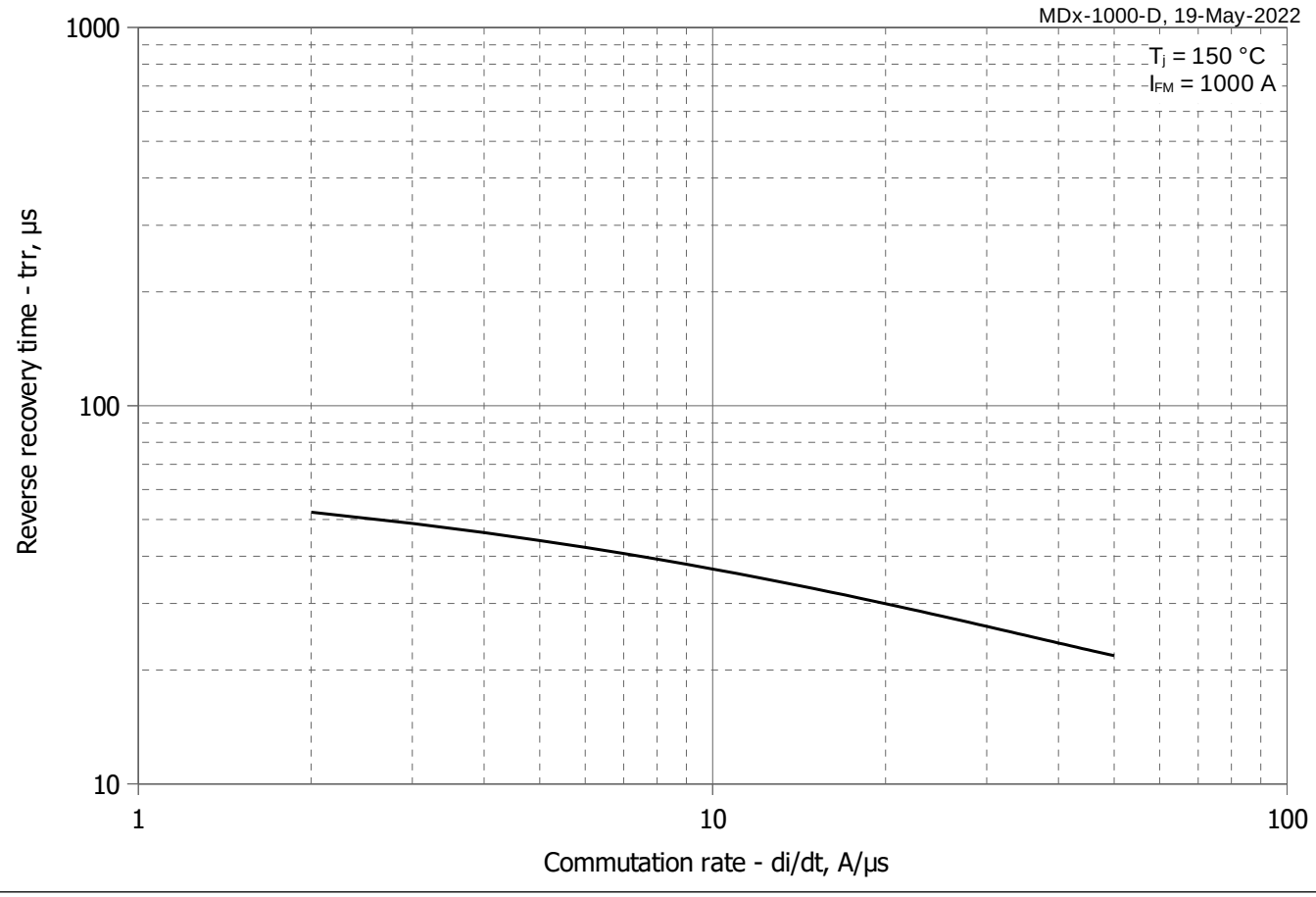


Fig 5 – Maximum recovery time t_{rr} vs. commutation rate di_R/dt (25% chord)

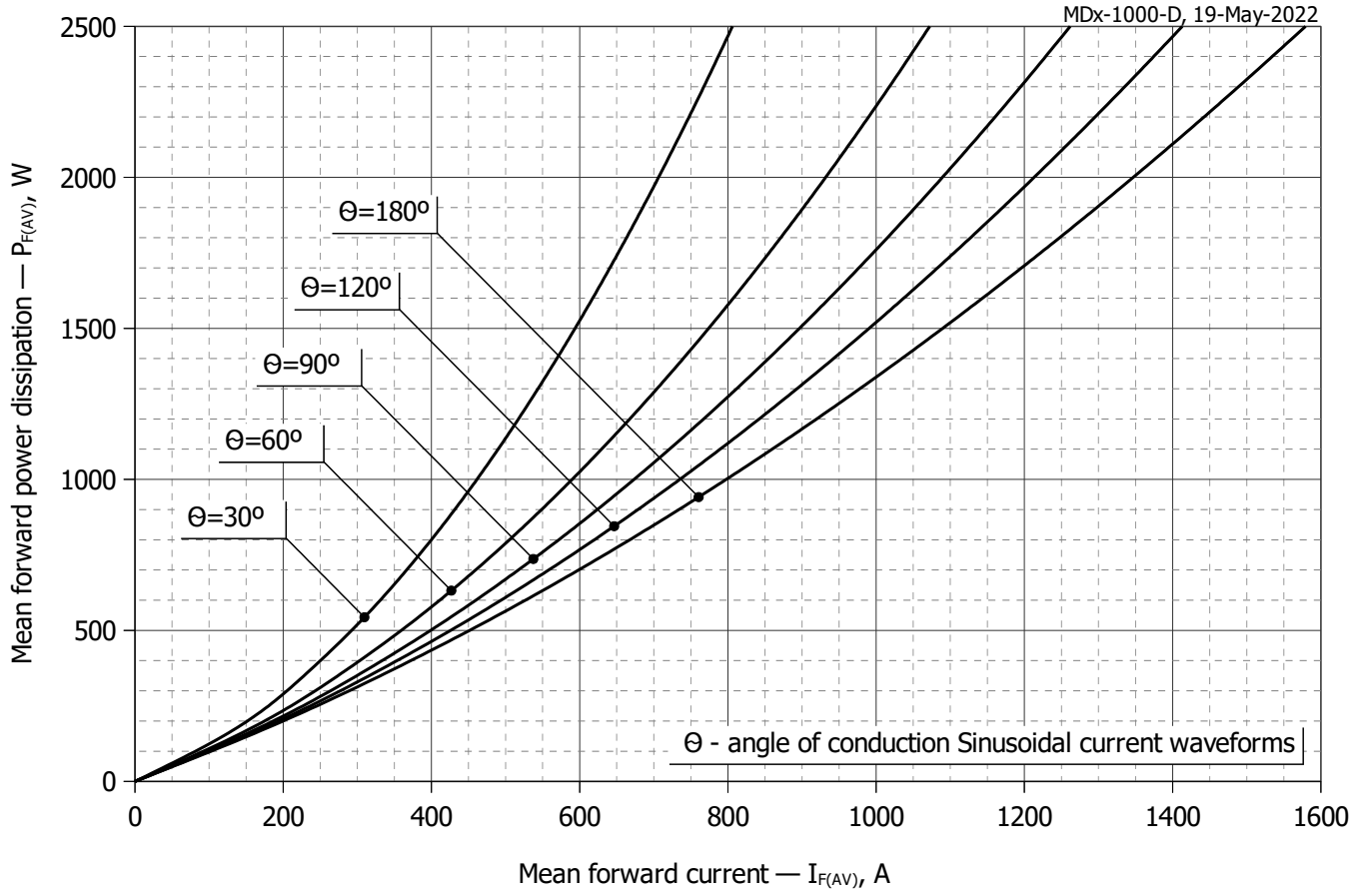


Fig. 6 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles (f=50Hz)

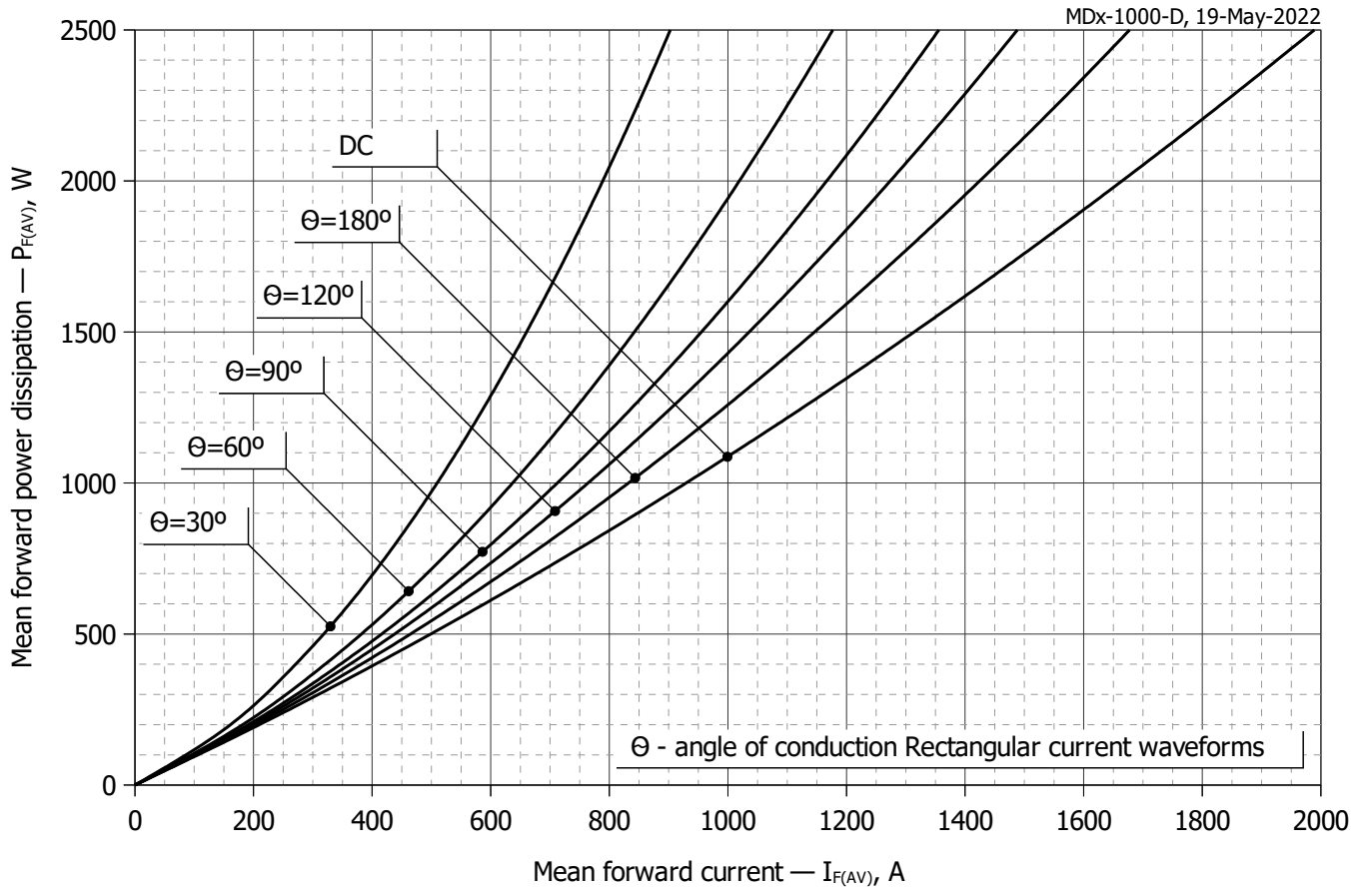


Fig. 7 – Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC (f=50Hz)

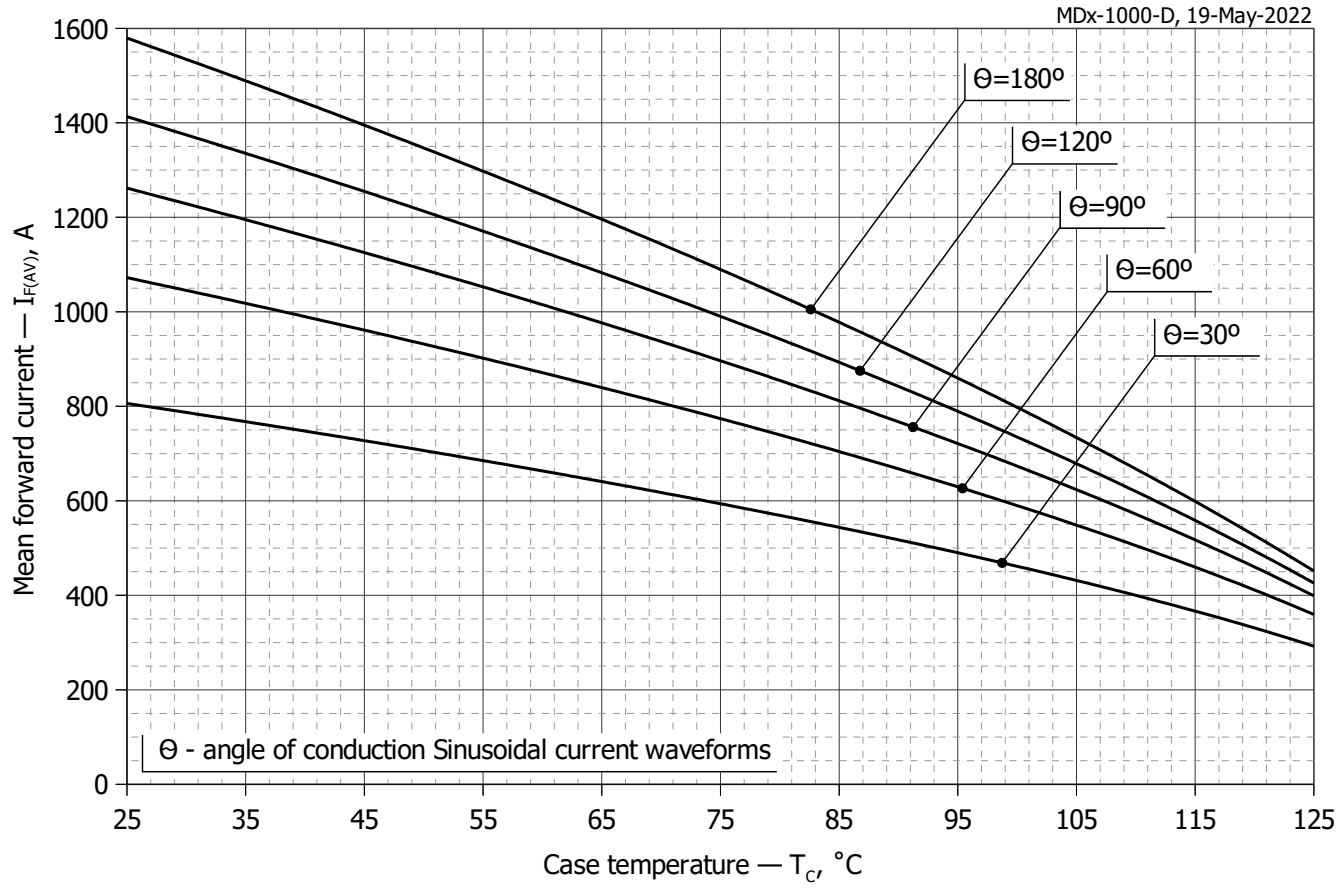


Fig. 8 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles (f=50Hz)

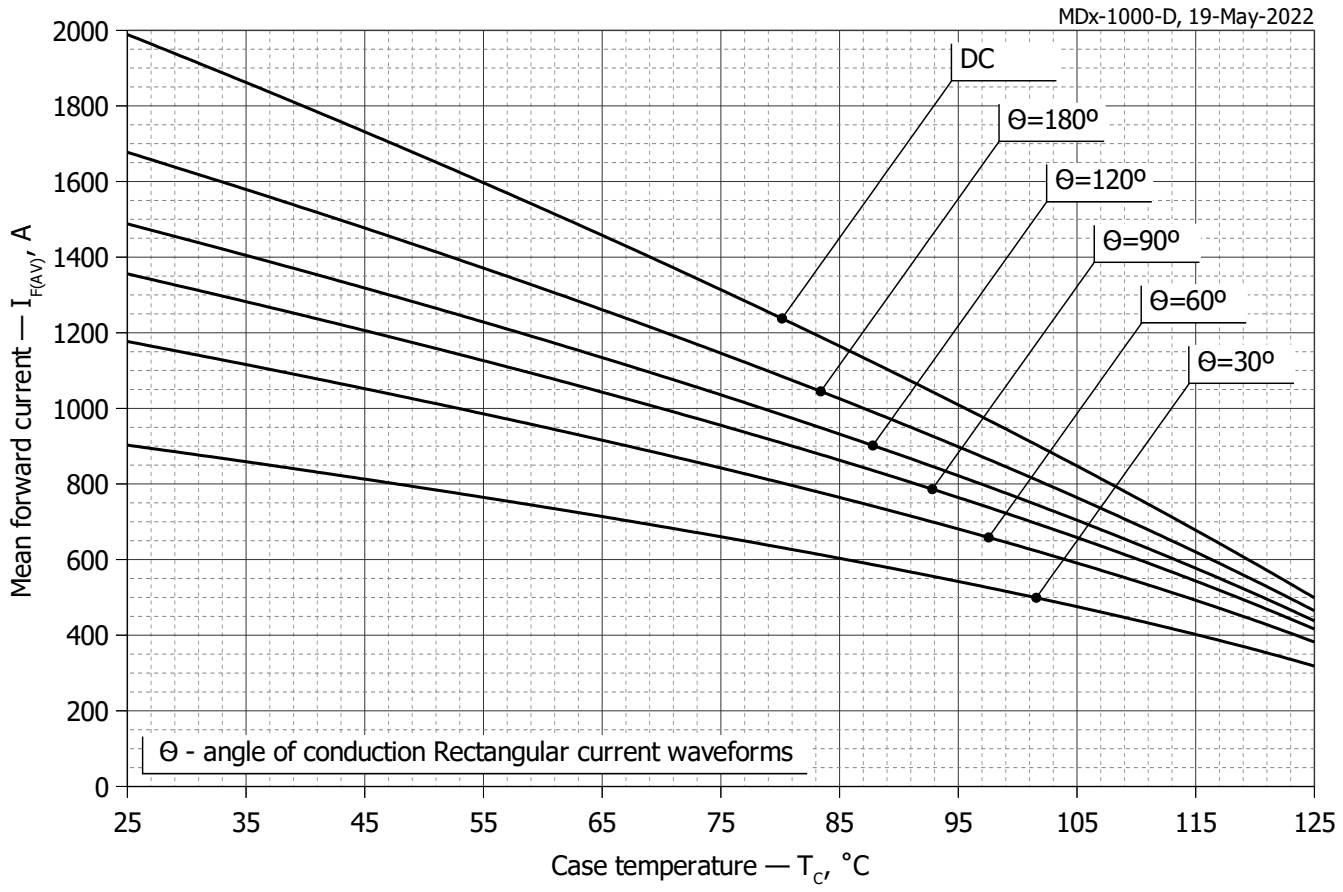


Fig. 9 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC (f=50Hz)

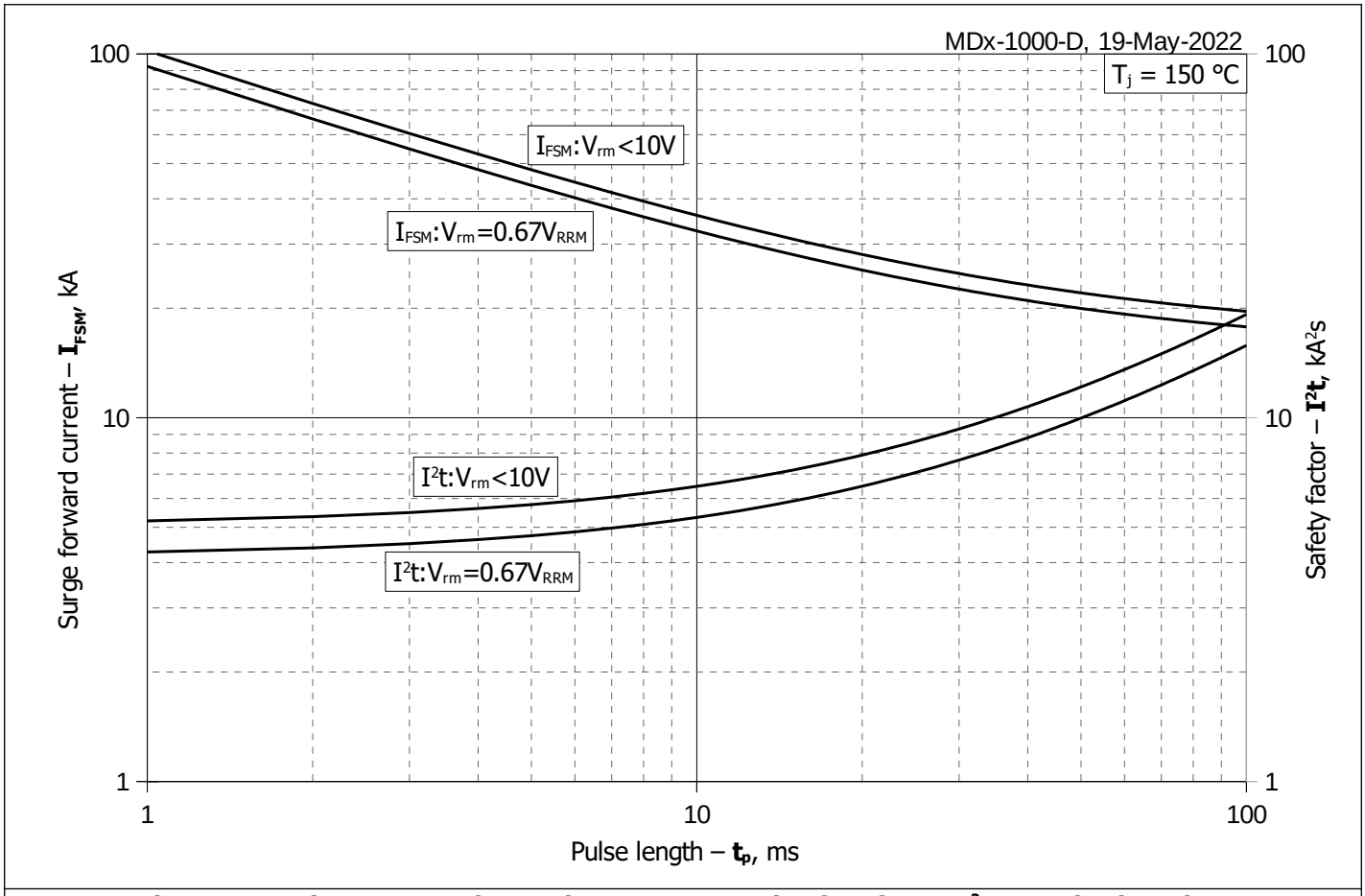


Fig. 10 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

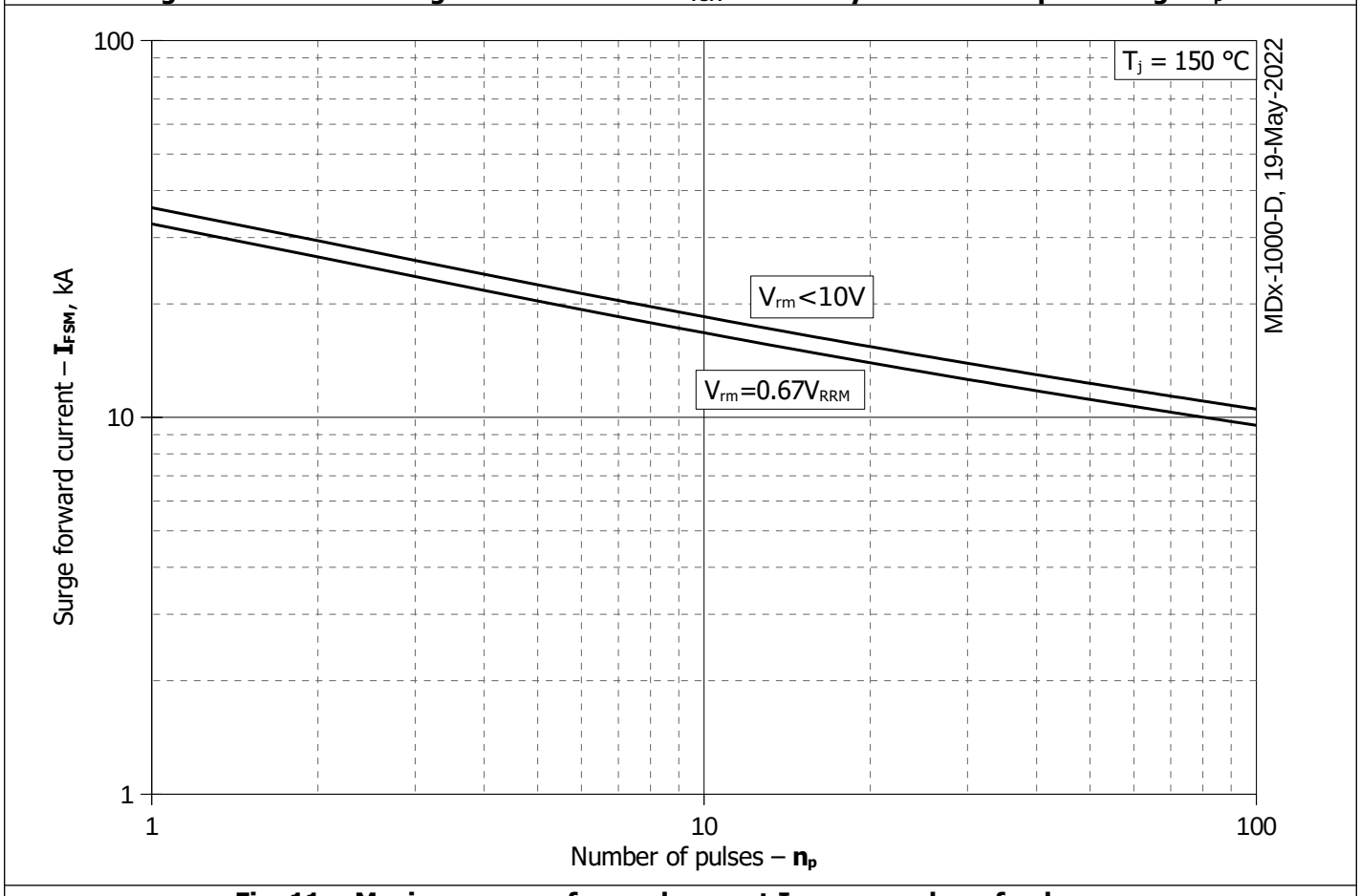


Fig. 11 - Maximum surge forward current I_{FSM} vs. number of pulses n_p