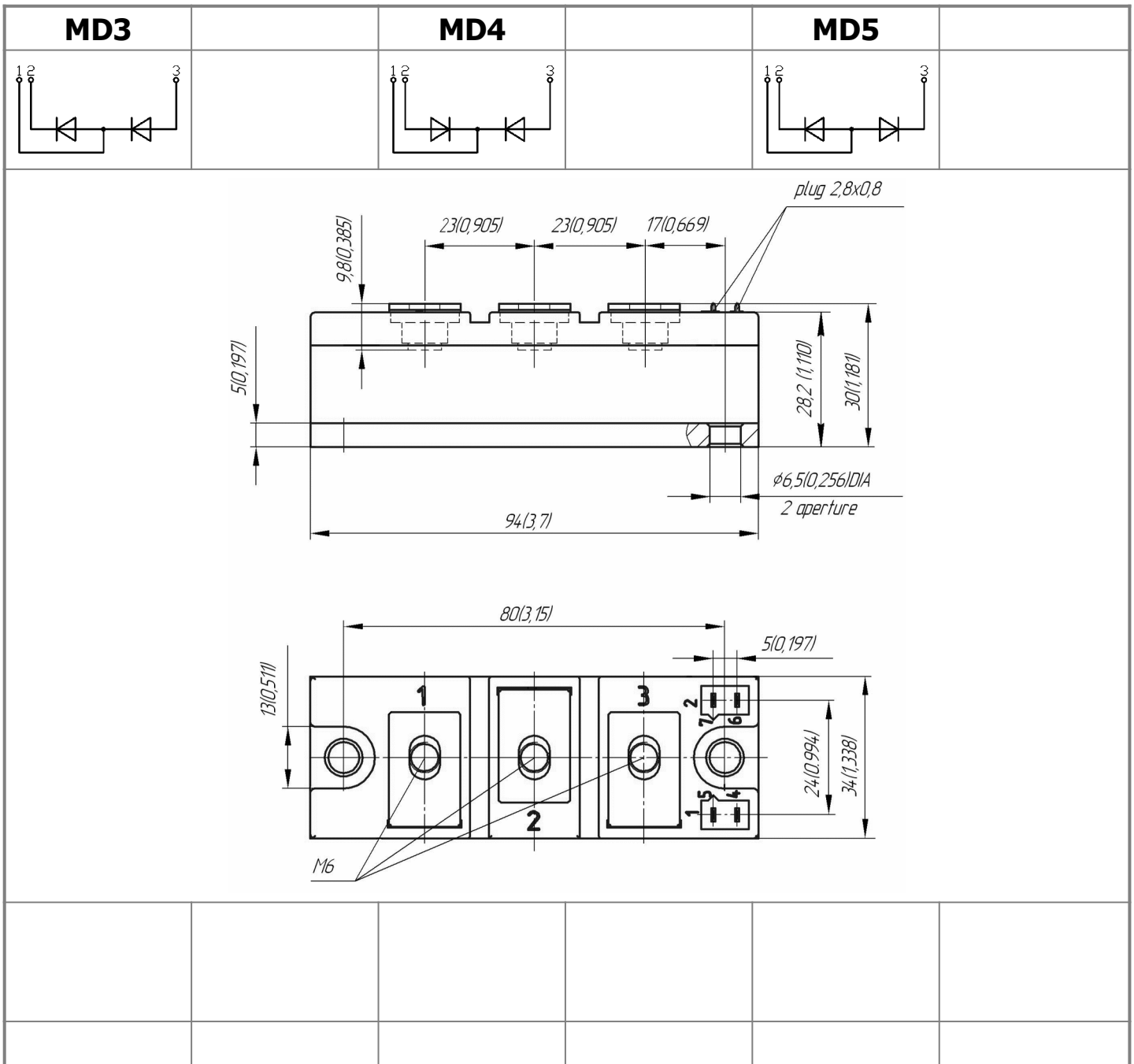




Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

Double Diode Module
For Phase Control
MDx-245-18-F

Average forward current				I_{FAV}	245 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
$T_j, ^\circ C$	-40...+150							



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	245 230	$T_c = 95\text{ }^\circ\text{C};$ $T_c = 100\text{ }^\circ\text{C};$ 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	385	$T_c = 95\text{ }^\circ\text{C};$ 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	8.1 9.5	$T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p = 10\text{ ms};$ single pulse; $V_R = 0\text{ V}$
			8.5 10.0	$T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p = 8.3\text{ ms};$ single pulse; $V_R = 0\text{ V}$
I^2t	Safety factor	$A^2s \cdot 10^3$	320 450	$T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p = 10\text{ ms};$ single pulse; $V_R = 0\text{ V}$
			290 410	$T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$	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	1000...1800	$T_{j\text{ min}} < T_j < T_{j\text{ max}};$ 180° half-sine wave; 50 Hz	
V_{RSM}	Non-repetitive peak reverse voltages	V	1100...1900	$T_{j\text{ min}} < T_j < T_{j\text{ max}};$ 180° half-sine wave; single pulse	
V_R	Reverse continuous voltages	V	$0.6 \cdot V_{RRM}$	$T_j = T_{j\text{ max}}$	
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	1.30	$T_j = 25\text{ }^\circ\text{C};$ $I_{FM} = 500\text{ A}$	
$V_{F(TO)}$	Forward threshold voltage, max	V	0.886	$T_j = T_{j\text{ max}};$	
r_T	Forward slope resistance, max	$m\Omega$	0.692	$0.5 \pi I_{FAV} < I_T < 1.5 \pi I_{FAV}$	
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	20 2.50	$T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$	$V_R = V_{RRM}$
SWITCHING					
Q_r	Recovered charge, max	μC	820	$T_j = T_{j\text{ max}};$ $I_{FM} = I_{FAV};$	
t_{rr}	Reverse recovery time, max	μs	17	$di_R/dt = -10\text{ A}/\mu\text{s};$	
I_{rr}	Reverse recovery current, max	A	96	$V_R = 100\text{ V}$	
THERMAL					
R_{thjc}	Thermal resistance, junction to case				
	per module	°C/W	0.0850	180° half-sine wave, 50 Hz	
	per arm	°C/W	0.1700		
	per module	°C/W	0.0800	DC	
per arm	°C/W	0.1600			
R_{thch}	Thermal resistance, case to heatsink				
	per module	°C/W	0.0300		
	per arm	°C/W	0.0600		

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 (M6) ¹⁾	Nm	6.00	Tolerance ± 15%	
m	Weight, max	g	350		

PART NUMBERING GUIDE						NOTES					
MD	3	-	245	-	18	-	F	-	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.F) 6. Ambient Conditions: N – Normal											¹⁾ The screws must be lubricated

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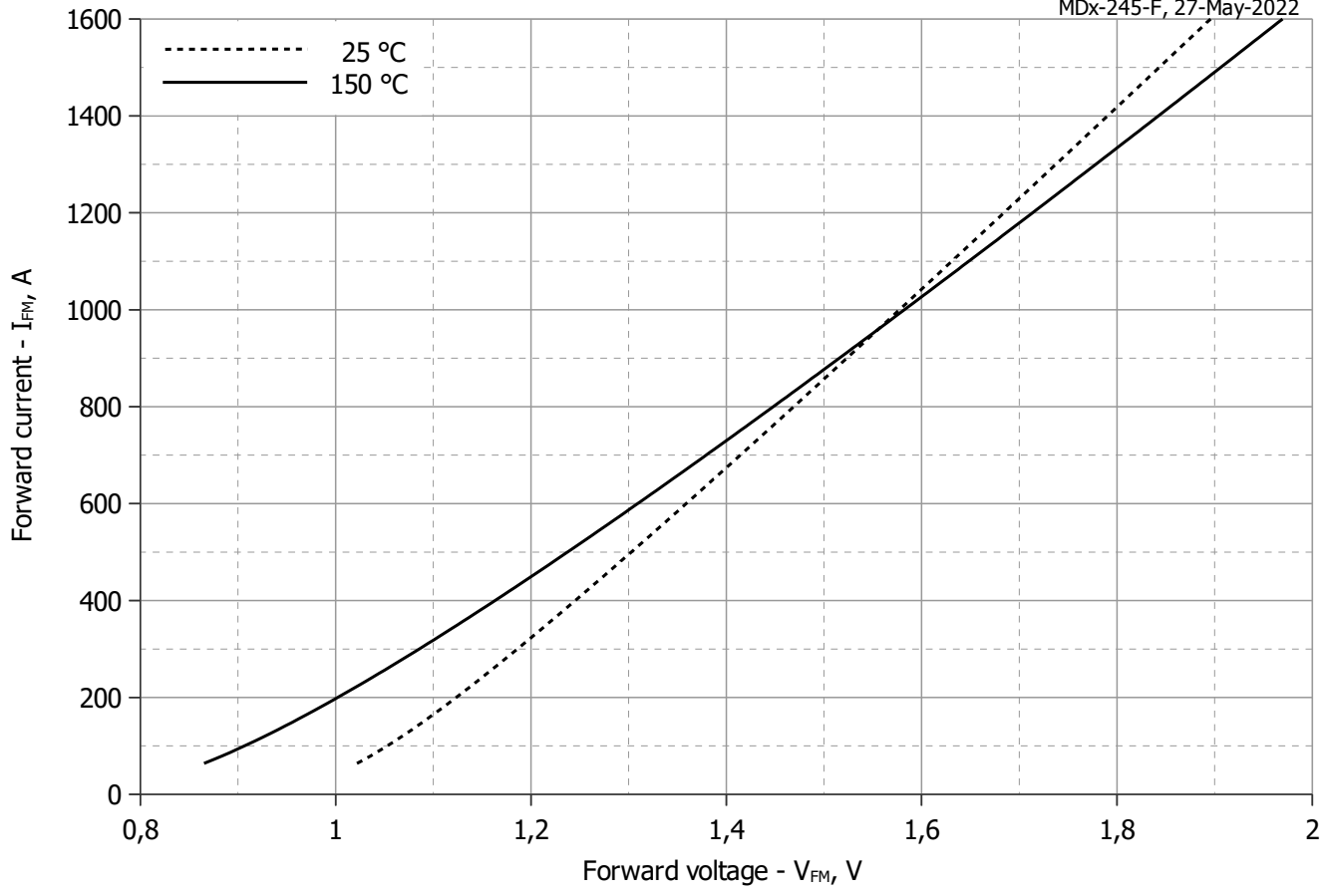


Fig 1 – Forward characteristics of Limit device

Analytical function for Forward characteristic:

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

	Coefficients for max curves	
	$T_j = 25^\circ\text{C}$	$T_j = T_{j,max}$
A	0.87340265	0.70107224
B	0.00050415	0.00052711
C	0.02705832	0.01680710
D	0.00040390	0.00752706

Forward characteristic model (see Fig. 1).

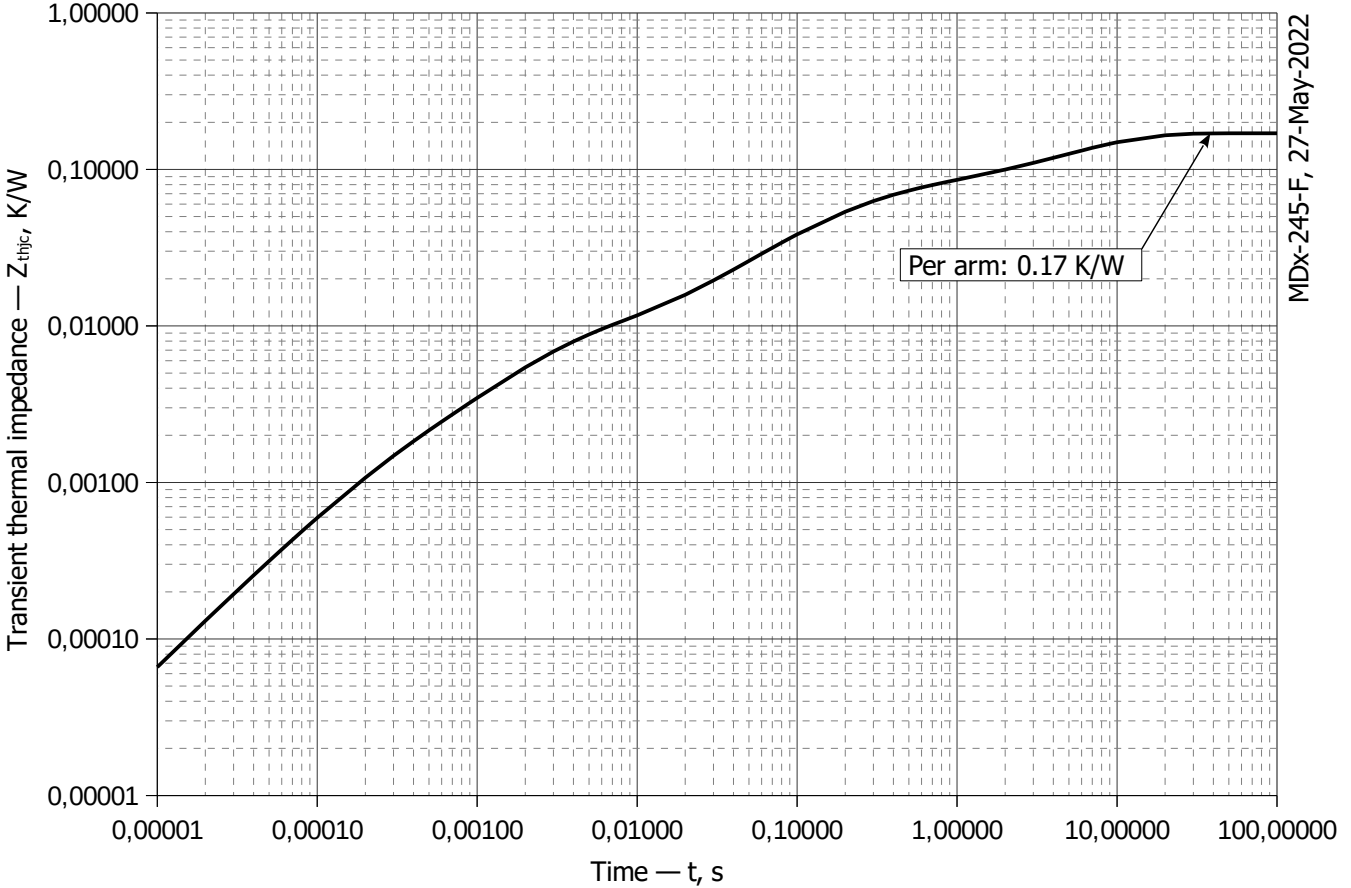


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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 constant of r_{th} term.

i	1	2	3	4	5	6
R_i, K/W	0.0007228424	0.006639986	0.0153862565	0.0389709604	0.0142906115	0.09398934
τ_i, s	0.0002111	0.002366	0.06905	0.1909	0.6646	6.64

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

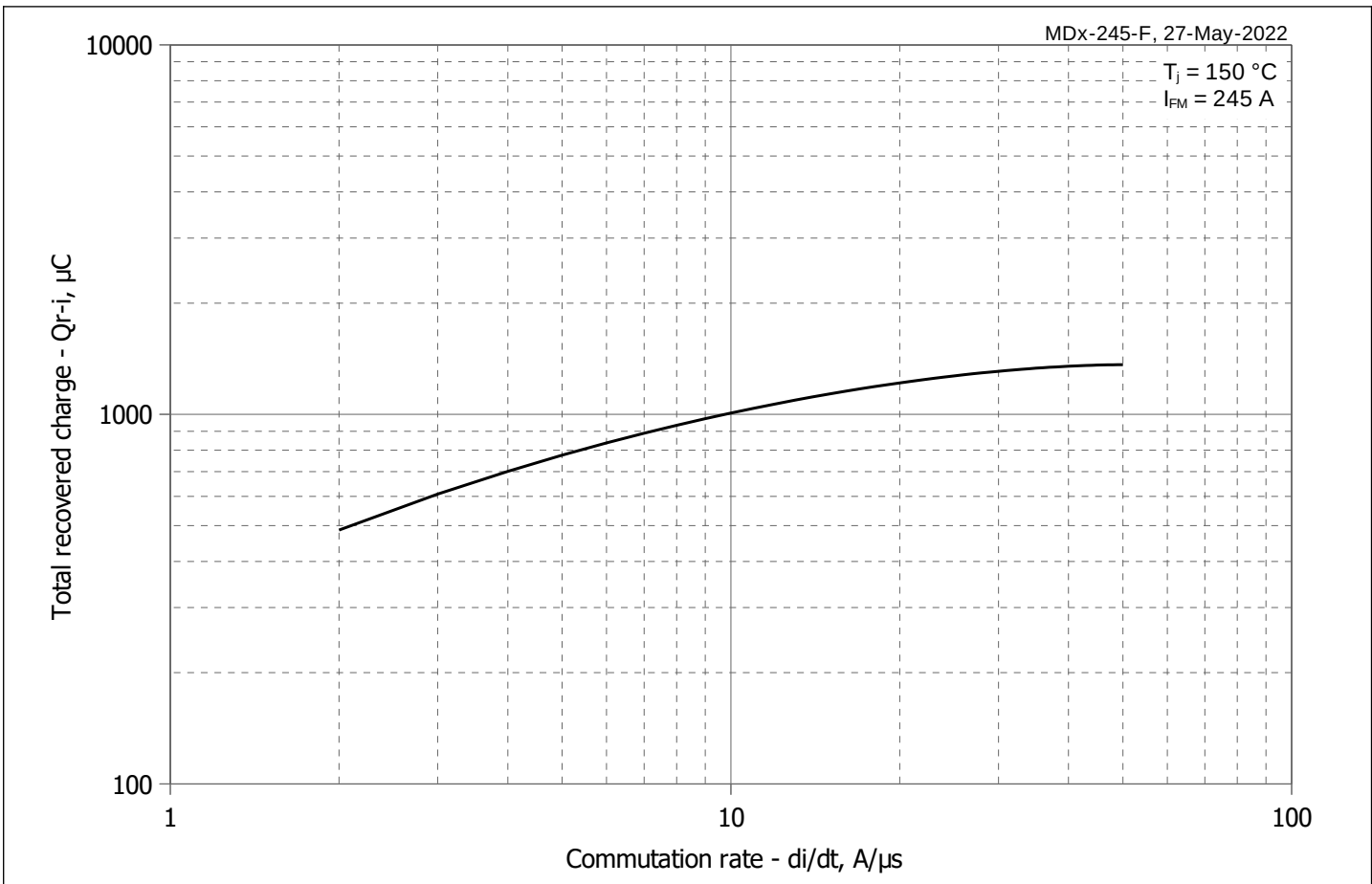


Fig 3 - Maximum recovered charge Q_{r-i} (integral) vs. commutation rate di_R/dt

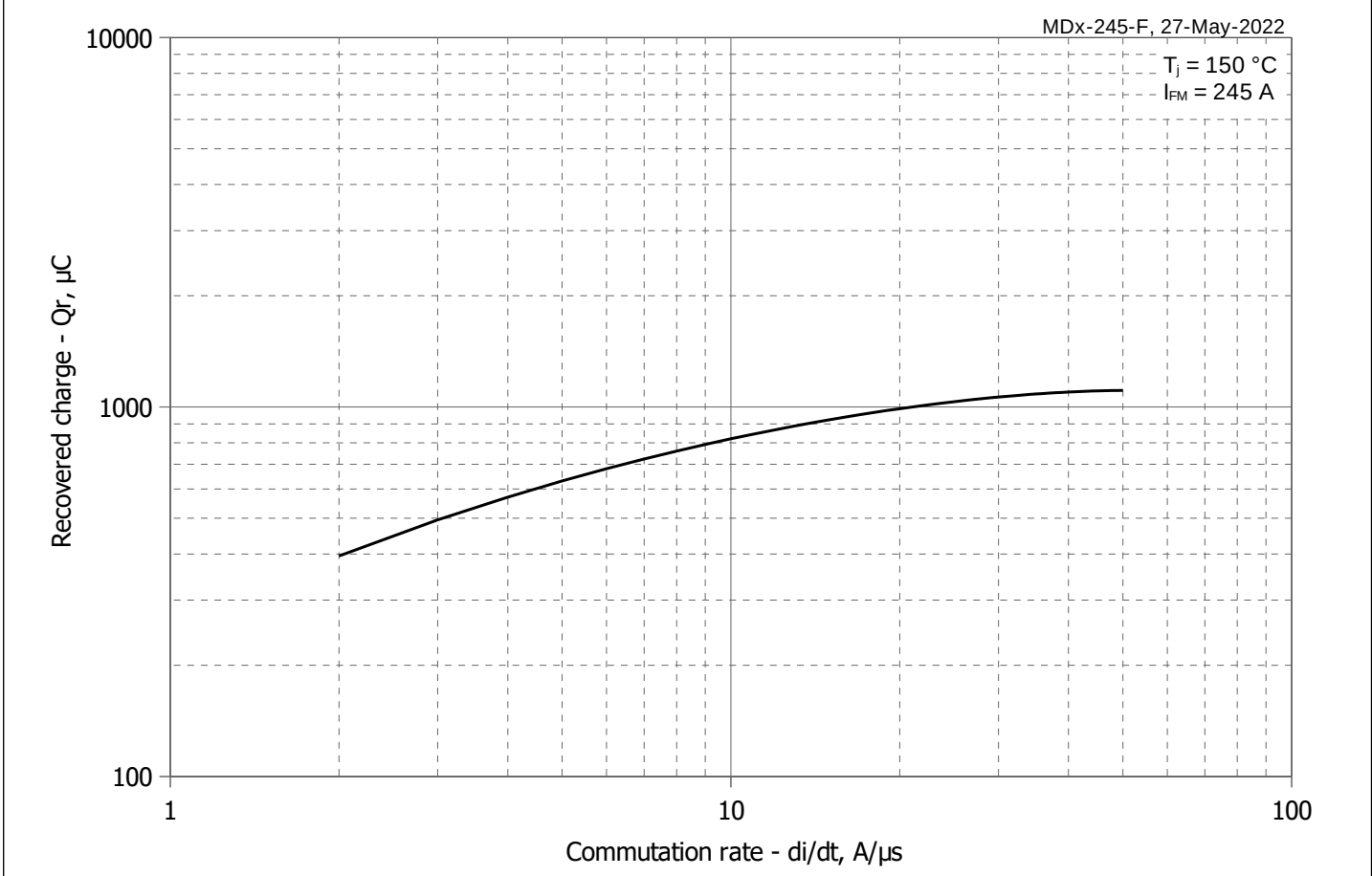


Fig 4 - Maximum recovered charge Q_r vs. commutation rate di_R/dt (25% chord)

$T_j = 150\text{ }^\circ\text{C}$
 $I_{FM} = 245\text{ A}$

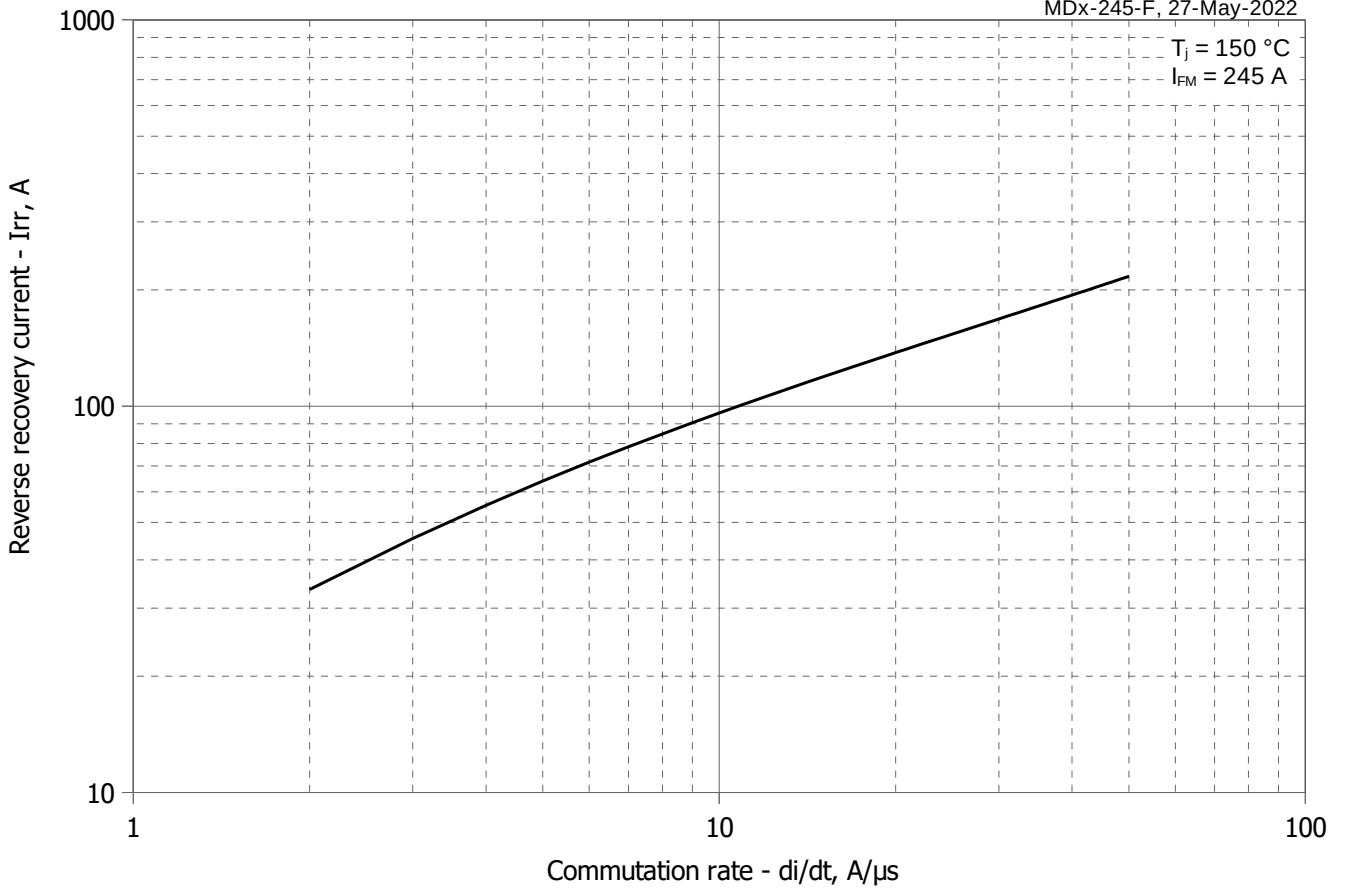


Fig 5 - Maximum reverse recovery current I_{rr} vs. commutation rate di_R/dt

$T_j = 150\text{ }^\circ\text{C}$
 $I_{FM} = 245\text{ A}$

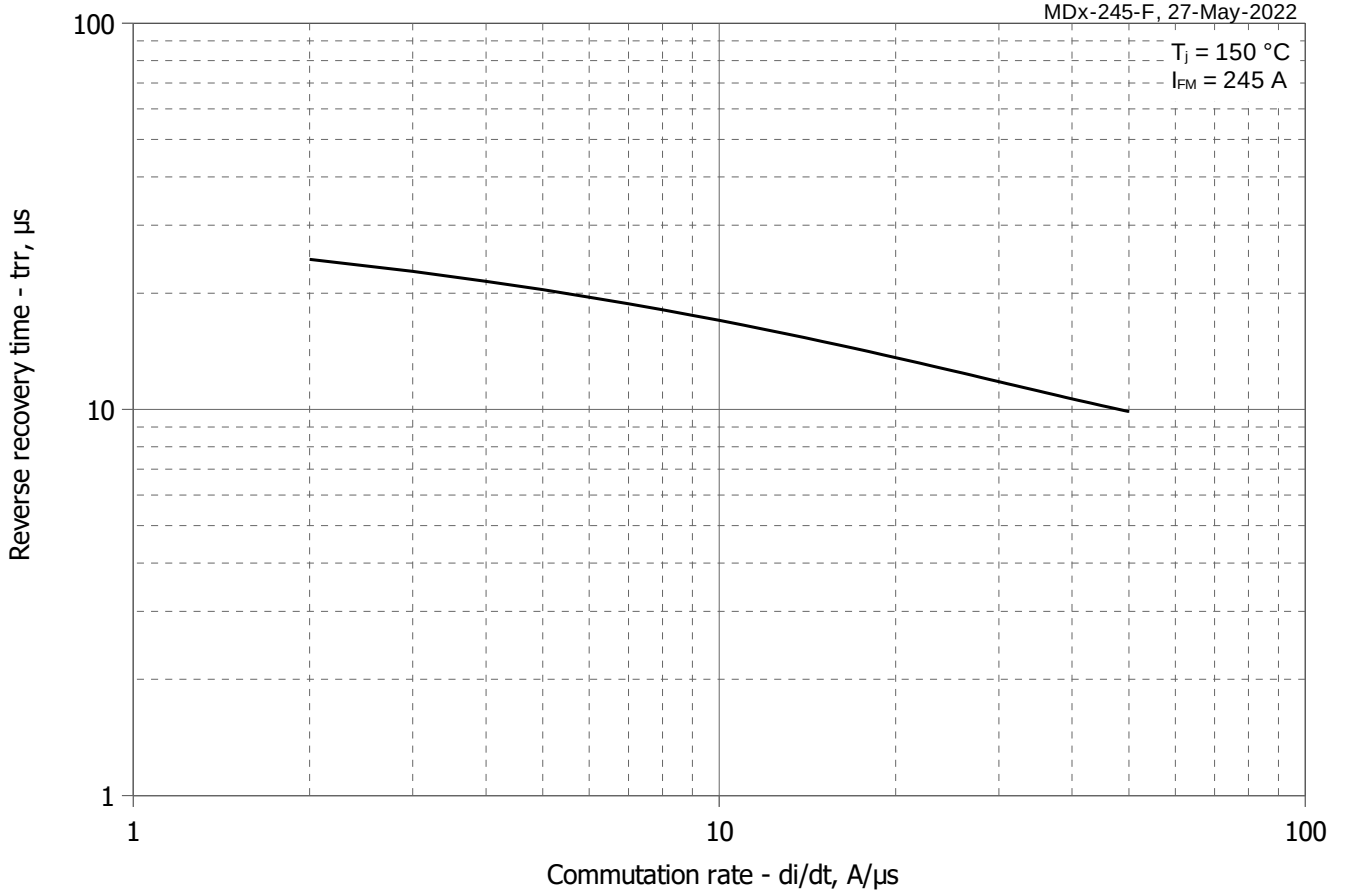


Fig 6 - Maximum recovery time t_{rr} vs. commutation rate di_R/dt (25% chord)

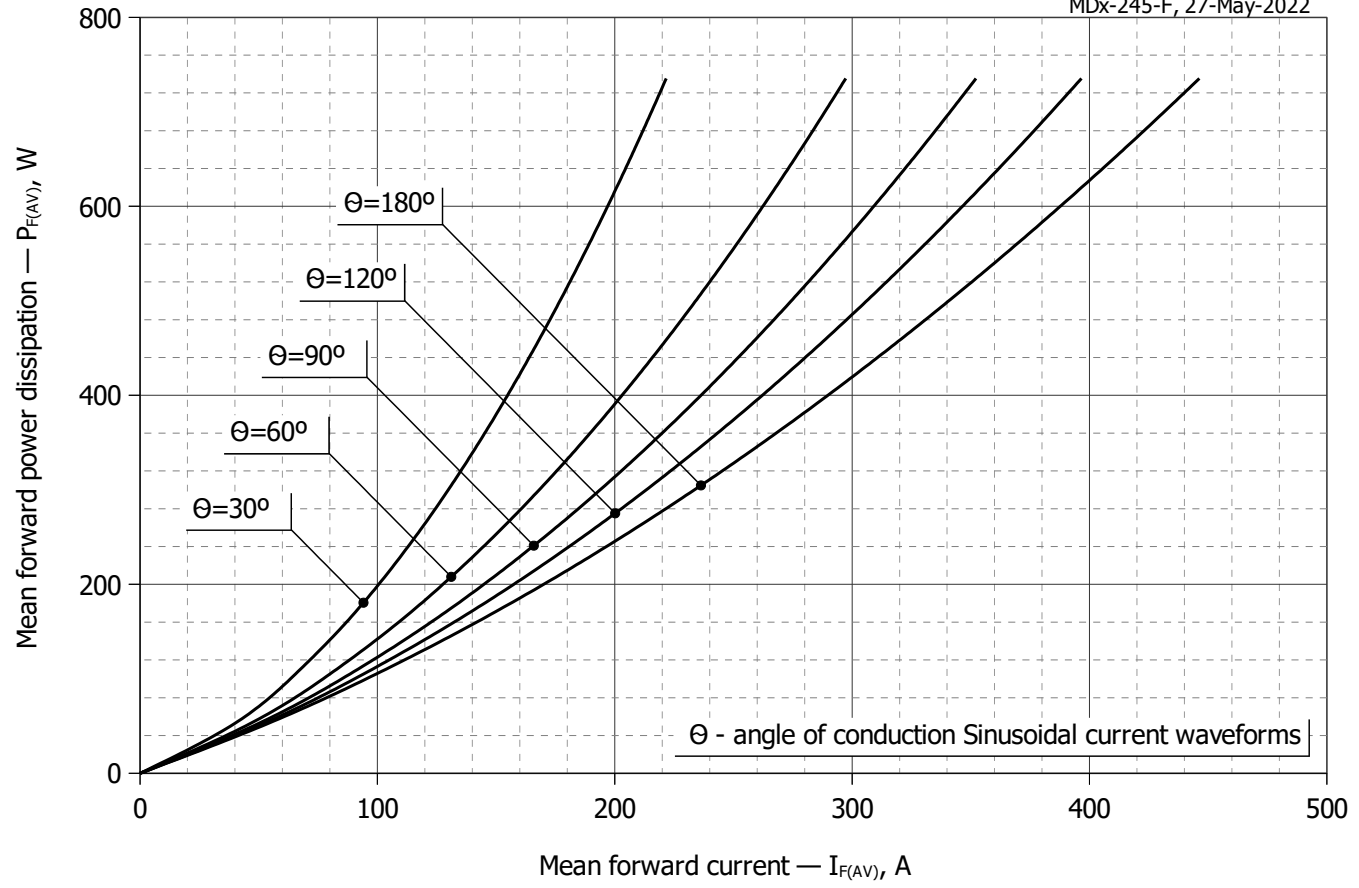


Fig. 7 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$)

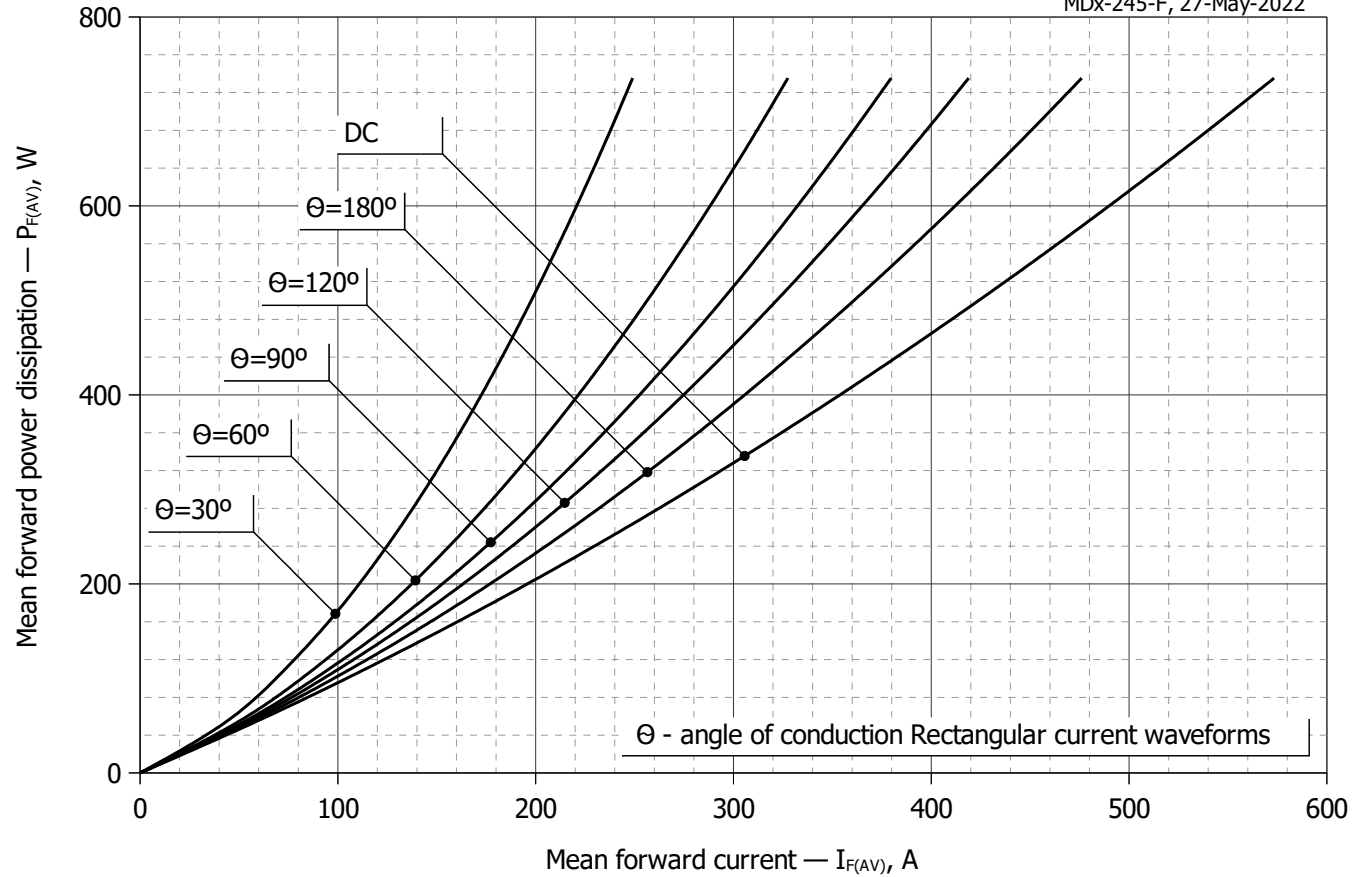


Fig. 8 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$)

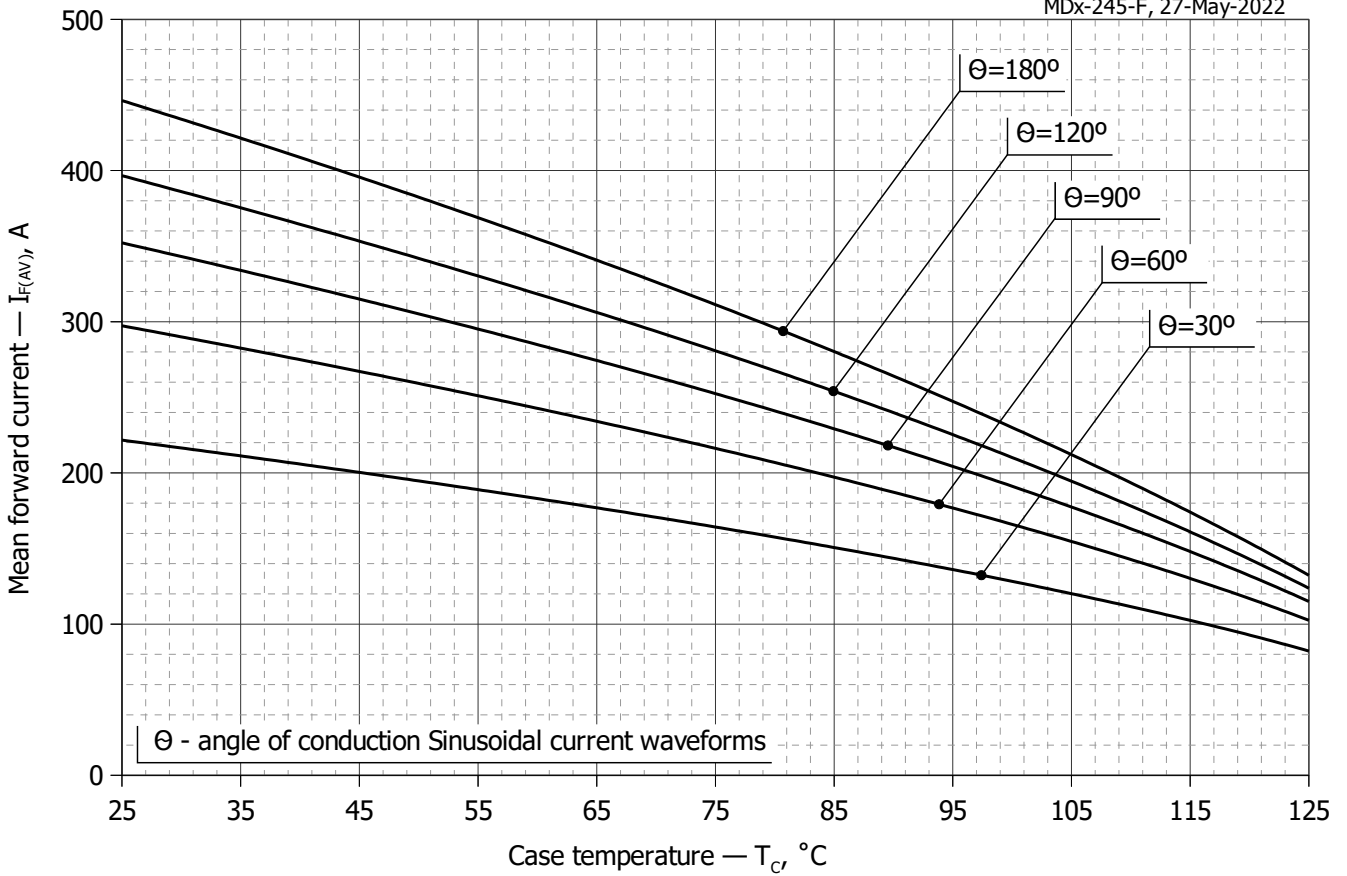


Fig. 9 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$)

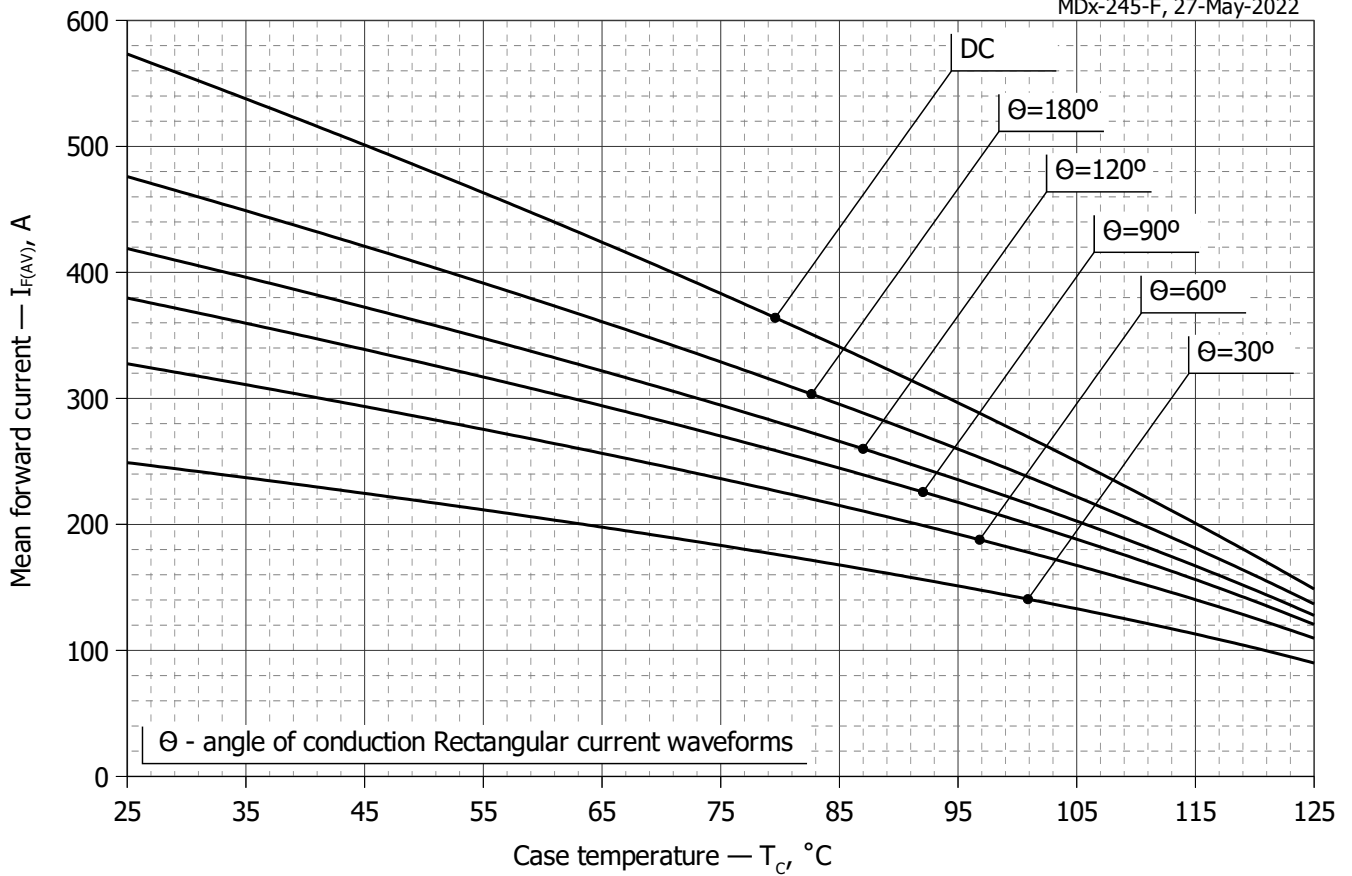


Fig. 10 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$)

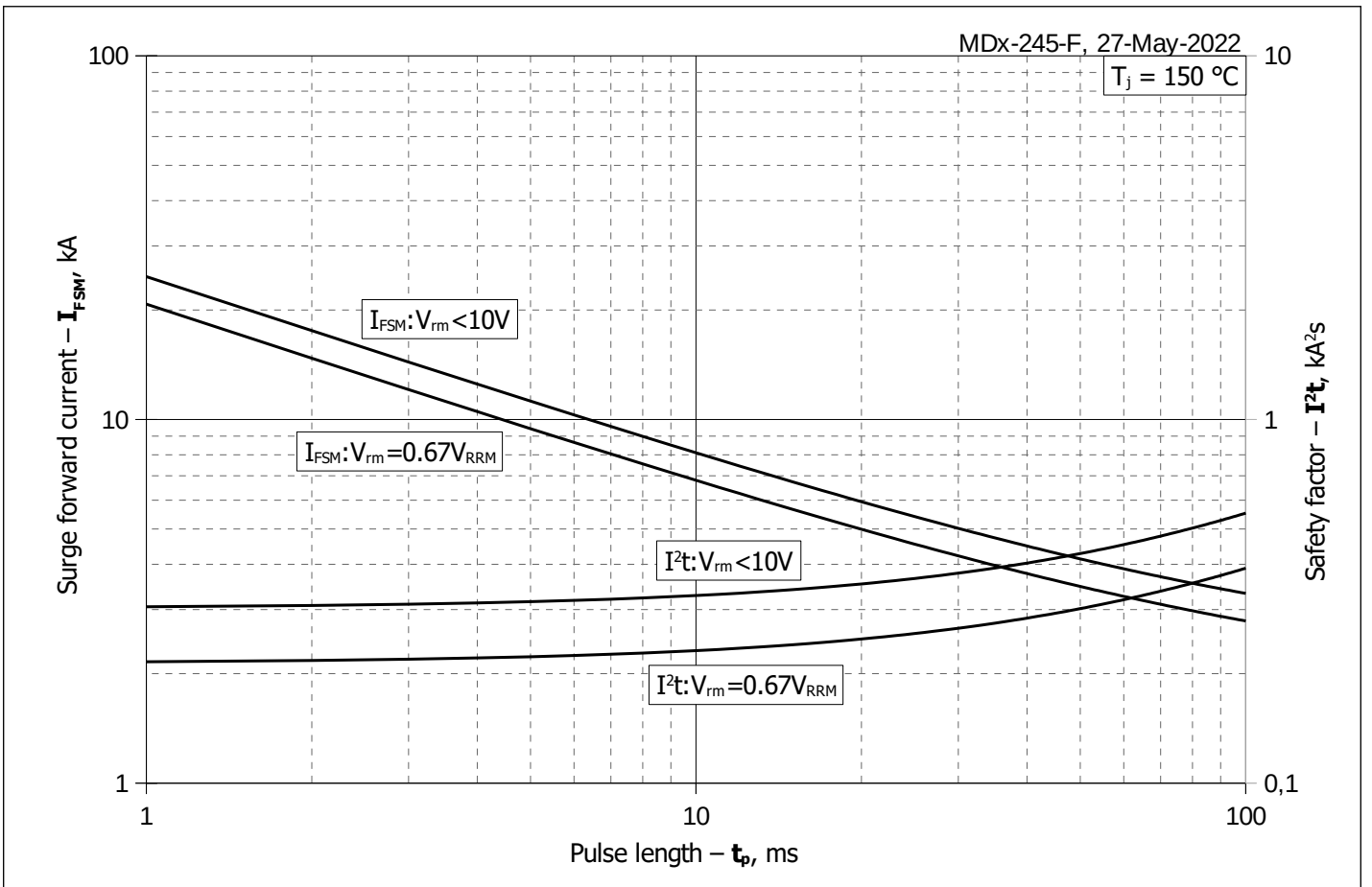


Fig. 11 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

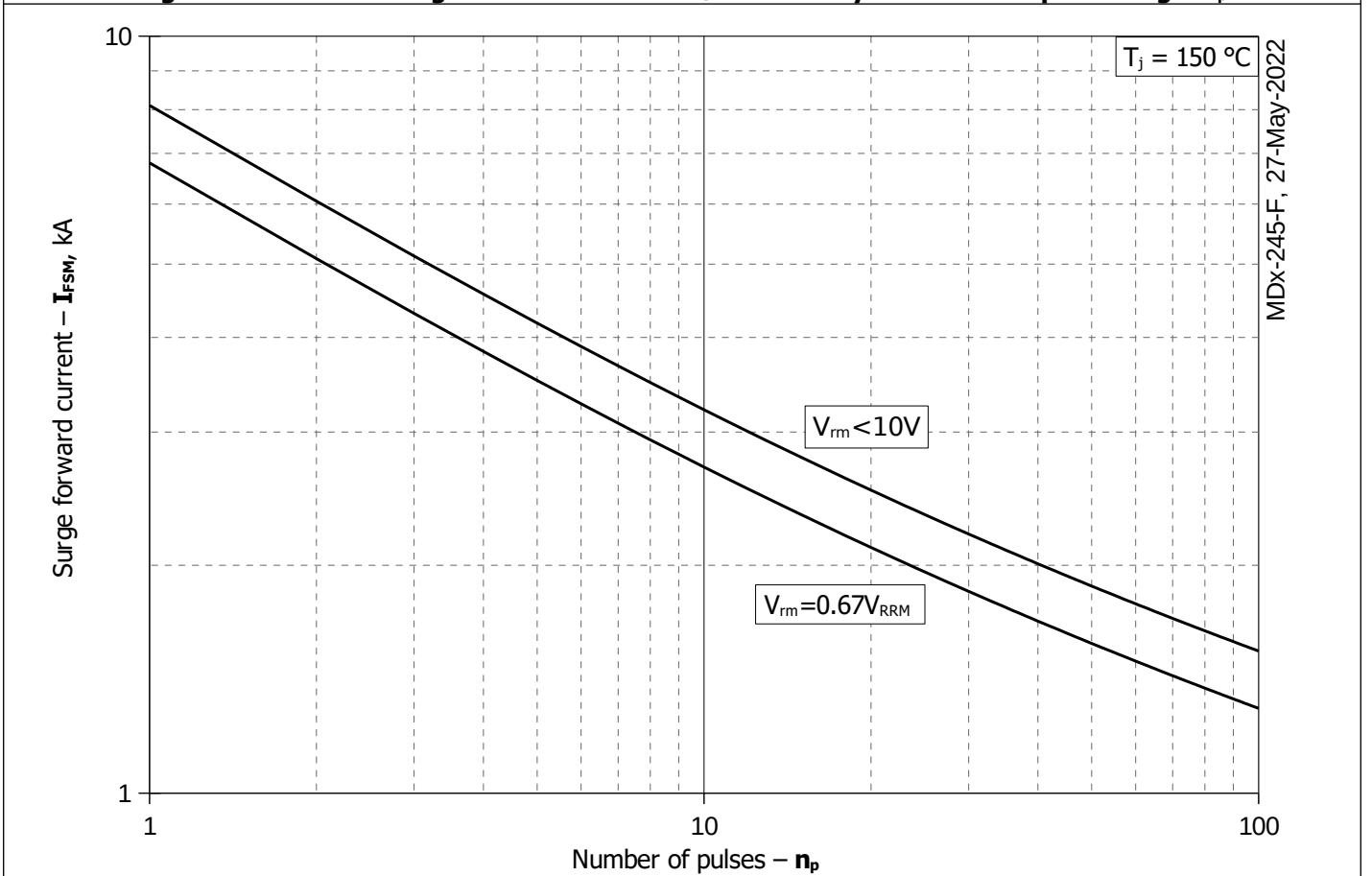


Fig. 12 – Maximum surge forward current I_{FSM} vs. number of pulses n_p