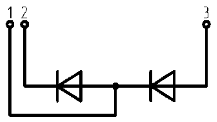
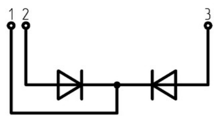
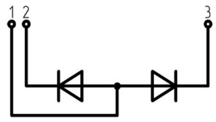
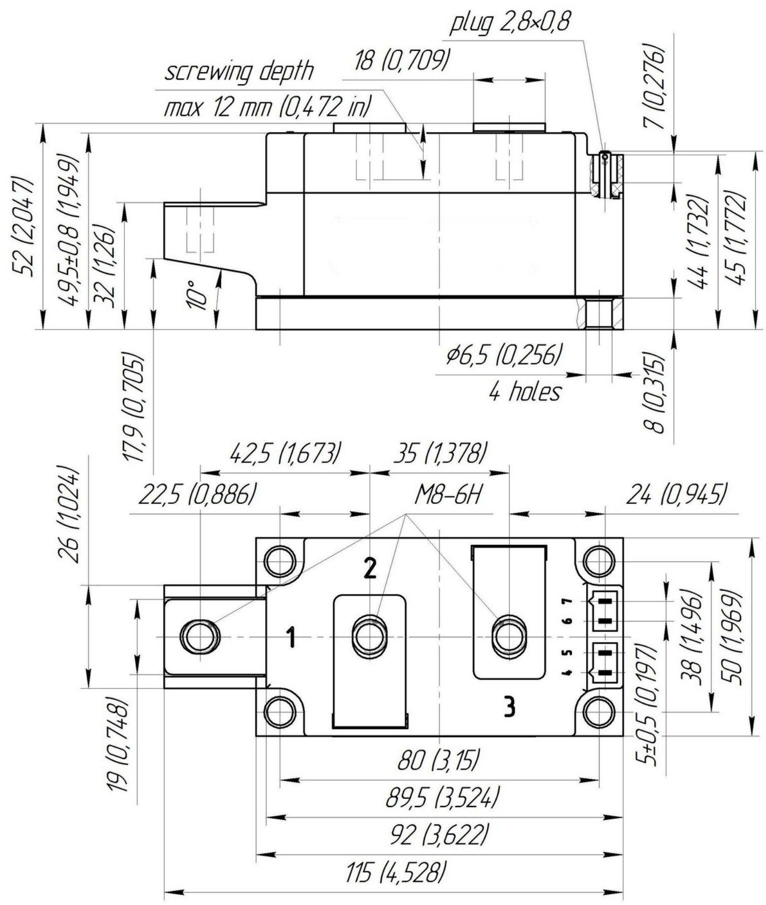
Double Diode Module For Phase Control
MDx-250-36-C1

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

Average forward current		I_{FAV}	250 A	
Repetitive peak reverse voltage		V_{RRM}	3000 ÷ 3600 V	
V_{RRM}, V	3000	3200	3400	3600
Voltage code	30	32	34	36
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	250 246	T_c= 98 °C; T_c= 100 °C; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	393	T_c= 98 °C; 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	5.0 6.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			5.5 6.5	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	$A^2s\cdot10^3$	120 180	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			120 170	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	3000÷3600	$T_{j\,min}$< T_j <$T_{j\,max}$; 180° half-sine wave; 50 Hz;	
V_{RSM}	Non-repetitive peak reverse voltages	V	3100÷3700	$T_{j\,min}$< 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		
$T_{c\,op}$	Operating temperature	°C	- 40 ÷ 125		
a	Acceleration under vibration	m/s^2	50		

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions
ON-STATE				
V_{FM}	Peak forward voltage, max	V	2.00	T_j=25 °C; I_{FM}=785 A
$V_{F(TO)}$	Forward threshold voltage, max	V	0.90	T_j=$T_{j\,max}$; 0.5 π I_{FAV} < I_T < 1.5 π I_{FAV}
r_T	Forward slope resistance, max	mΩ	1.570	
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	1850	T_j=$T_{j\,max}$; I_{FM}= 250 A; di_R/dt=-5 A/μs; V_R=100 V;
t_{rr}	Reverse recovery time, max	μs	44	
I_{rrM}	Peak reverse recovery current, max	A	84	
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=60 sec
			3.60		t=1 sec
MECHANICAL					
M_1	Mounting torque (M6)[1)]	Nm	6.00	Tolerance ± 15%	
M_2	Terminal connection torque (M8)[1)]	Nm	9.00	Tolerance ± 15%	
w	Weight, max	g	860		

PART NUMBERING GUIDE

MD	3	-	250	-	36	-	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

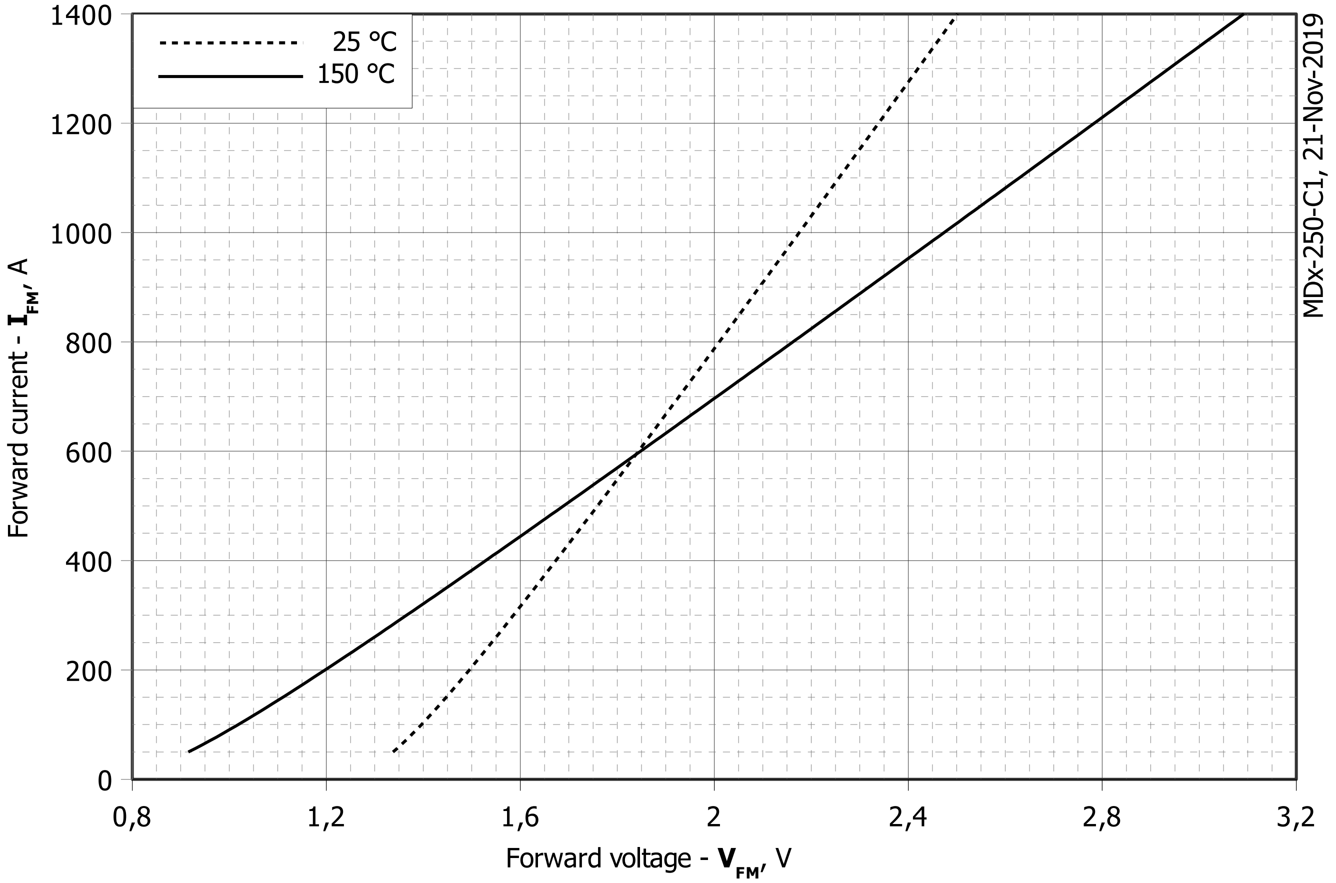


Fig 1 – Forward characteristics of Limit device

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°C	$T_j = T_{j\,max}$
A	1.19210000	0.68988000
B	0.00078610	0.00150080
C	0.02603800	0.03659600
D	0.00054117	0.00095847

Forward characteristic model (see Fig. 1).

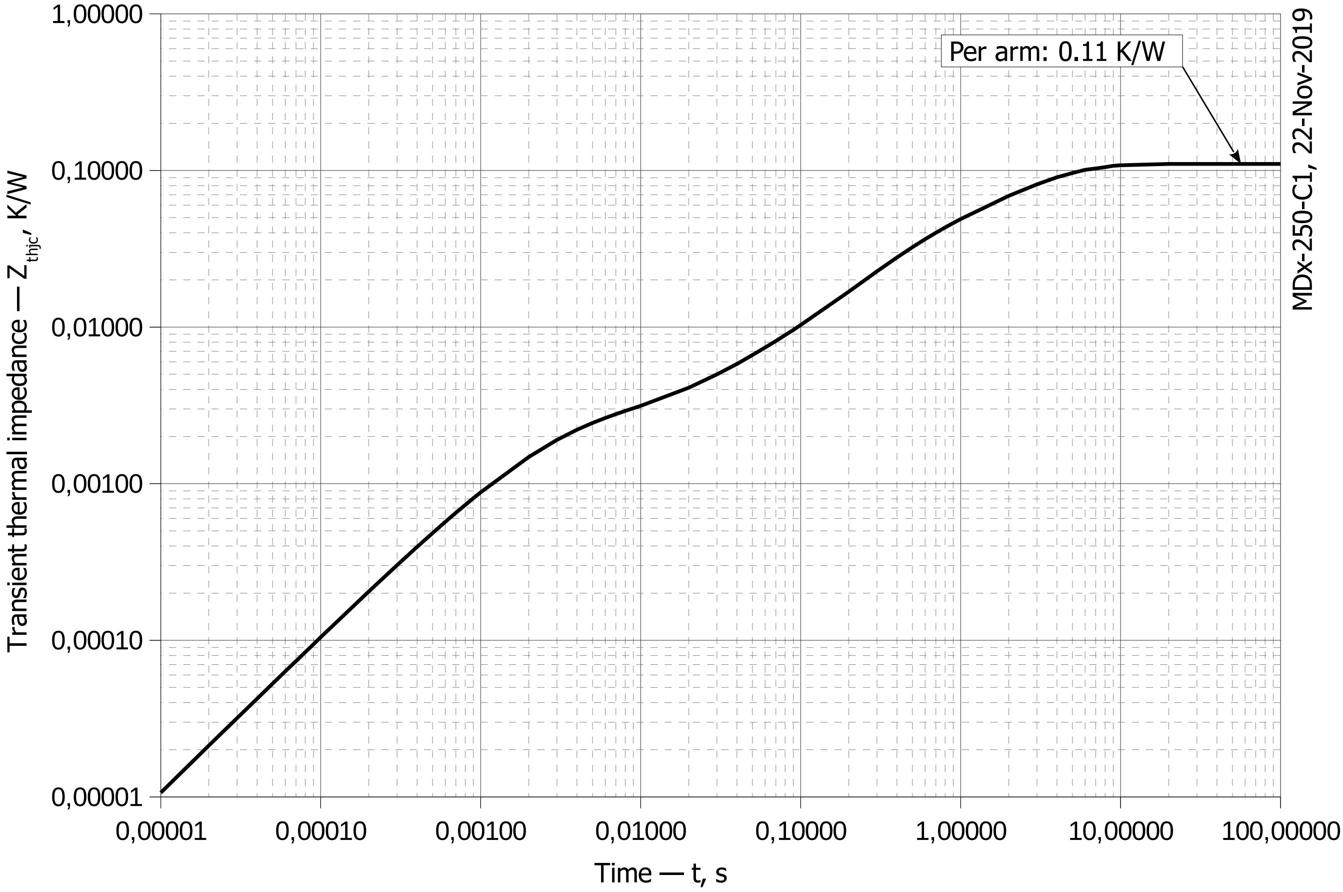


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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 constatnt of r_{th} term.

DC

i	1	2	3	4	5	6
R_i, K/W	0.0808	0.007806	0.02226	-0.007688	0.00471	0.00217
τ_i, s	2.801	1.283	0.3281	0.09408	0.0572	0.002255

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

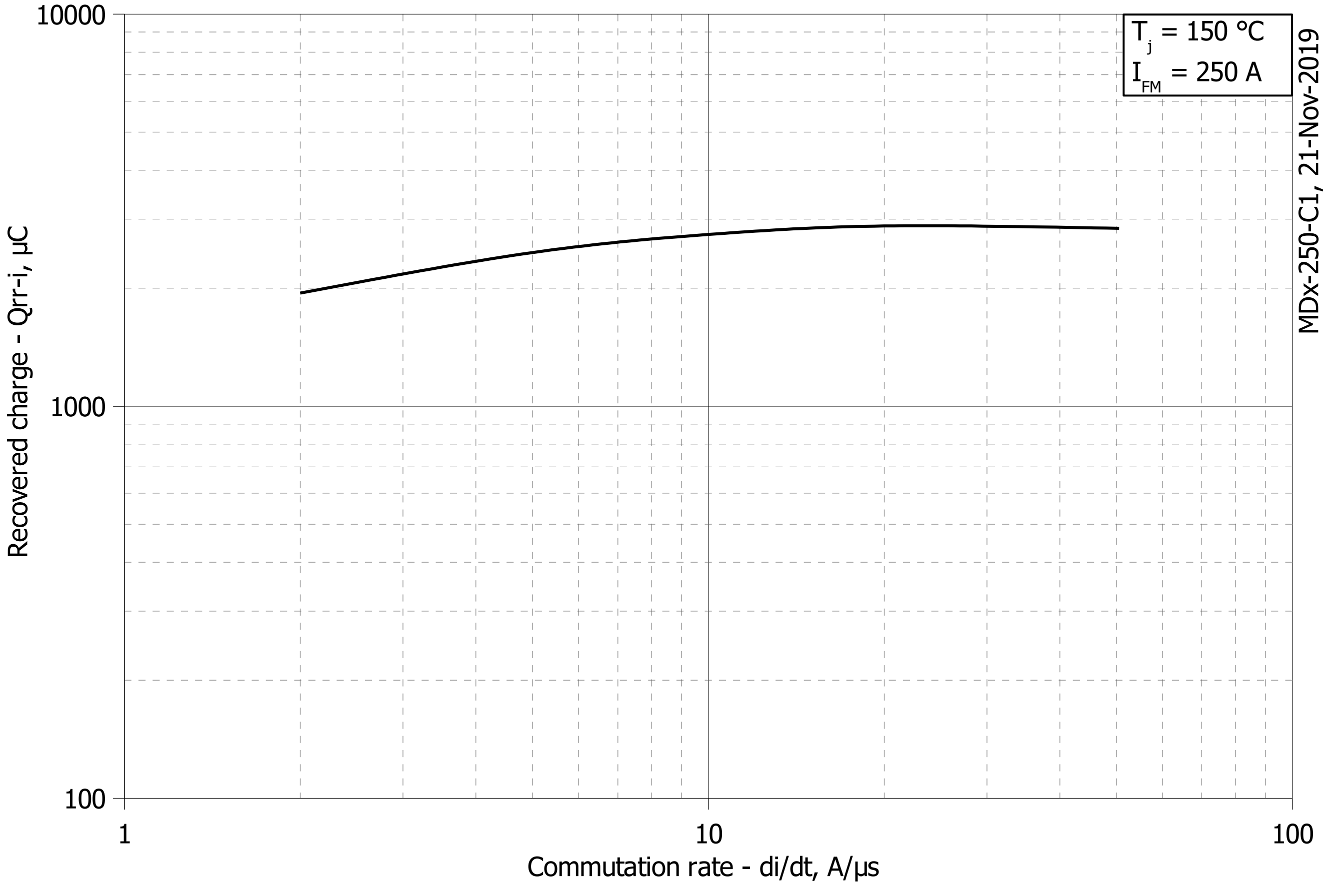


Fig 3 – Maximum recovered charge Q_{rr-i} (integral) vs. commutation rate di_R/dt

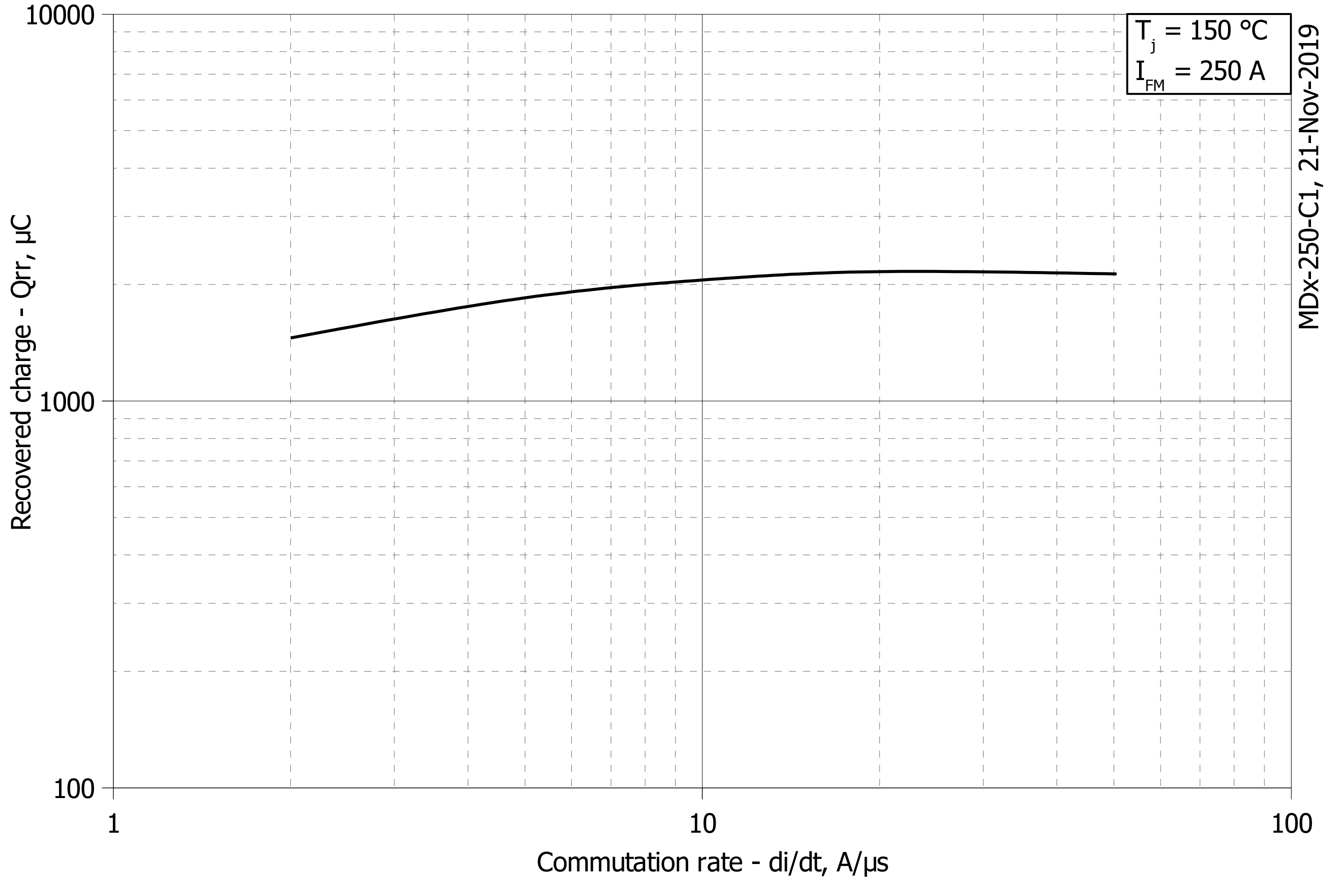


Fig 4 – Maximum recovered charge Q_{rr} vs. commutation rate di_R/dt (25% chord)

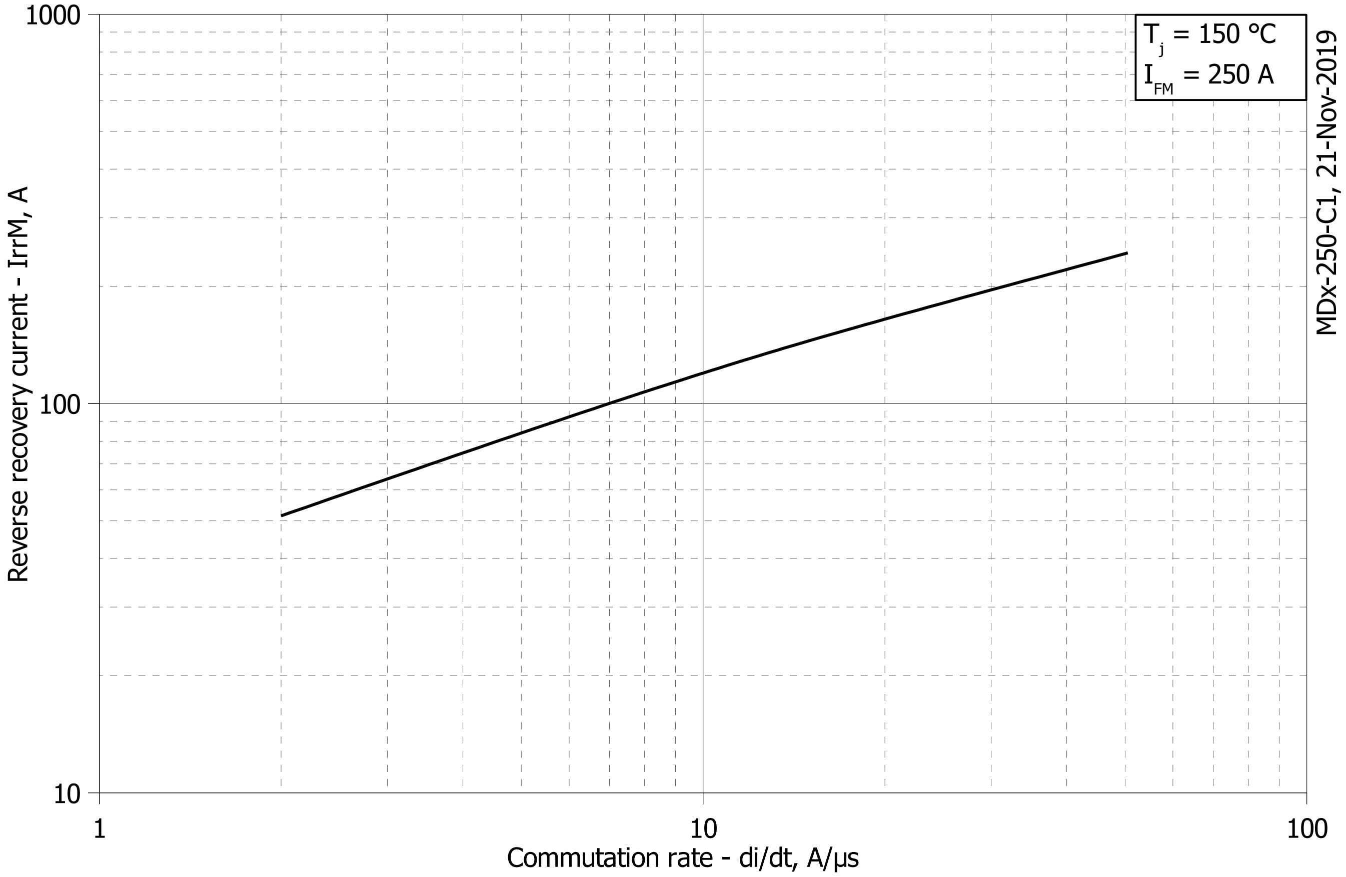


Fig 5 – Maximum reverse recovery current I_{rrM} vs. commutation rate di_R/dt

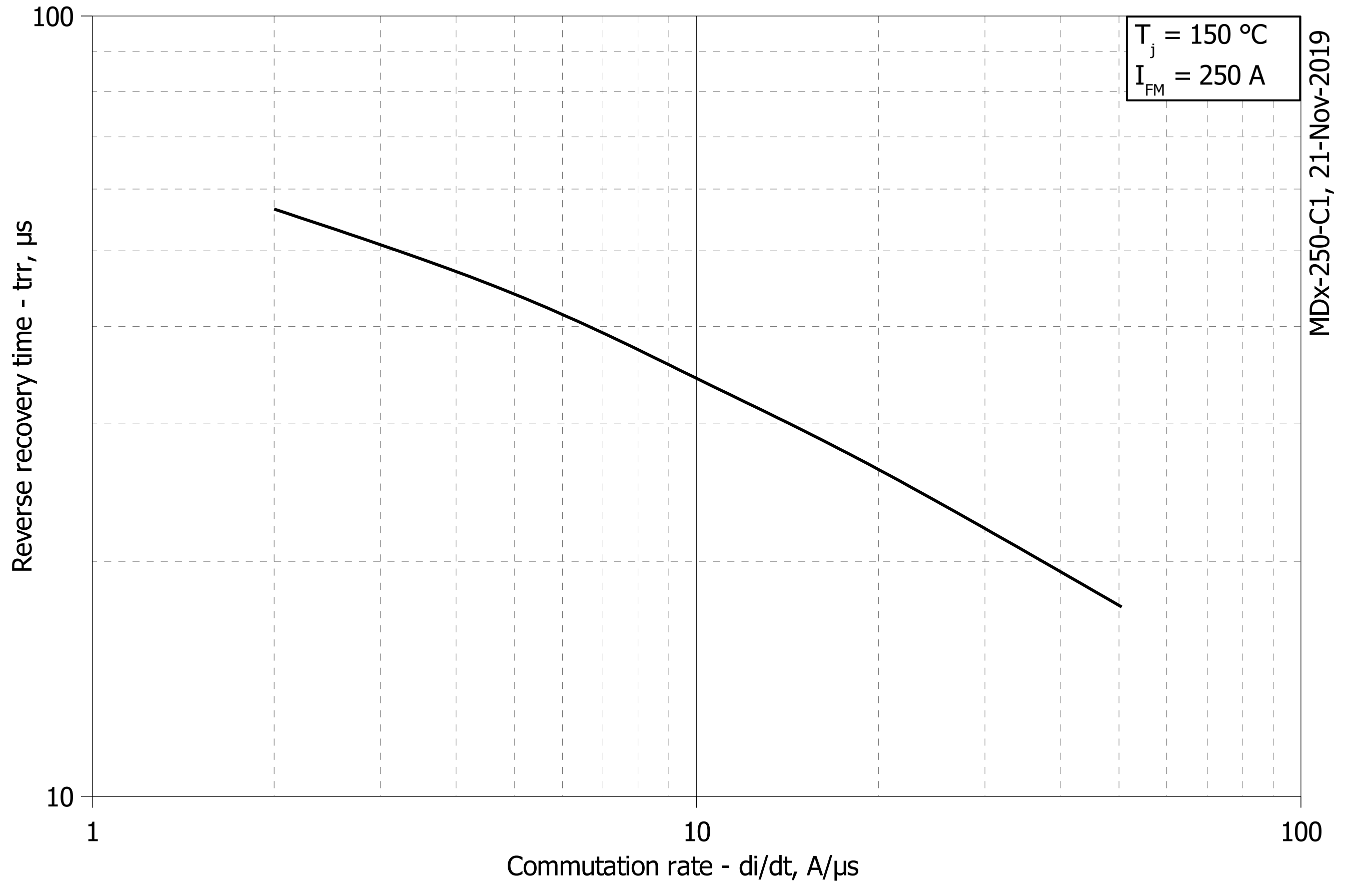


Fig 6 – Maximum recovery time t_{rr} vs. commutation rate di_R/dt (25% chord)

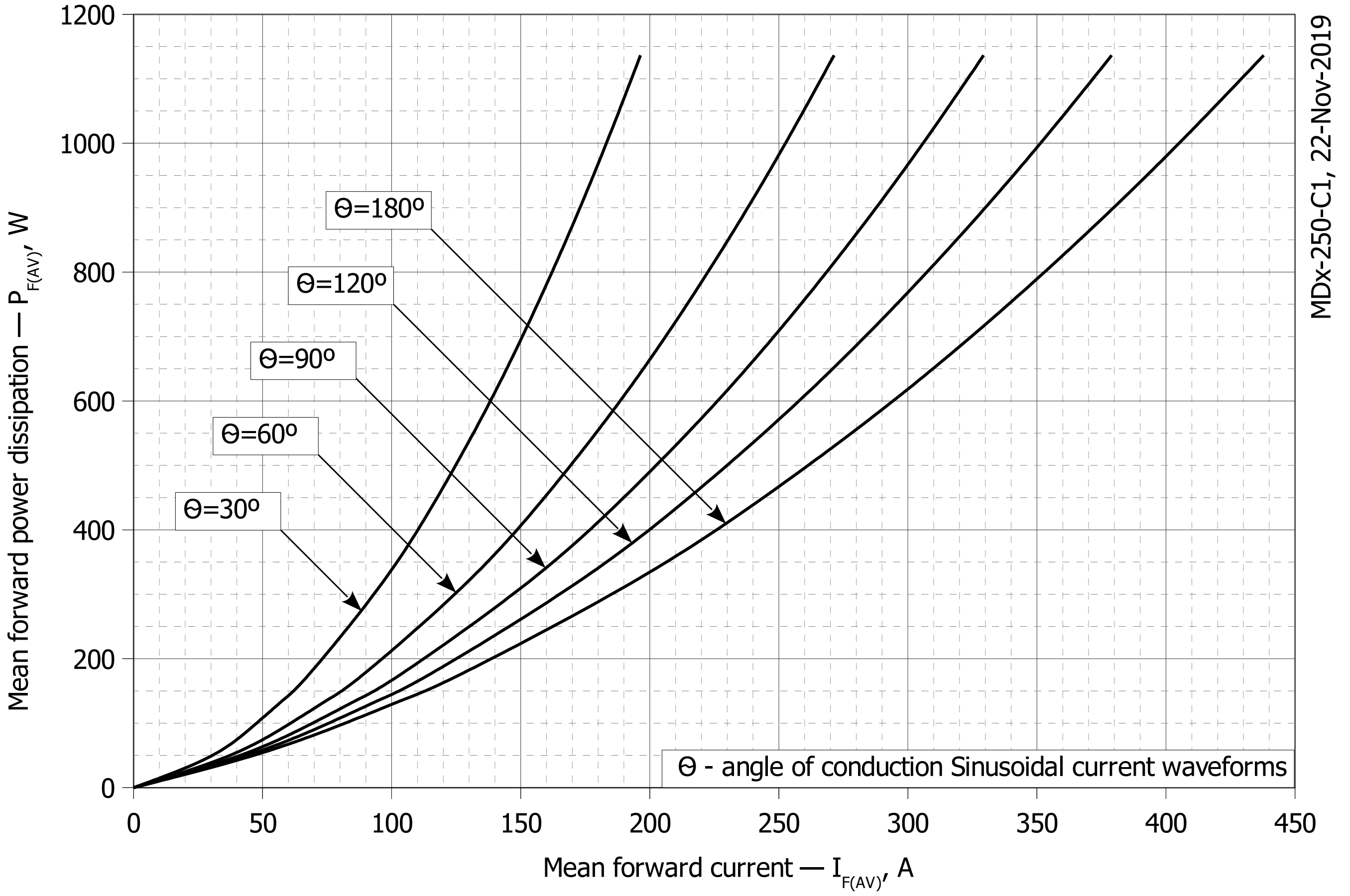


Fig. 7 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles (f=50Hz, DSC)

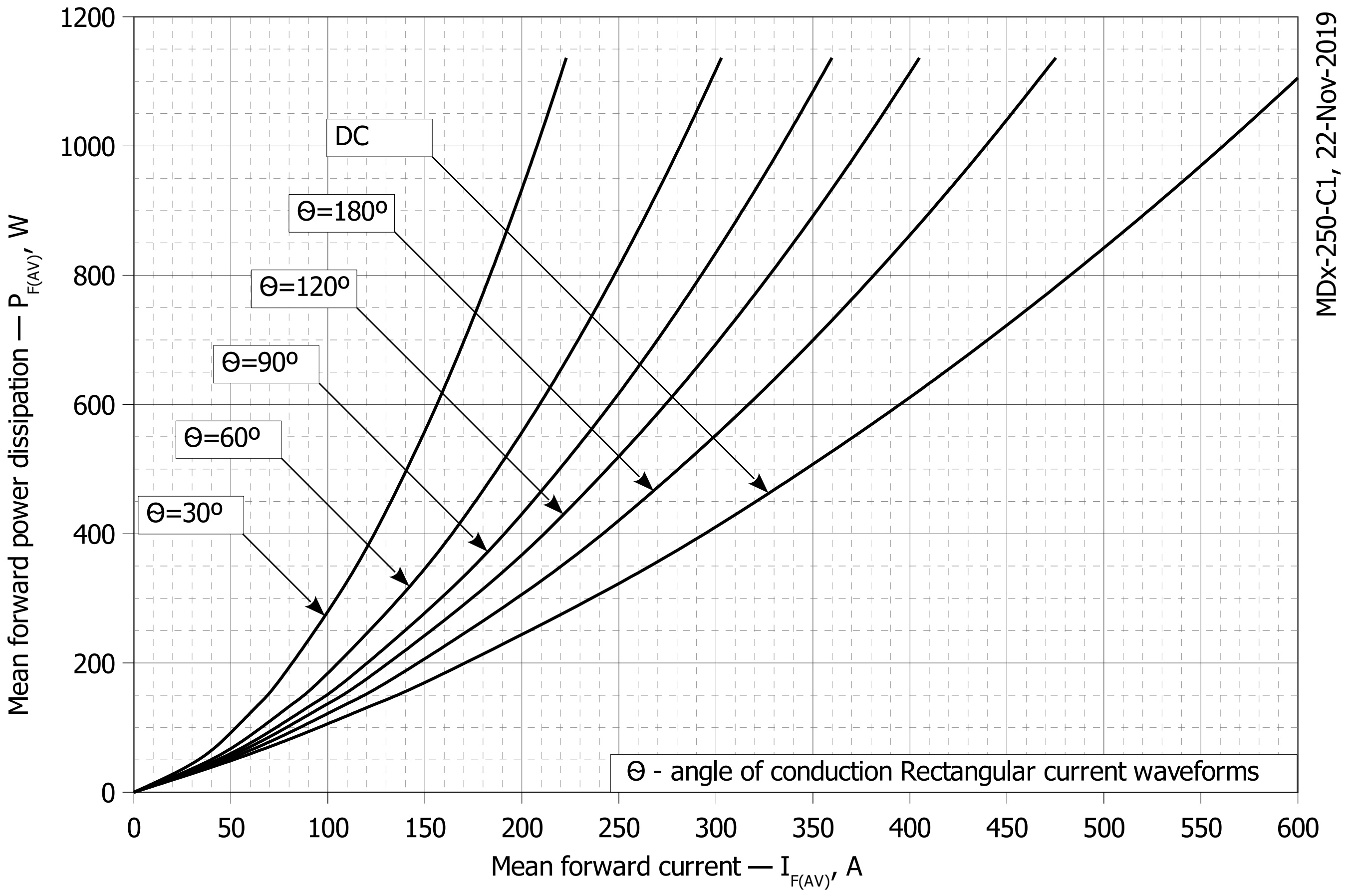


Fig. 8 – Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC (f=50Hz, DSC)

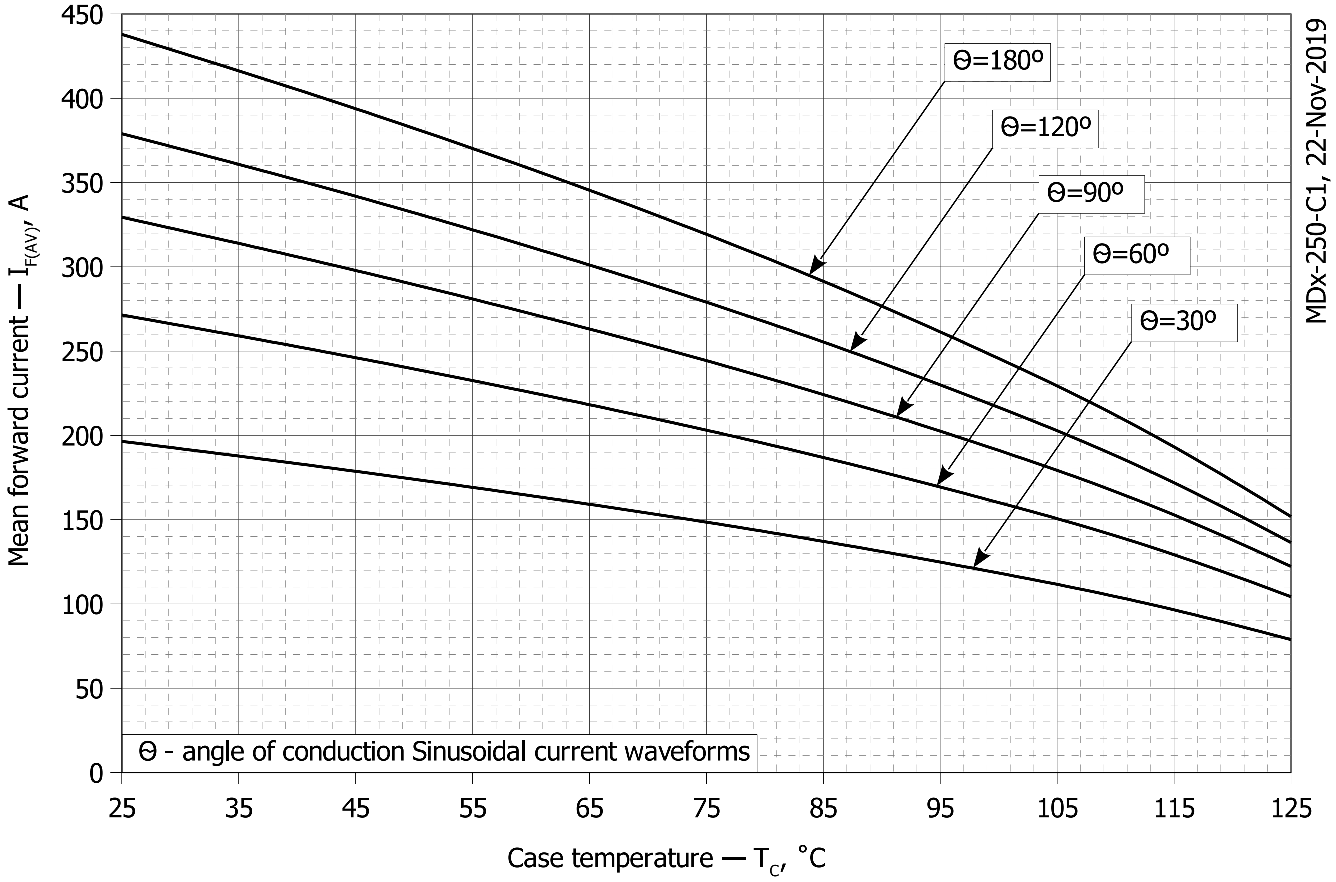


Fig. 9 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles (f=50Hz, DSC)

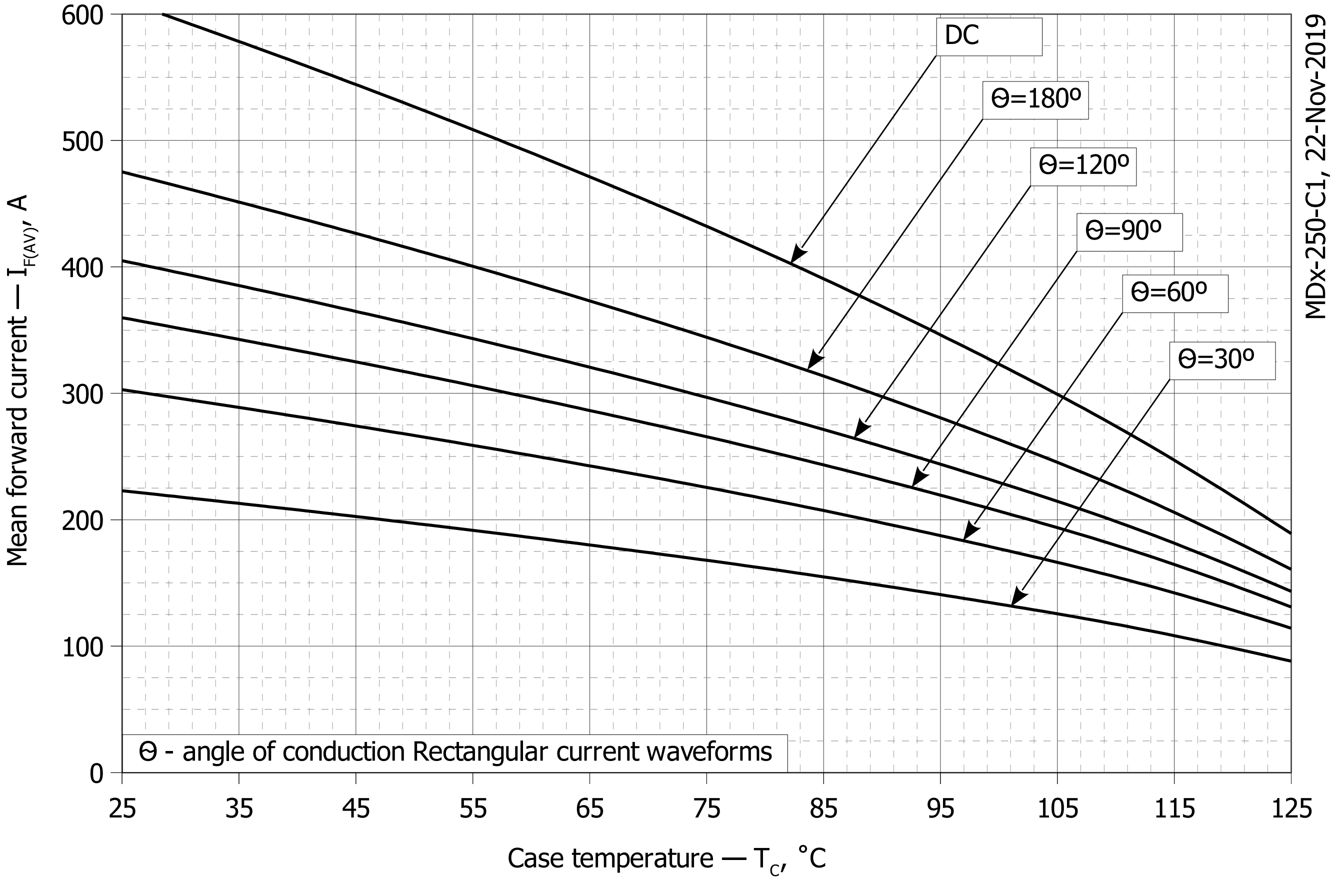


Fig. 10 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC (f=50Hz, DSC)

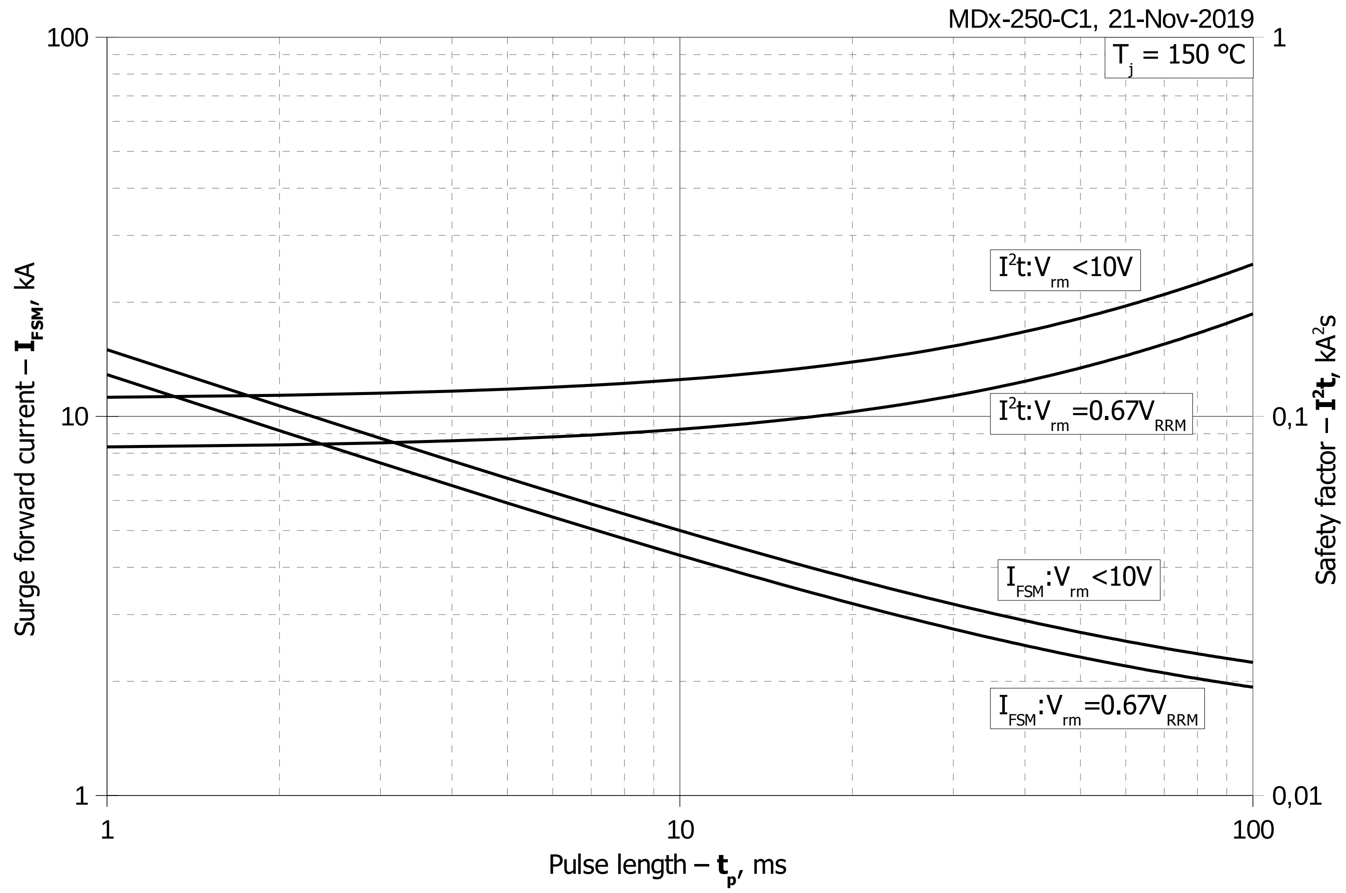


Fig. 11 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

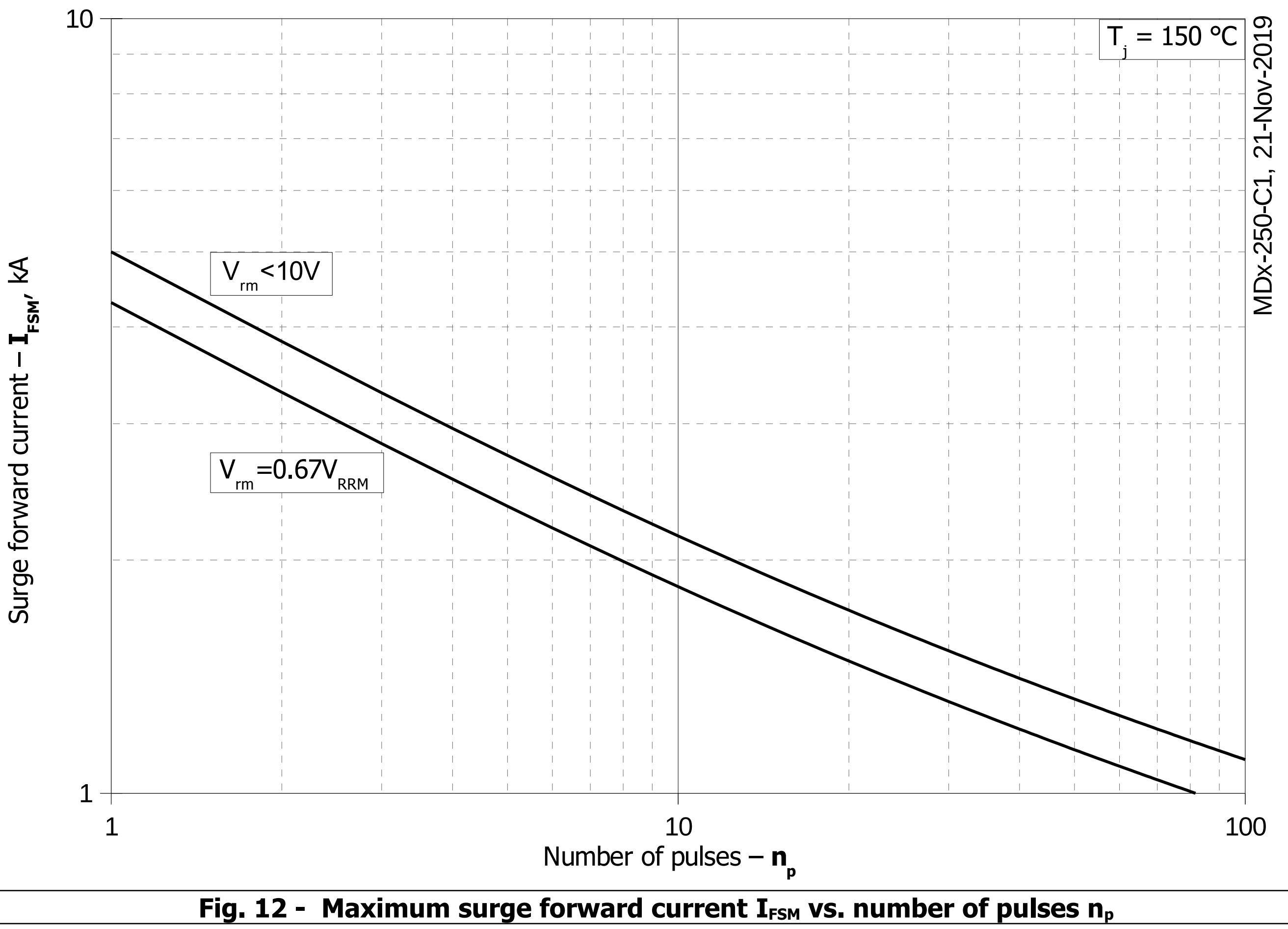


Fig. 12 - Maximum surge forward current I_{FSM} vs. number of pulses n_p