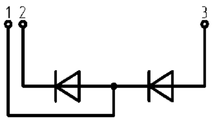
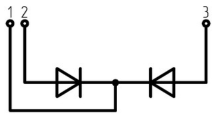
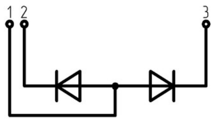
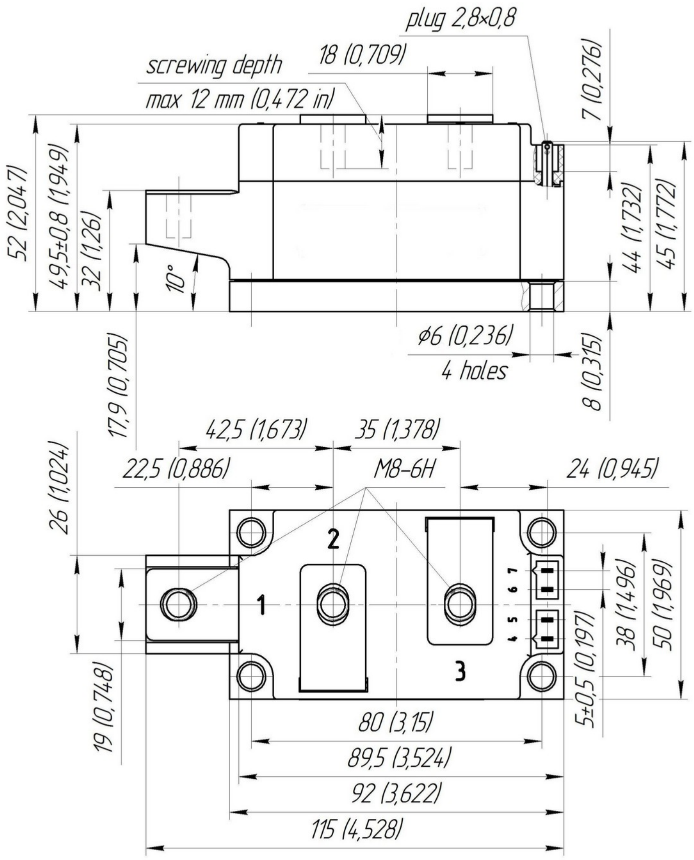
Double Diode Module For Phase Control MDx-320-28-C1

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

Average forward current	I_{FAV}	320 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}	Average forward current	A	320 363	T_c= 107 °C; T_c= 100 °C; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	502	T_c= 107 °C; 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	8.5 10.0	$T_j=T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			9.0 10.5	$T_j=T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=8.3 ms; single pulse; V_R=0 V;
I^2t	Safety factor	$A^2s \cdot 10^3$	360 500	$T_j=T_{j\,max}$ T_j=25 °C	180° half-sine wave; t_p=10 ms; single pulse; V_R=0 V;
			330 450	$T_j=T_{j\,max}$ 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	$0.6 \cdot V_{RRM}$	$T_j=T_{j\,max}$;	
THERMAL					
T_{stg}	Storage temperature	°C	- 40 ÷ 50		
T_j	Operating junction temperature	°C	- 40 ÷ 150		
$T_{c\,op}$	Operating temperature	°C	- 40 ÷ 125		
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	1.40	T_j=25 °C; I_{FM}=785 A
$V_{F(TO)}$	Forward threshold voltage, max	V	0.85	$T_j=T_{j\,max}$; $0.5\,\pi\,I_{FAV} < I_T < 1.5\,\pi\,I_{FAV}$
r_T	Forward slope resistance, max	mΩ	0.450	
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	1800	$T_j=T_{j\,max}$; I_{TM}=320 A; di_R/dt=-10 A/μs; V_R=100 V
t_{rr}	Reverse recovery time, max	μs	27	
I_{rrM}	Peak reverse recovery current, max	A	135	
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 (M5)[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	-	320	-	28	-	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

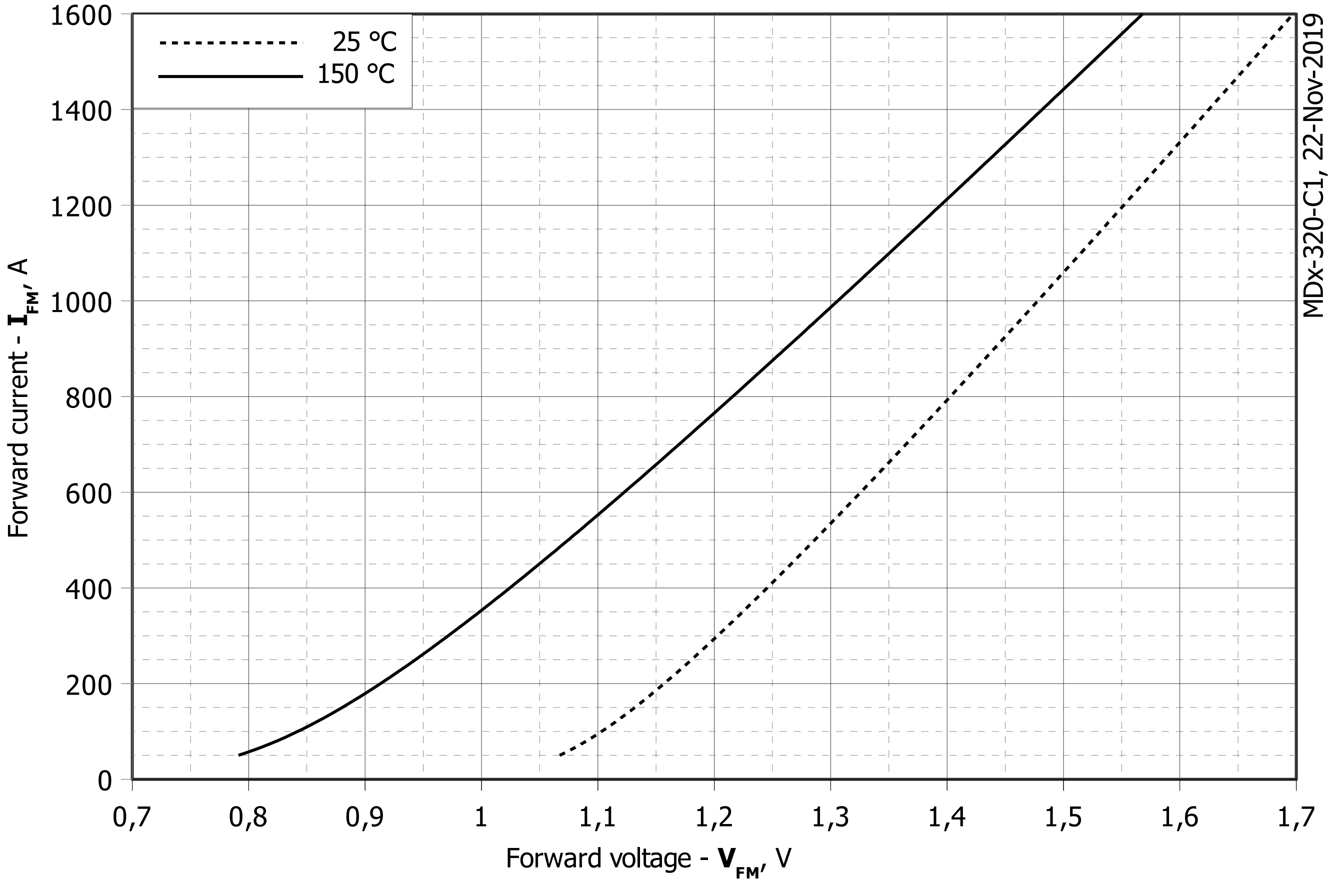


Fig 1 – Forward characteristics of Limit device

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 = 25ºC	$T_j = T_{j\,max}$
A	0.94446000	0.59085000
B	0.00033922	0.00040490
C	0.02609700	0.04637000
D	0.00044135	-0.00031834

Forward characteristic model (see Fig. 1).

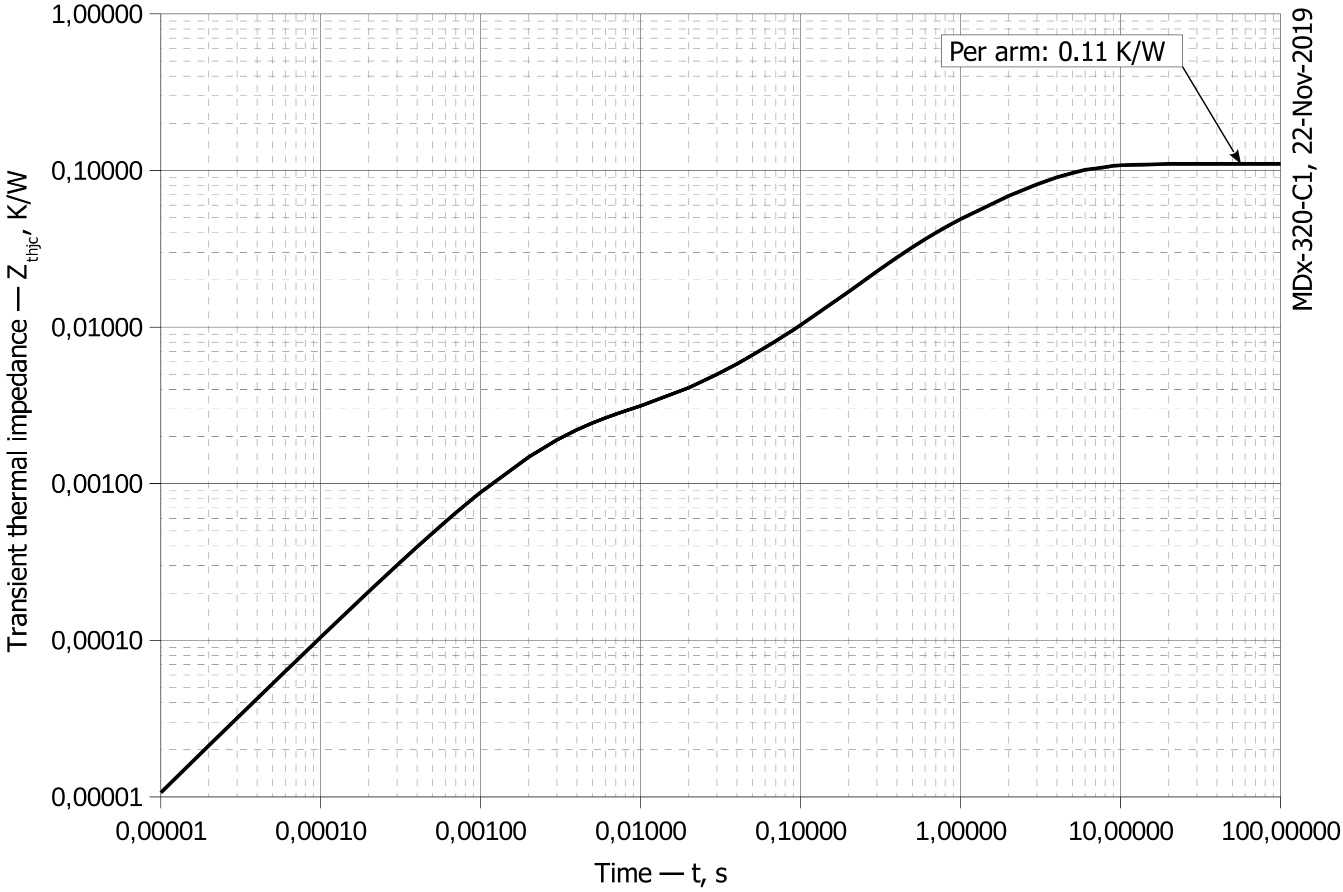


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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)

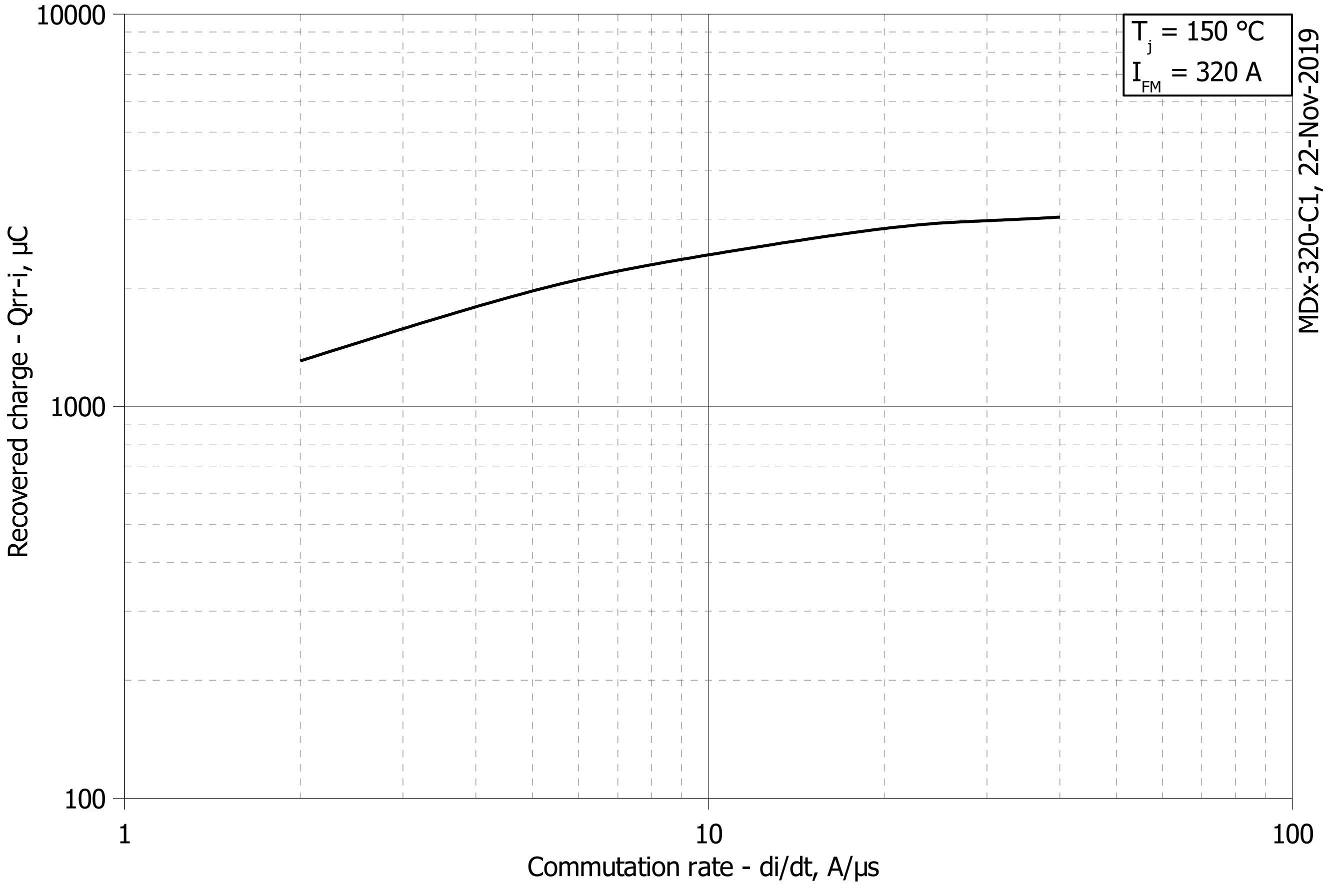


Fig 3 – Maximum recovered charge Q_{rr-i} (integral) vs. commutation rate di_R/dt

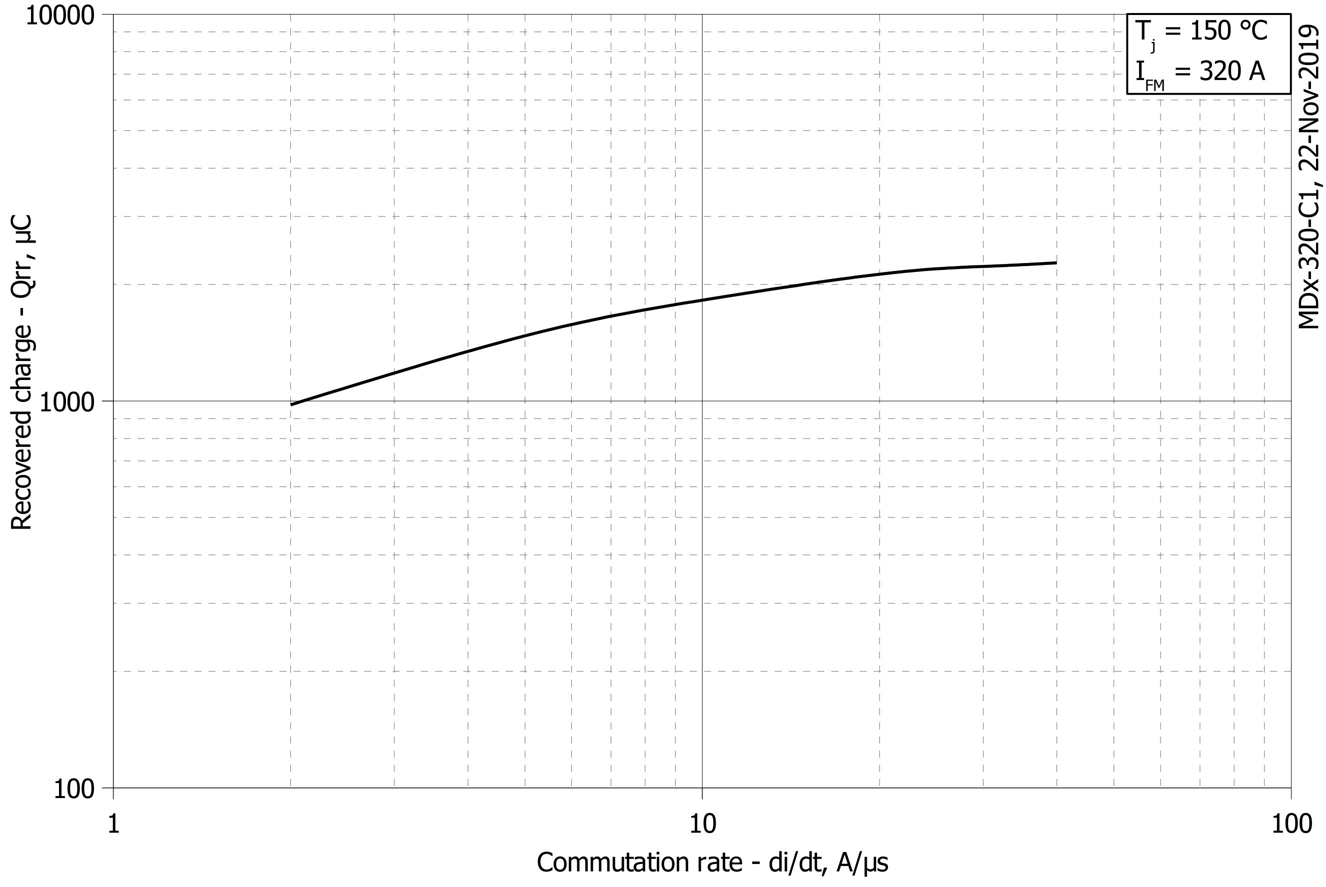


Fig 4 – Maximum recovered charge Q_{rr} vs. commutation rate di_R/dt (25% chord)

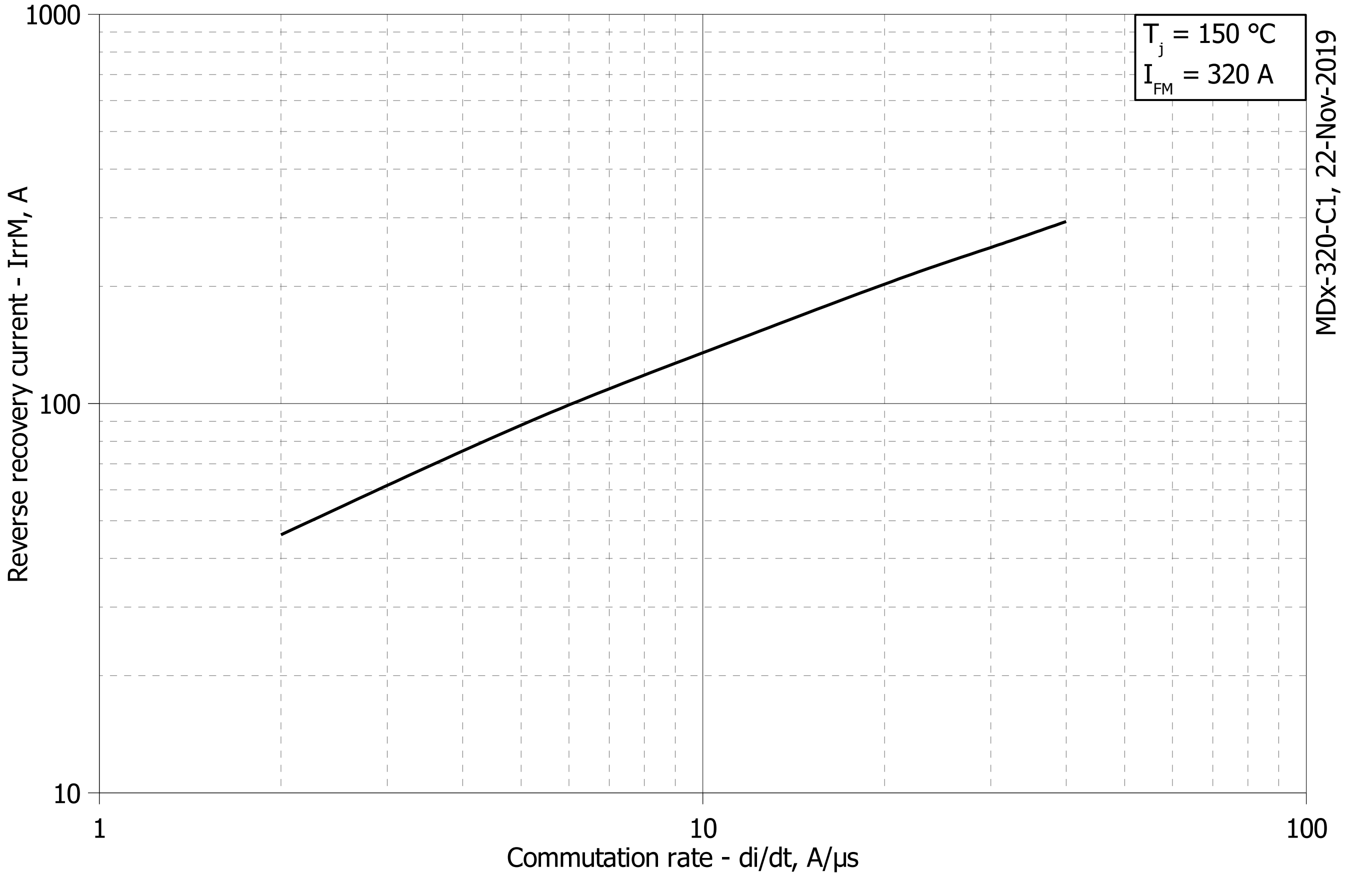


Fig 5 – Maximum reverse recovery current I_{rrM} vs. commutation rate di_R/dt

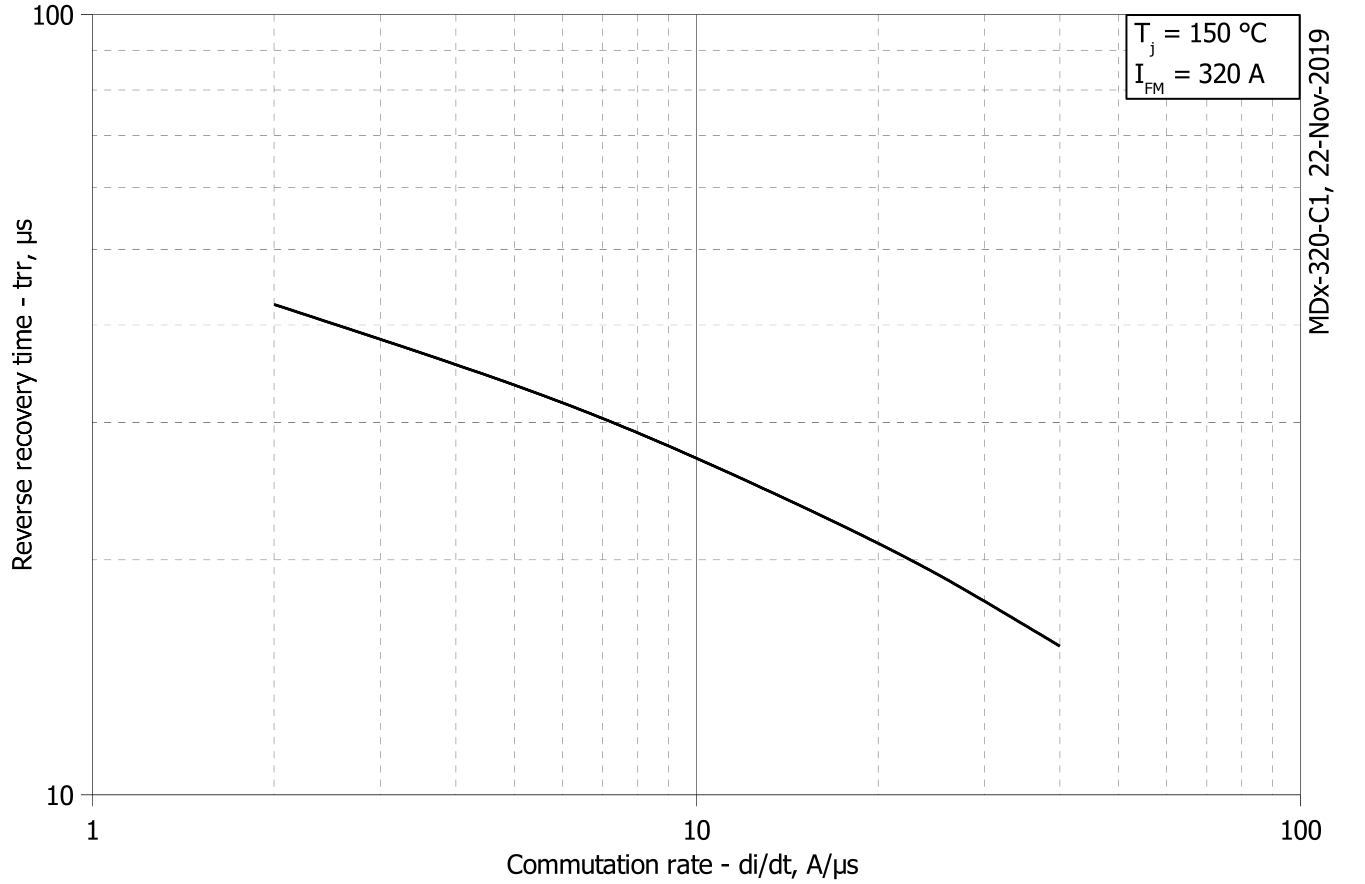


Fig 6 – Maximum recovery time t_{rr} vs. commutation rate di_R/dt (25% chord)

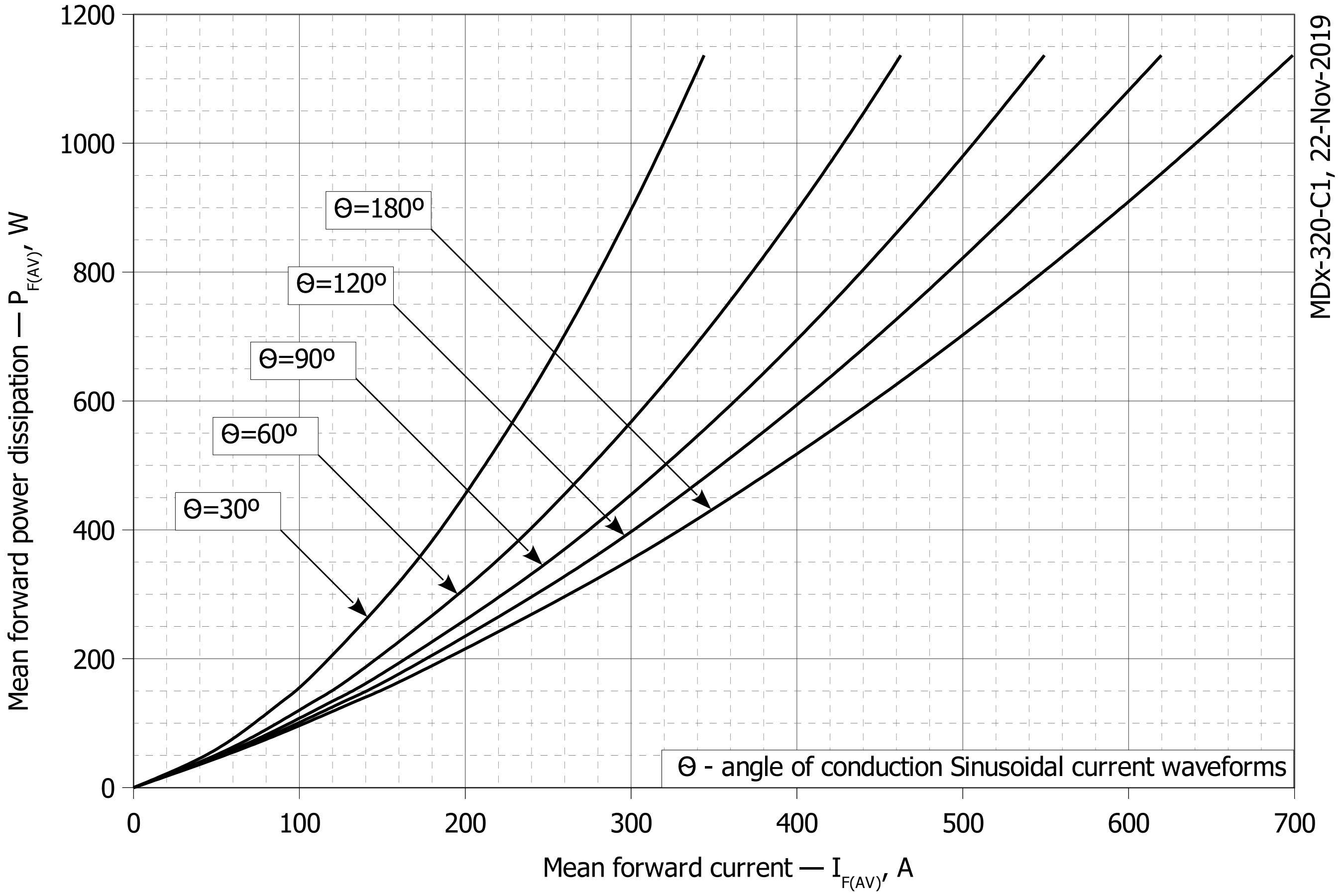


Fig. 7 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles (f=50Hz, DSC)

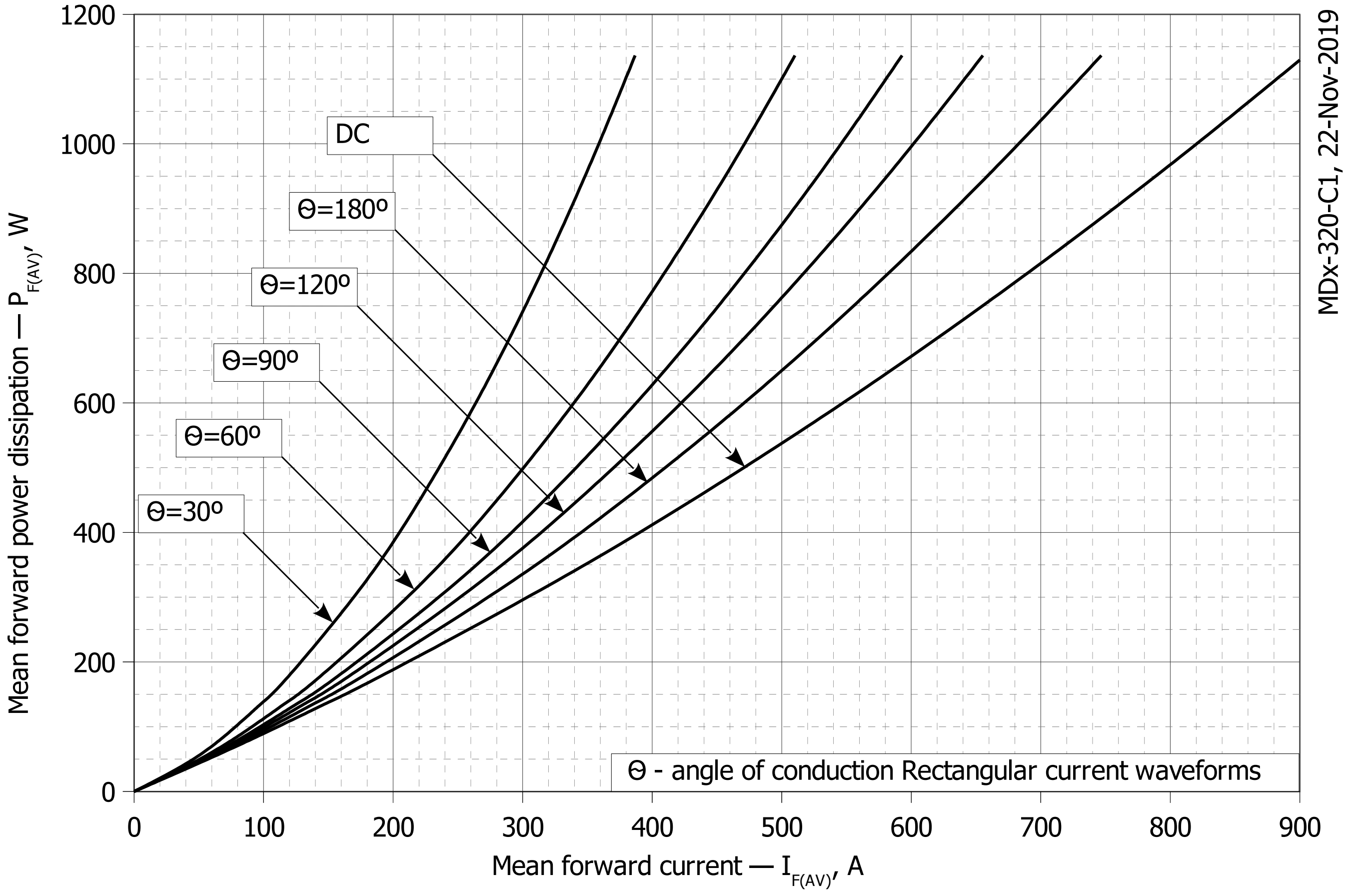


Fig. 8 – Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC (f=50Hz, DSC)

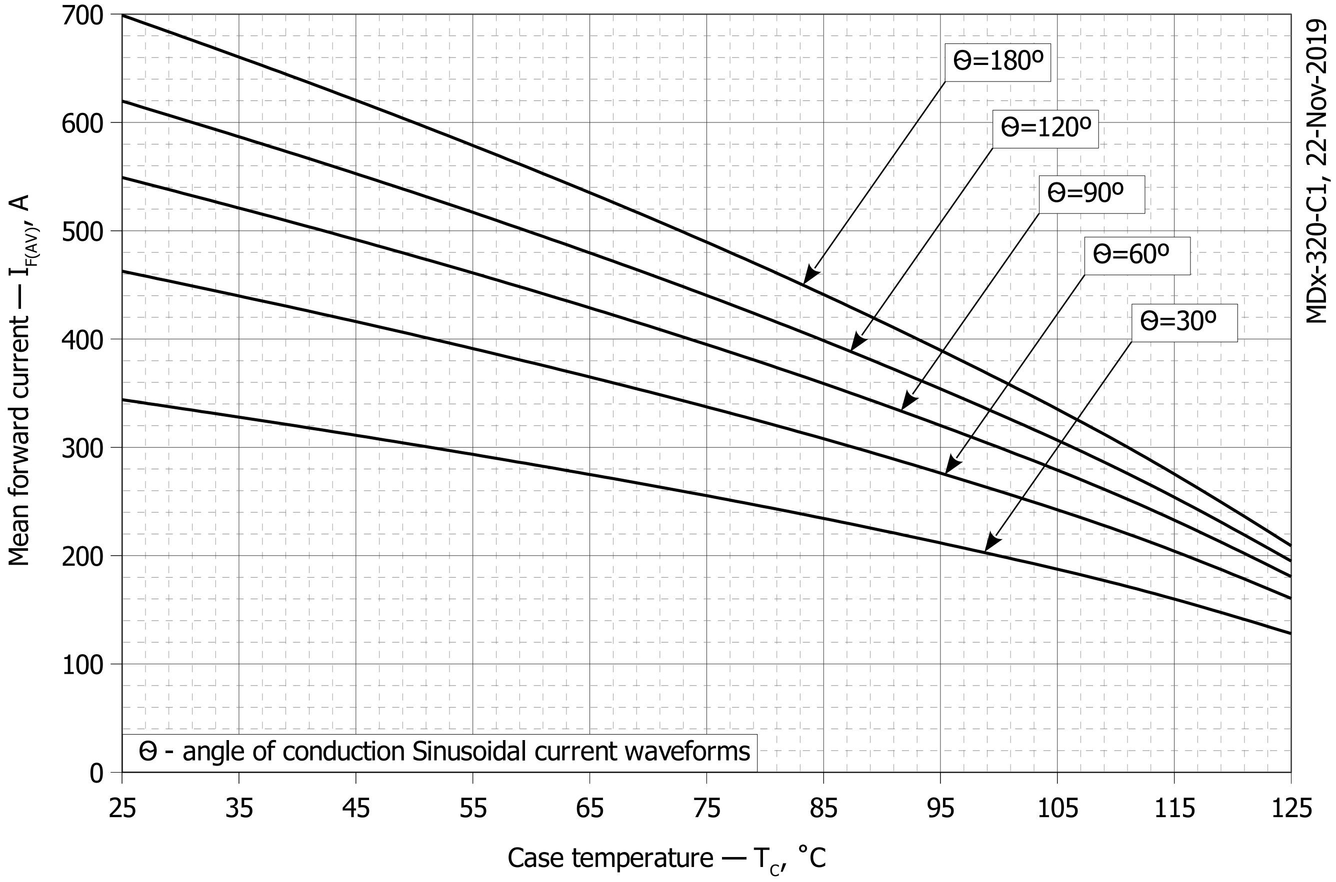


Fig. 9 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles (f=50Hz, DSC)

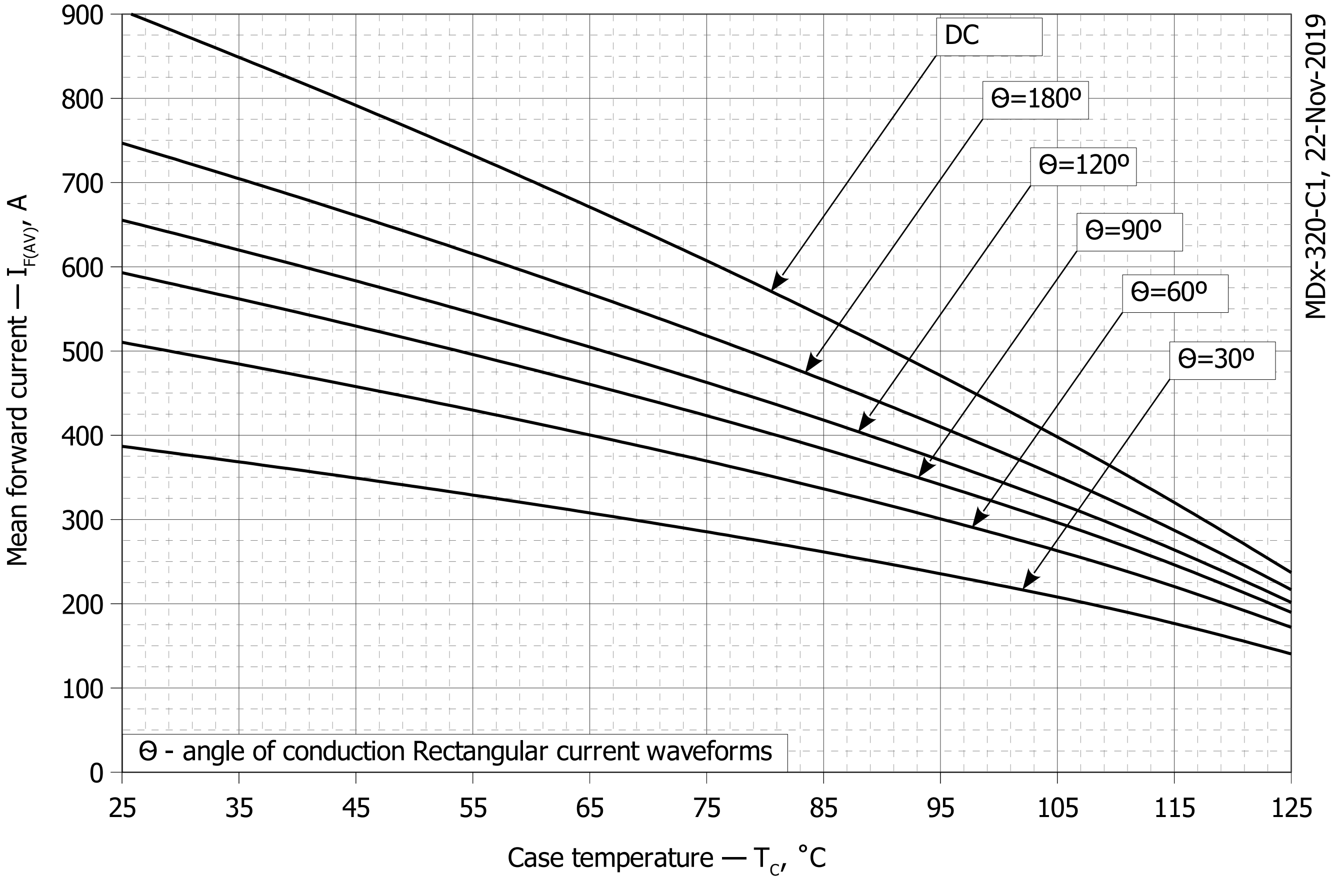


Fig. 10 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC (f=50Hz, DSC)

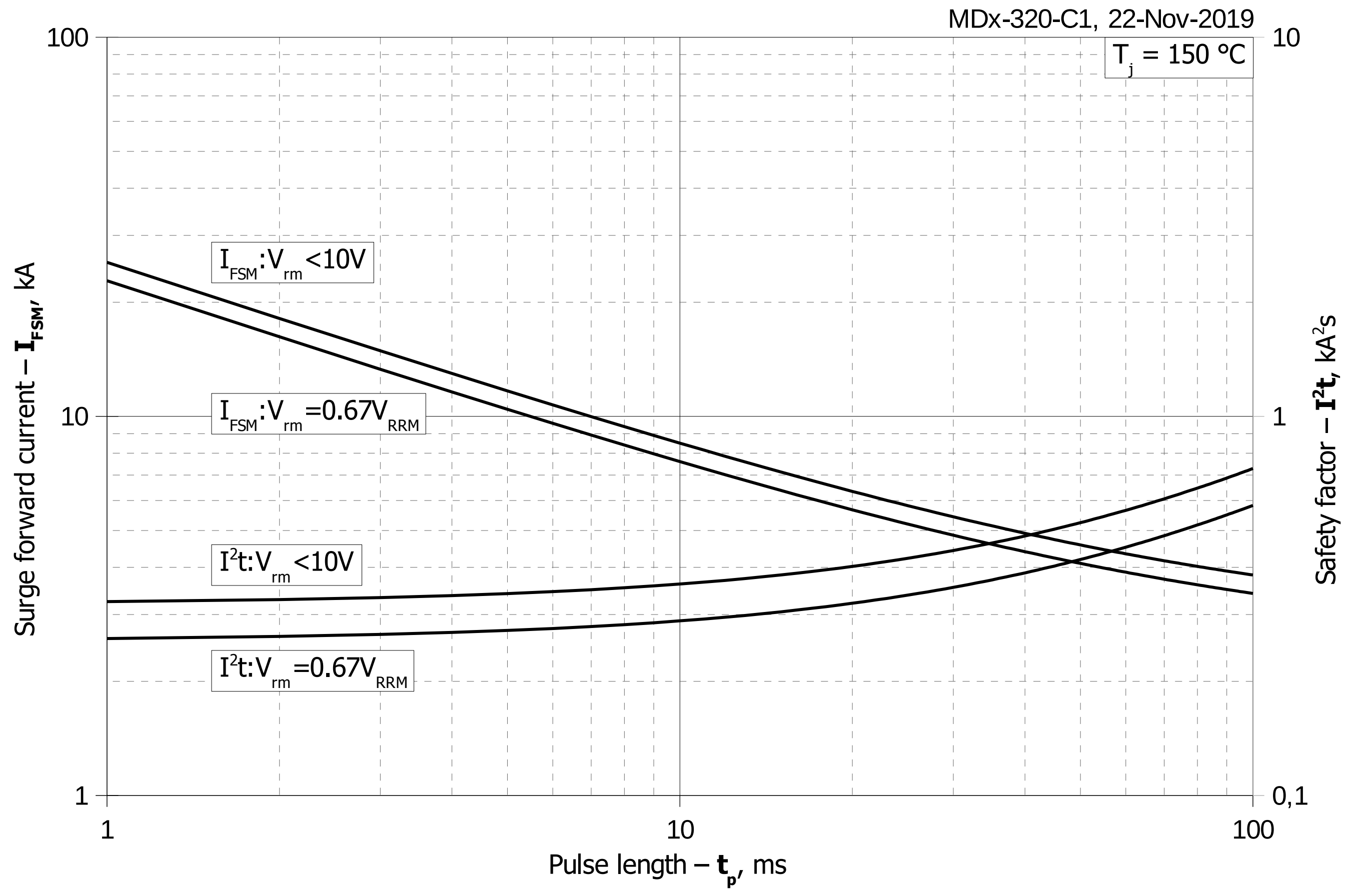


Fig. 11 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

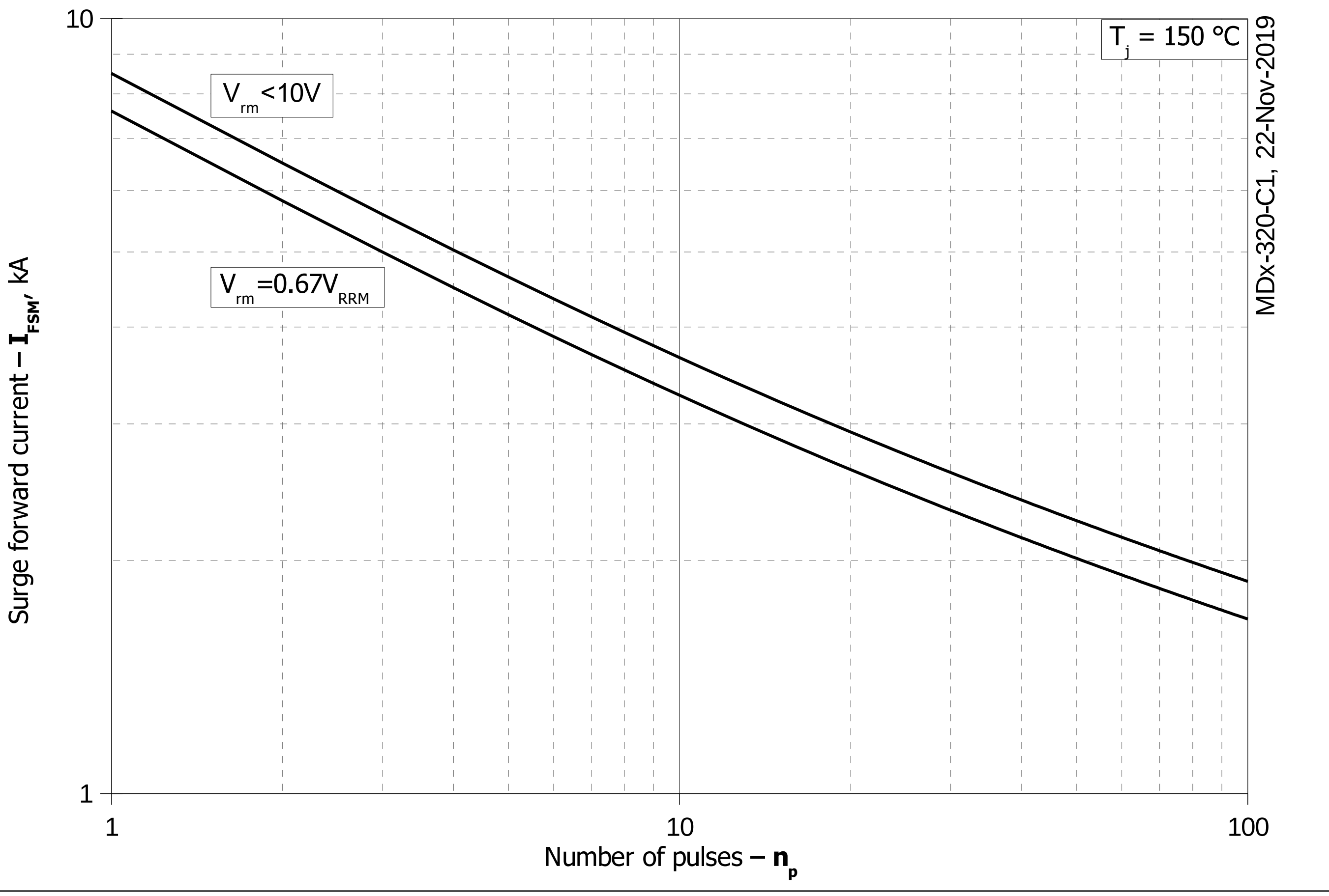


Fig. 12 - Maximum surge forward current I_{FSM} vs. number of pulses n_p