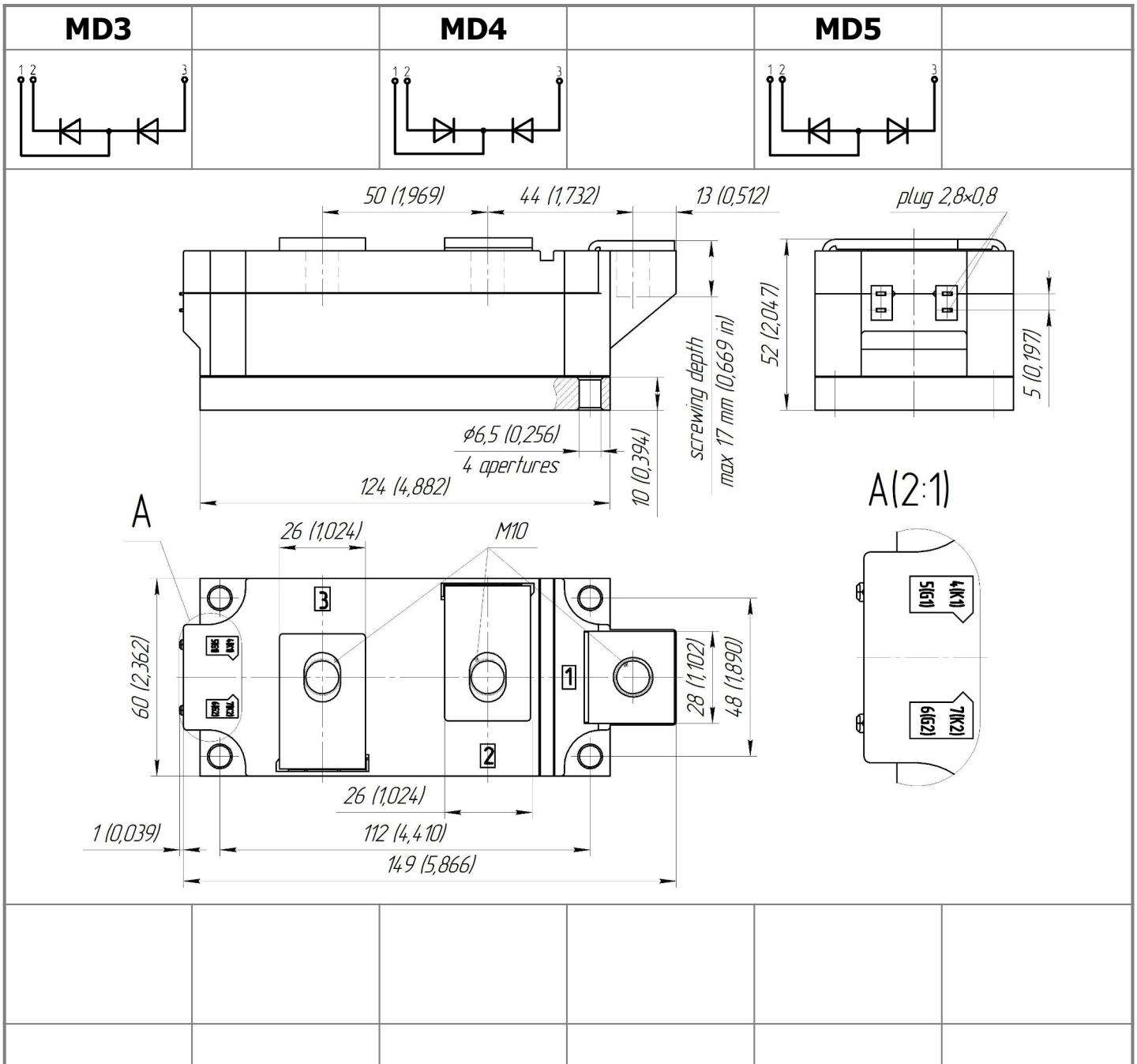




Diode Modules MDx-500-36-A2



Average forward current		I_{FAV}		500 A	
Repetitive peak reverse voltage		V_{RRM}		3000...3600 V	
V_{RRM}, V	3000	3200	3400	3600	
Voltage code	30	32	34	36	
$T_j, ^\circ C$	-40...+150				



MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{FAV}	Maximum allowable average forward current	A	565 500	$T_c=100\text{ }^\circ\text{C};$ $T_c=107\text{ }^\circ\text{C};$ 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	785	$T_c=107\text{ }^\circ\text{C};$ 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	14.0 16.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=10\text{ ms};$ single pulse; $V_R=0\text{ V}$
			15.0 17.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms};$ single pulse; $V_R=0\text{ V}$
I^2t	Safety factor	$A^2s\cdot 10^3$	980 1280	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$	180° half-sine wave; $t_p=10\text{ ms};$ single pulse; $V_R=0\text{ V}$
			930 1190	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$	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	3000...3600	$T_{j\text{ min}} < T_j < T_{j\text{ max}};$ 180° half-sine wave; 50 Hz	
V_{RSM}	Non-repetitive peak reverse voltages	V	3100...3700	$T_{j\text{ min}} < T_j < T_{j\text{ max}};$ 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	$^\circ\text{C}$	-40...+50		
T_j	Operating junction temperature	$^\circ\text{C}$	-40...+150		
$T_{c\text{ op}}$	Operating temperature	$^\circ\text{C}$	-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	1.55	$T_j=25\text{ }^\circ\text{C}; I_{FM}=1256\text{ A}$	
$V_{F(TO)}$	Forward threshold voltage, max	V	0.937	$T_j=T_{j\text{ max}};$	
r_T	Forward slope resistance, max	$\text{m}\Omega$	0.485	$0.5\pi I_{FAV} < I_T < 1.5\pi I_{FAV}$	
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	50 3.00	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$	$V_R=V_{RRM}$
SWITCHING					
Q_r	Recovered charge, max	μC	2860	$T_j=T_{j\text{ max}}; I_{FM}=I_{FAV};$	
t_{rr}	Reverse recovery time, max	μs	55	$di_R/dt=-5\text{ A}/\mu\text{s};$	
I_{rr}	Reverse recovery current, max	A	104	$V_R=100\text{ V}$	
THERMAL					
R_{thjc}	Thermal resistance, junction to case				
	per module	$^\circ\text{C}/\text{W}$	0.0275	180° half-sine wave, 50 Hz	
	per arm	$^\circ\text{C}/\text{W}$	0.0550		
	per module	$^\circ\text{C}/\text{W}$	0.0265	DC	
per arm	$^\circ\text{C}/\text{W}$	0.0530			
R_{thch}	Thermal resistance, case to heatsink				
	per module	$^\circ\text{C}/\text{W}$	0.0100		
	per arm	$^\circ\text{C}/\text{W}$	0.0200		
INSULATION					
V_{ISOL}	Insulation test voltage	kV	3.00	Sine wave, 50 Hz;	t=60 sec
			3.60	RMS	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%
m	Weight, max	g	1500	

PART NUMBERING GUIDE		NOTES
MD	3 - 500 - 36 - A2 - N	¹⁾ The screws must be lubricated
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		

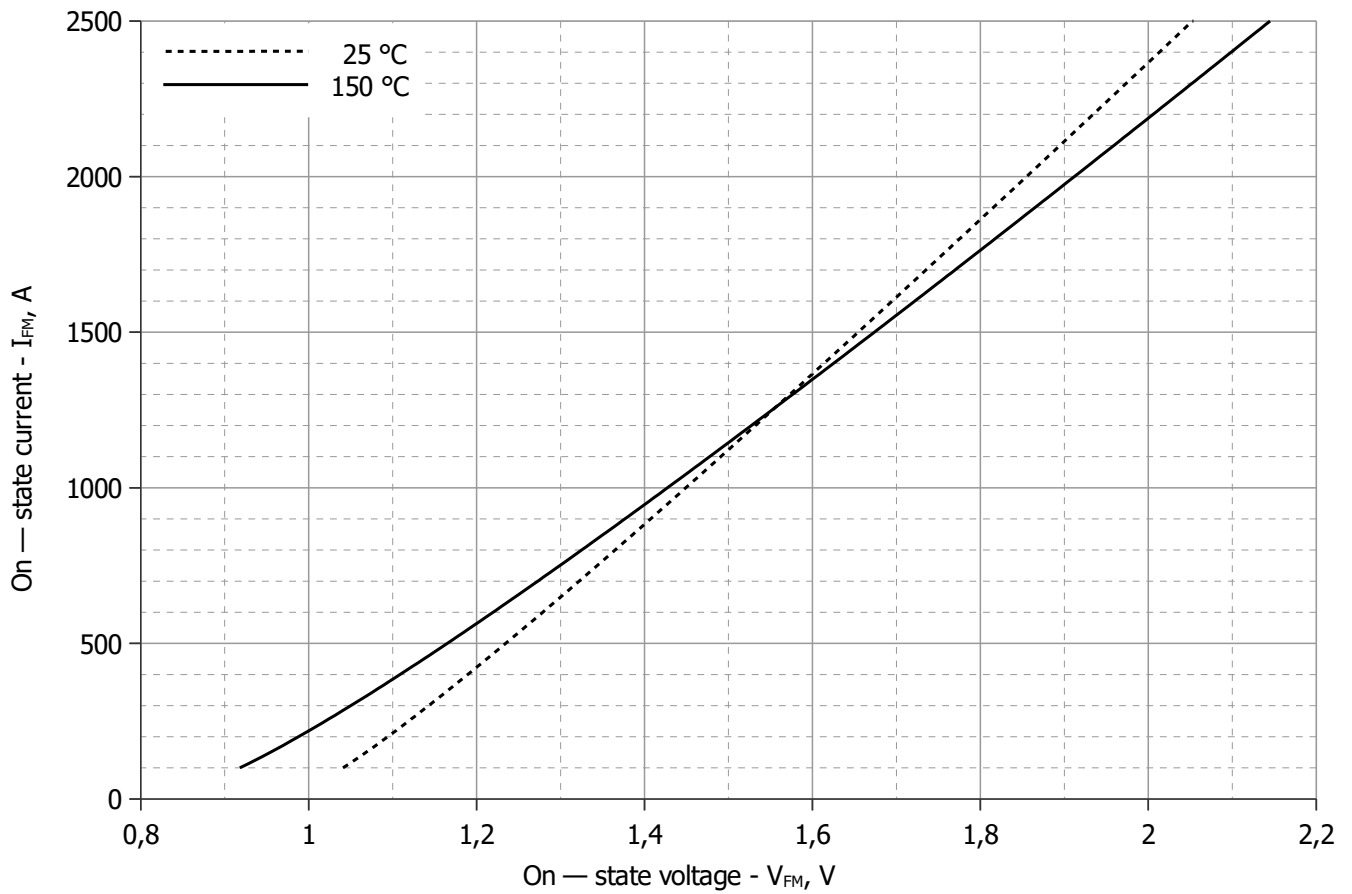


Fig 1 – On-state characteristics of Limit device

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	
	$T_j = 25^\circ\text{C}$	$T_j = T_{j\text{max}}$
A	0.95571265	0.79948026
B	0.00035178	0.00039020
C	0.00212829	0.00183697
D	0.00401392	0.00711161

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

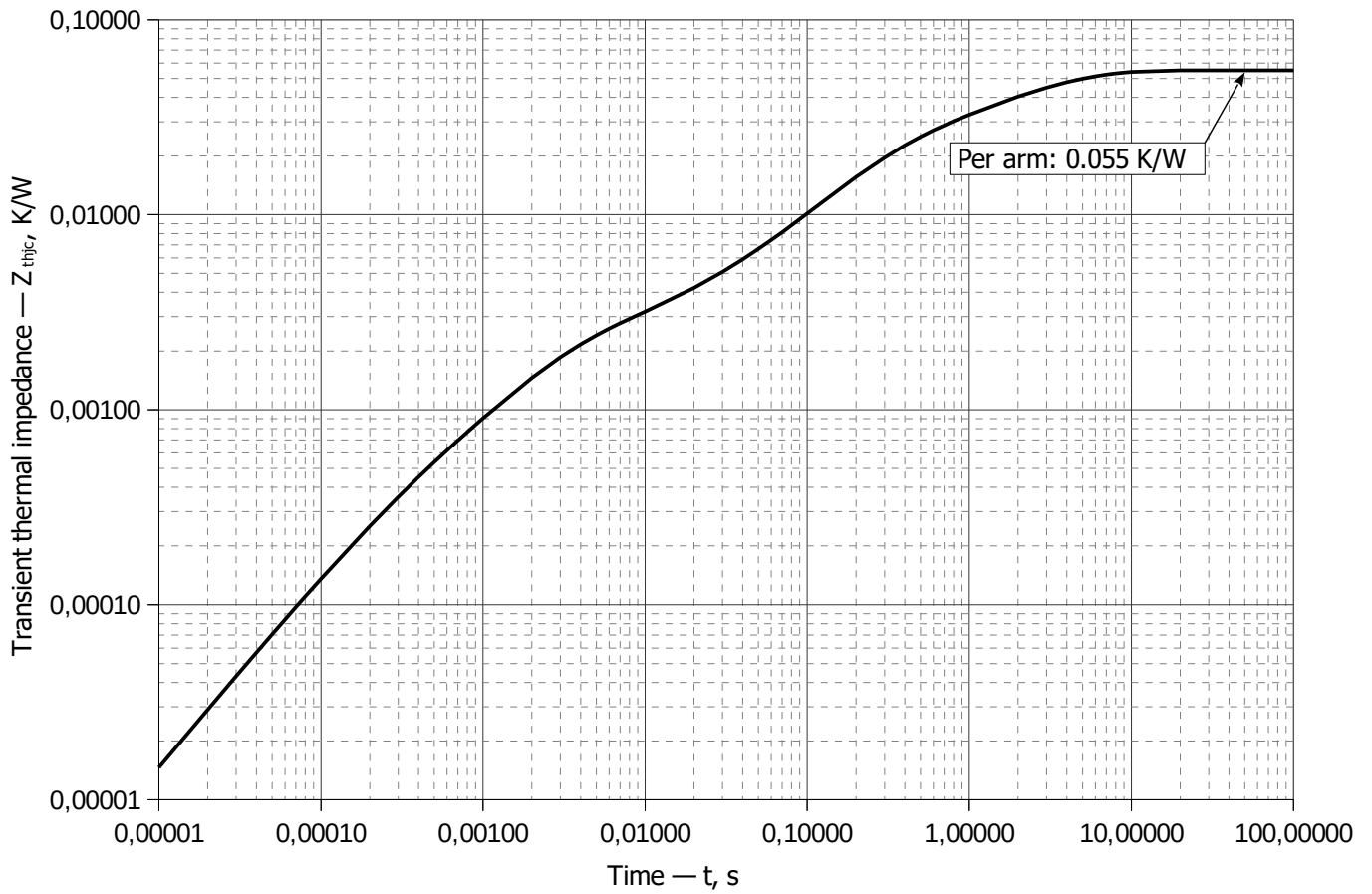


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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	0.0249	0.0112	0.01635	0.0006528	0.00179	0.000136
τ_i , s	3.132	1	0.2335	0.01038	0.002348	0.0002448

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

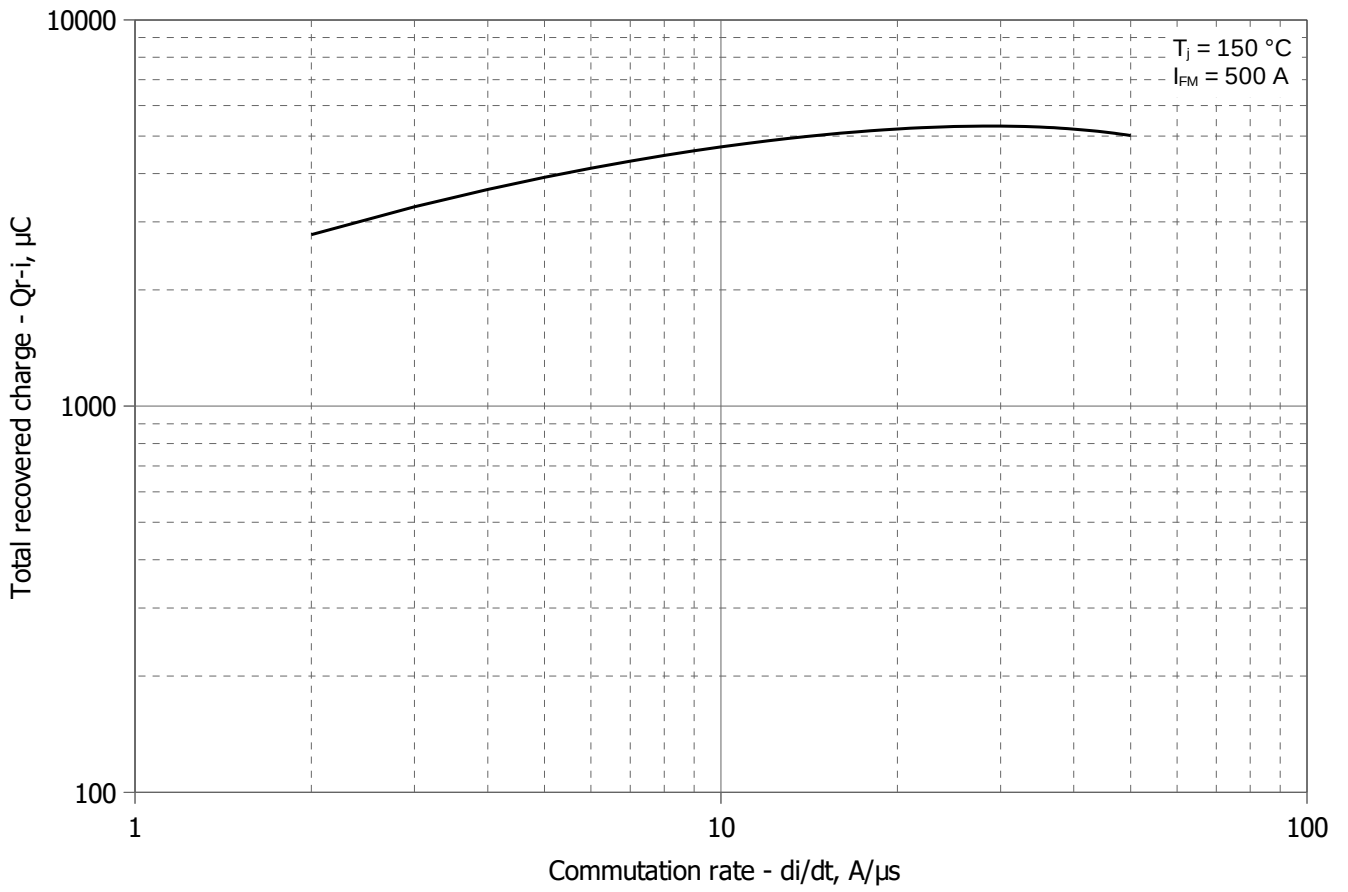


Fig 3 - Maximum recovered charge Q_{r-i} (integral) vs. commutation rate di_R/dt

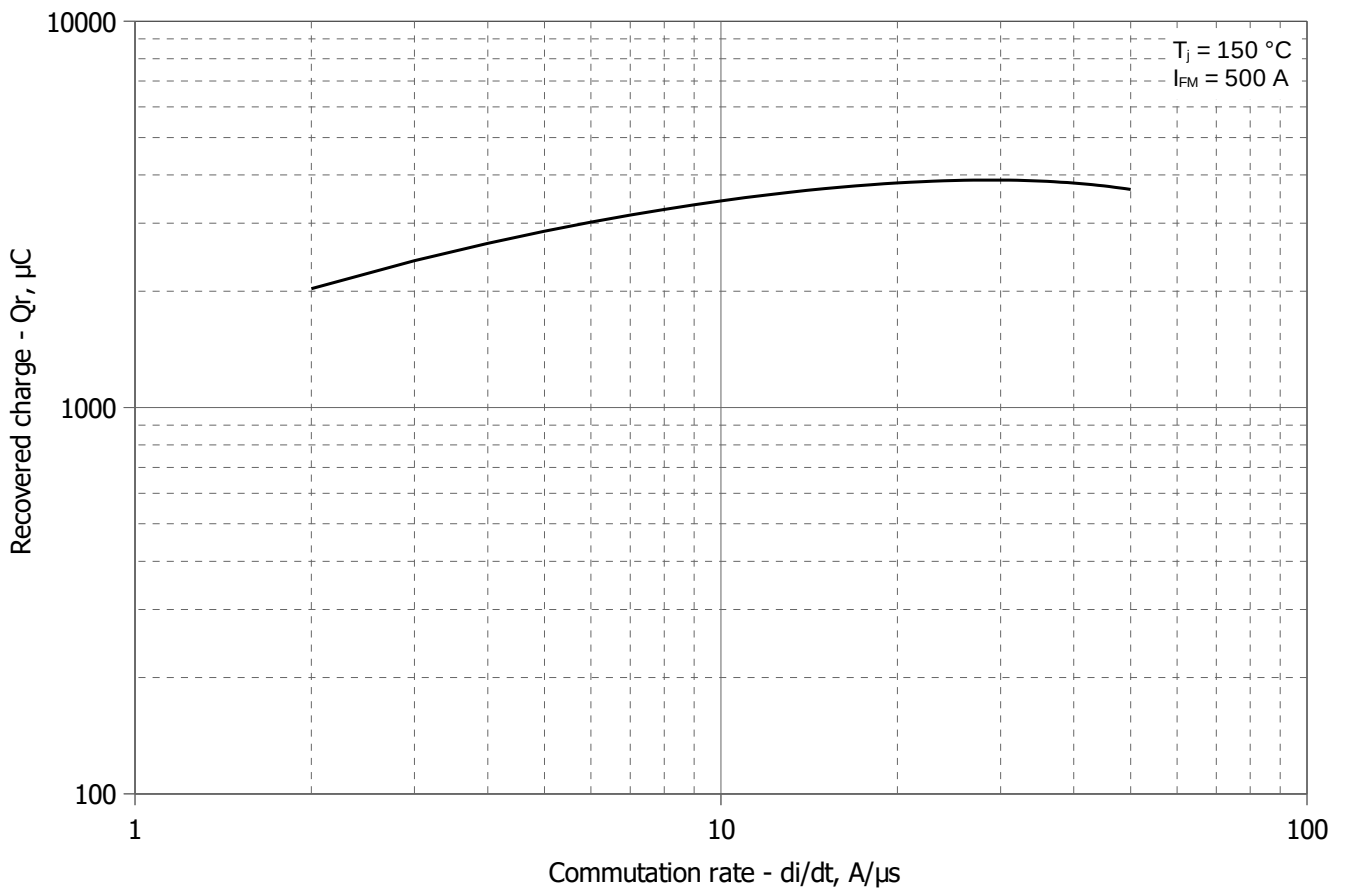


Fig 4 - Maximum recovered charge Q_r vs. commutation rate di_R/dt (25% chord)

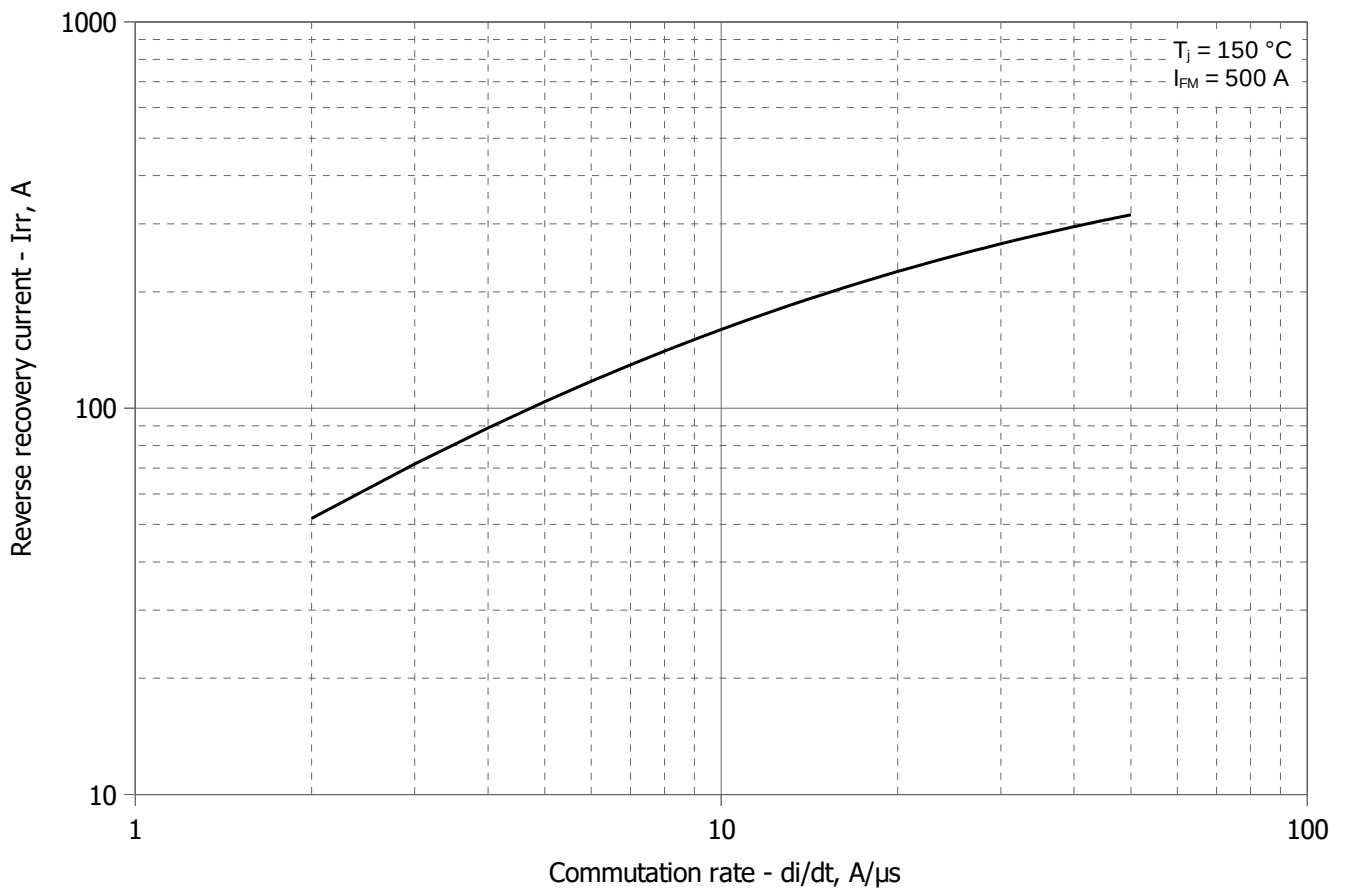


Fig 5 - Maximum reverse recovery current I_{rr} vs. commutation rate di_R/dt

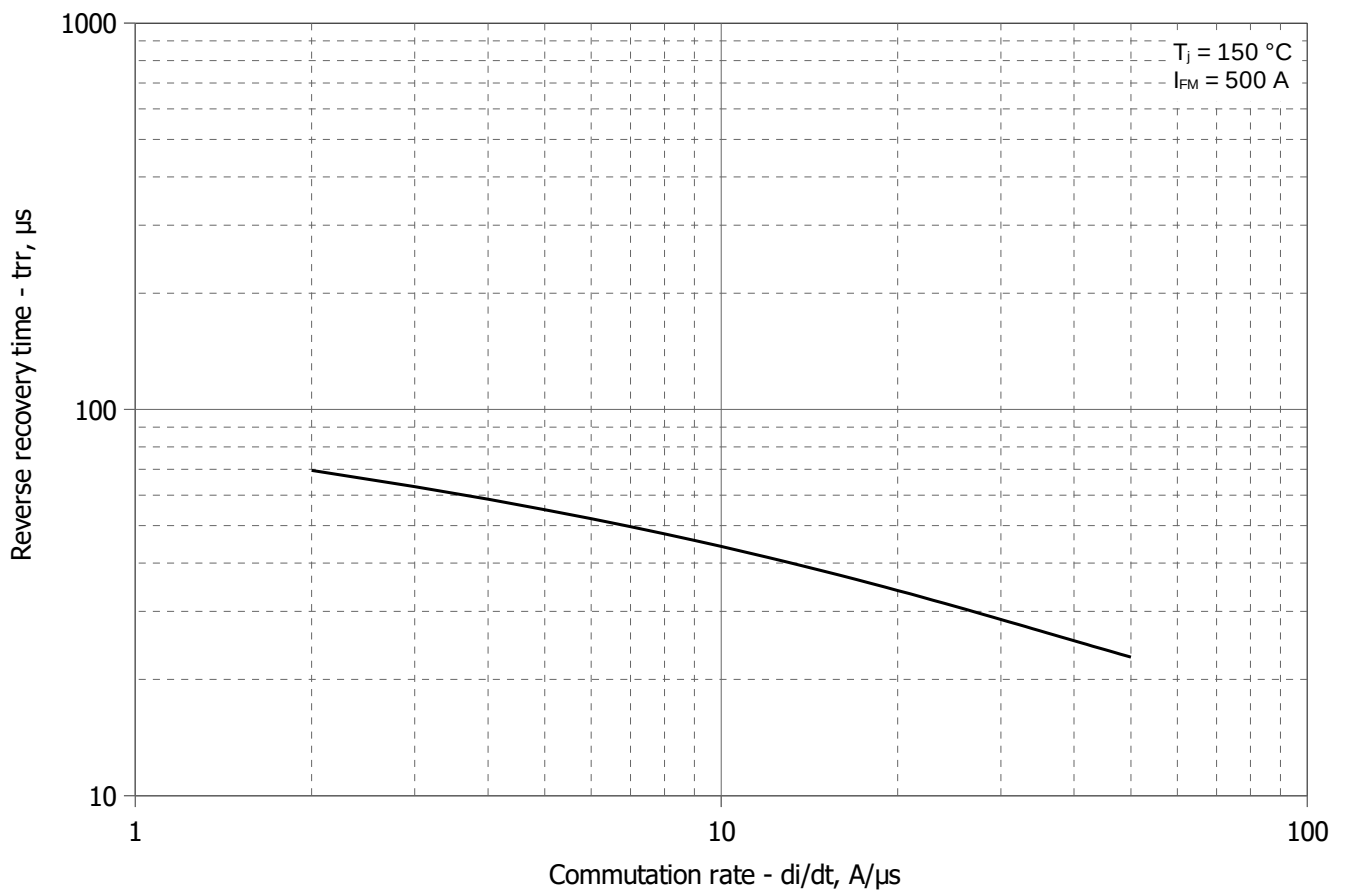


Fig 6 - Maximum recovery time t_{rr} vs. commutation rate di_R/dt (25% chord)

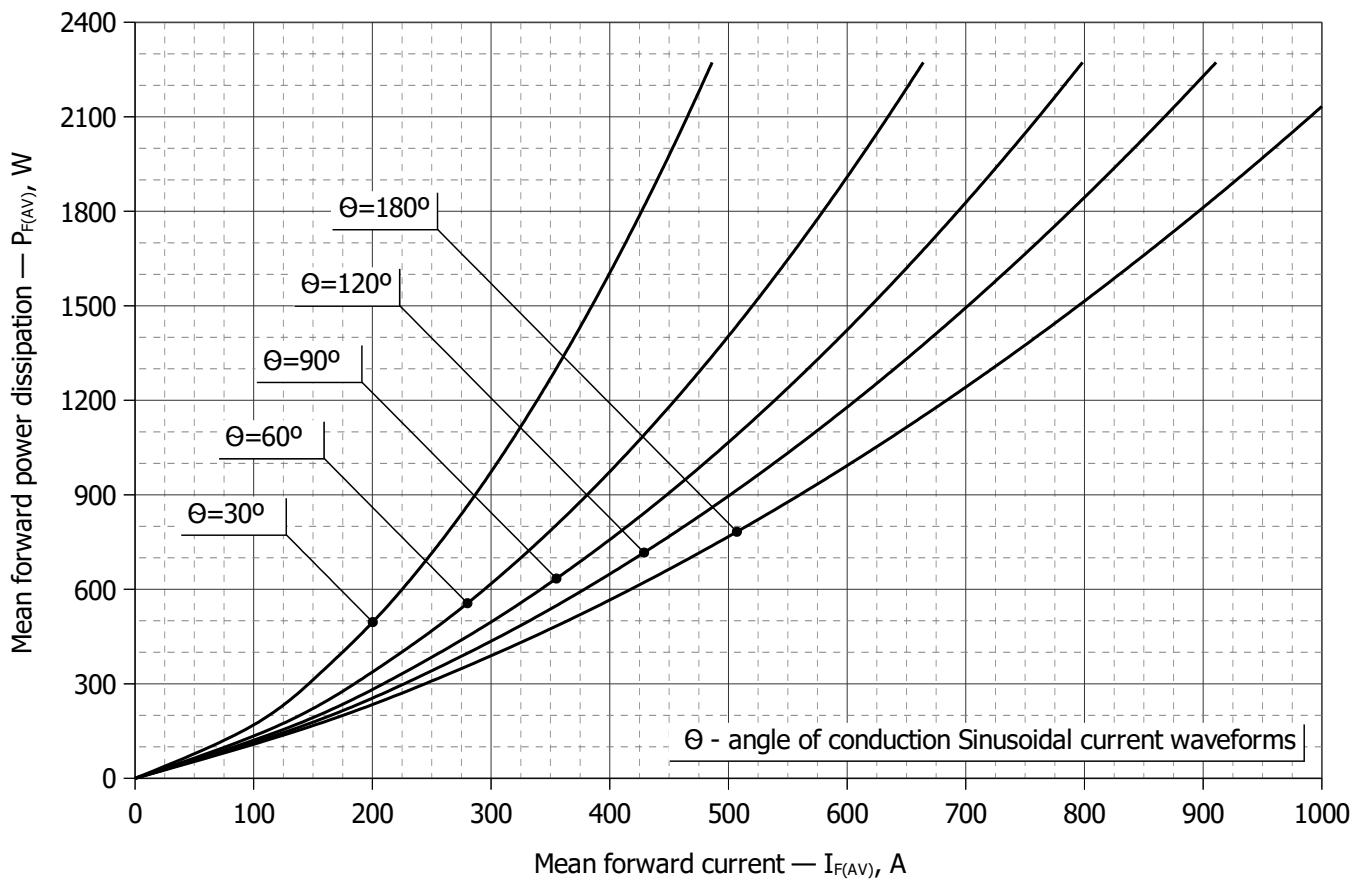


Fig. 7 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$)

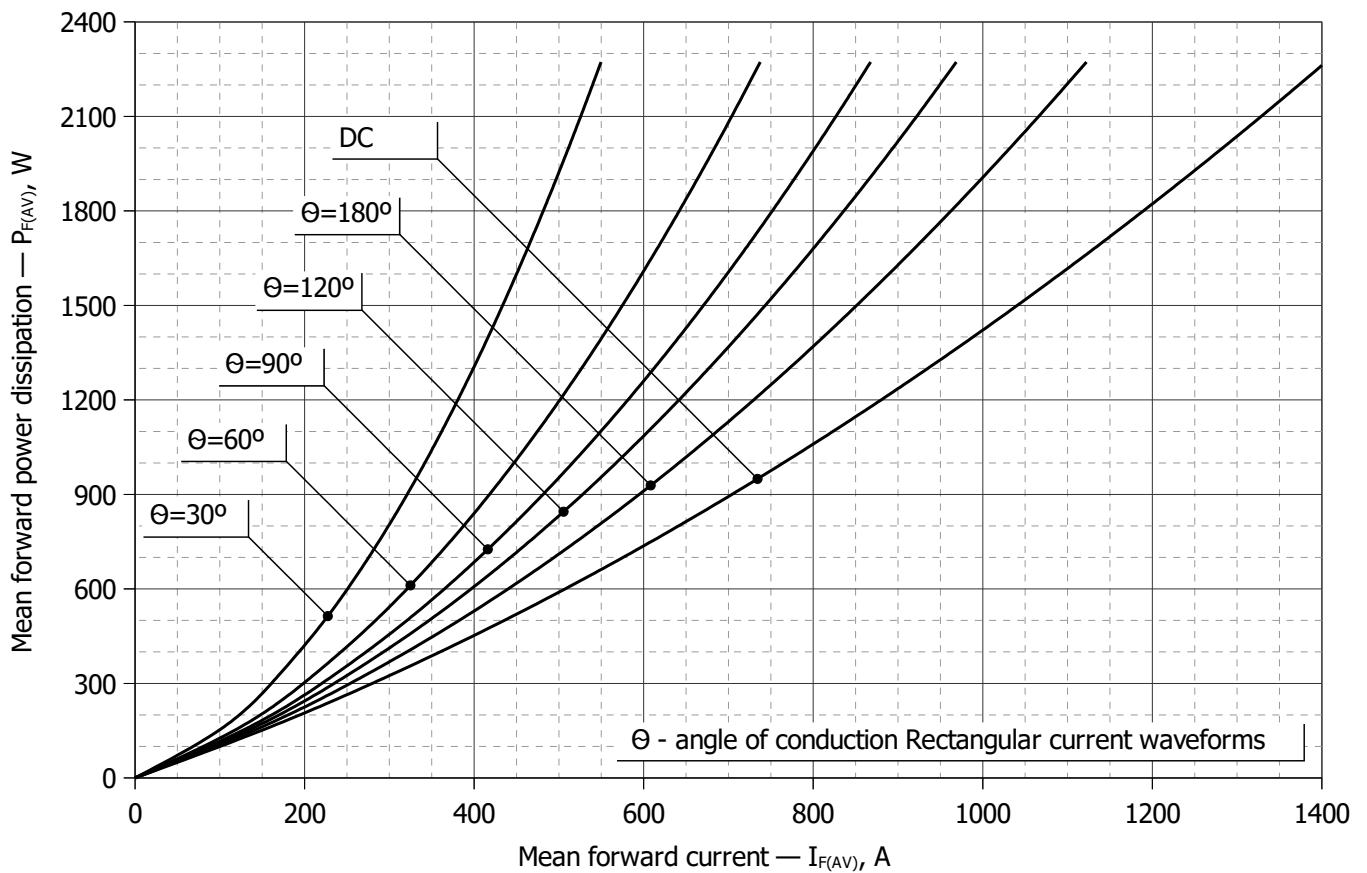


Fig. 8 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$)

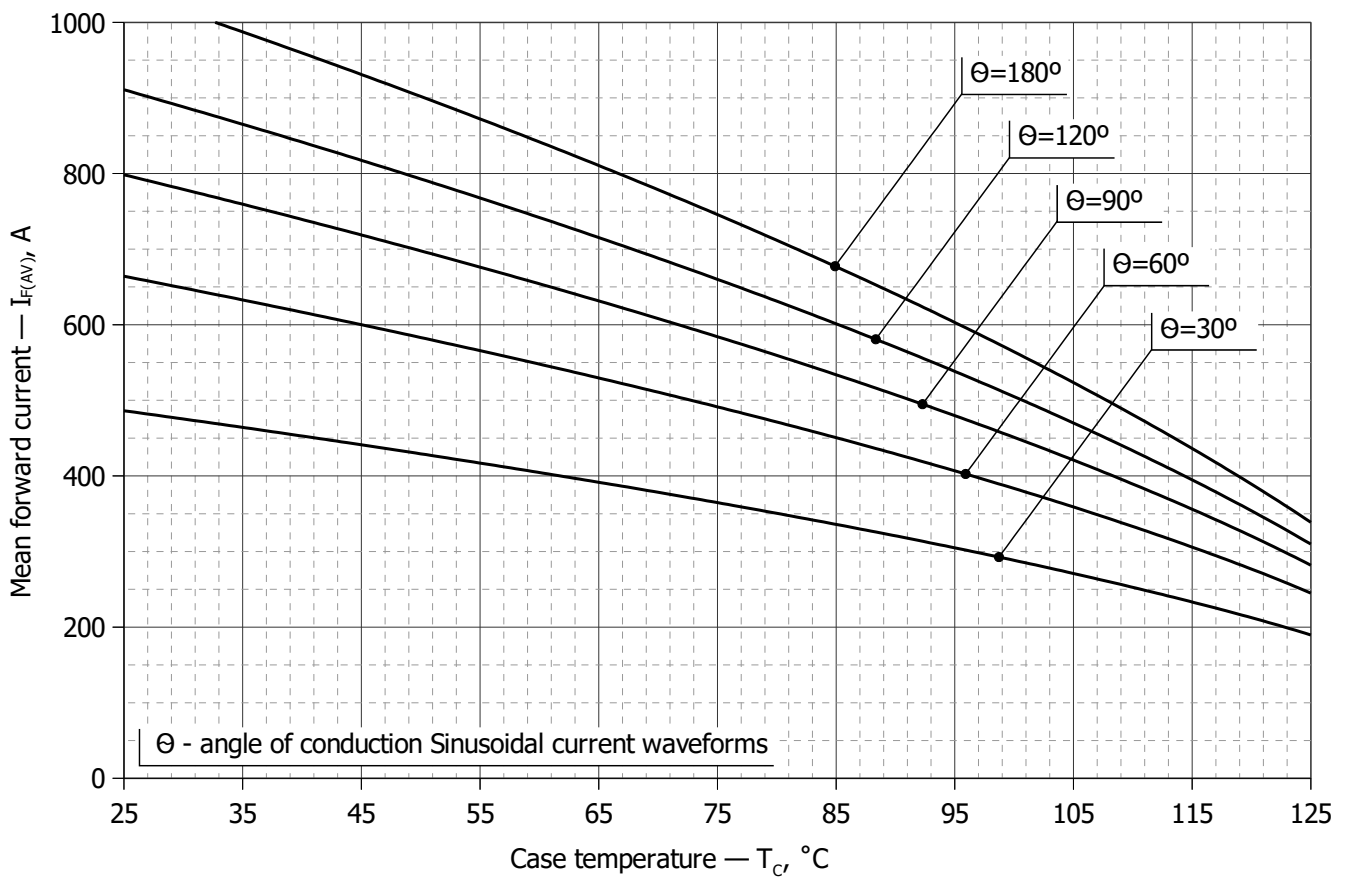


Fig. 9 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50Hz$)

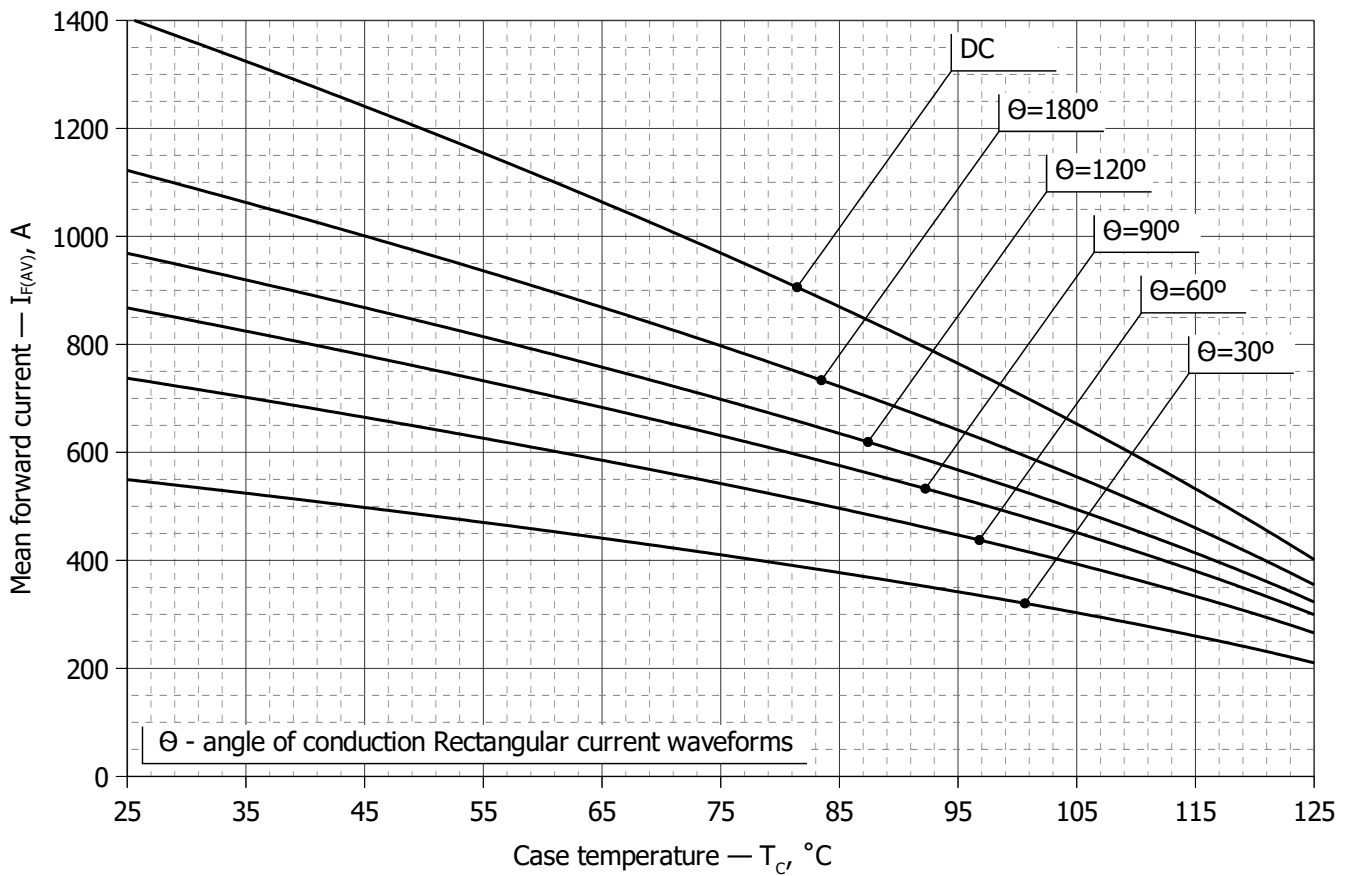


Fig. 10 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50Hz$)

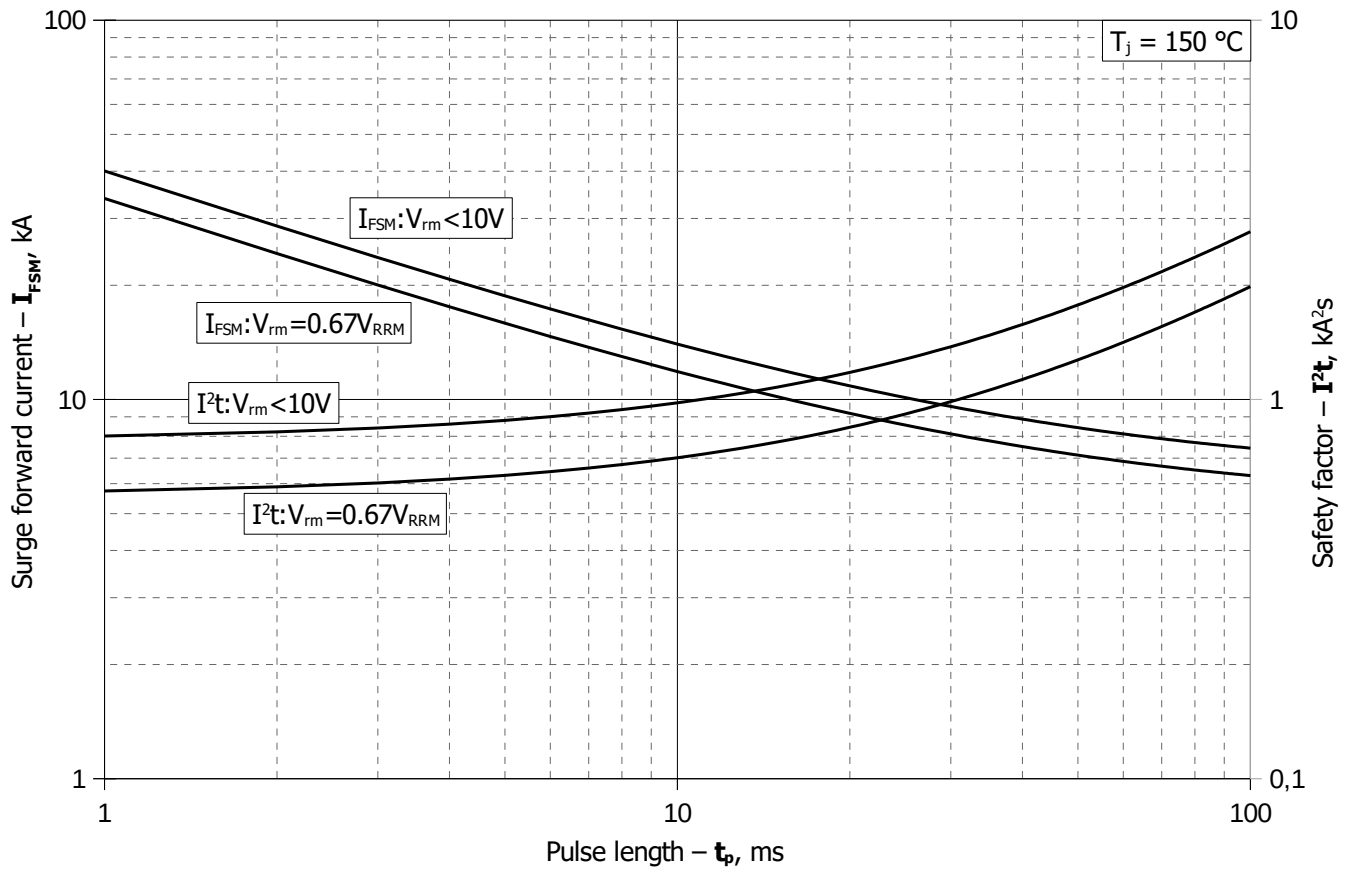


Fig. 11 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

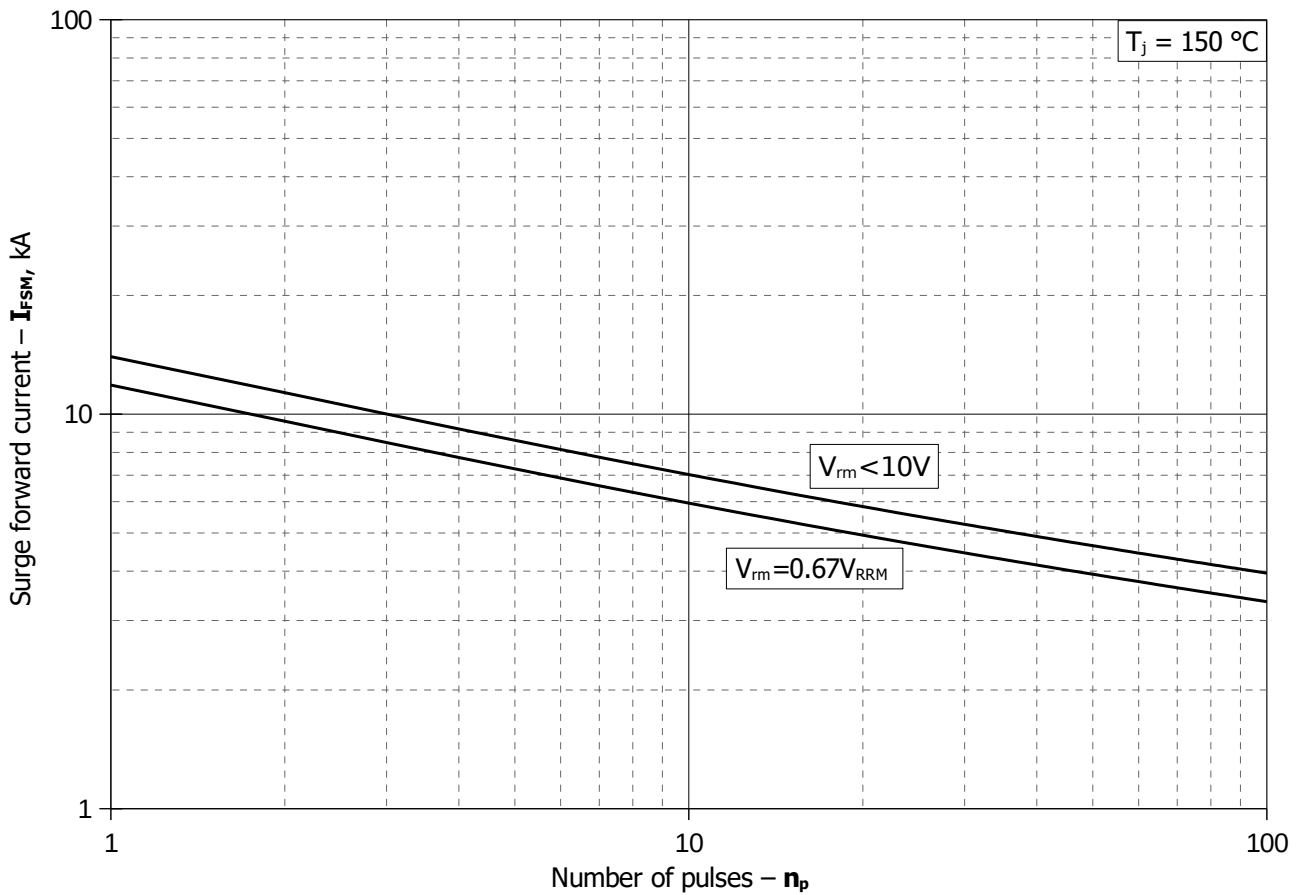


Fig. 12 – Maximum surge forward current I_{FSM} vs. number of pulses n_p