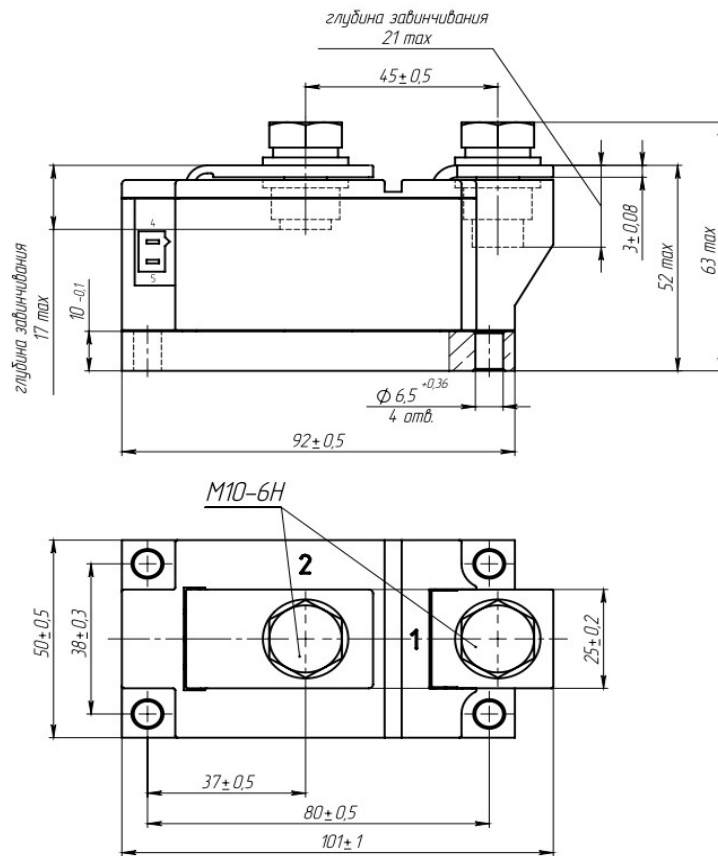
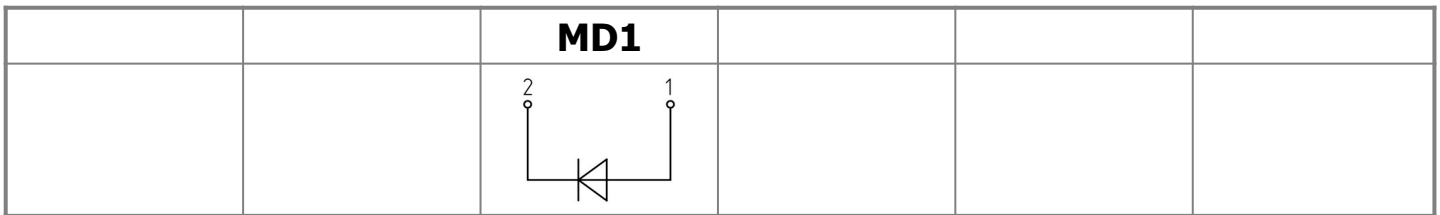


Electrically isolated base plate
 Industrial standard package
 Simplified mechanical design, rapid assembly
 Pressure contact

Single Diode Module For Phase Control MD1-500-44-B0

Average forward current		I_{FAV}	500 A	
Repetitive peak reverse voltage		V_{RRM}	3800...4400 V	
V_{RRM}, V	3800	4000	4200	4400
Voltage code	38	40	42	44
$T_j, ^\circ C$	-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	500 535	$T_c=104\text{ }^\circ\text{C}$; $T_c=100\text{ }^\circ\text{C}$; 180° half-sine wave; 50 Hz
I_{FRMS}	RMS forward current	A	785	$T_c=104\text{ }^\circ\text{C}$; 180° half-sine wave; 50 Hz
I_{FSM}	Surge forward current	kA	13.0 15.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$ 180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V}$;
			14.0 16.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$ 180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_R=0\text{ V}$;
I^2t	Safety factor	$A^2s\cdot 10^3$	840 1120	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$ 180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V}$;
			810 1060	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^\circ\text{C}$ 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	3800...4400	$T_{j\text{ min}} < T_j < T_{j\text{ max}}$; 180° half-sine wave; 50 Hz;
V_{RSM}	Non-repetitive peak reverse voltages	V	3900...4500	$T_{j\text{ min}} < T_j < T_{j\text{ max}}$; 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	1.70	$T_j=25\text{ }^\circ\text{C}$; $I_{FM}=1570\text{ A}$
$V_{F(TO)}$	Forward threshold voltage, max	V	0.930	$T_j=T_{j\text{ max}}$;
r_T	Forward slope resistance, max	$\text{m}\Omega$	0.585	$0.5\pi I_{FAV} < I_T < 1.5\pi I_{FAV}$
BLOCKING				
I_{RRM}	Repetitive peak reverse current, max	mA	50	$T_j=T_{j\text{ max}}$; $V_R=V_{RRM}$
THERMAL				
R_{thjc}	Thermal resistance, junction to case	$^\circ\text{C/W}$	0.0550	180° half-sine wave, 50 Hz
	per module			
R_{thch}	Thermal resistance, case to heatsink	$^\circ\text{C/W}$	0.0100	
	per module			
INSULATION				
V_{ISOL}	Insulation test voltage	kV	7.00	Sine wave, 50 Hz; $t=1\text{ min}$
			8.40	RMS $t=1\text{ sec}$
MECHANICAL				
M_1	Mounting torque (M6) ¹⁾	Nm	6.00	Tolerance $\pm 15\%$
M_2	Terminal connection torque (M10) ¹⁾	Nm	12.00	Tolerance $\pm 15\%$
m	Weight, max	g	900	

PART NUMBERING GUIDE						NOTES				
MD	1	-	500	-	44	-	B0	-	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.B0) 6. Ambient Conditions: N – Normal										
										1) The screws must be lubricated

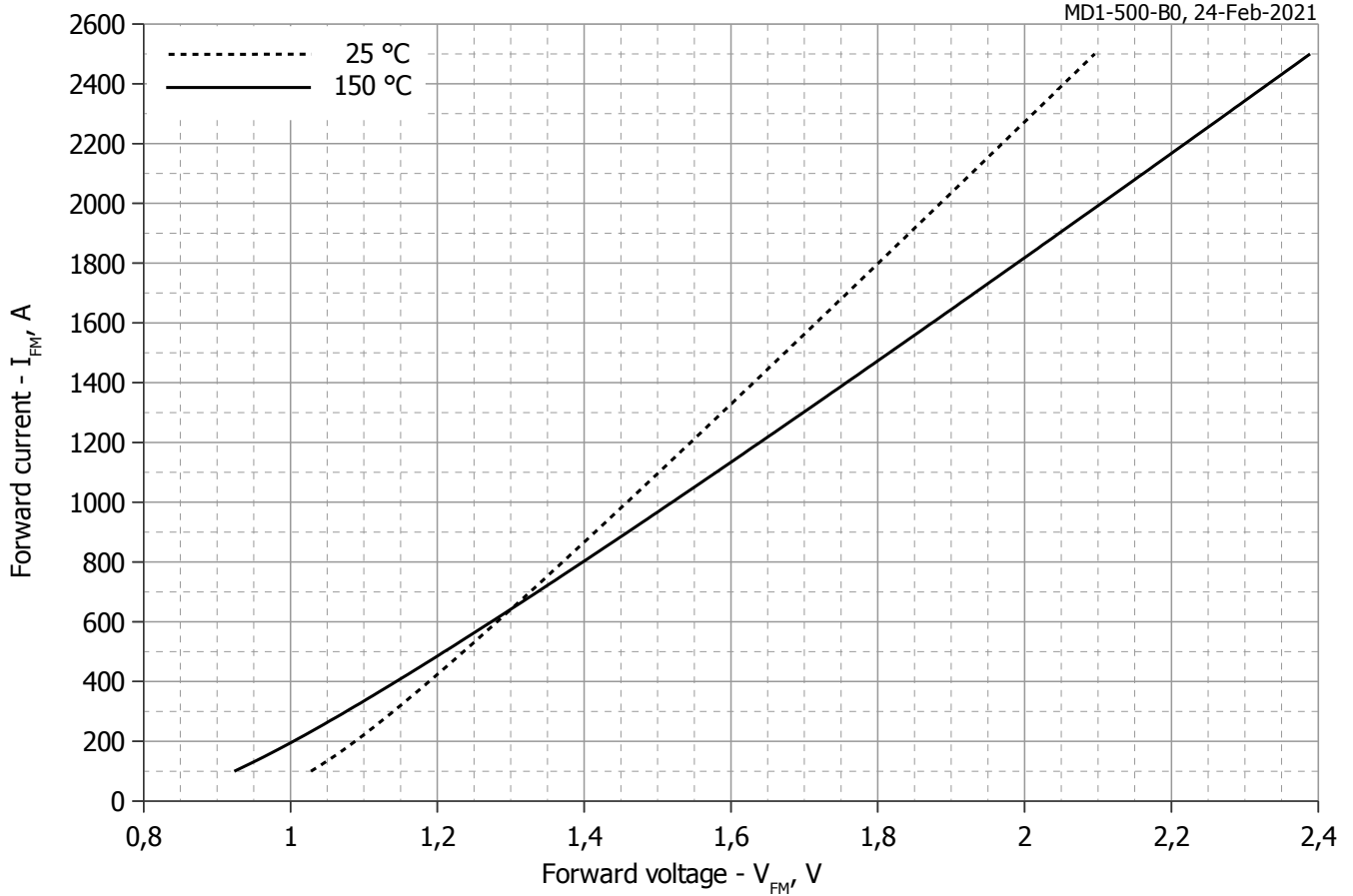


Fig 1 – Forward characteristics of Limit device

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	
	$T_j = 25^\circ\text{C}$	$T_j = T_{j\text{max}}$
A	0.85114414	0.76364974
B	0.00041112	0.00051069
C	0.03023093	0.01279542
D	-0.00040089	0.00496810

Forward characteristic model (see Fig. 1).

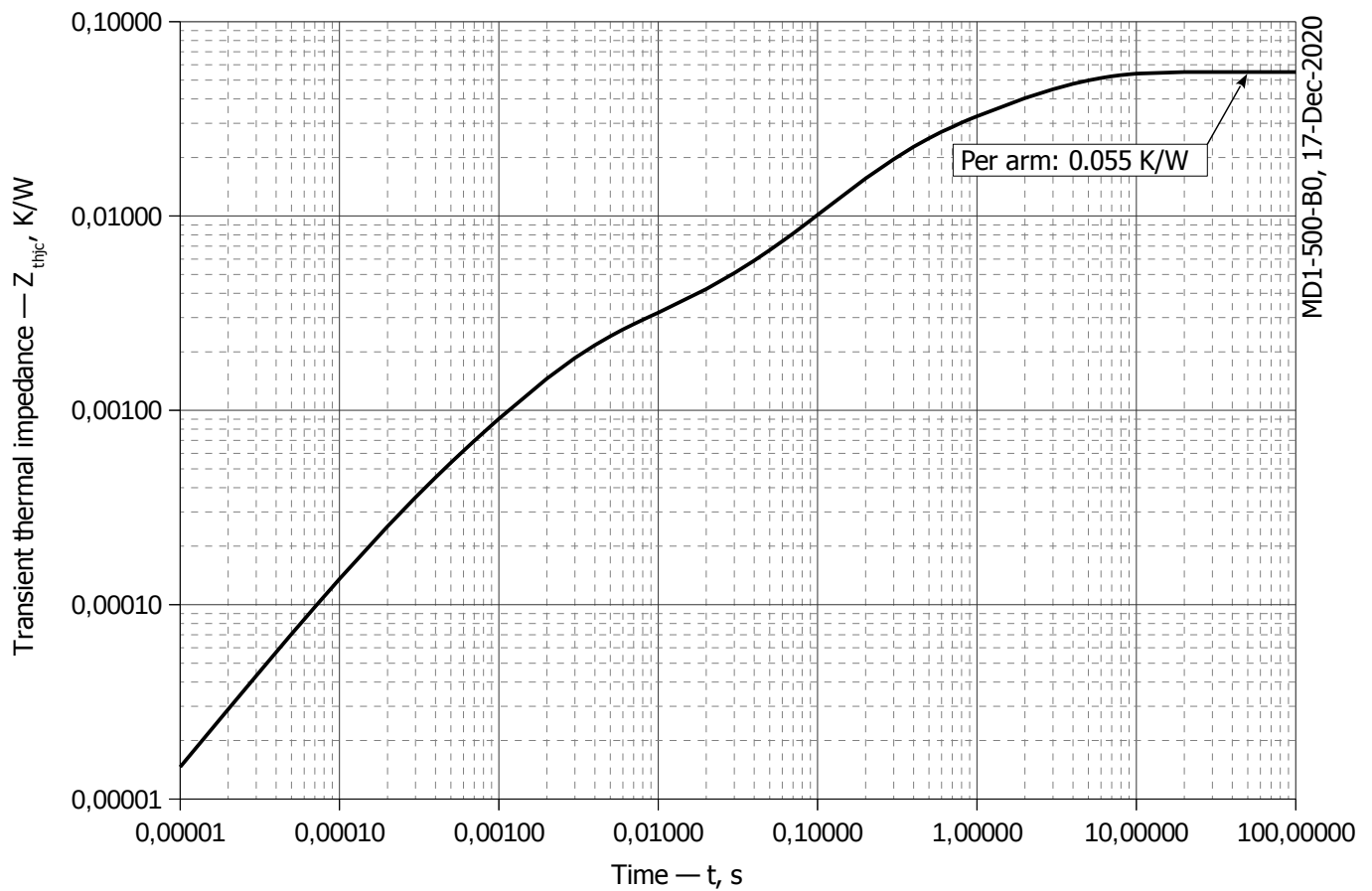


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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.

DC

i	1	2	3	4	5	6
R_i, K/W	0.0249	0.0112	0.01635	0.0006528	0.001791	0.0001363
τ_i, s	3.132	1.000	0.2335	0.01038	0.002348	0.0002448

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

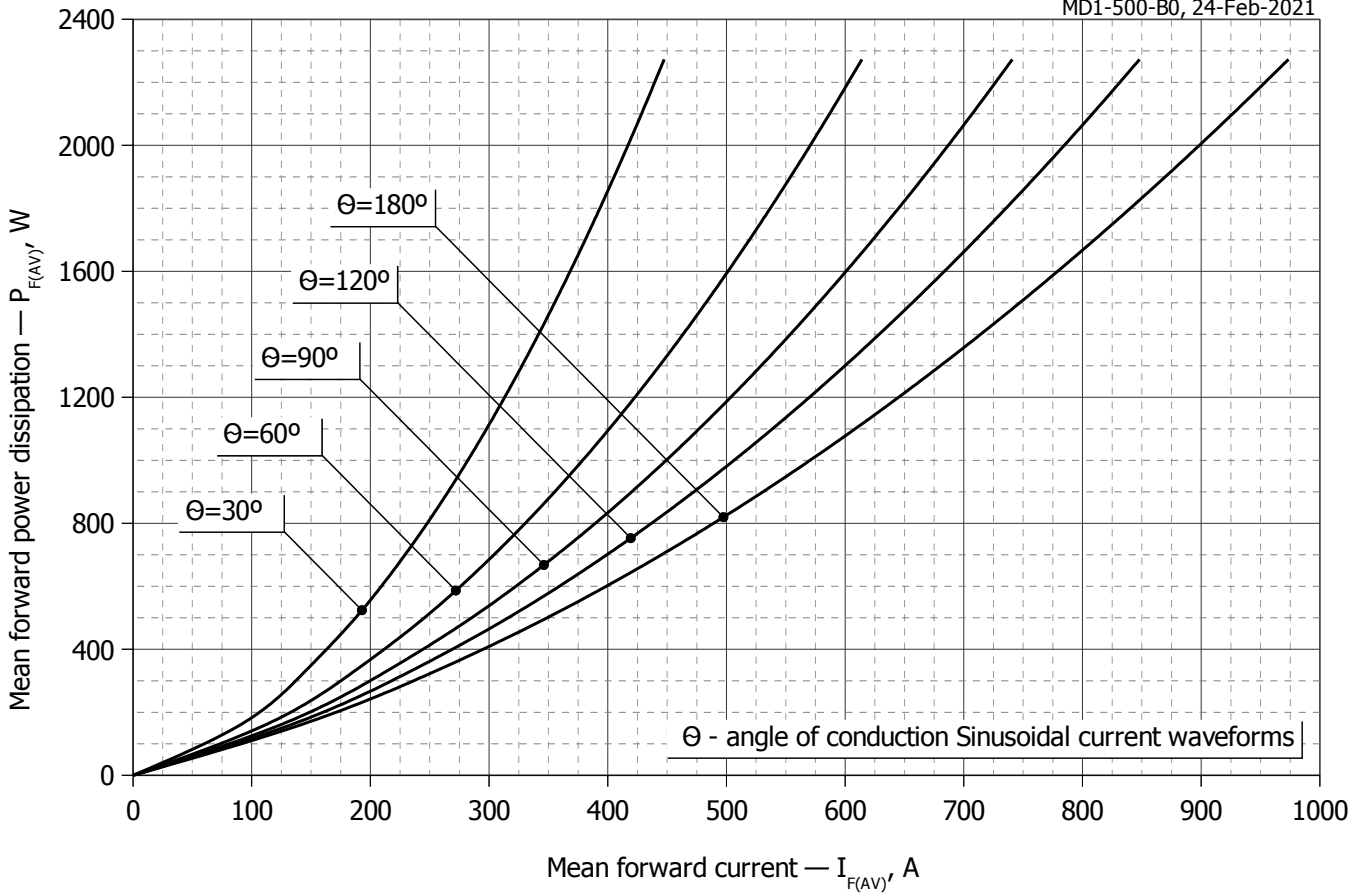


Fig. 3 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

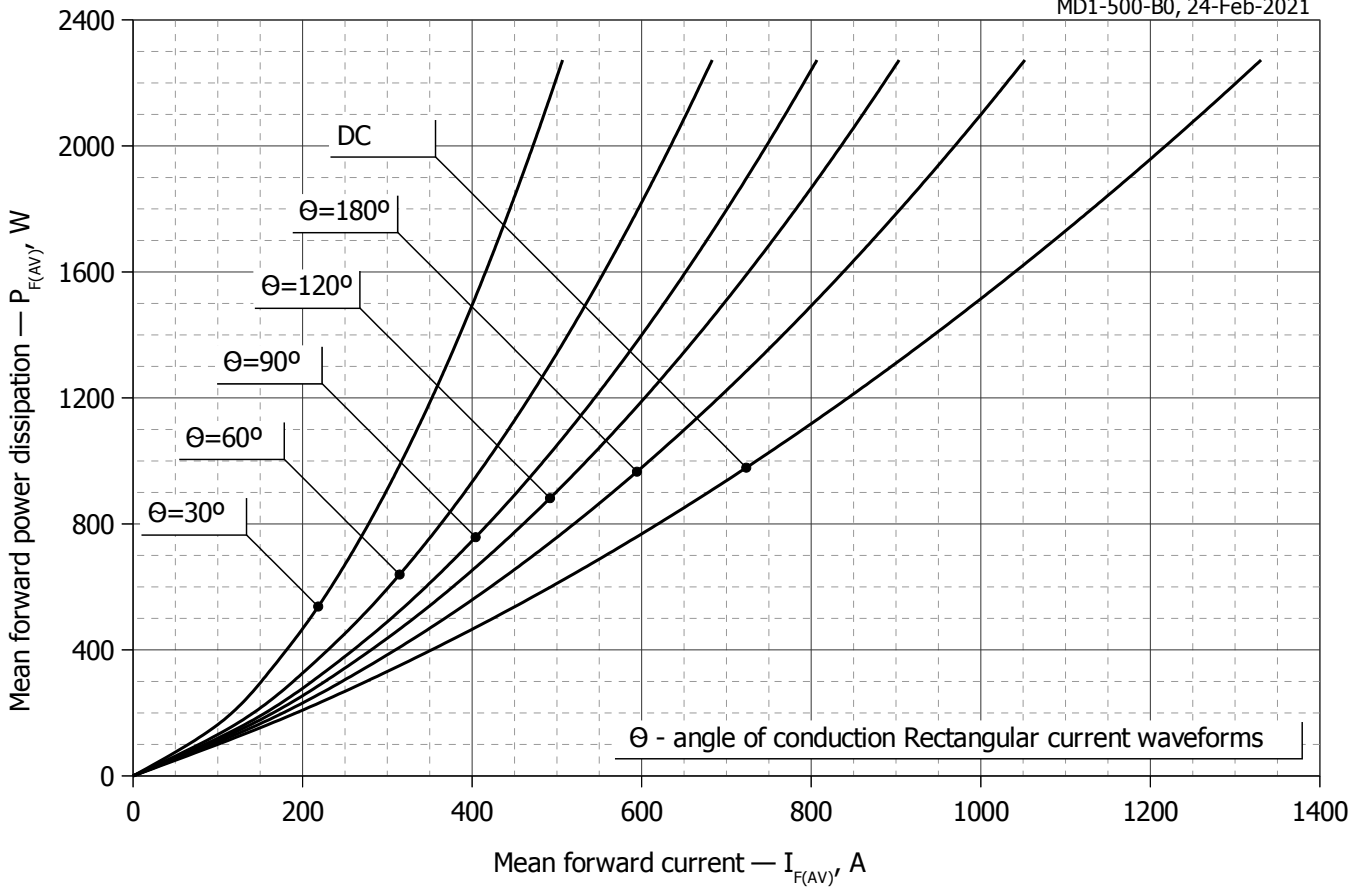


Fig. 4 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

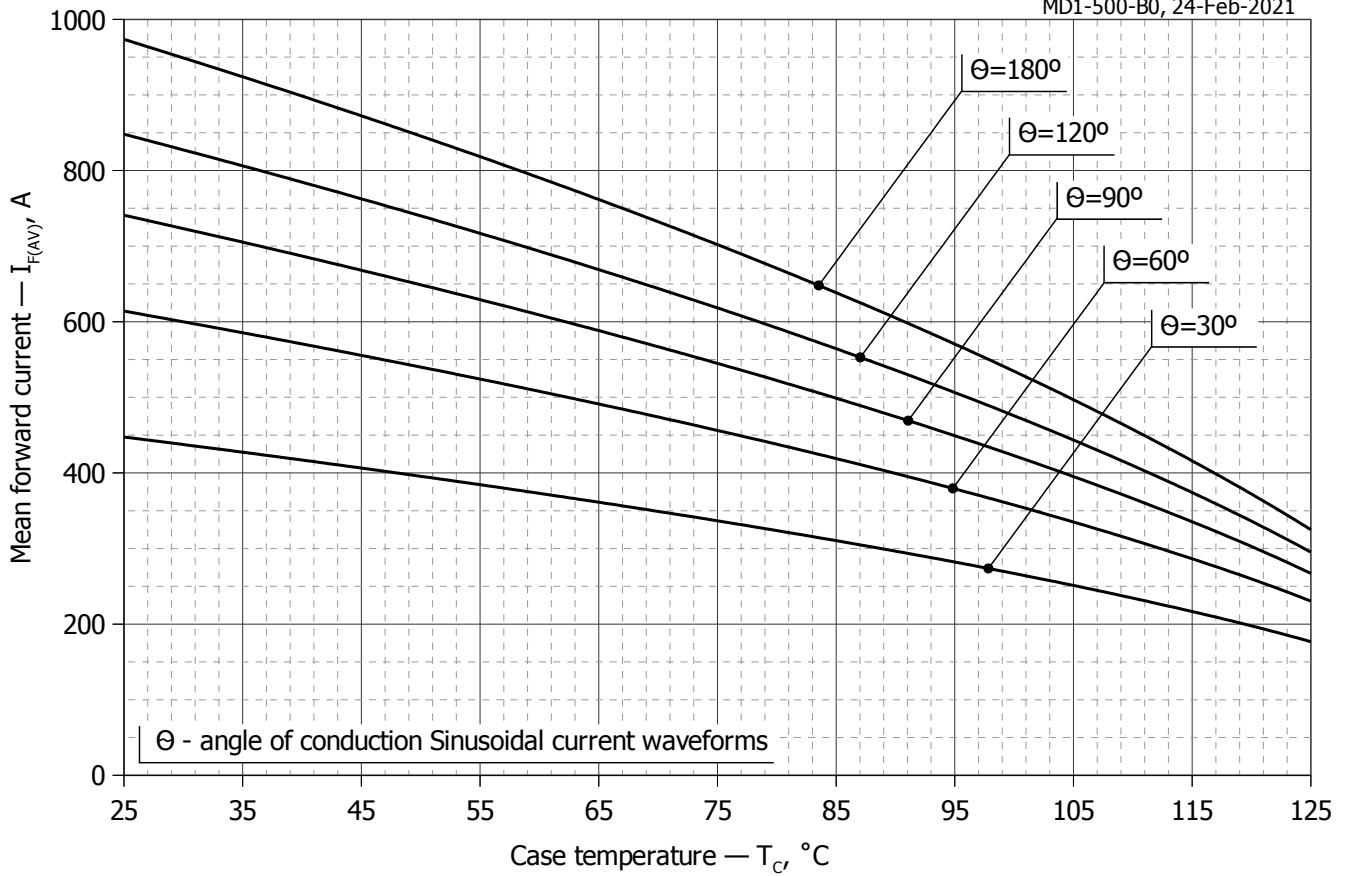


Fig. 5 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

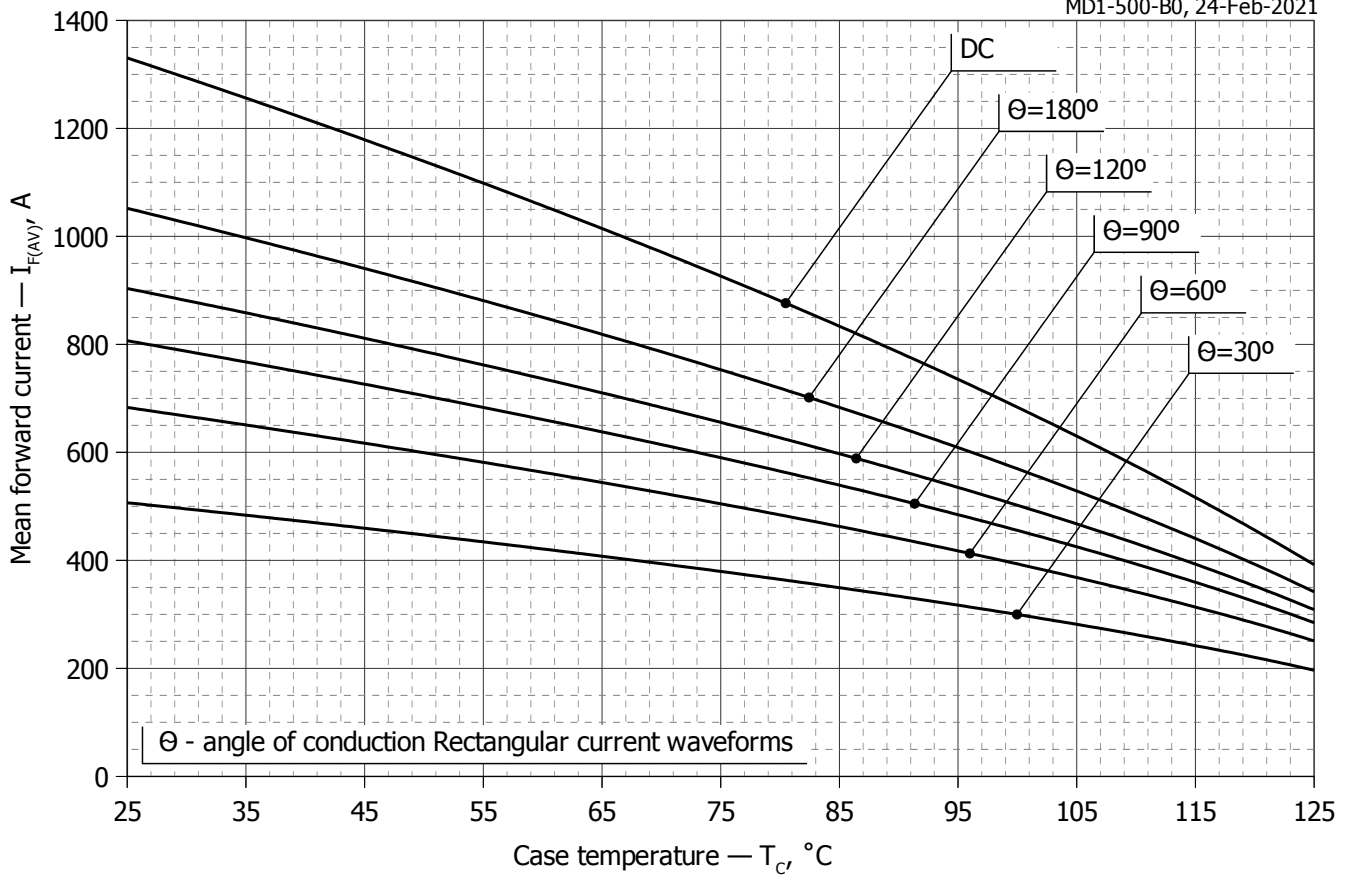


Fig. 6 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

$T_j = 150\text{ }^\circ\text{C}$

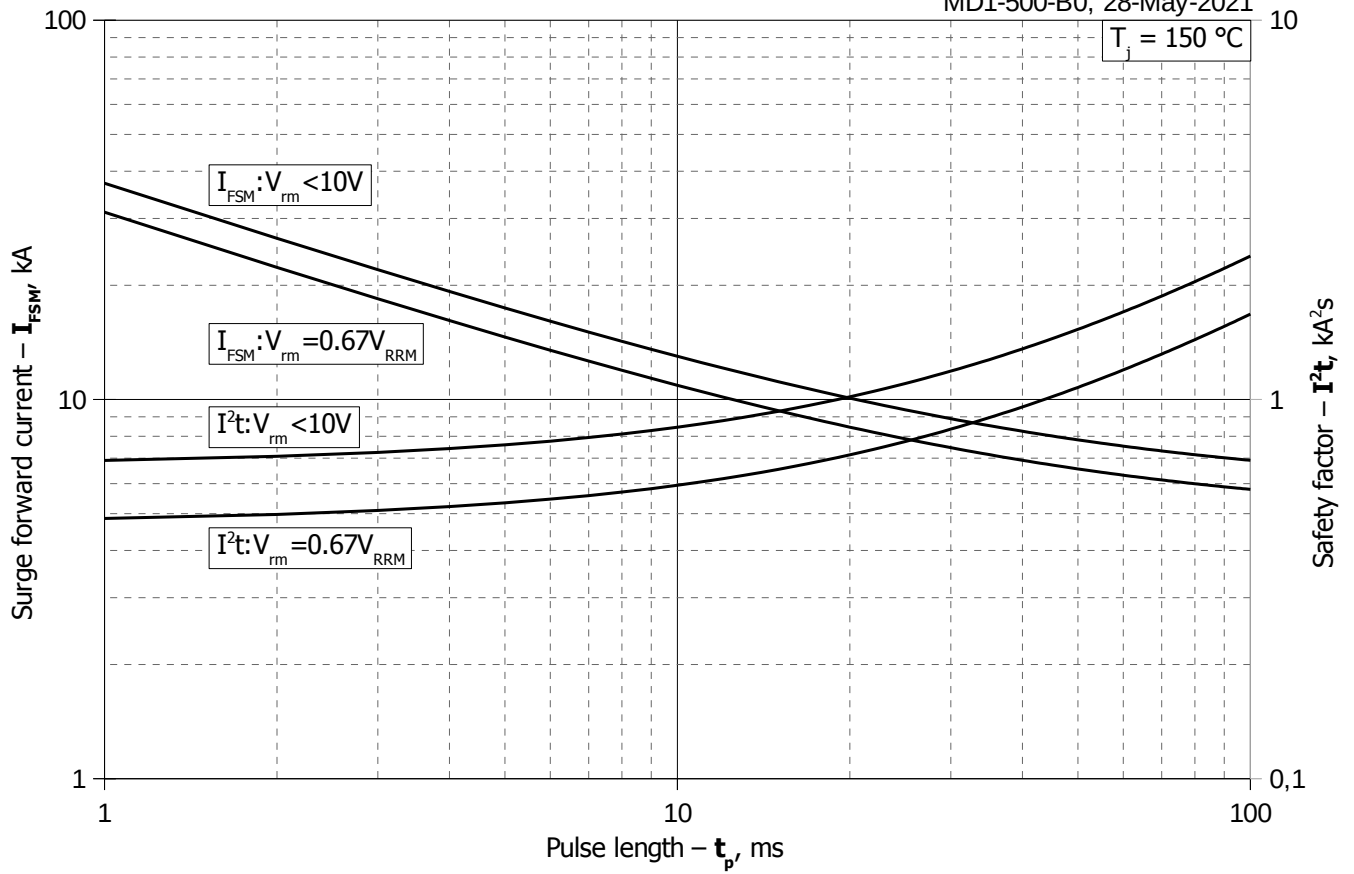


Fig. 7 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

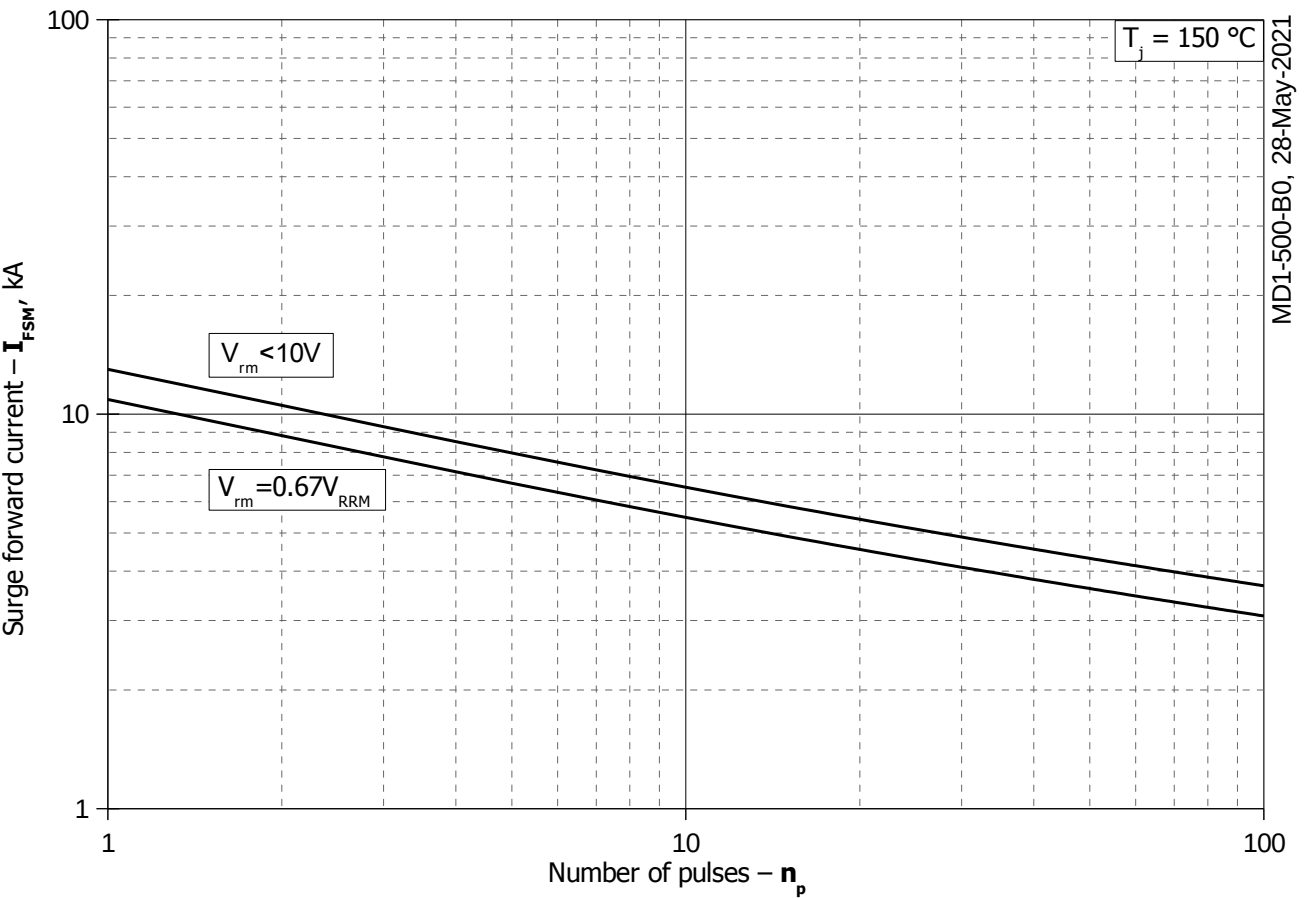


Fig. 8 – Maximum surge forward current I_{FSM} vs. number of pulses n_p