

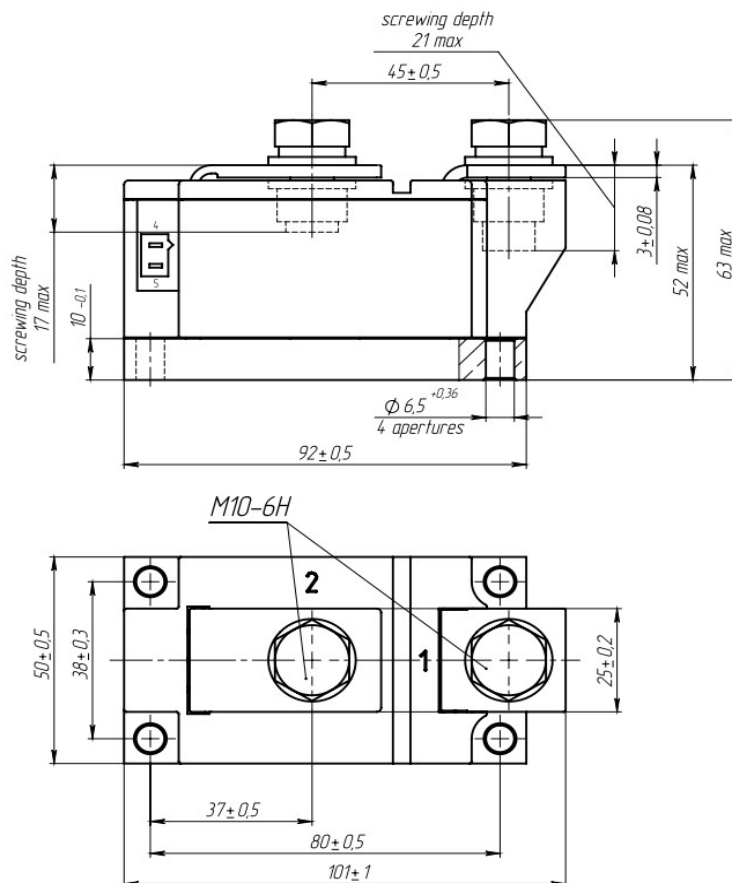
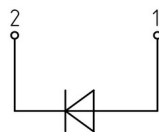


Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

Single Diode Module For Phase Control MD1-540-36-B0

Average forward current		I_{FAV}	540 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			

MD1



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	540	$T_c=100\text{ }^{\circ}\text{C};$ 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	848		
I_{FSM}	Surge forward current	kA	14.0 16.0	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V};$
			15.0 17.0	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	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	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V};$
			930 1190	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	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	$T_{j\min}<T_j<T_{j\max};$ 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	$^{\circ}\text{C}$	−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	1.75	T _j =25 °C; I _{FM} =1696 A	
V _{F(TO)}	Forward threshold voltage, max	V	0.957	T _j =T _{j max} ;	
r _T	Forward slope resistance, max	mΩ	0.547	0.5 π I _{FAV} < I _T < 1.5 π I _{FAV}	
BLOCKING					
I _{RRM}	Repetitive peak reverse current, max	mA	50	T _j =T _{j max} ; V _R =V _{RRM}	
THERMAL					
R _{thjc}	Thermal resistance, junction to case			180° half-sine wave, 50 Hz	
	per module	°C/W	0.0550		
R _{thch}	Thermal resistance, case to heatsink				
	per module	°C/W	0.0100		
INSULATION					
V _{ISOL}	Insulation test voltage	kV	7.00	Sine wave, 50 Hz; RMS	t=1 min
			8.40		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	900		

PART NUMBERING GUIDE										NOTES
MD	1	-	540	-	36	-	B0	-	N	1) The screws must be lubricated
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										

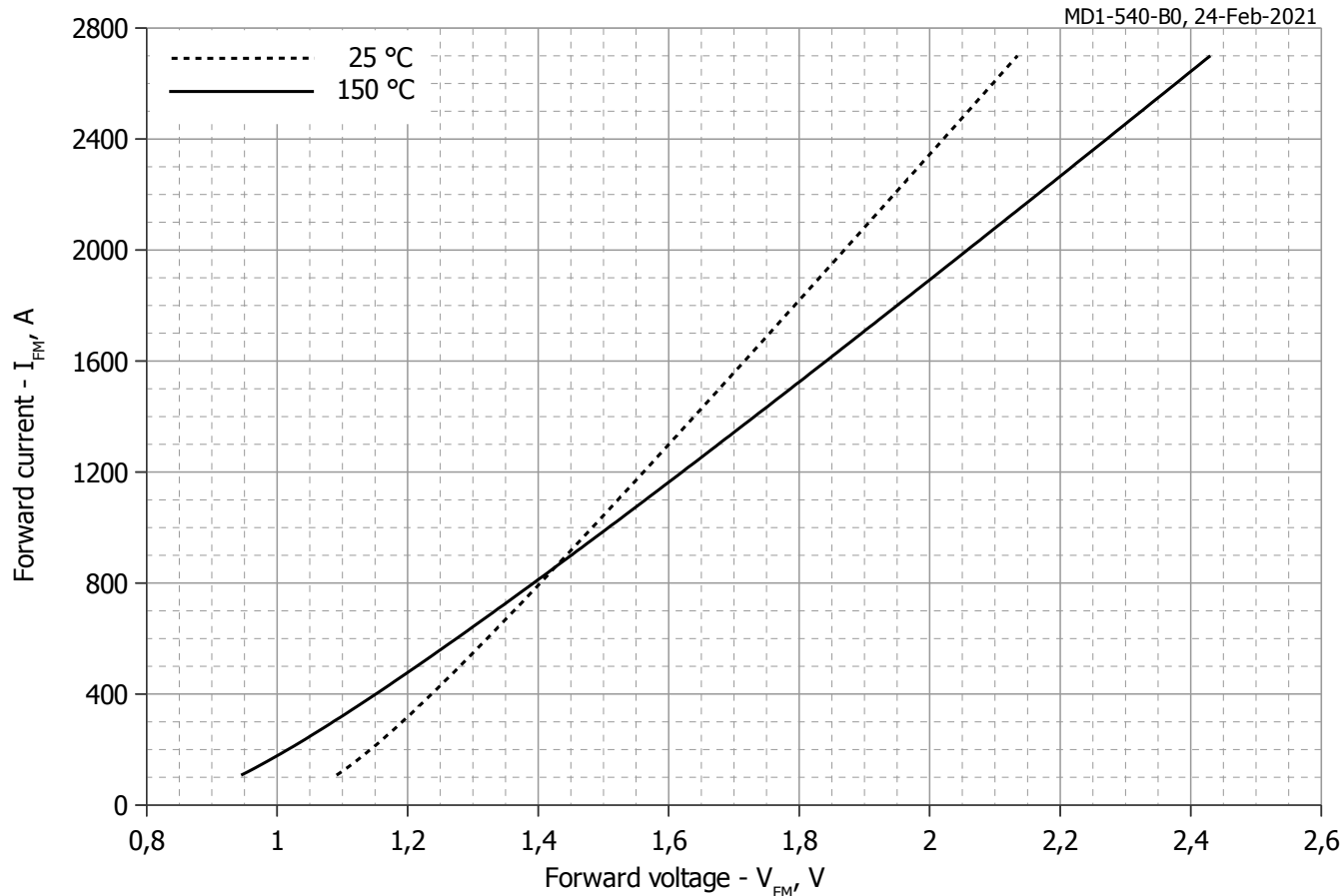


Fig 1 – Forward characteristics of Limit device

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	0.90460530	0.77549176
B	0.00036946	0.00047075
C	0.03214195	0.01344477
D	-0.00041890	0.00533303

Forward characteristic model (see Fig. 1).

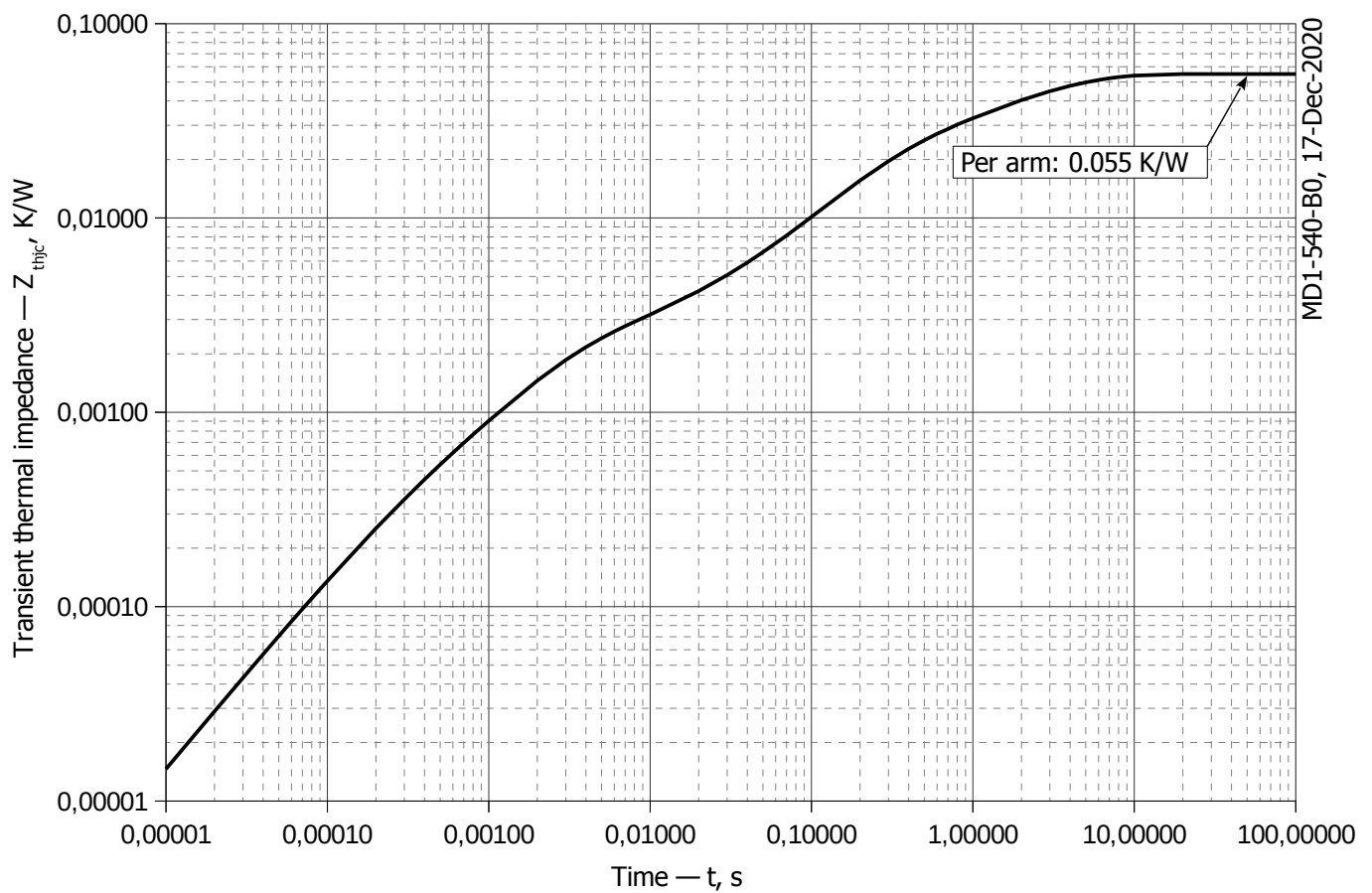


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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)

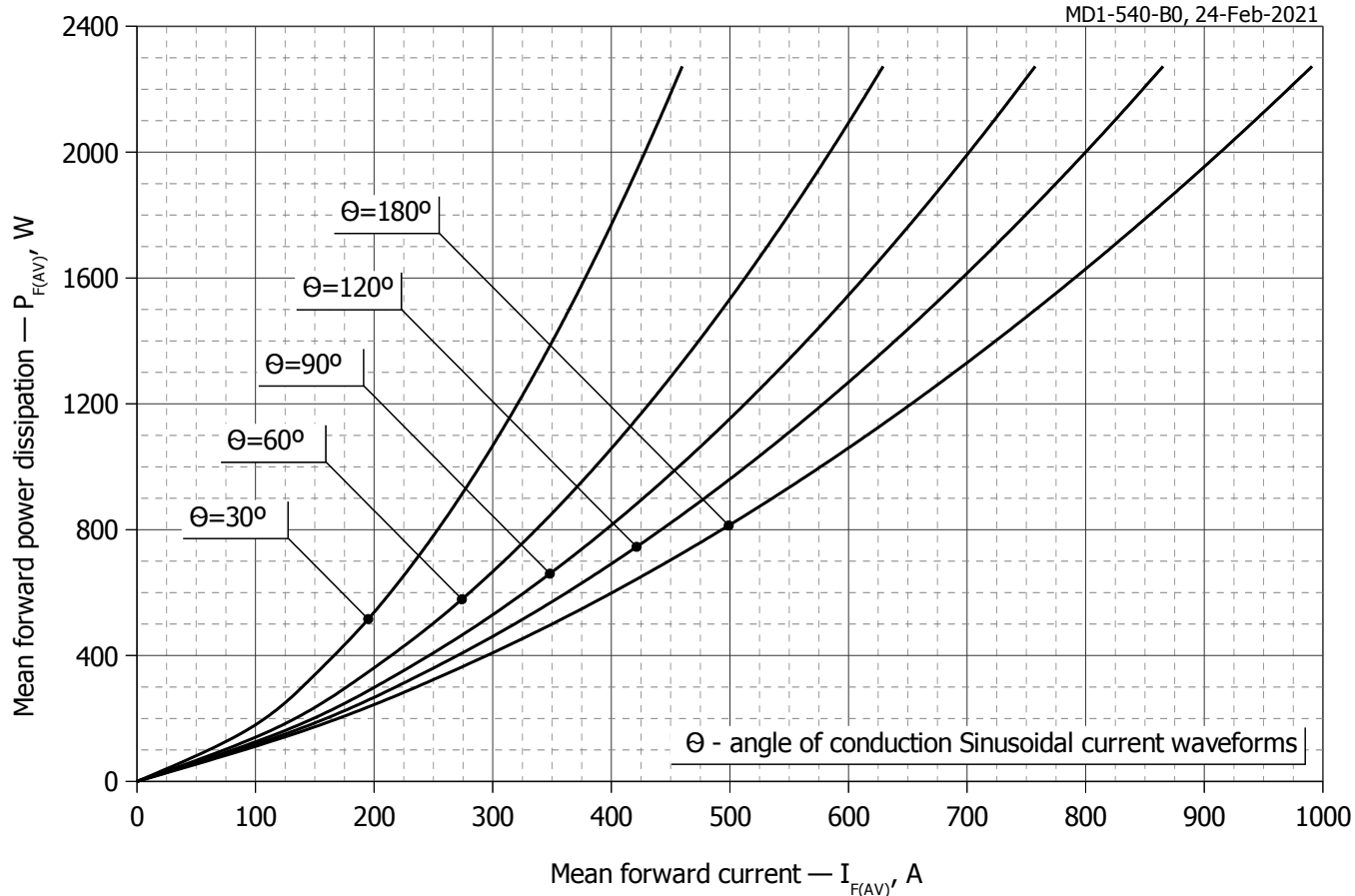


Fig. 3 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

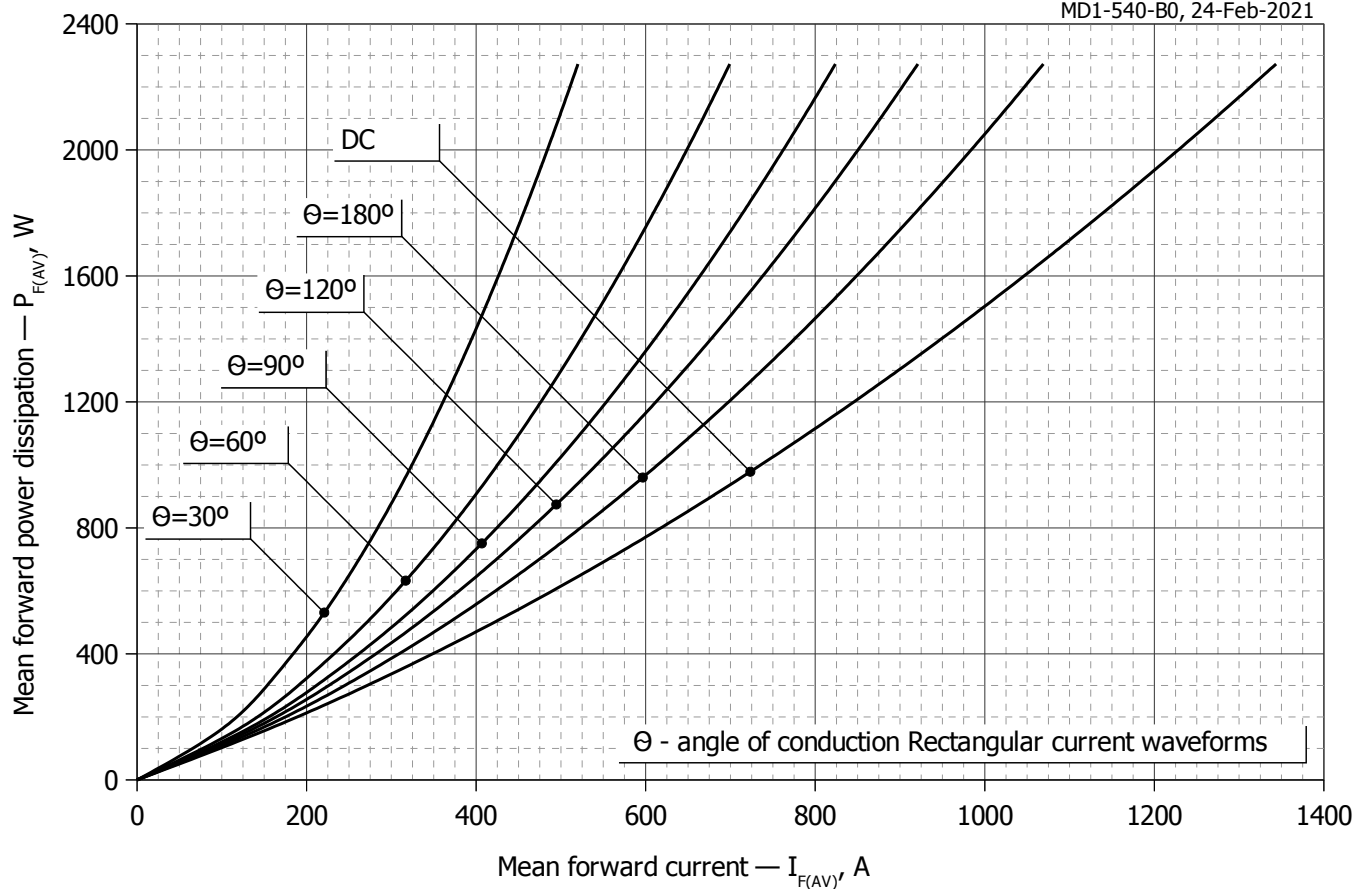


Fig. 4 – Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

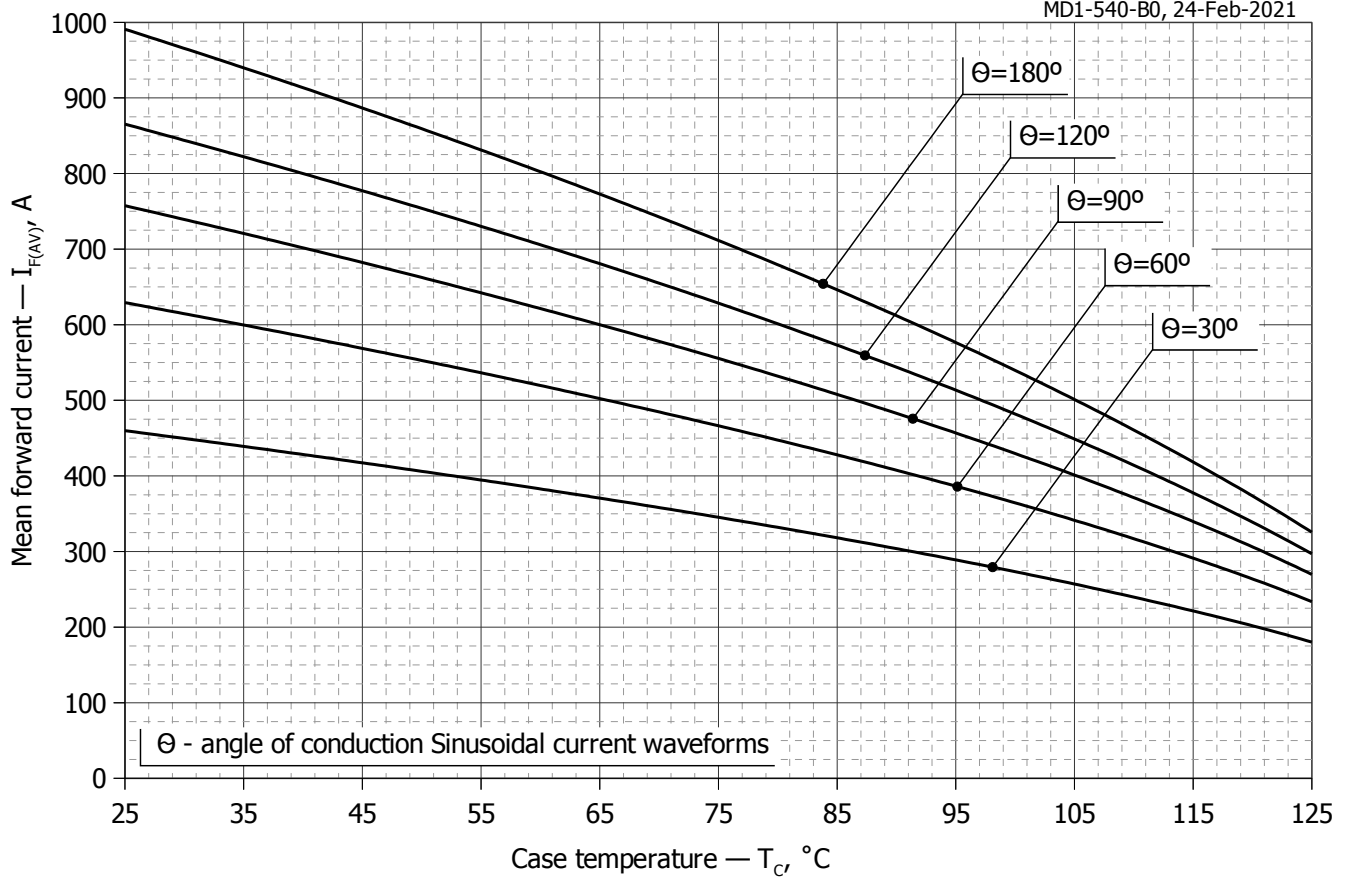


Fig. 5 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

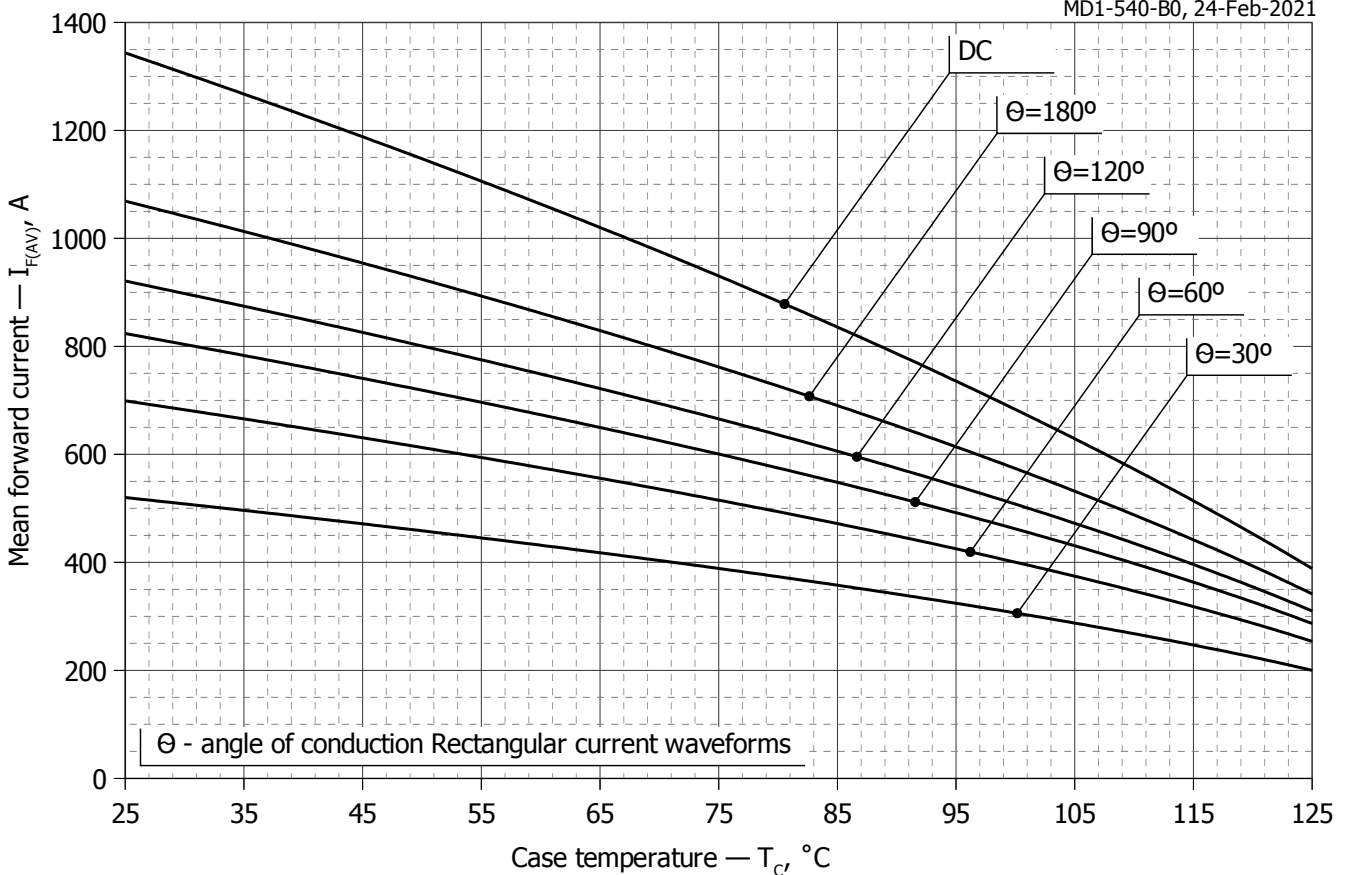


Fig. 6 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

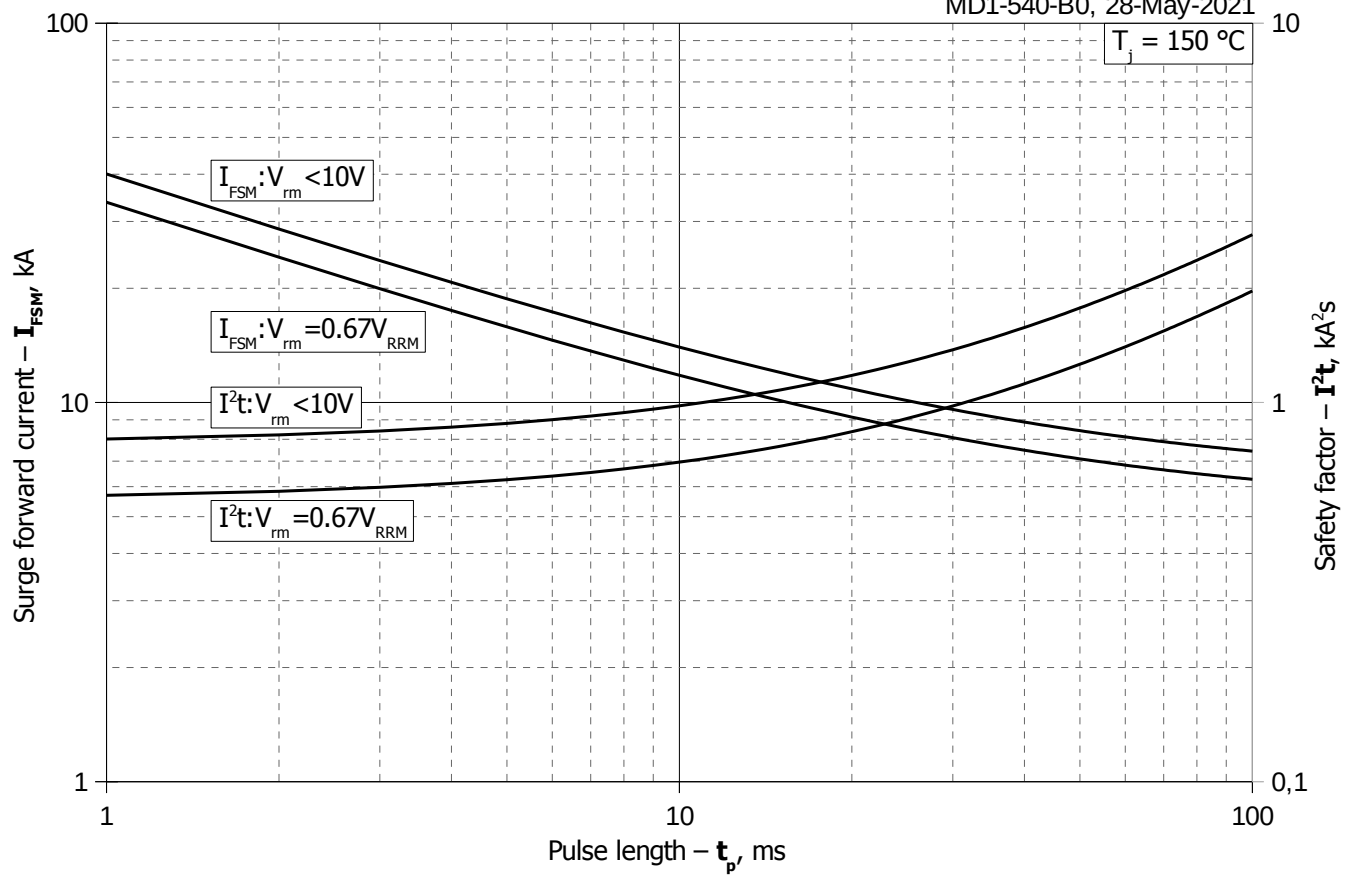


Fig. 7 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

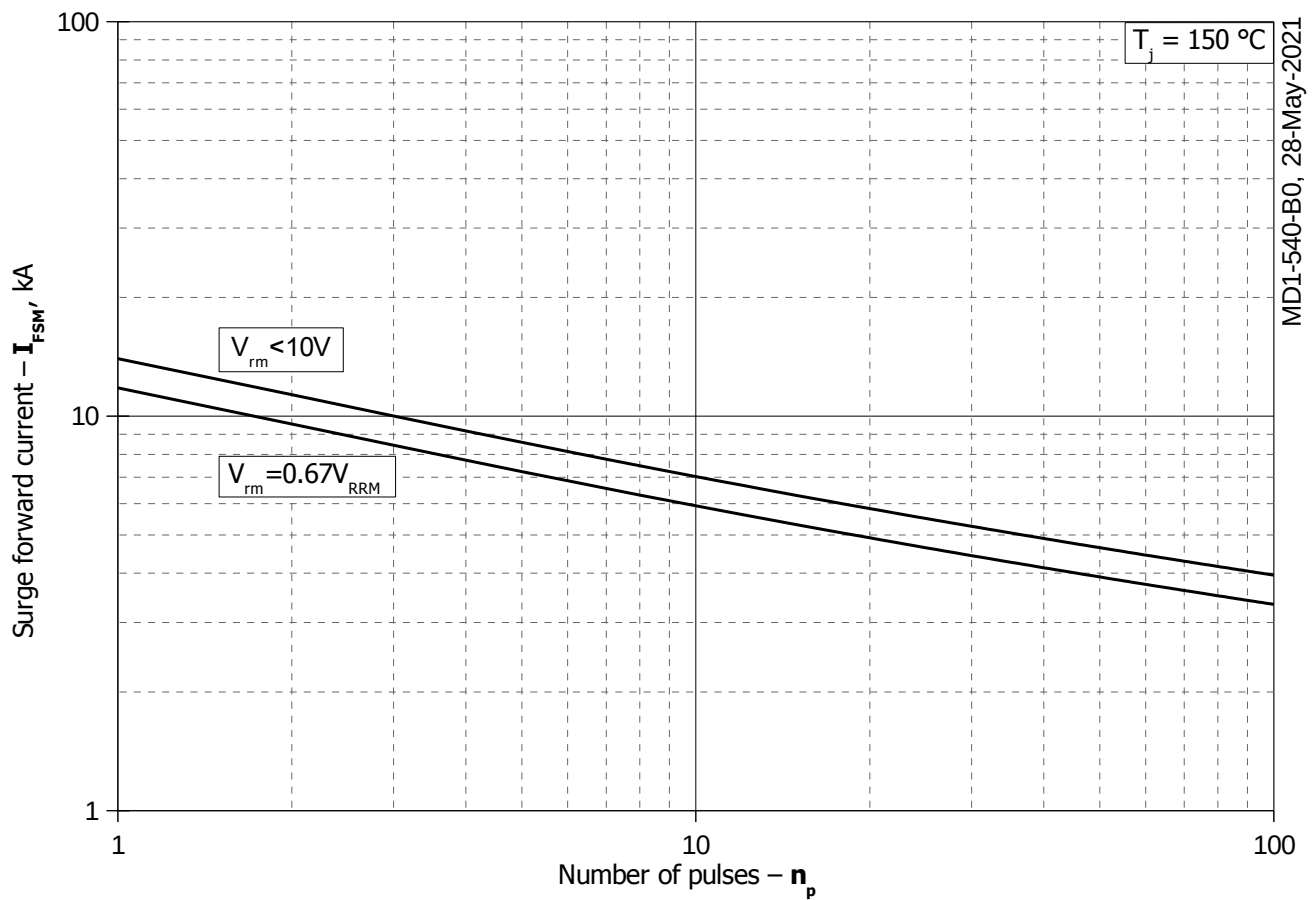


Fig. 8 - Maximum surge forward current I_{FSM} vs. number of pulses n_p