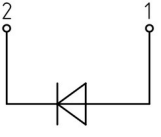
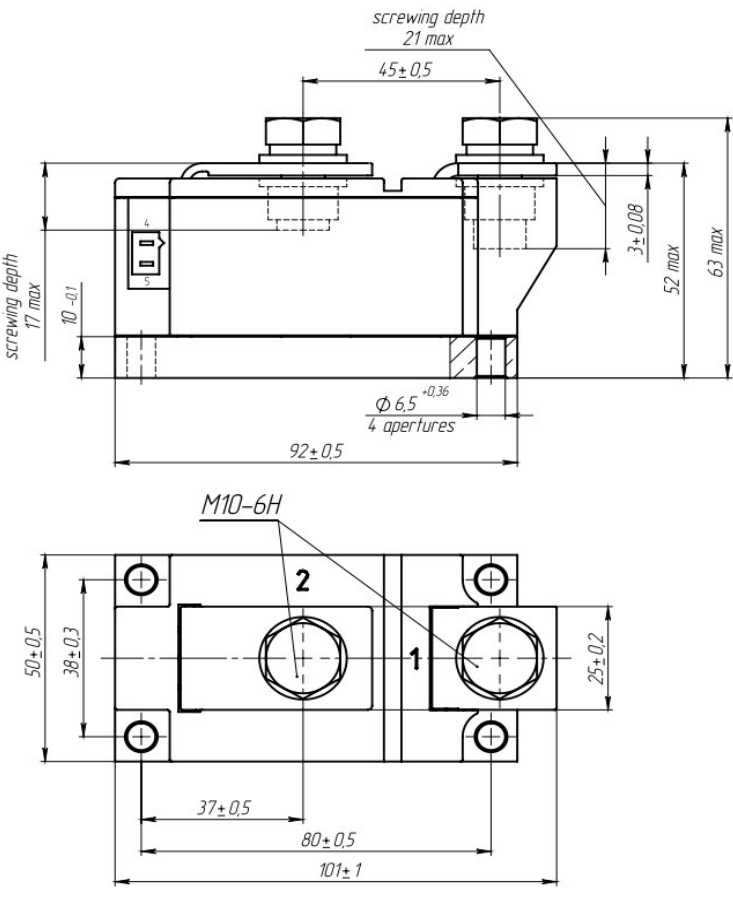




Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

Single Diode Module For Phase Control MD1-630-28-B0

Average forward current			I_{FAV}	630 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
$T_j, ^\circ C$	-40...+150				

MD1					
					
					

All dimensions in millimeters (inches)

MAXIMUM ALLOWABLE RATINGS

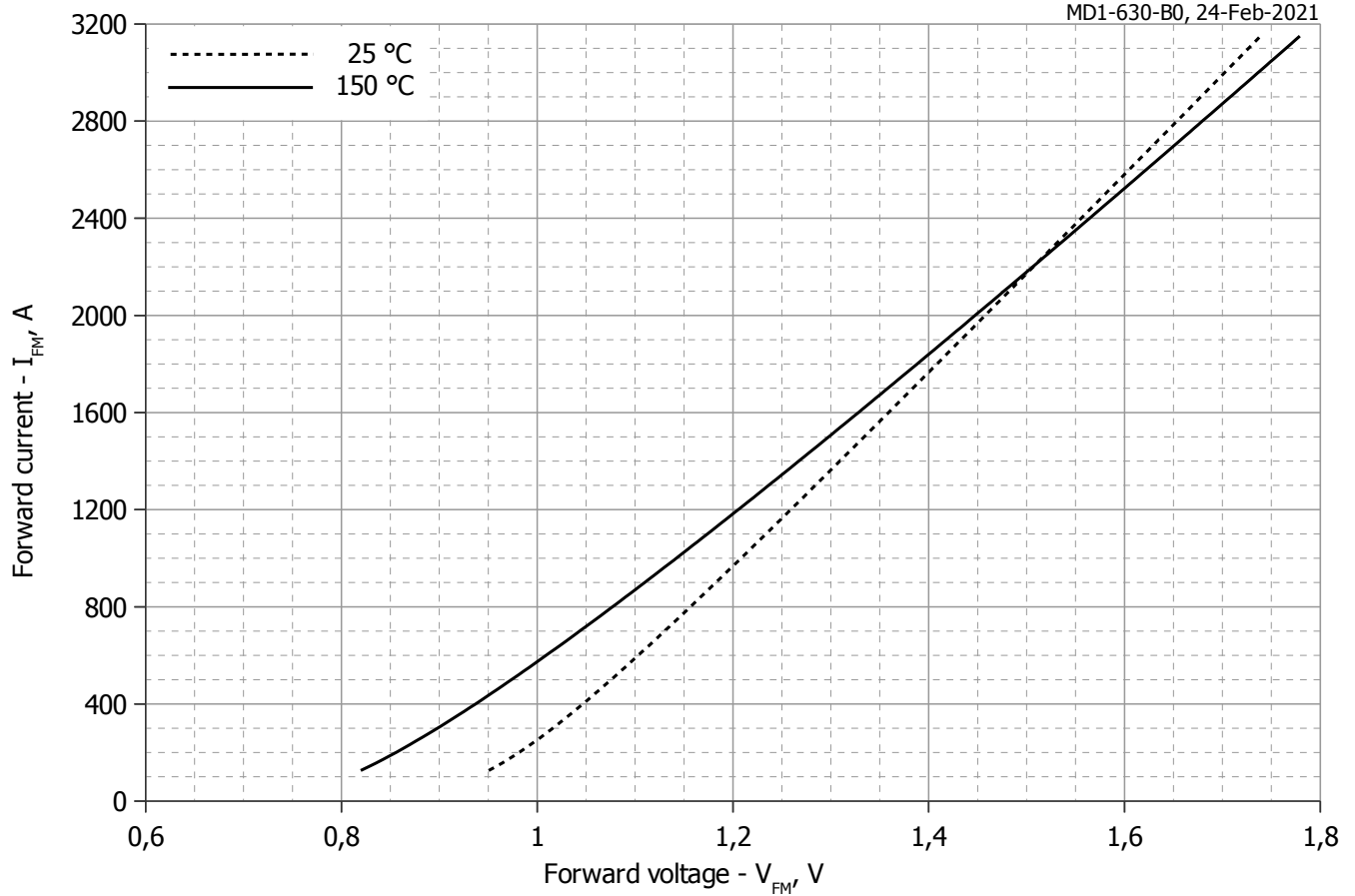
Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I _{FAV}	Maximum allowable average forward current	A	630 678	T _c =104 °C; T _c =100 °C; 180° half-sine wave; 50 Hz	
I _{FRMS}	RMS forward current	A	989	T _c =104 °C; 180° half-sine wave; 50 Hz	
I _{FSM}	Surge forward current	kA	16.0 18.0	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _R =0 V;
			17.0 20.0	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 ² t	Safety factor	A ² s·10 ³	1200 1600	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _R =0 V;
			1100 1600	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·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	1.45	T _j =25 °C; I _{FM} =1978 A	
V _{F(TO)}	Forward threshold voltage, max	V	0.844	T _j =T _{j max} ;	
r _T	Forward slope resistance, max	mΩ	0.298	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	3.00	Sine wave, 50 Hz; RMS	t=1 min
			3.60		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	-	630	-	28	-	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										

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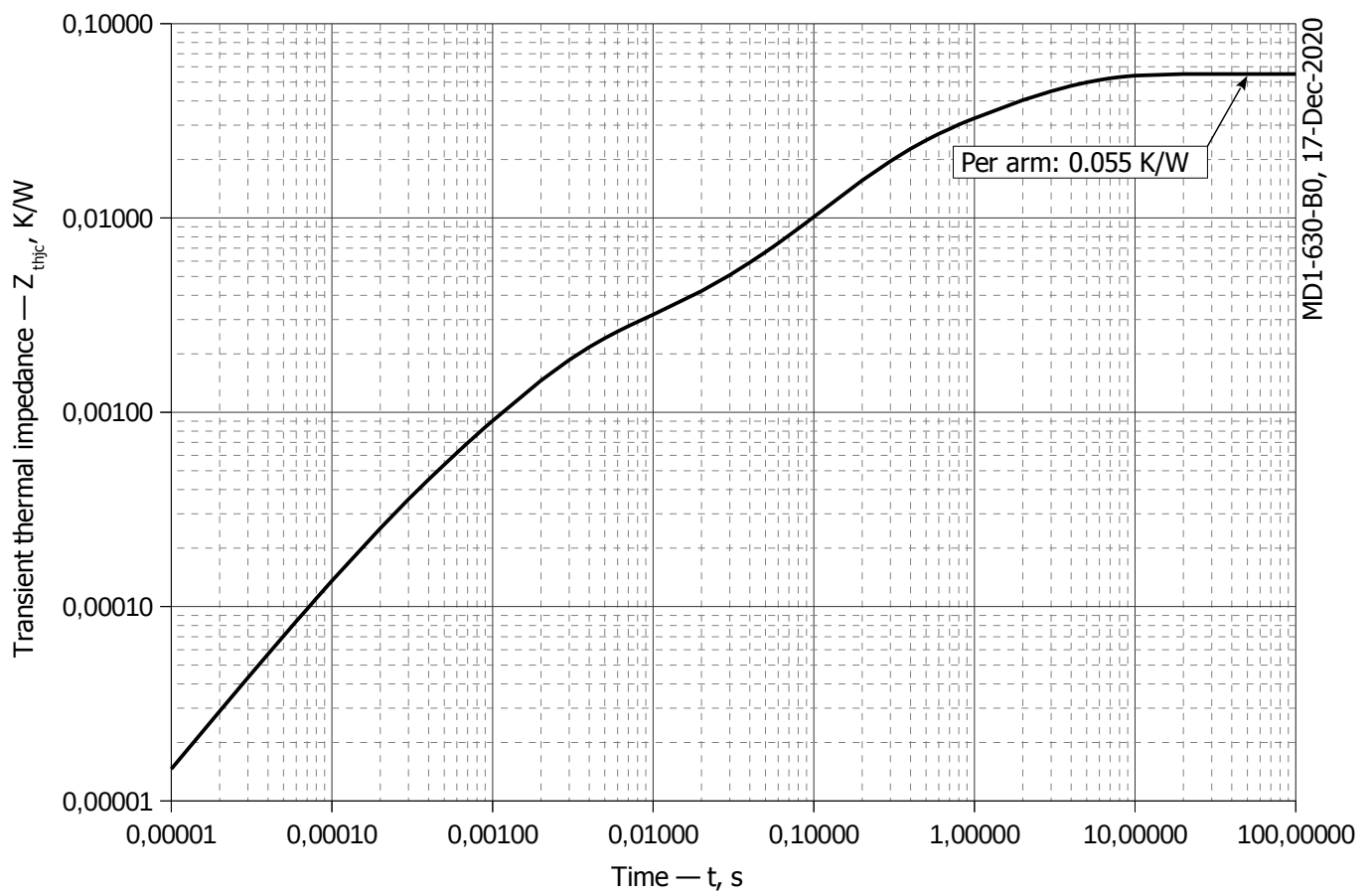
**Fig 1 – Forward characteristics of Limit device**

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	0.74254975	0.68277389
B	0.00025185	0.00024219
C	0.04193795	0.01231816
D	-0.00240073	0.00417329

Forward characteristic model (see Fig. 1).



MD1-630-B0, 17-Dec-2020

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)

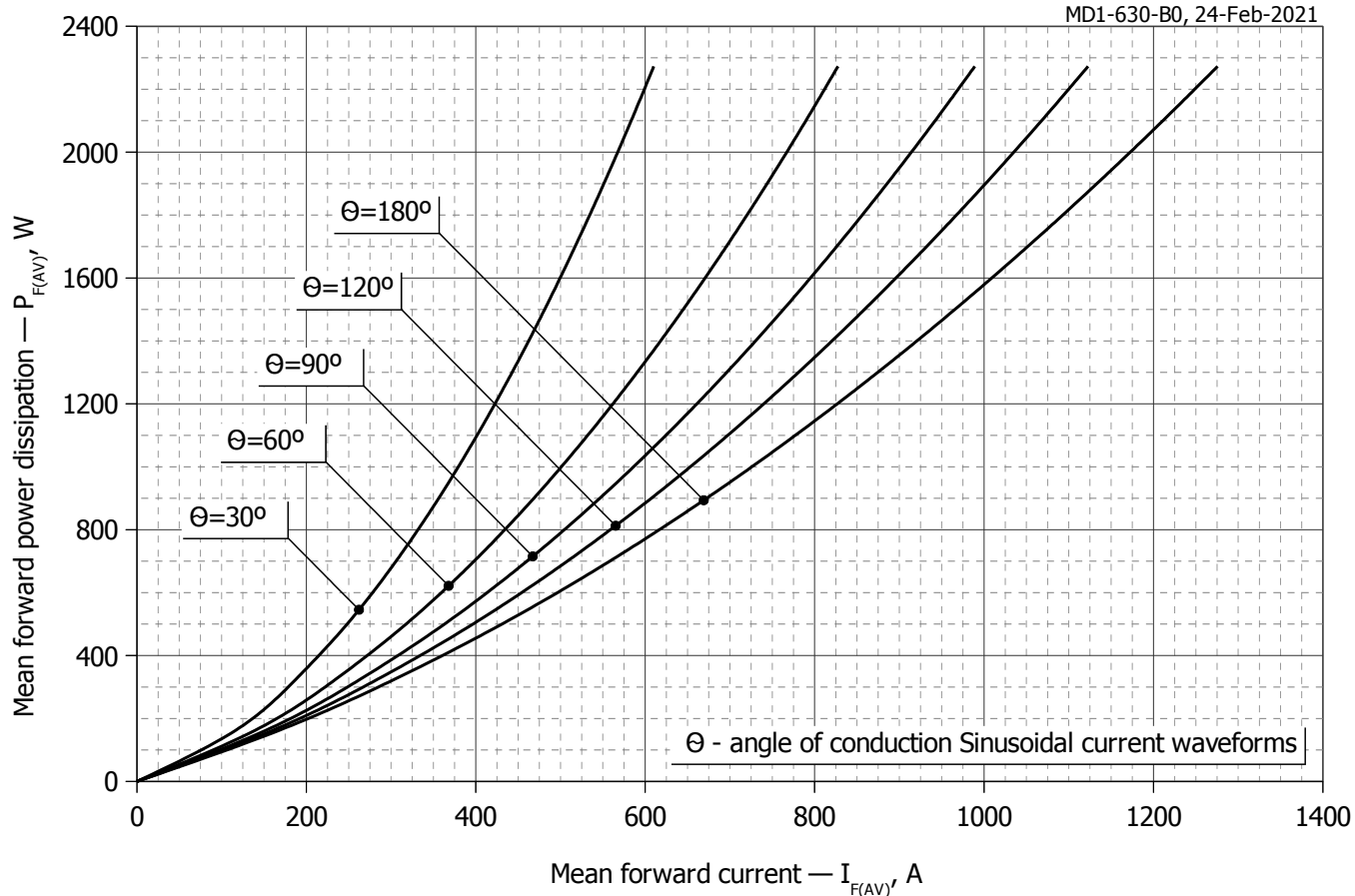


Fig. 3 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

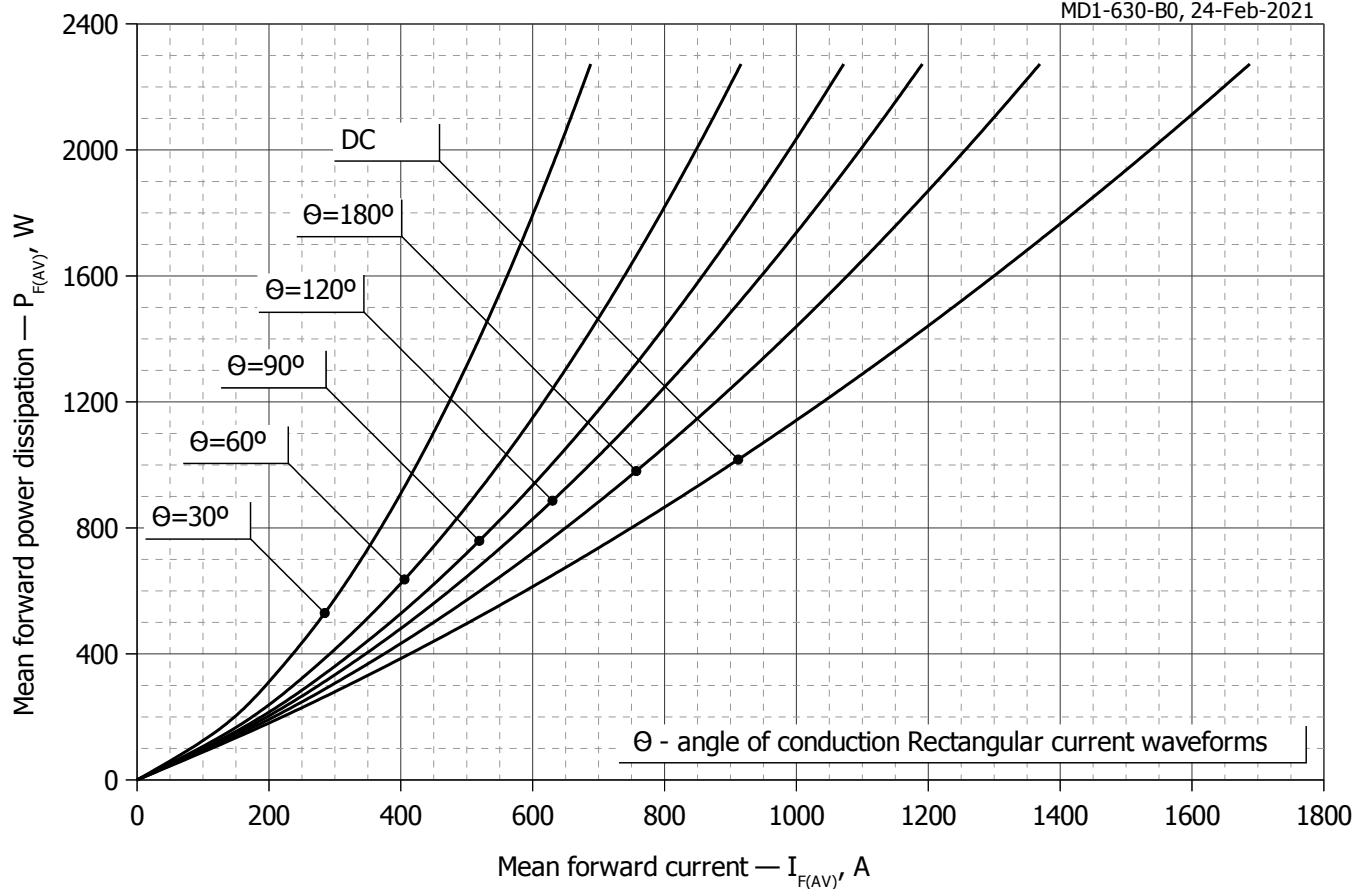


Fig. 4 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

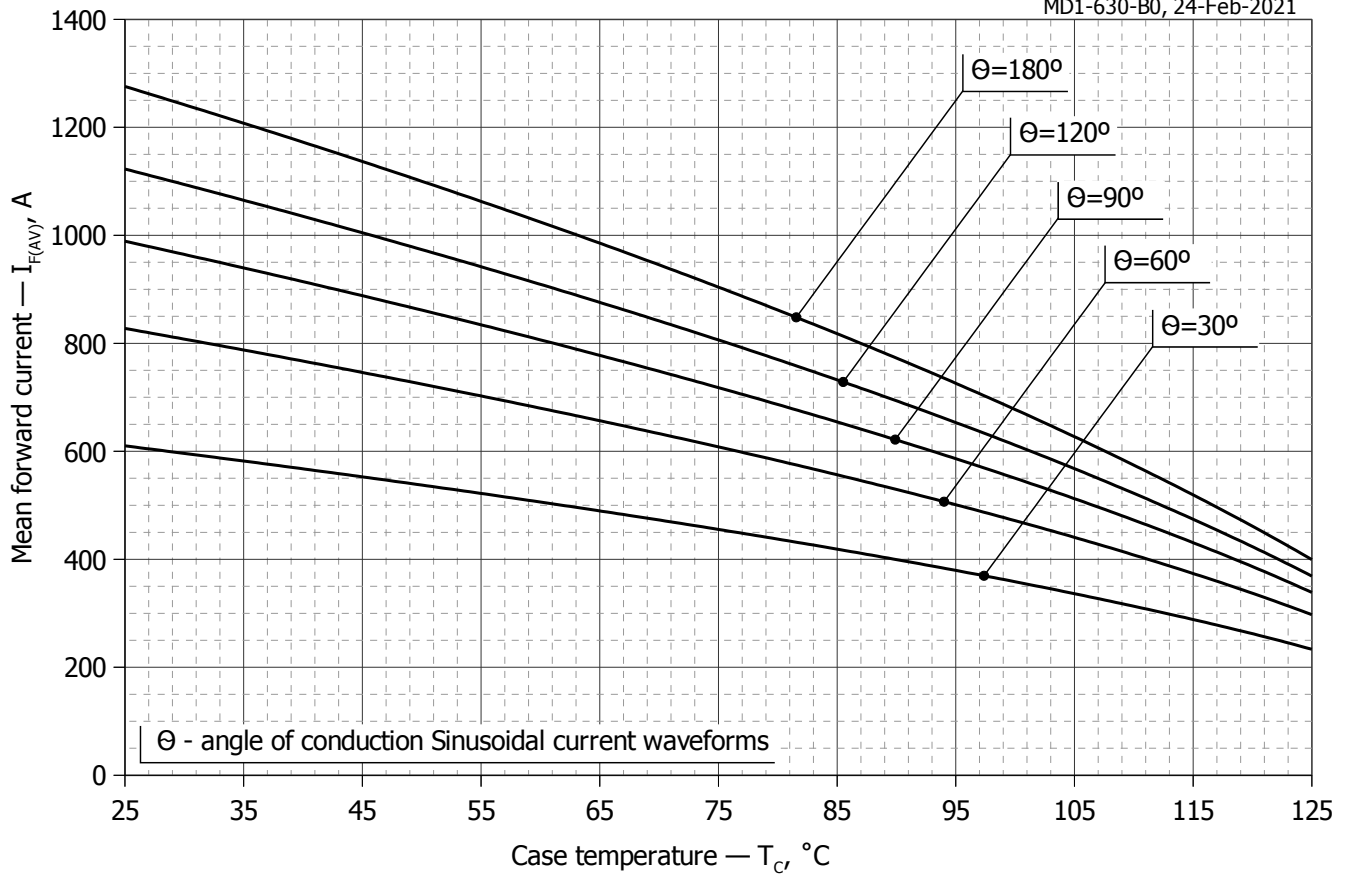


Fig. 5 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

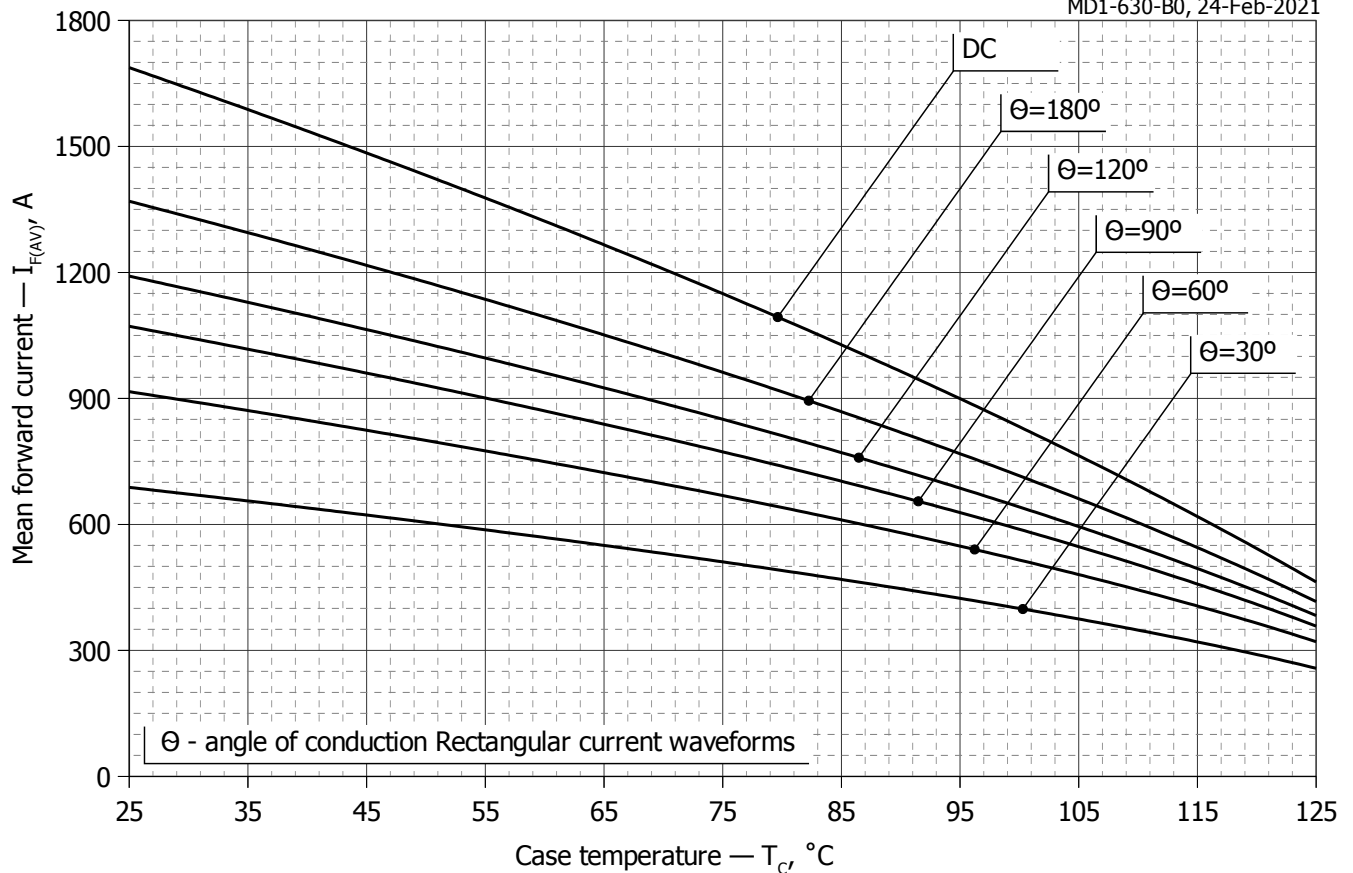


Fig. 6 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

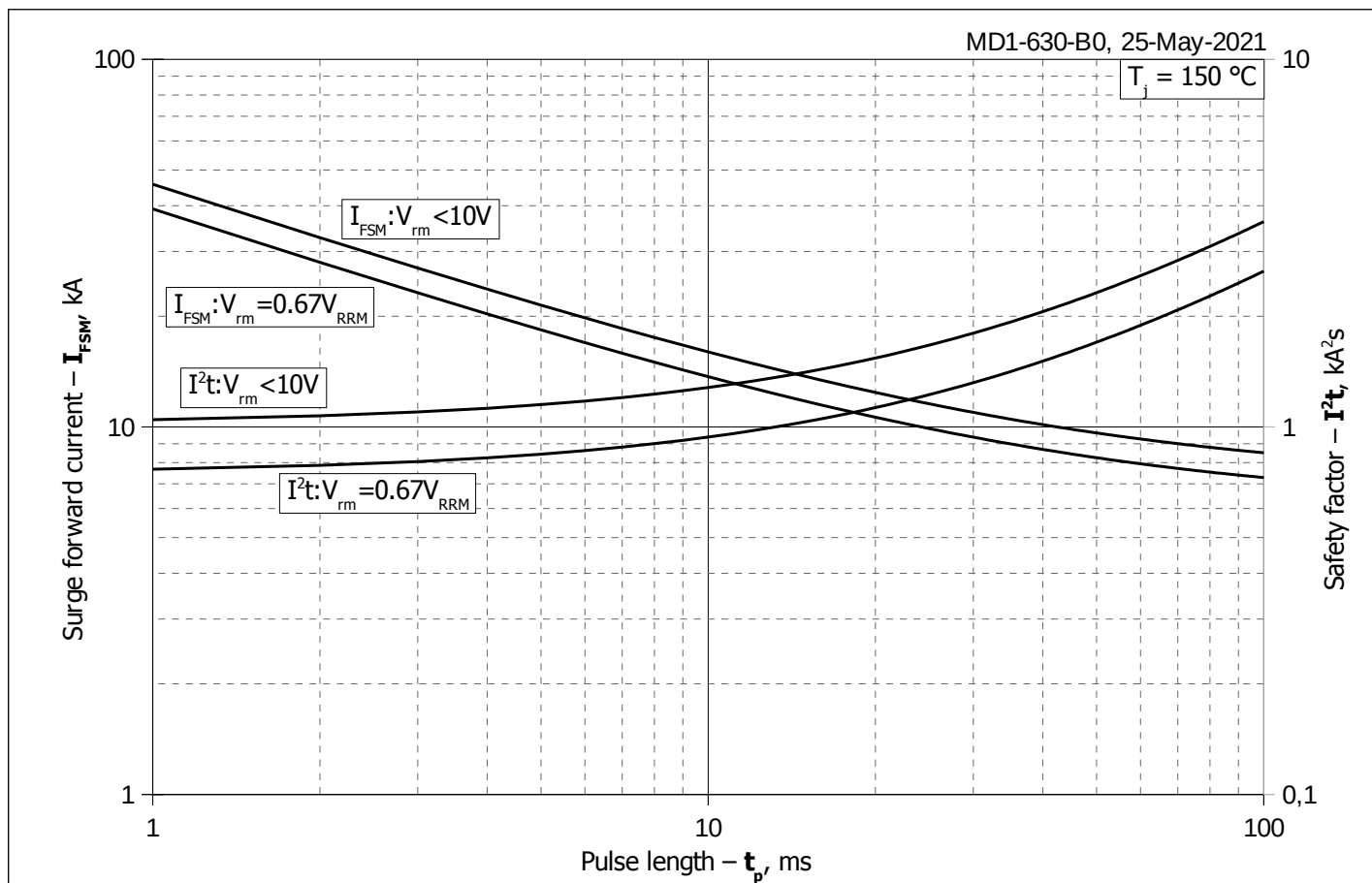


Fig. 7 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

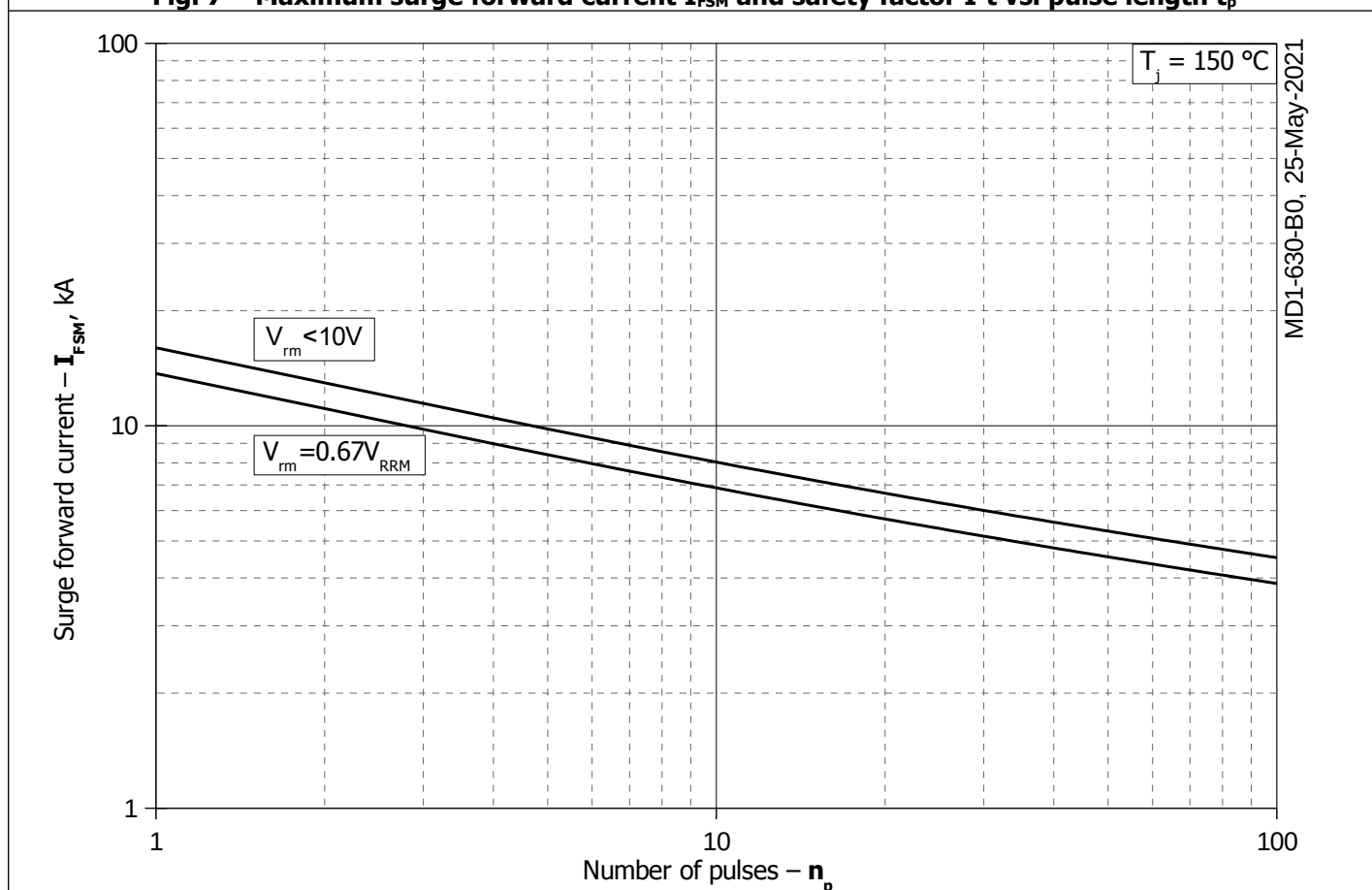


Fig. 8 - Maximum surge forward current I_{FSM} vs. number of pulses n_p