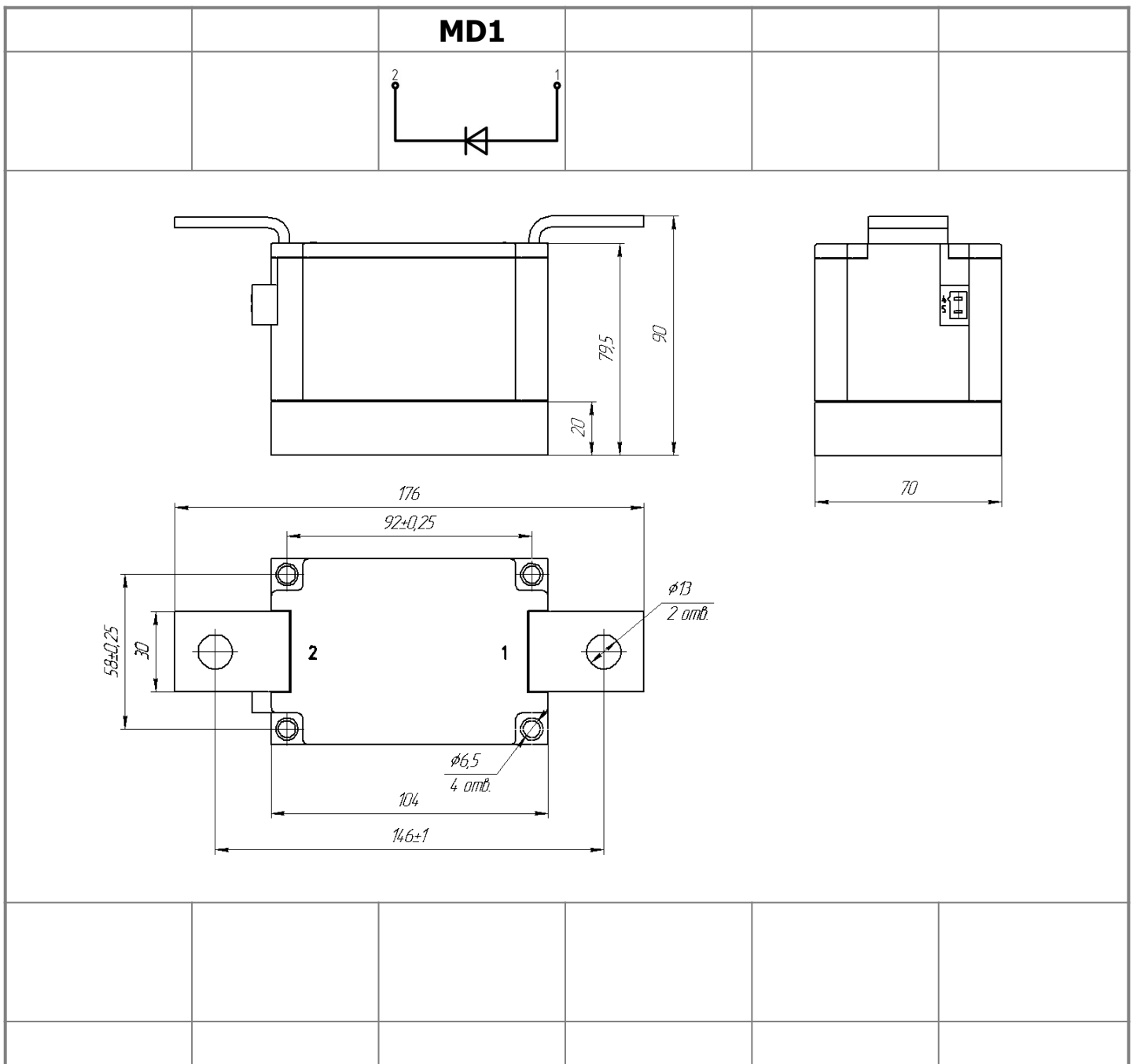




**Single Diode Module
For Phase Control
MD1-950-44-E**

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

Average forward current			I_{FAV}	950 A
Repetitive peak reverse voltage			V_{RRM}	4000 ÷ 4400 V
V_{RRM}, V	4000		4200	4400
Voltage code	40		42	44
$T_j, °C$	- 40 ÷ 160			




All dimensions in millimeters (inches)

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions
ON-STATE				
I_{FAV}	Average forward current	A	950	$T_c=100\text{ }^\circ\text{C}$; 180° half-sine wave; 50 Hz
I_{FRMS}	RMS forward current	A	1491	$T_c=100\text{ }^\circ\text{C}$; 180° half-sine wave; 50 Hz
I_{FSM}	Surge forward current	kA	34.0 41.0	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$ 180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V}$;
			36.0 43.0	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$ 180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_R=0\text{ V}$;
I^2t	Safety factor	$A^2s\cdot 10^3$	5700 8400	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$ 180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_R=0\text{ V}$;
			5300 7600	$T_j=T_{j\max}$ $T_j=25\text{ }^\circ\text{C}$ 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	4000÷4400	$T_{j\min} < T_j < T_{j\max}$; 180° half-sine wave; 50 Hz;
V_{RSM}	Non-repetitive peak reverse voltages	V	4100÷4500	$T_{j\min} < T_j < T_{j\max}$; 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 ÷ 160	
$T_{c\text{ op}}$	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	1.50	$T_j=25\text{ }^\circ\text{C}$; $I_{FM}=2512\text{ A}$
$V_{F(TO)}$	Forward threshold voltage, max	V	0.85	$T_j=T_{j\max}$;
r_T	Forward slope resistance, max	$\text{m}\Omega$	0.280	$0.5\pi I_{FAV} < I_T < 1.5\pi I_{FAV}$
BLOCKING				
I_{RRM}	Repetitive peak reverse current, max	mA	100	$T_j=T_{j\max}$; $V_R=V_{RRM}$
SWITCHING				
Q_{rr}	Total recovered charge, max	μC	5500	$T_j=T_{j\max}$; $I_{FM}=I_{FAV}$; $dI_{FM}/dt=-5\text{ A}/\mu\text{s}$; $V_R=100\text{ V}$
t_{rr}	Reverse recovery time, max	μs	70	
I_{rrM}	Peak reverse recovery current, max	A	157	
THERMAL				
R_{thjc}	Thermal resistance, junction to case			180° half-sine wave, 50 Hz
	per module	$^\circ\text{C}/\text{W}$	0.0420	
R_{thch}	Thermal resistance, case to heatsink			
	per module	$^\circ\text{C}/\text{W}$	0.0100	
INSULATION				
V_{ISOL}	Insulation test voltage	kV	3.00	Sine wave, 50 Hz; $t=60\text{ sec}$
			3.60	RMS $t=1\text{ sec}$
MECHANICAL				
M_1	Mounting torque (M6) ¹⁾	Nm	6.00	Tolerance $\pm 15\%$
M_2	Terminal connection torque (M12) ¹⁾	Nm	18.00	Tolerance $\pm 15\%$
w	Weight, max	g	2250	

PART NUMBERING GUIDE						NOTES				
MD	1	-	950	-	44	-	E	-	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.E) 6. Ambient Conditions: N – Normal										
		UL certified file-No. E255404								

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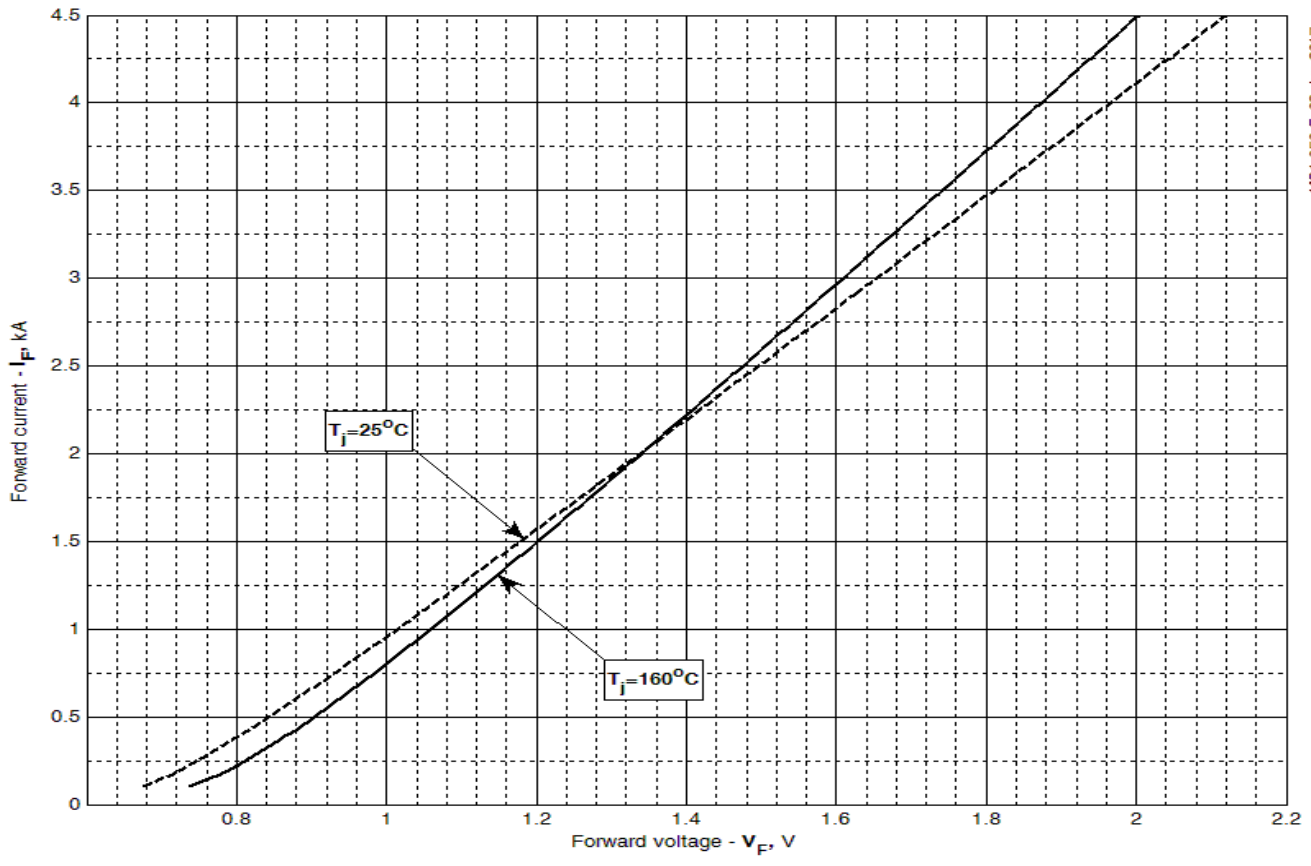


Fig 1 – Forward characteristics of Limit device

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	0.579461	0.615440
B	0.274124	0.209316
C	-0.148778	-0.216178
D	0.264245	0.383954

Forward characteristic model (see Fig. 1)

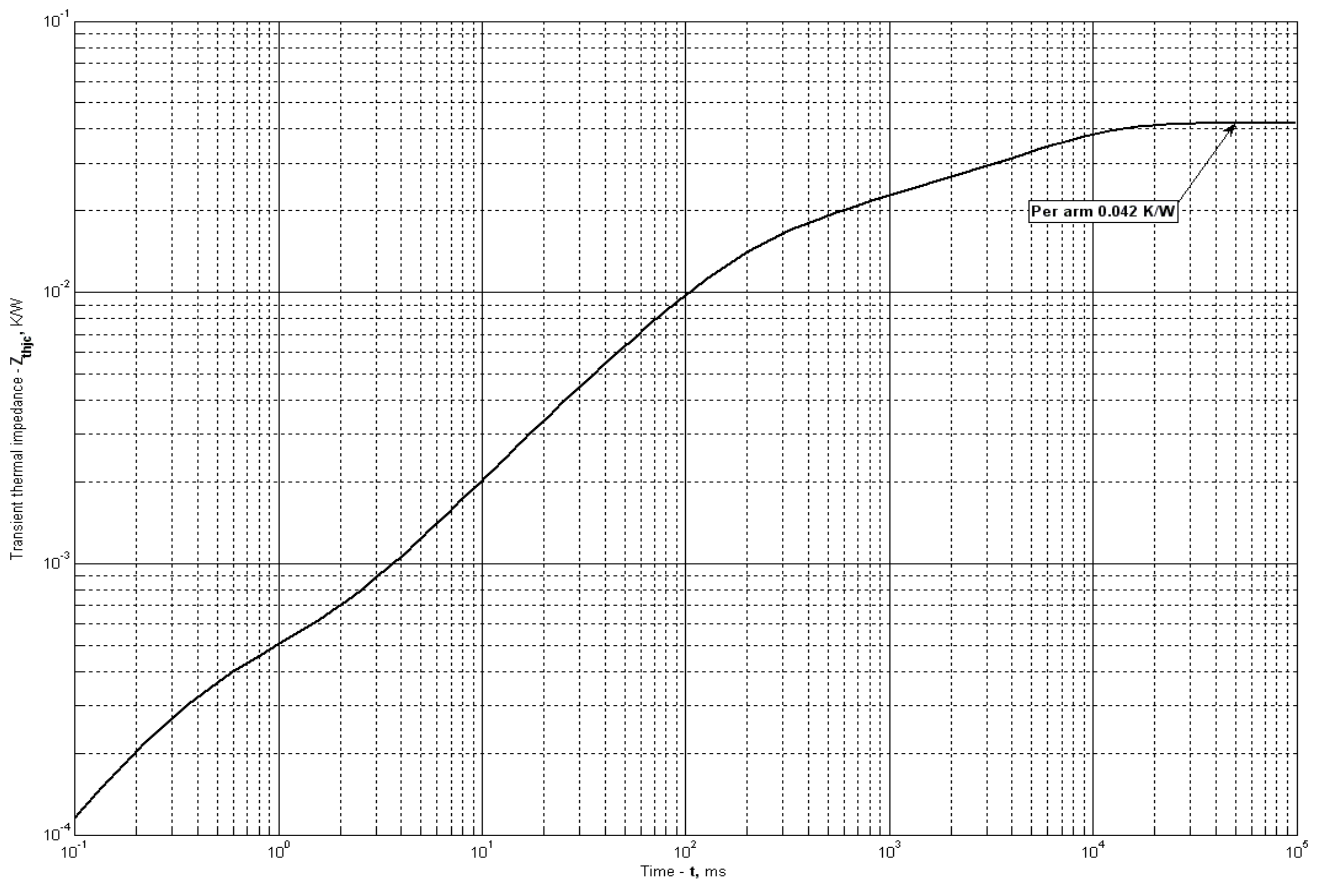


Fig 2 – Transient thermal impedance

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	0.02105	0.005931	0.009502	0.004252	0.001006	0.0003132
τ_i, s	5.887	0.7389	0.1616	0.08215	0.01267	0.0002712

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

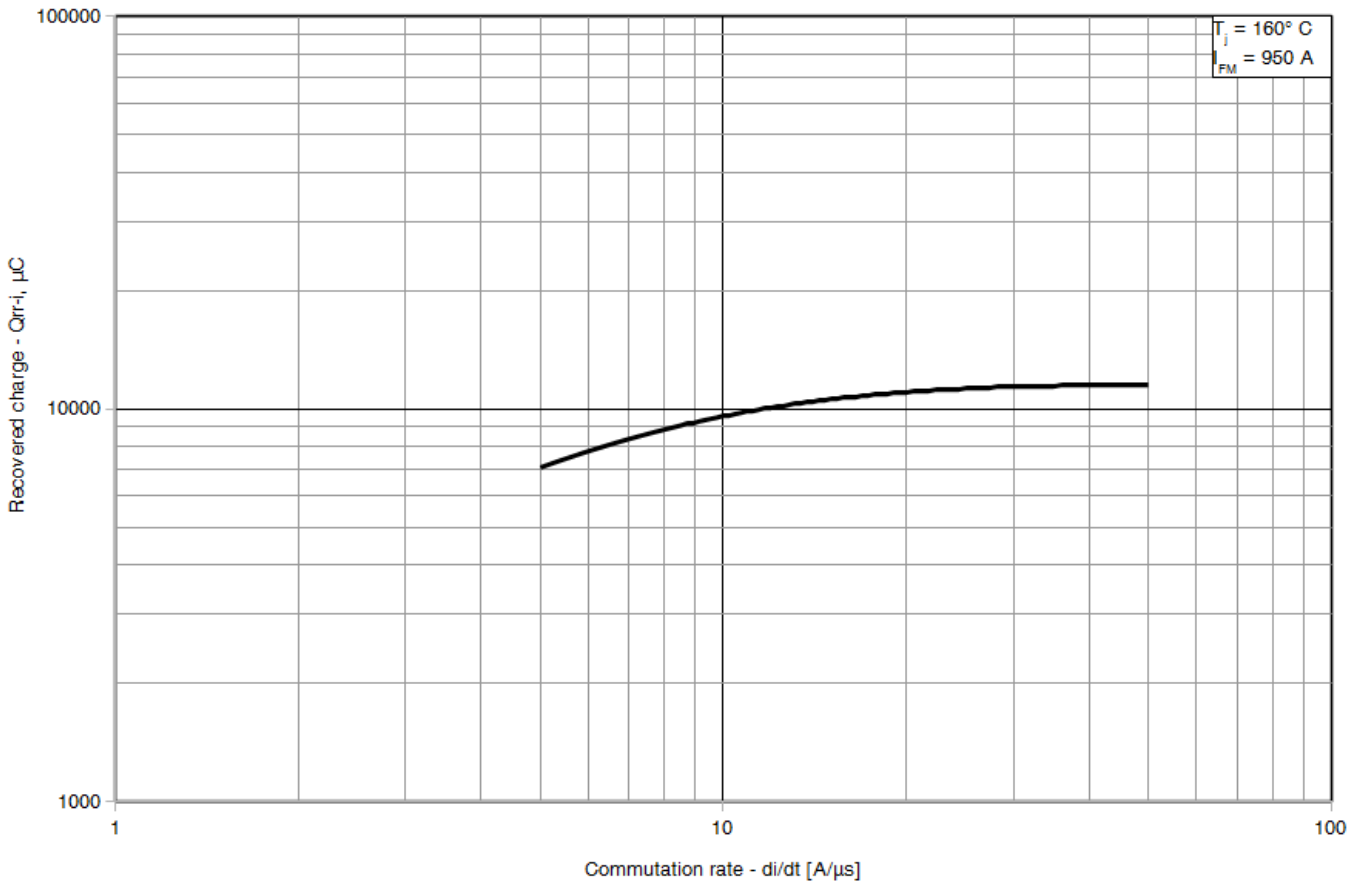


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

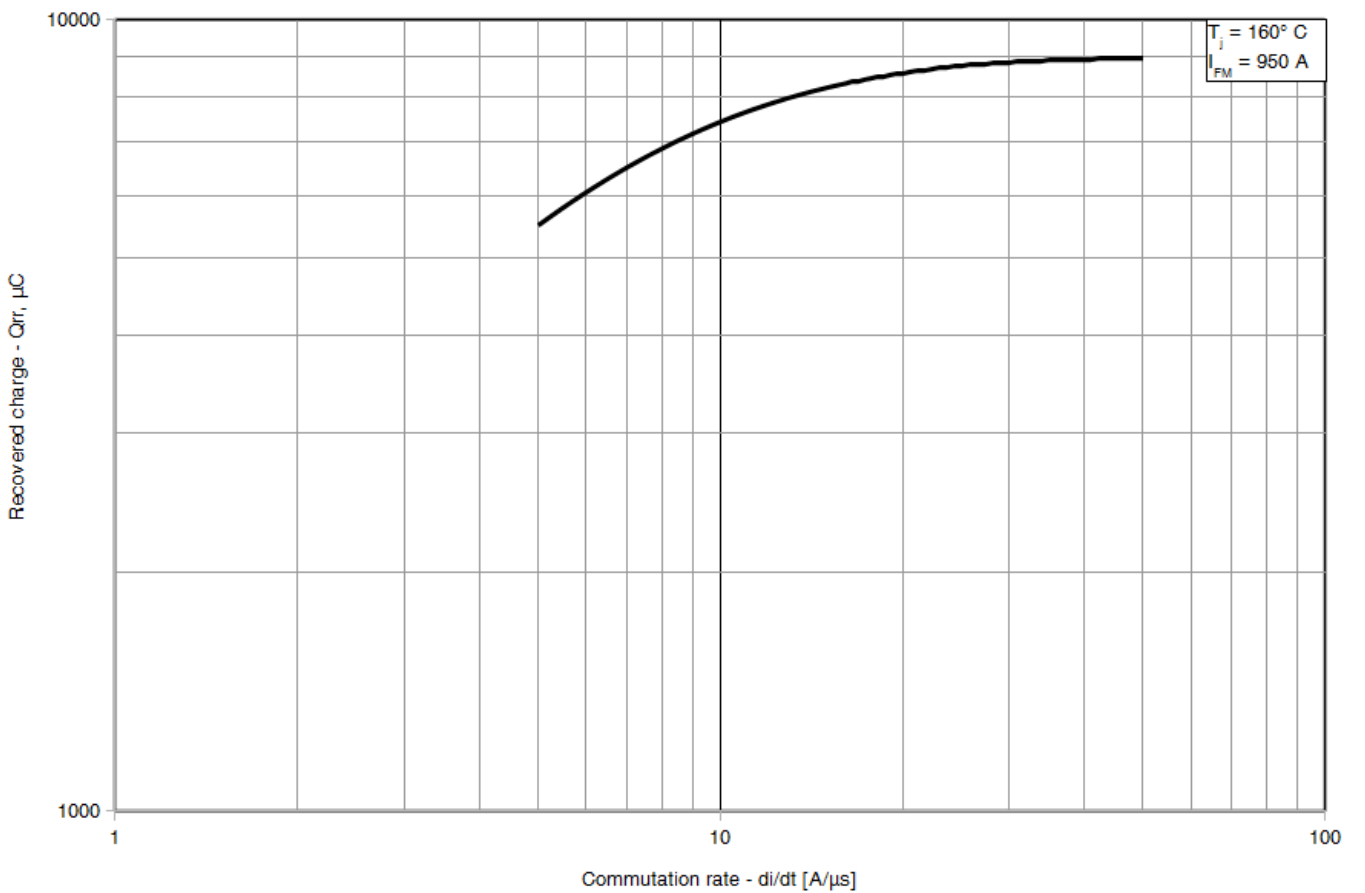


Fig 4 - Recovered charge, Q_{rr} (25% chord)

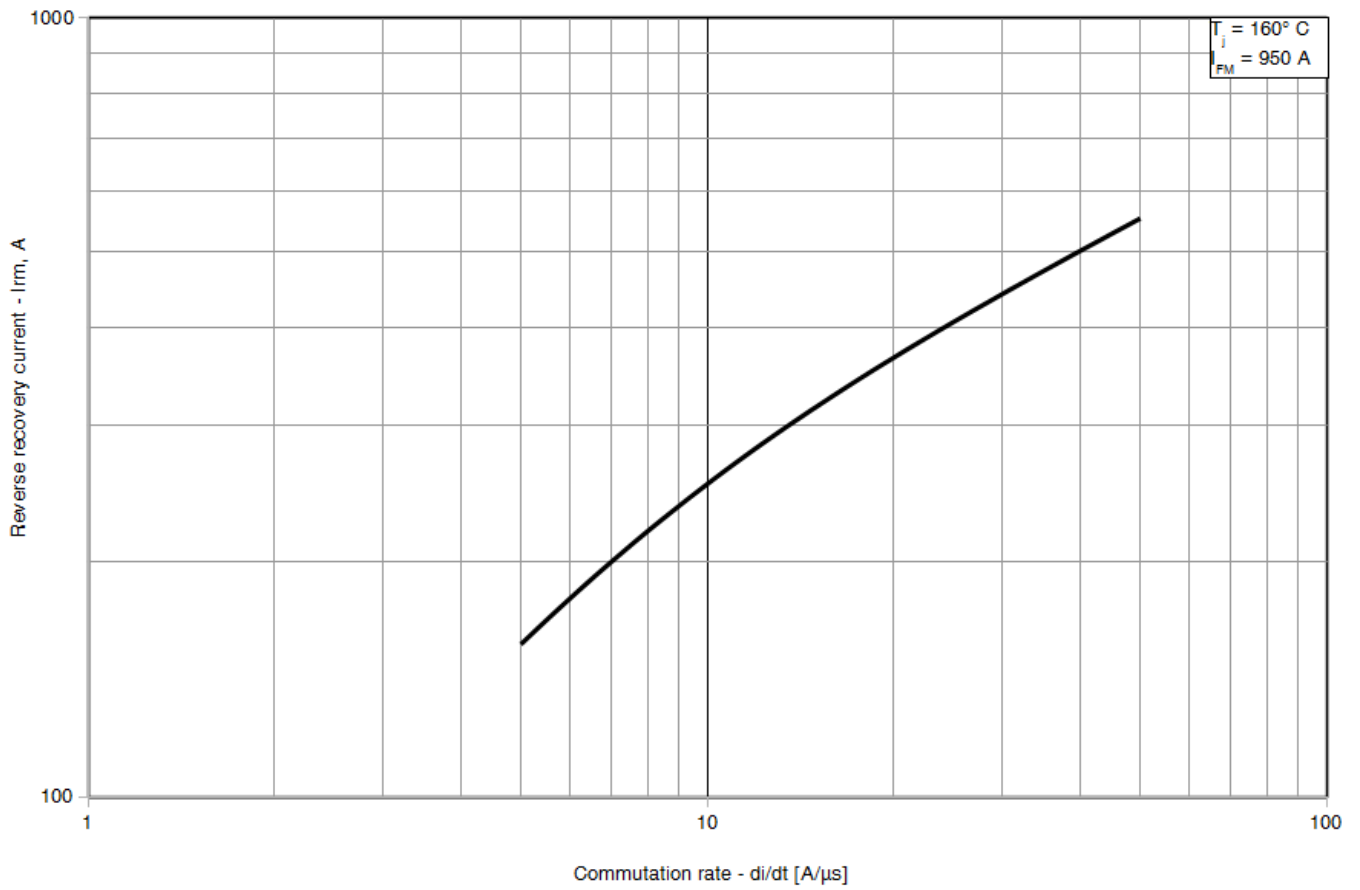


Fig 5 – Peak reverse recovery current, I_{rm}

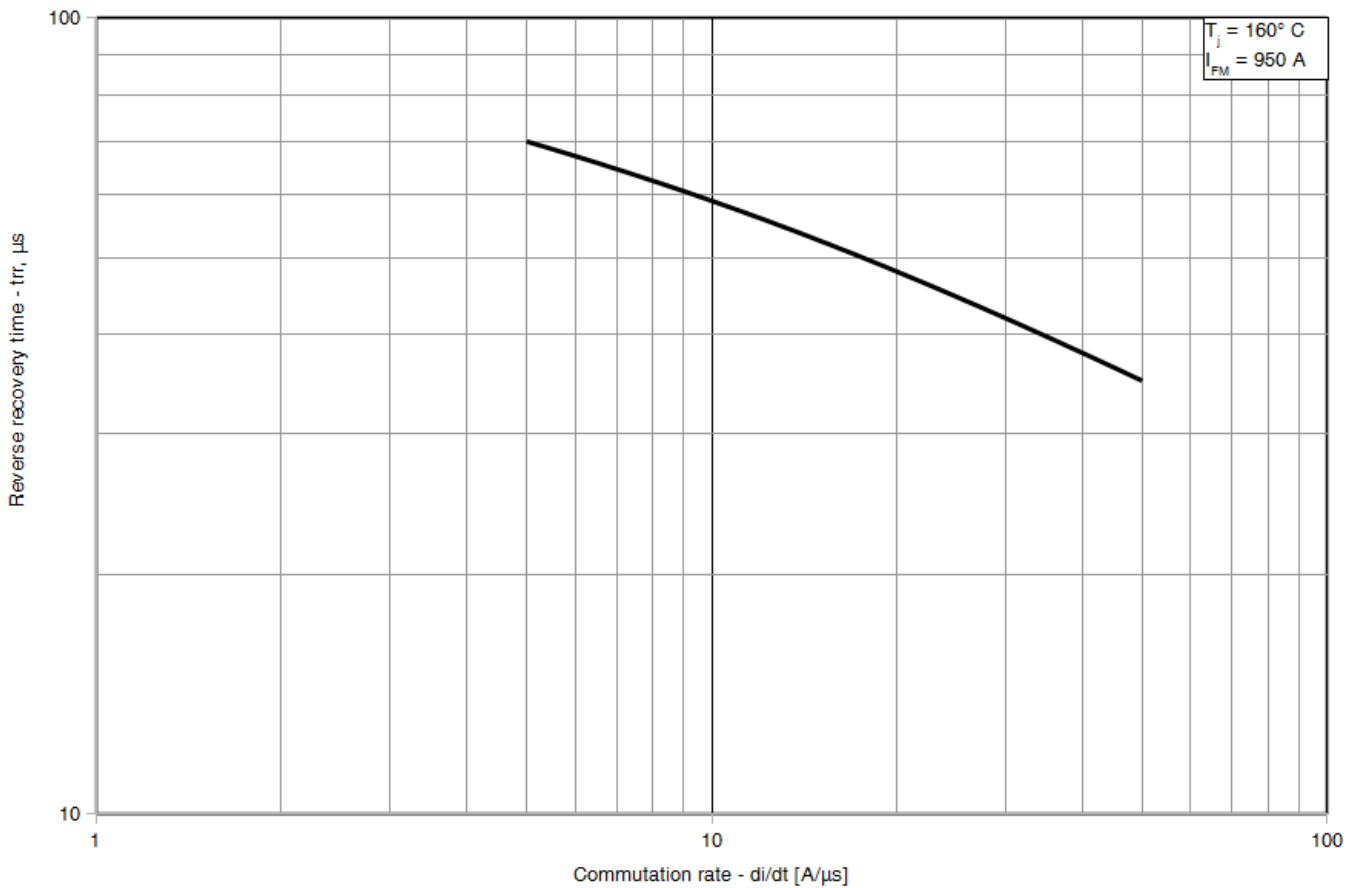
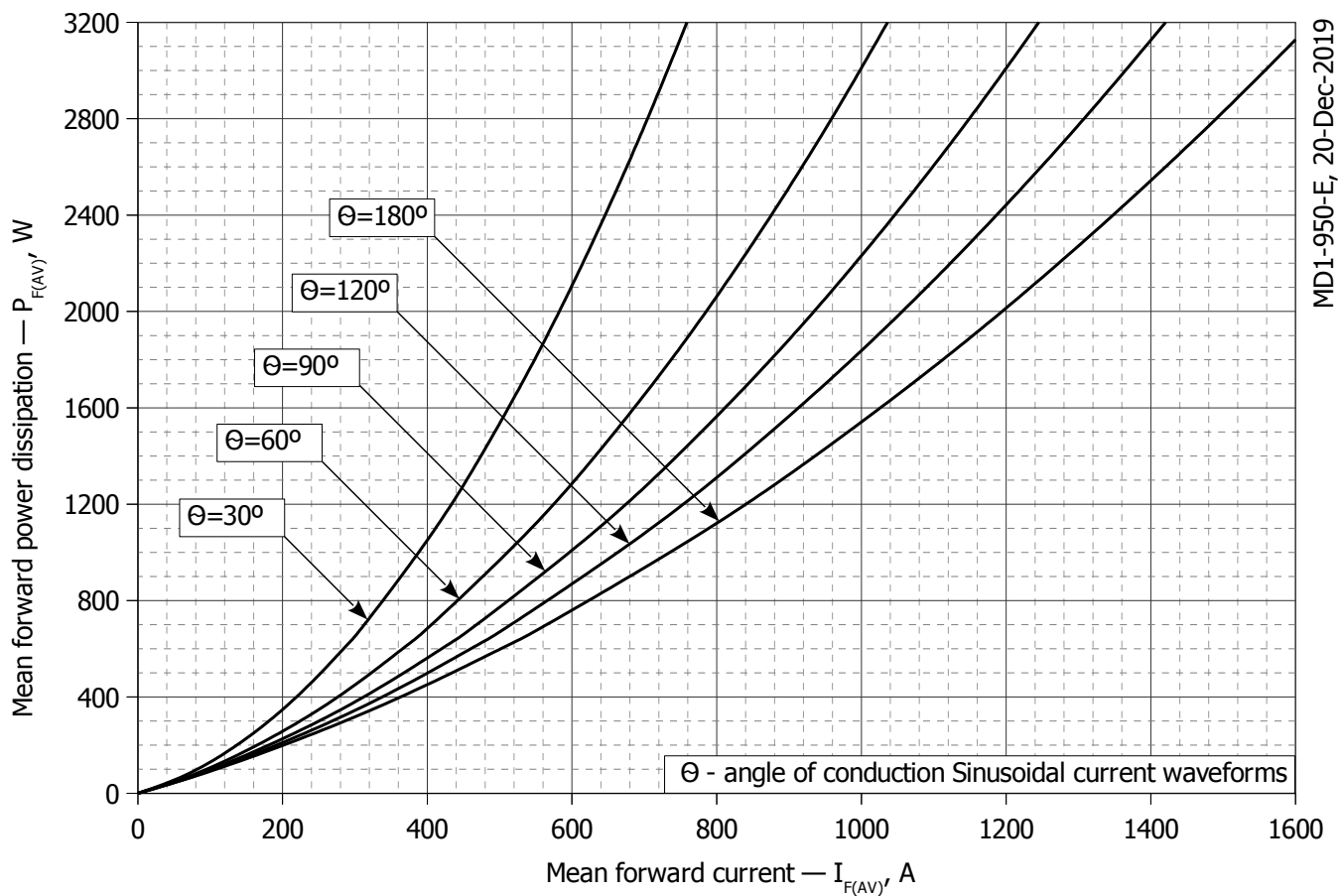
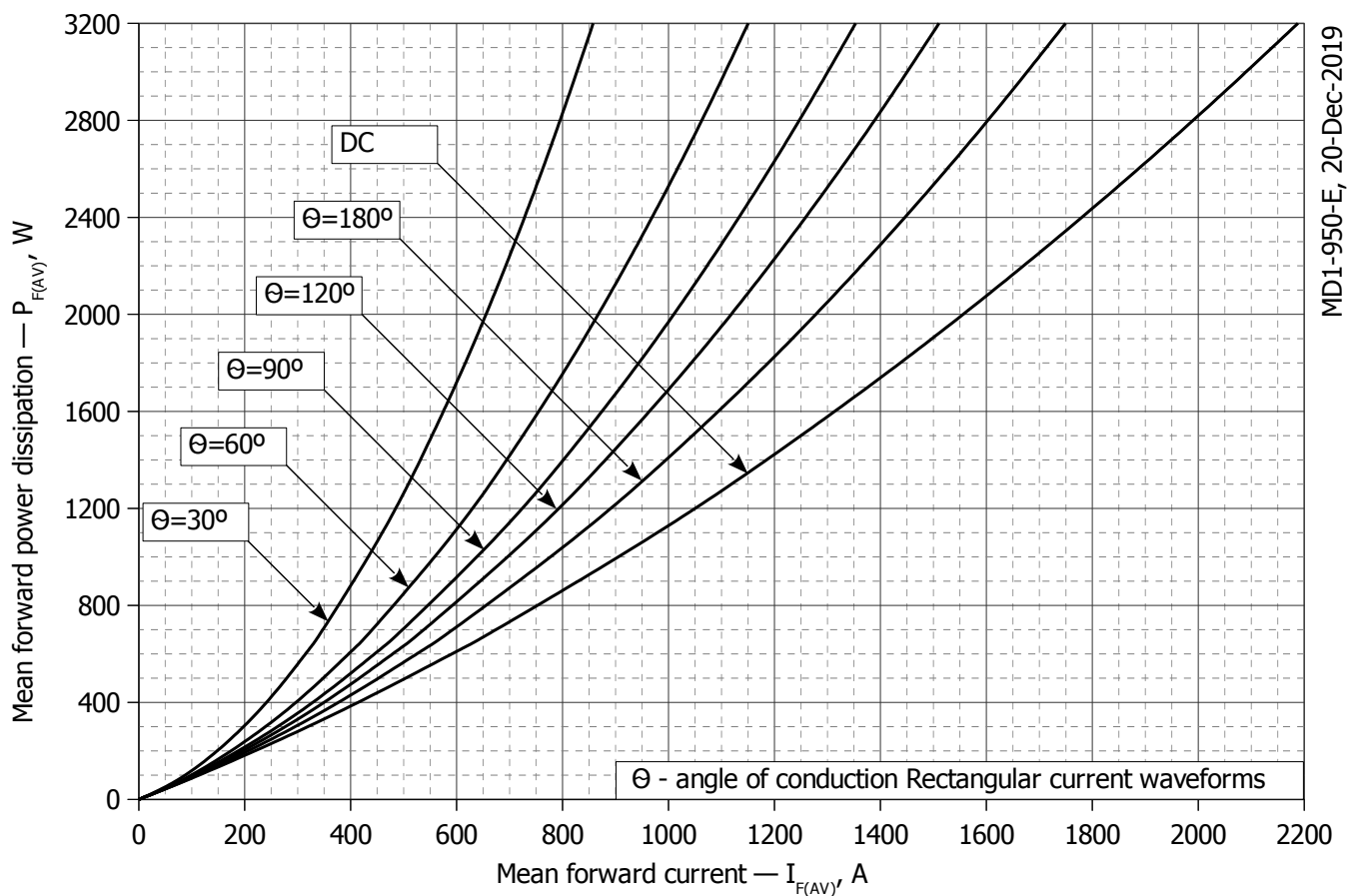


Fig 6 – Maximum recovery time, t_{rr} (25% chord)



MD1-950-E, 20-Dec-2019

Fig 7 – Mean forward power dissipation P_{FAV} vs. Mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles



MD1-950-E, 20-Dec-2019

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

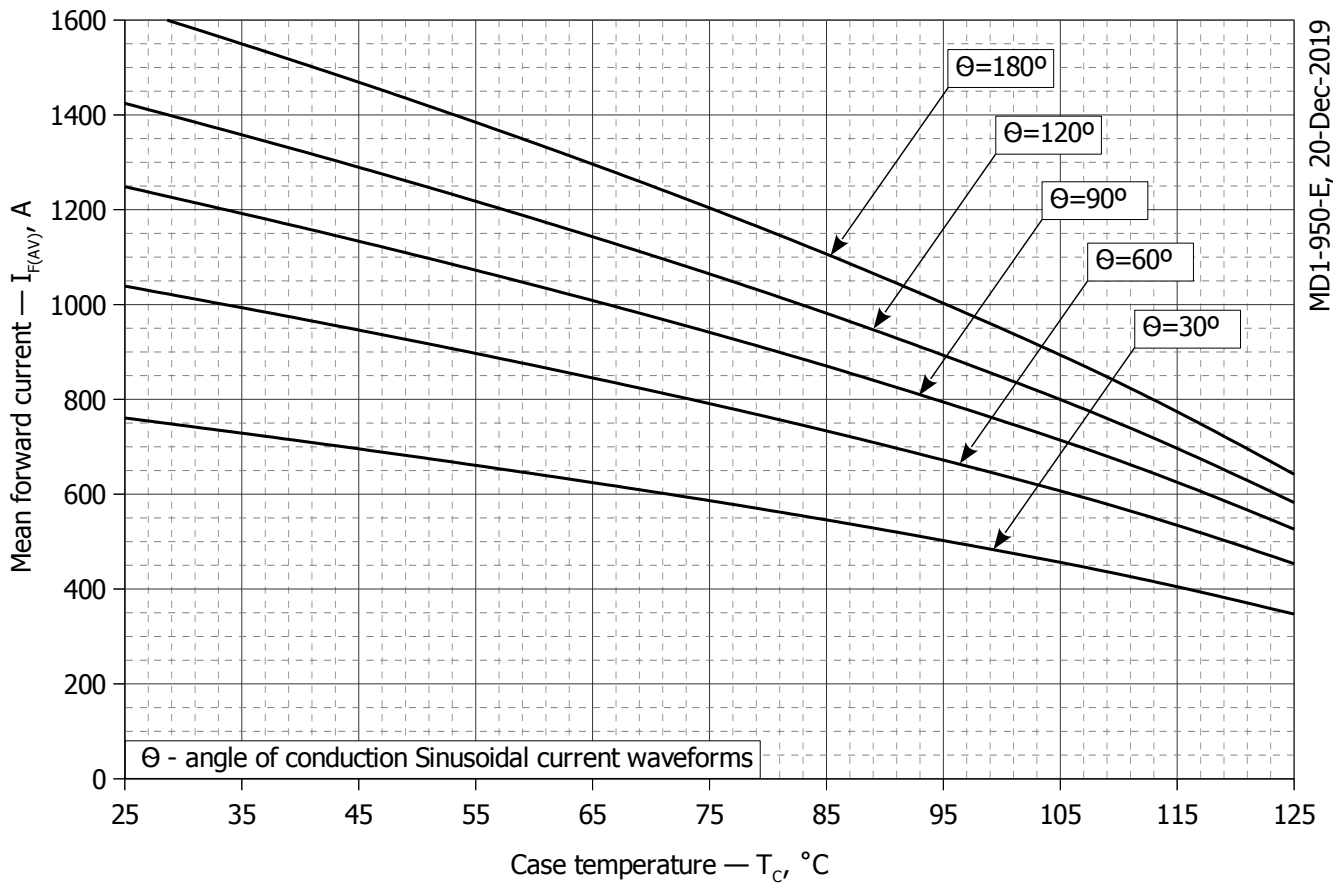


Fig 9 – Mean forward current I_{FAV} vs. Case temperature T_C for sinusoidal current waveforms at different conduction angles

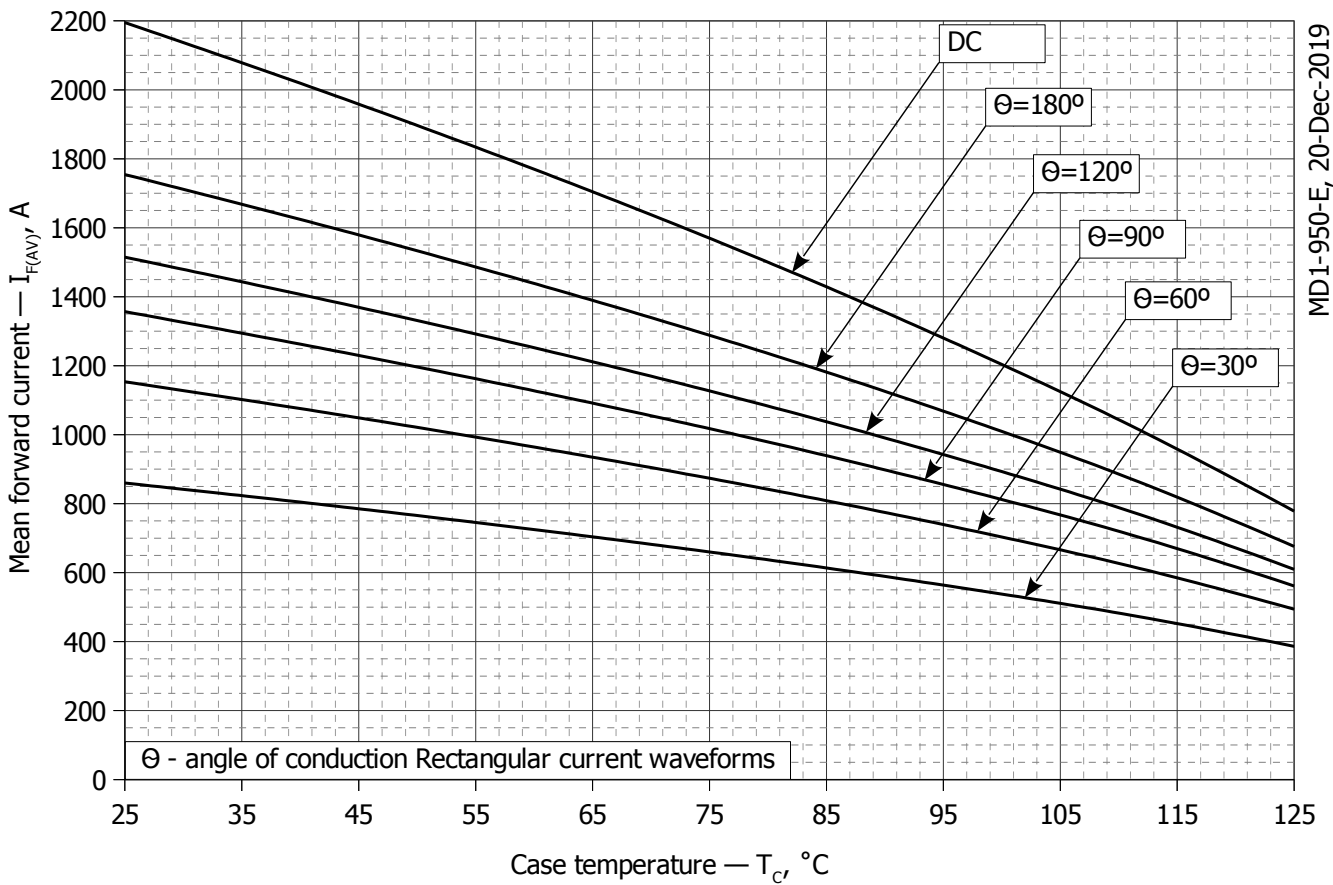


Fig 10 – Mean forward current I_{FAV} vs. Case temperature T_C for rectangular current waveforms at different conduction angles and for DC

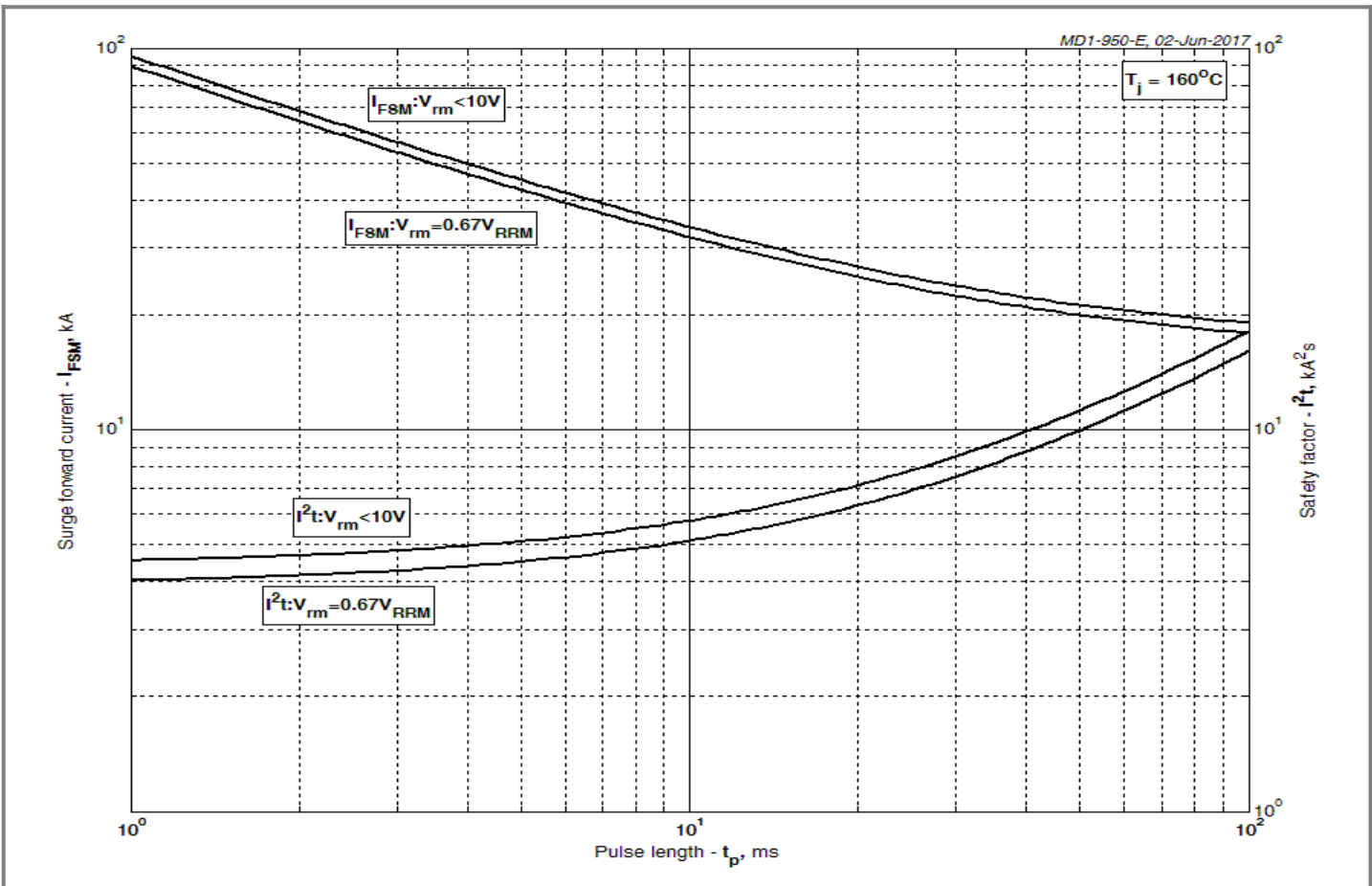


Fig 11 – Maximum surge and I^2t ratings

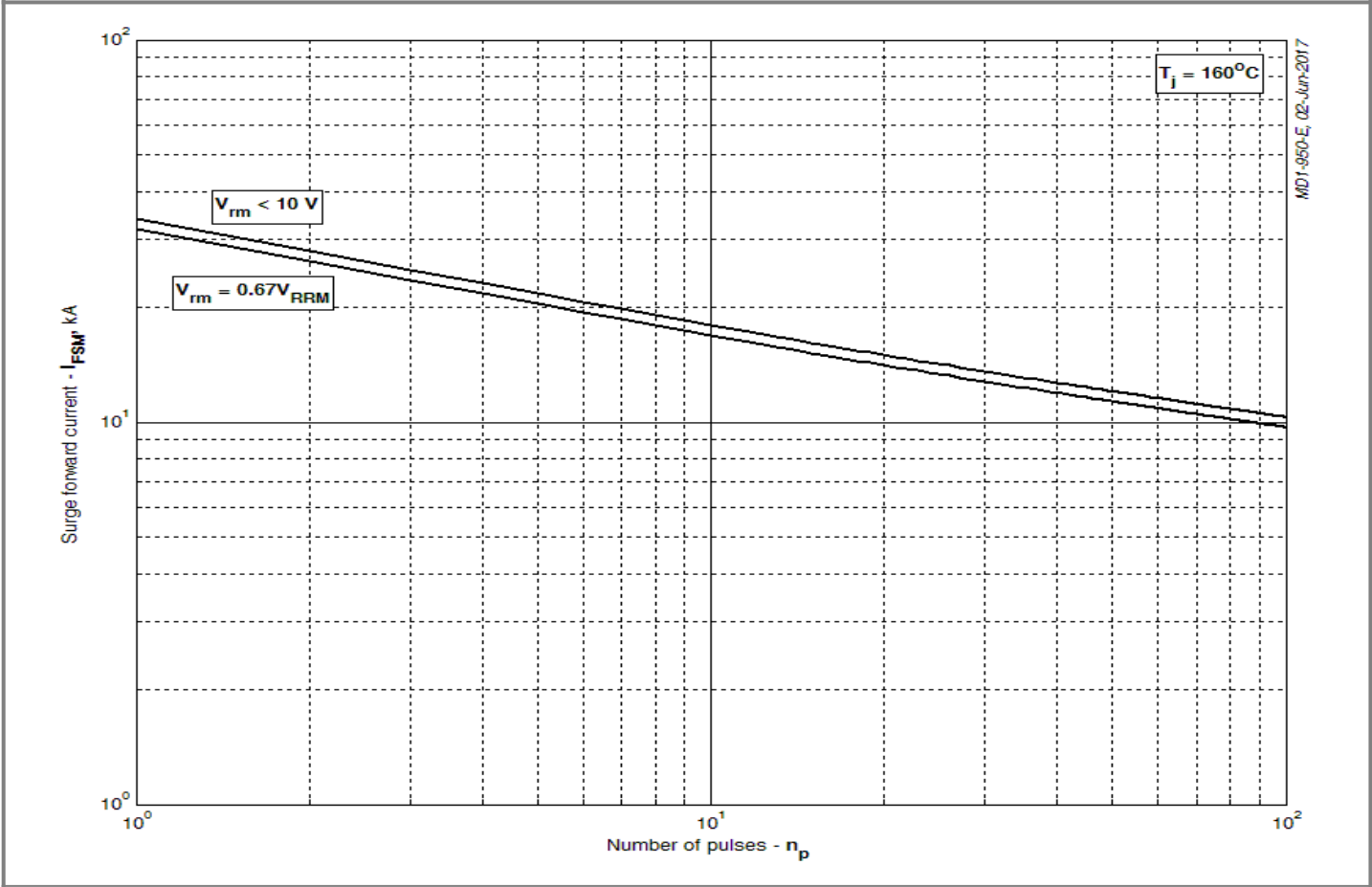


Fig 12 – Maximum surge ratings