



Low switching losses
Low reverse recovery charge
High power cycling capability

Fast Recovery Diode Type DF243-1000-18

Average forward current				I_{FAV}	1000 A			
Repetitive peak reverse voltage				V_{RRM}	1000...1800 V			
Reverse recovery time				t_{rr}	5.00, 6.30, 8.00, 10.0 μ s			
V_{RRM} , V	1000	1100	1200	1300	1400	1500	1600	1800
Voltage code	10	11	12	13	14	15	16	18
T_j , °C	-60...+125							

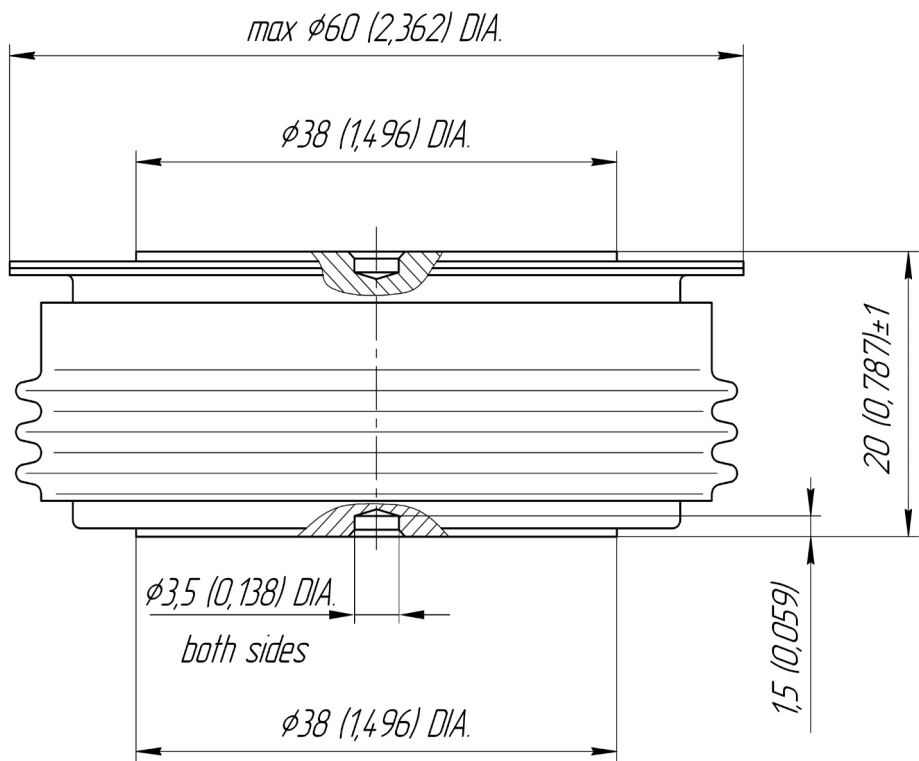
MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I _{FAV}	Maximum allowable average forward current	A	1000 1296	T _c =75 °C; Double side cooled; T _c =55 °C; Double side cooled; 180° half-sine wave; 50 Hz	
I _{FRMS}	RMS forward current	A	1570	T _c =75 °C; Double side cooled; 180° half-sine wave; 50 Hz	
I _{FSM}	Surge forward current	kA	22.0 25.0	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _R =0 V;
			23.0 26.0	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	2400 3100	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _R =0 V;
			2100 2800	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	1000...1800	T _{j min} < T _j < T _{j max} ; 180° half-sine wave; 50 Hz;	
V _{RSM}	Non-repetitive peak reverse voltages	V	1100...1900	T _{j min} < T _j < T _{j max} ; 180° half-sine wave; single pulse;	
V _R	Reverse continuous voltages	V	0.6·U _{RRM}	T _j =T _{j max} ;	
THERMAL					
T _{stg}	Storage temperature	°C	−60...+55		
T _j	Operating junction temperature	°C	−60...+125		
MECHANICAL					
F	Mounting force	kN	14.0...16.0		
a	Acceleration	m/s ²	50	Device clamped	

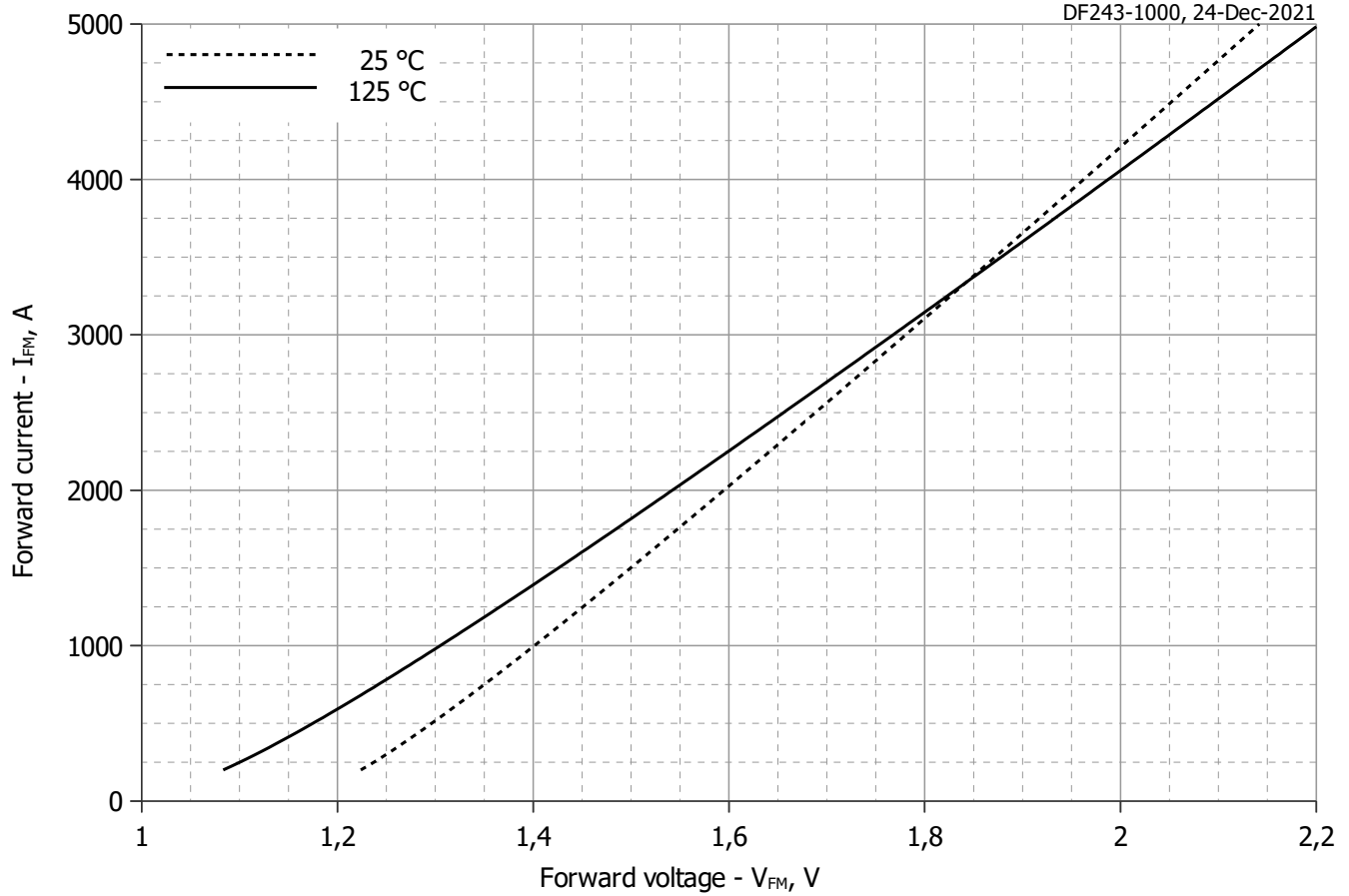
CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V _{FM}	Peak forward voltage, max	V	1.80	T _j =25 °C; I _{FM} =3140 A	
V _{F(TO)}	Forward threshold voltage, max	V	1.092	T _j =T _{j max} ;	
r _T	Forward slope resistance, max	mΩ	0.223	0.5 π I _{FAV} < I _T < 1.5 π I _{FAV}	
BLOCKING					
I _{RRM}	Repetitive peak reverse current, max	mA	70	T _j =T _{j max} ; V _R =V _{RRM}	
SWITCHING					
Q _r	Recovered charge, max	μC	800	T _j =T _{j max} ; I _{FM} =I _{FAV} ;	
t _{rr}	Reverse recovery time ¹⁾ , max	μs	5.00, 6.30, 8.00, 10.0	di _R /dt=-100 A/μs;	
I _{rr}	Reverse recovery current, max	A	320	V _R =100 V;	
THERMAL					
R _{thjc}	Thermal resistance, junction to case, max	°C/W	0.0300	Direct current	Double side cooled
R _{thjc-A}			0.0660		Anode side cooled
R _{thjc-K}			0.0540		Cathode side cooled
R _{thck}	Thermal resistance, case to heatsink, max	°C/W	0.0060	Direct current	
MECHANICAL					
m	Weight, max	g	250		
D _s	Surface creepage distance	mm (inch)	23.69 (0.933)		
D _a	Air strike distance	mm (inch)	19.10 (0.752)		

PART NUMBERING GUIDE						NOTES										
DF	243	1000	18	E4	N	1) Reverse recovery time										
1	2	3	4	5	6											
1. Fast recovery diode 2. Design version 3. Average forward current, A 4. Voltage code 5. Group of reverse recovery time 6. Ambient conditions: N – normal; T – tropical																
						<table><tr><th>Symbol of group</th><th>E4</th><th>C4</th><th>B4</th><th>A4</th></tr><tr><td>t_{rr}, μs</td><td>5.00</td><td>6.30</td><td>8.00</td><td>10.0</td></tr></table>	Symbol of group	E4	C4	B4	A4	t _{rr} , μs	5.00	6.30	8.00	10.0
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All dimensions in millimeters (inches)

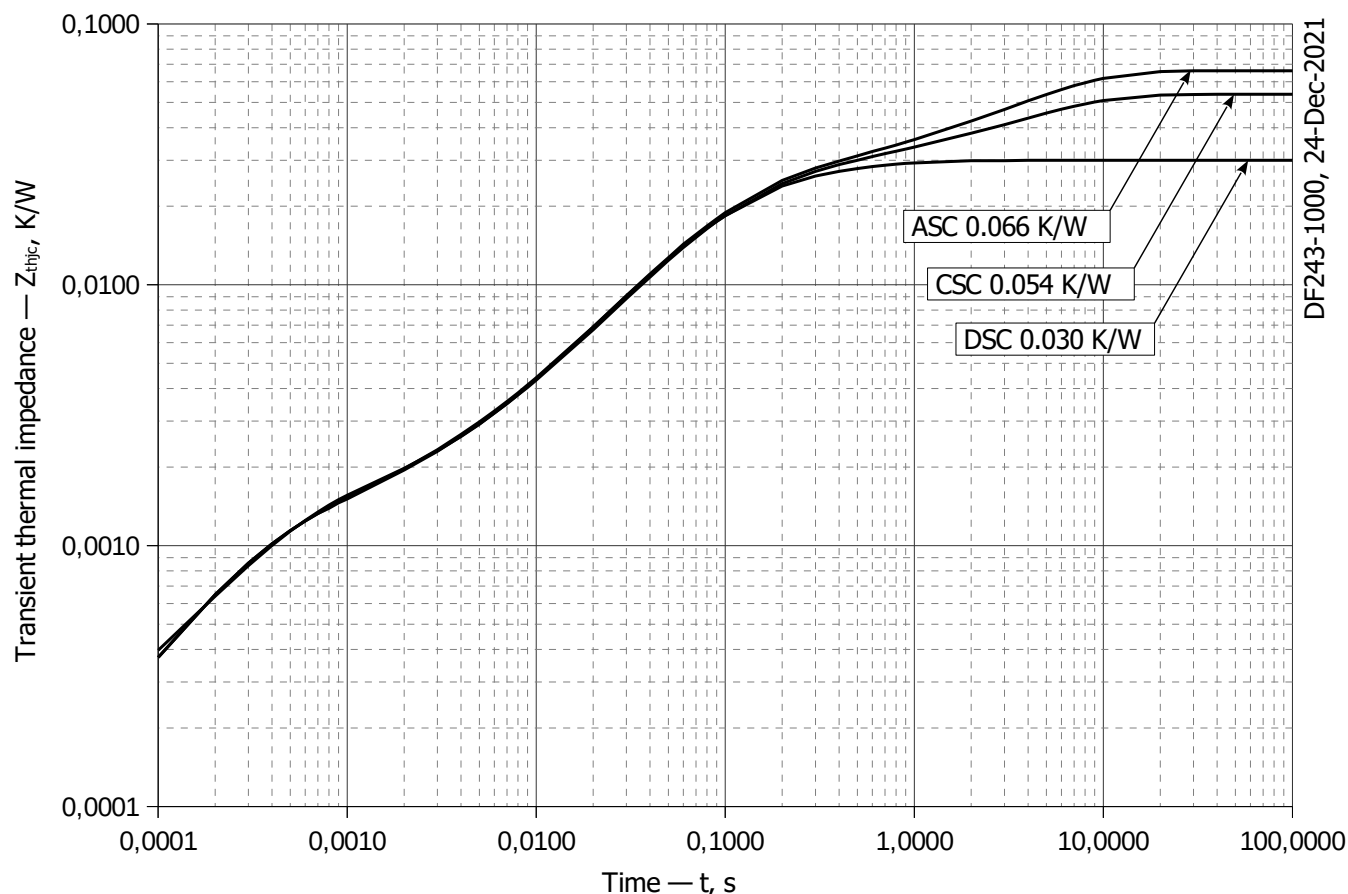
**Fig 1 – Forward characteristics of Limit device**

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	1.11393884	0.93863338
B	0.00016467	0.00019399
C	0.01002131	0.01301554
D	0.00168590	0.00260736

Forward characteristic model (see Fig. 1).



DF243-1000, 24-Dec-2021

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 Double side cooled

i	1	2	3	4	5	6
R_i , K/W	0.0007052	0.01986	0.001443	0.006652	0.001253	0.00009733
τ_i , s	1.200	0.083	0.0205	0.350	0.0004173	0.000001

DC Anode side cooled

i	1	2	3	4	5	6
R_i , K/W	0.03615	0.006266	0.0178	0.004365	0.0004912	0.001067
τ_i , s	4.713	0.5062	0.09497	0.04557	0.002123	0.0002807

DC Cathode side cooled

i	1	2	3	4	5	6
R_i , K/W	0.001065	0.0004934	0.004583	0.01764	0.006202	0.0237
τ_i , s	0.0002798	0.002114	0.04598	0.09501	0.4891	4.712

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

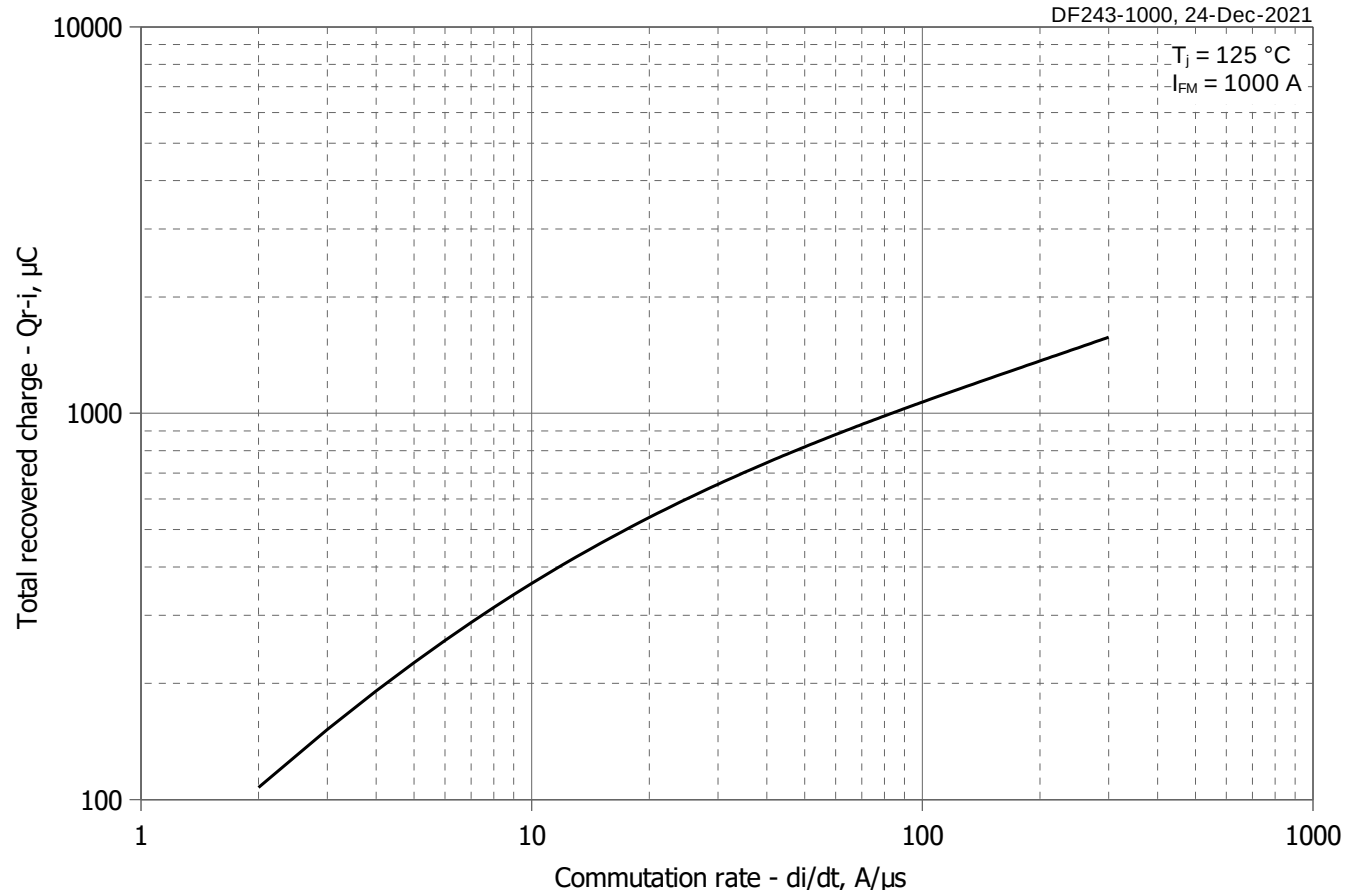


Fig 3 - Total recovered charge Q_{r-i} (integral) vs. commutation rate di_R/dt

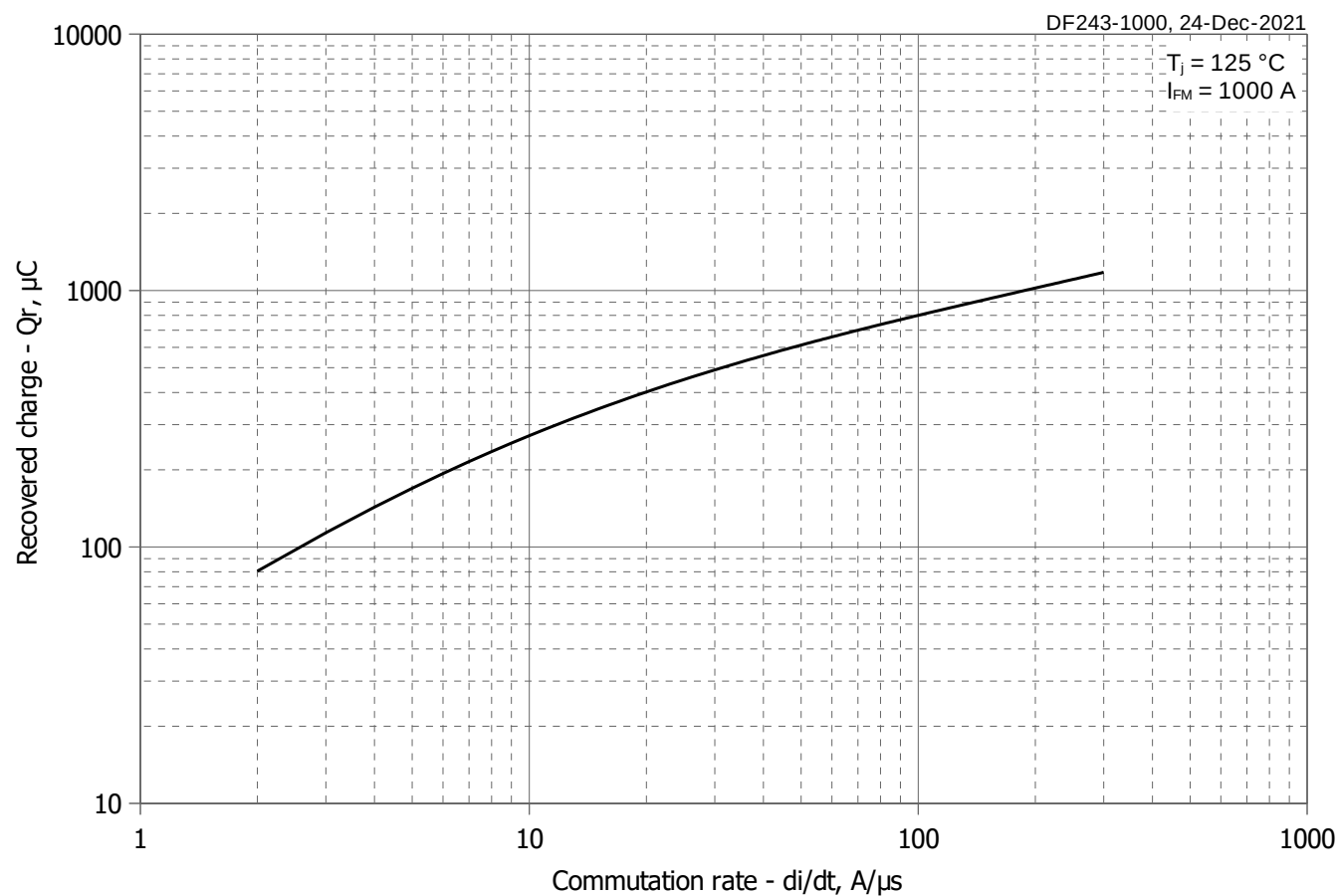


Fig 4 - Maximum recovered charge Q_r vs. commutation rate di_R/dt (50% chord)

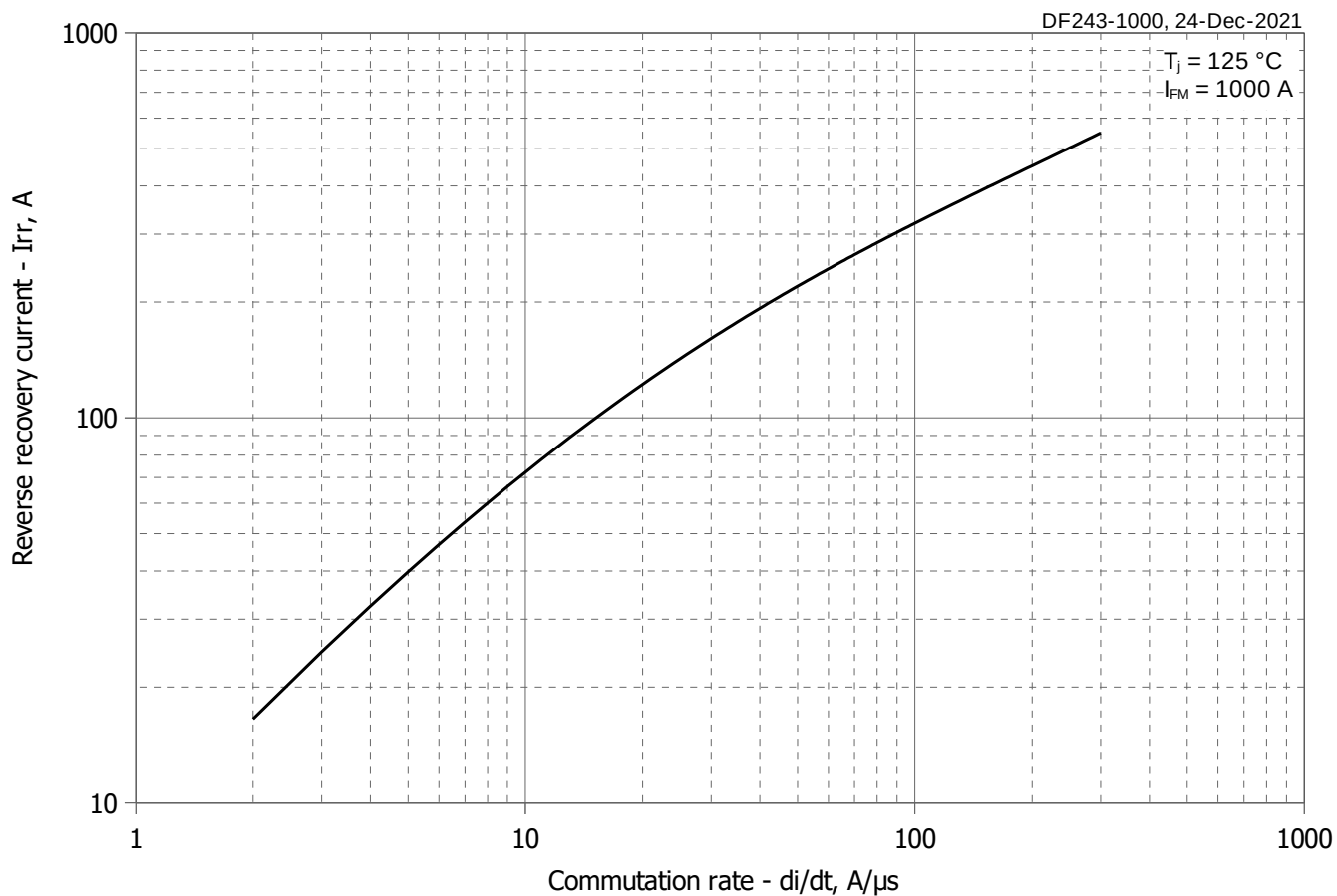


Fig 5 - Maximum reverse recovery current I_{rr} vs. commutation rate di_R/dt

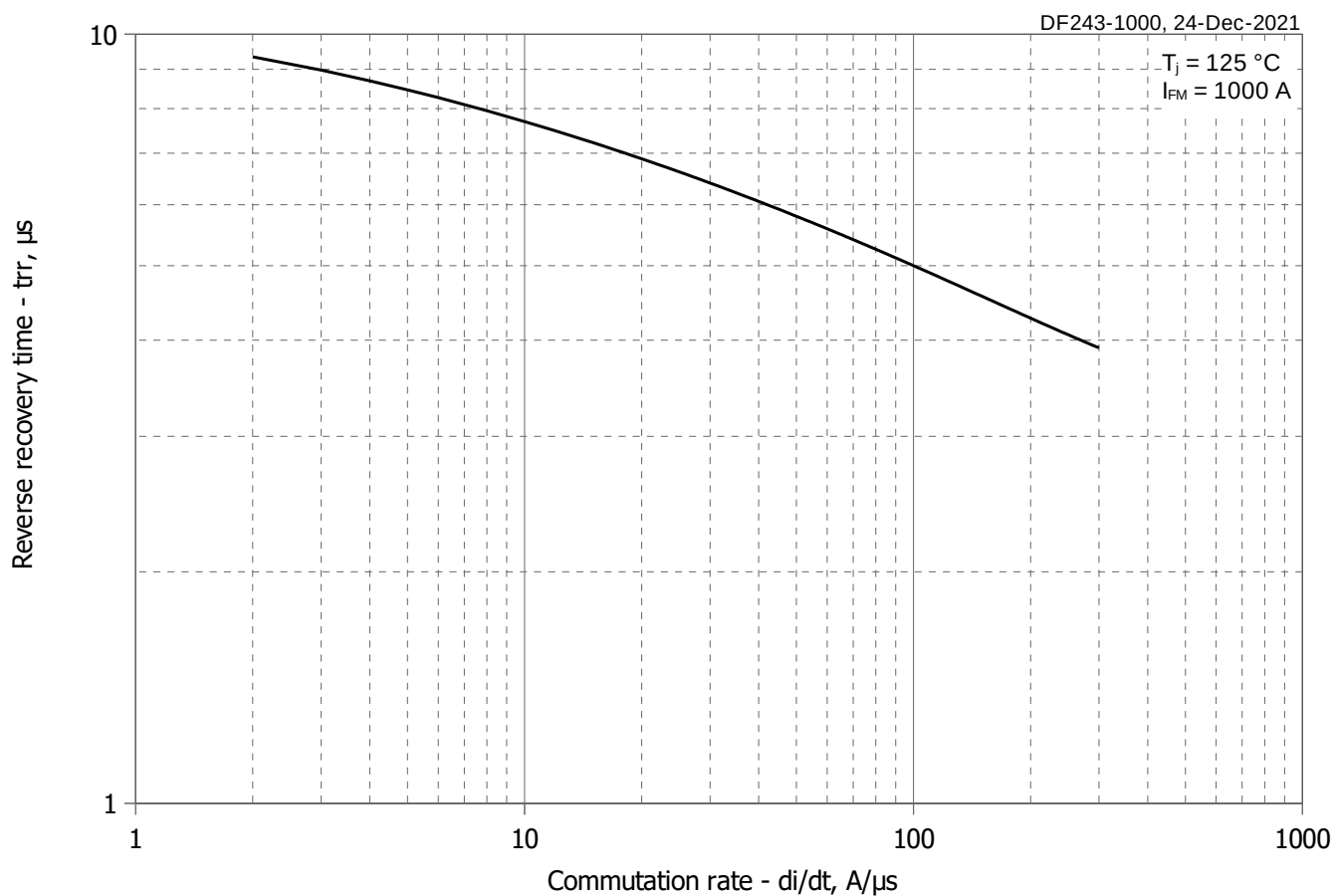


Fig 6 - Maximum recovery time t_{rr} vs. commutation rate di_R/dt (50% chord)

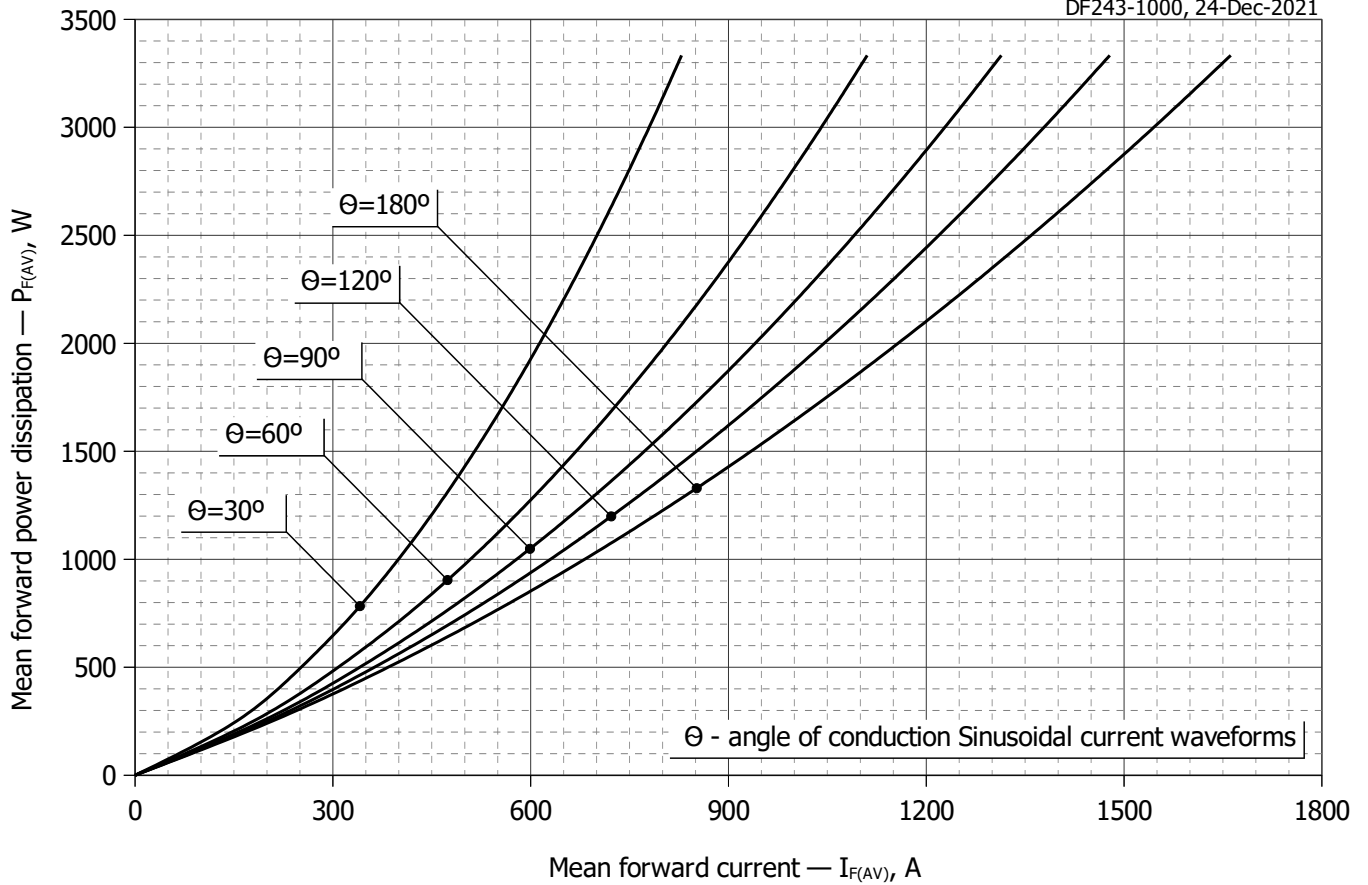


Fig. 7 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

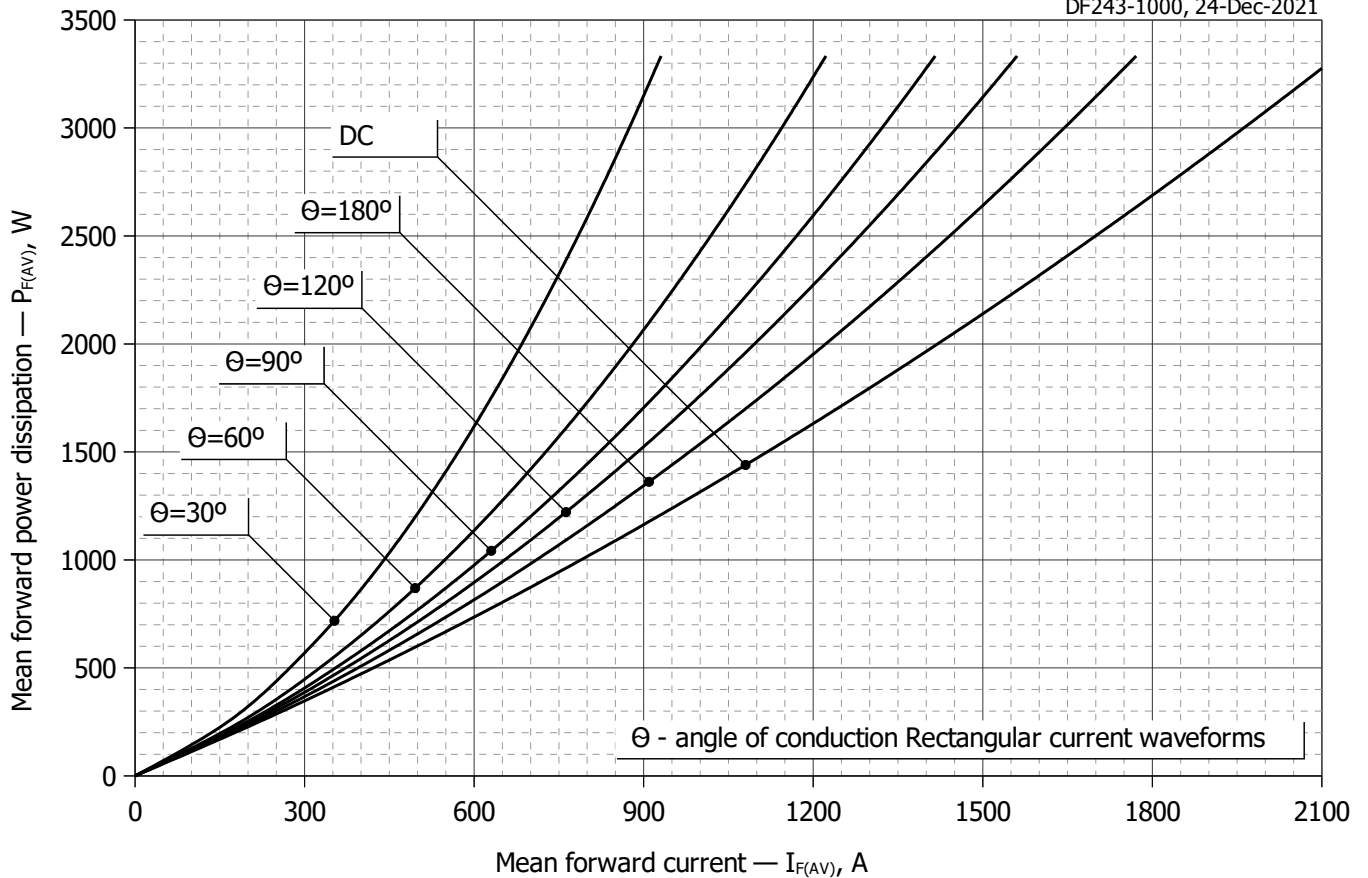


Fig. 8 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

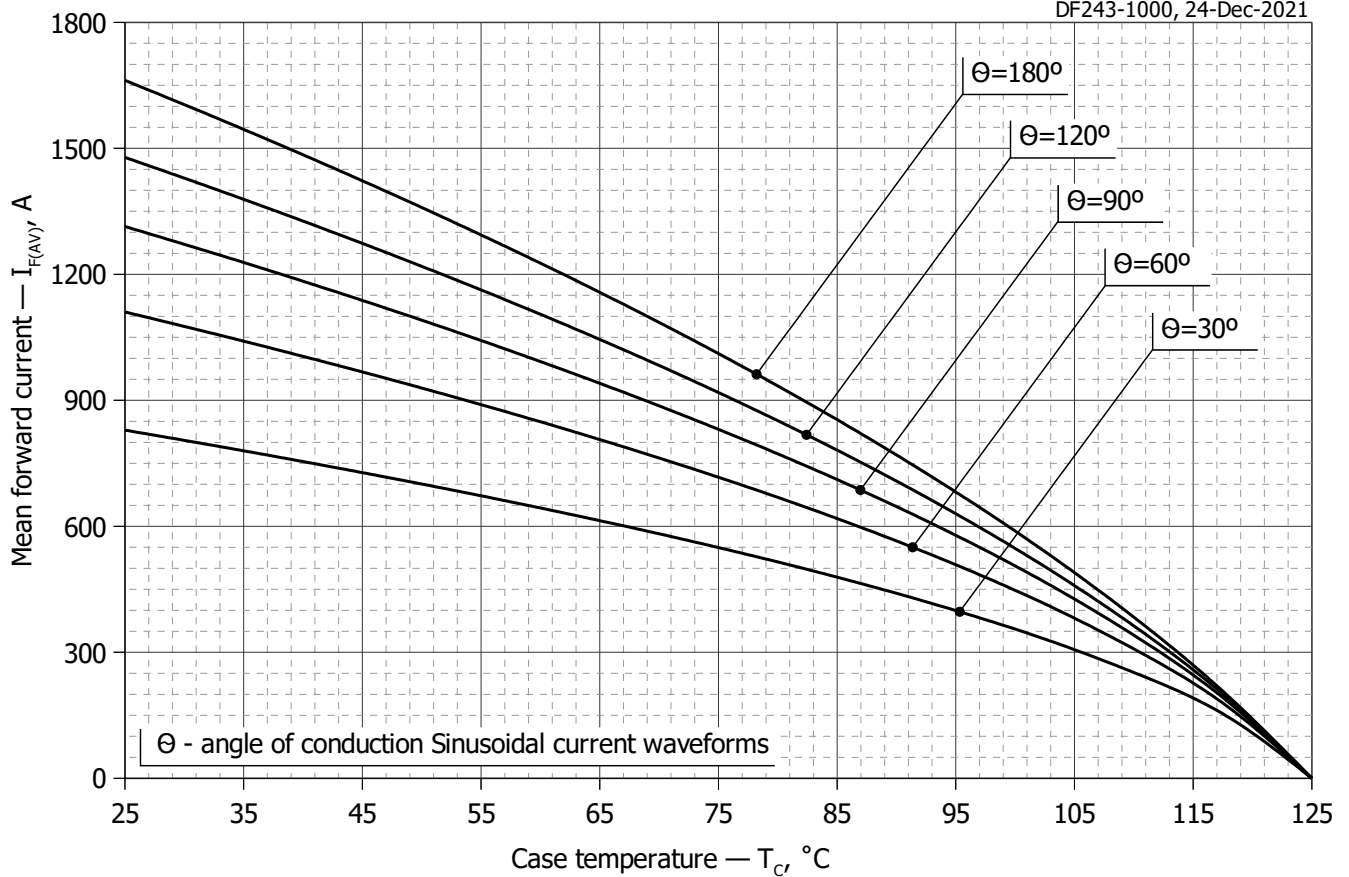


Fig. 9 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

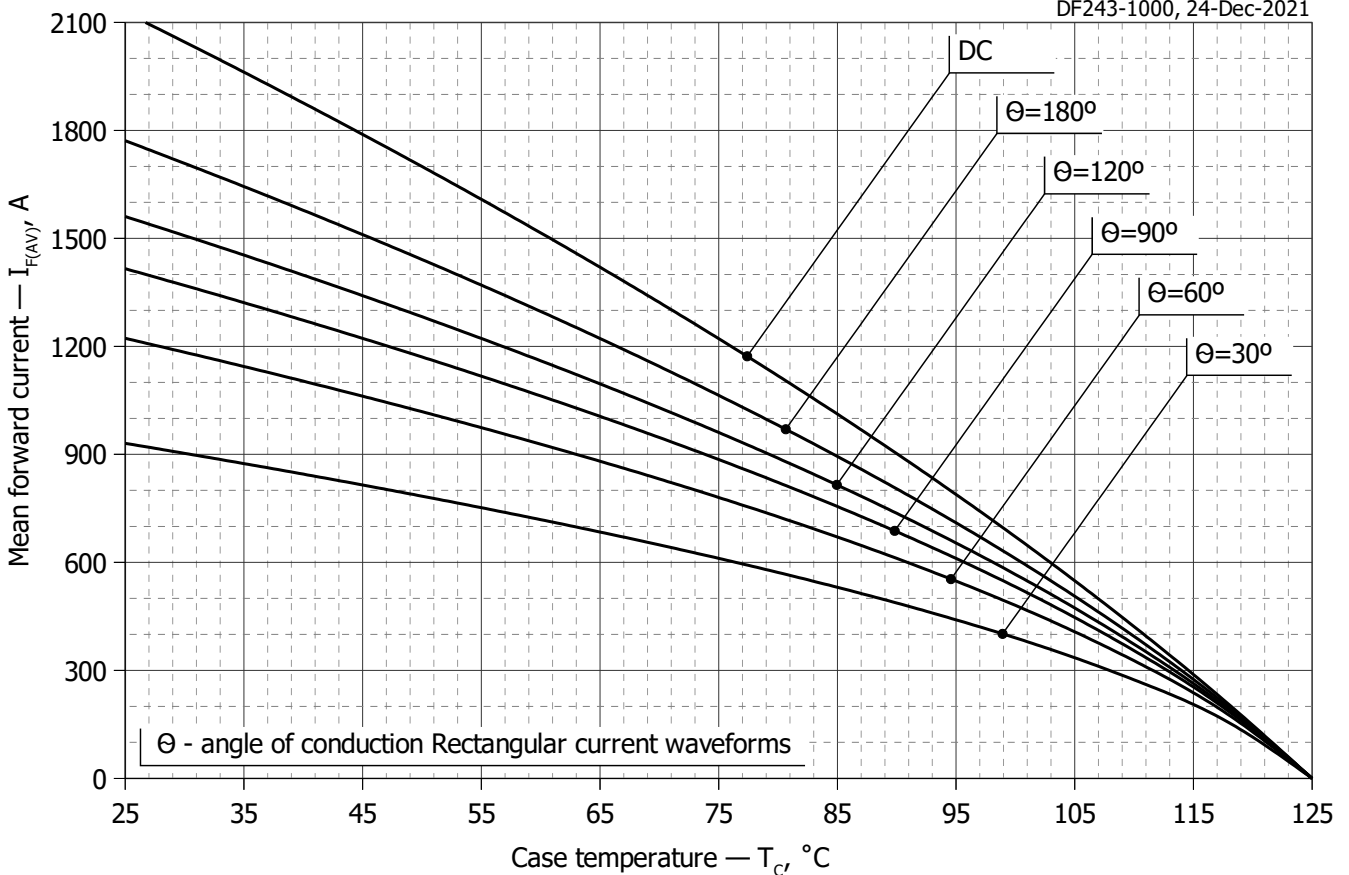


Fig. 10 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

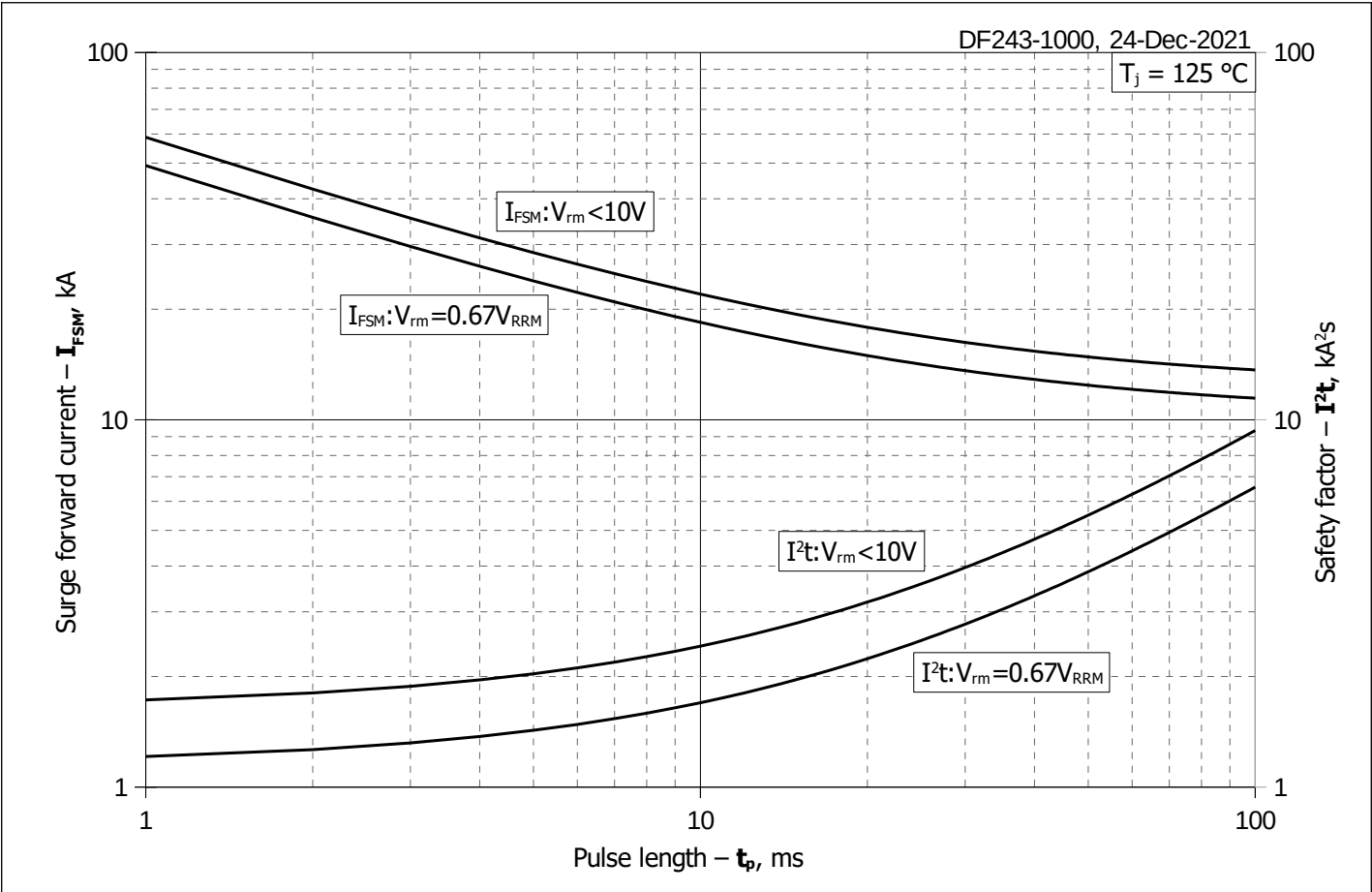


Fig. 11 – Maximum surge forward current I_{FSM} and safety factor I^2t vs. pulse length t_p

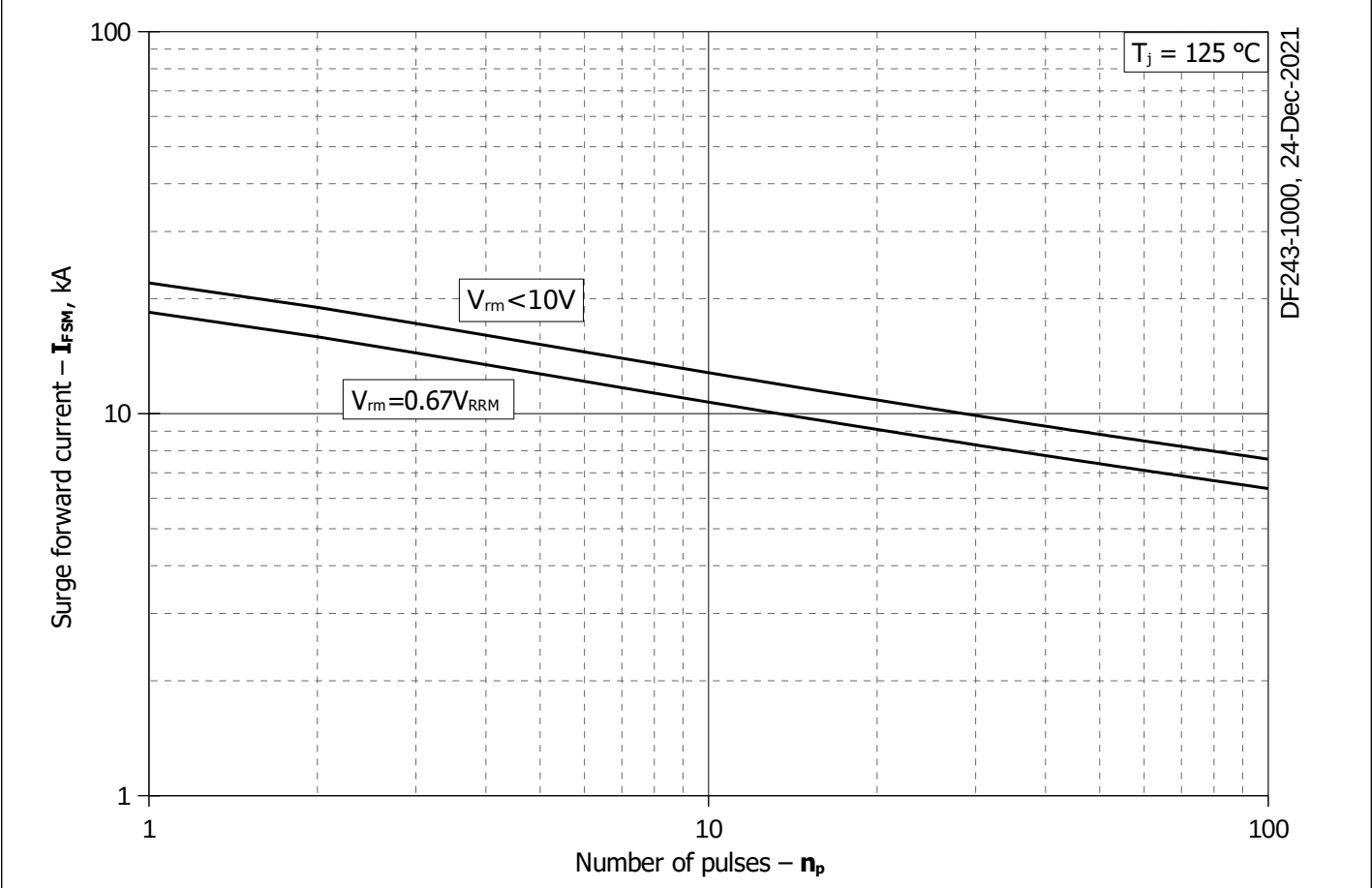


Fig. 12 - Maximum surge forward current I_{FSM} vs. number of pulses n_p