



Low switching losses
Low reverse recovery charge
High power cycling capability

Fast Recovery Diode Type DF443-320-44

Average forward current		I_{FAV}	320 A
Repetitive peak reverse voltage		V_{RRM}	3800...4400 V
Reverse recovery time		t_{rr}	4.00, 5.00, 6.30, 8.00 μ s
V_{RRM} , V	3800	4000	4200
Voltage code	38	40	42
T_j , °C	-60...+125		

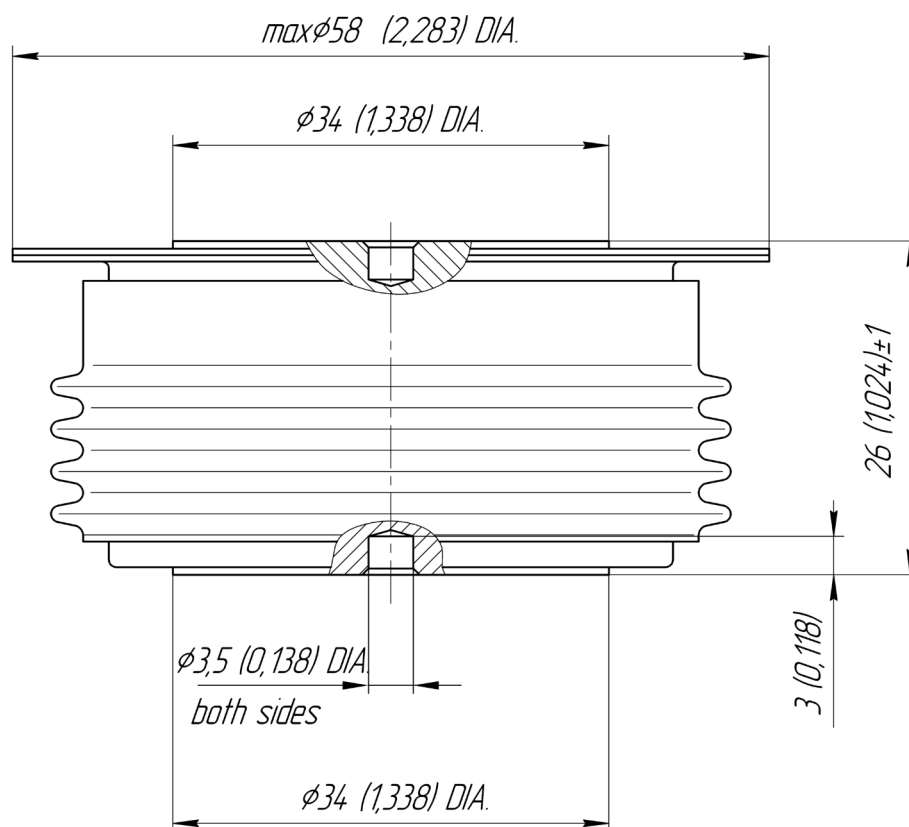
MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I _{FAV}	Maximum allowable average forward current	A	320 516	T _c =90 °C; Double side cooled; T _c =55 °C; Double side cooled; 180° half-sine wave; 50 Hz	
I _{FRMS}	RMS forward current	A	502	T _c =90 °C; Double side cooled; 180° half-sine wave; 50 Hz	
I _{FSM}	Surge forward current	kA	9.5 11.0	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _R =0 V;
			10.0 11.5	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	450 600	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _R =0 V;
			410 540	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	3800...4400	T _{j min} < T _j < T _{j max} ; 180° half-sine wave; 50 Hz;	
V _{RSM}	Non-repetitive peak reverse voltages	V	3900...4500	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	−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	3.60	T _j =25 °C; I _{FM} =1005 A	
V _{F(TO)}	Forward threshold voltage, max	V	2.180	T _j =T _{j max} ;	
r _T	Forward slope resistance, max	mΩ	1.850	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}	
SWITCHING					
Q _r	Recovered charge, max	μC	440	T _j =T _{j max} ; I _{FM} =I _{FAV} ; di _R /dt=-100 A/μs; V _R =100 V;	
t _{rr}	Reverse recovery time ¹⁾ , max	μs	4.00, 5.00, 6.30, 8.00		
I _{rr}	Reverse recovery current, max	A	220		
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	280		
D _s	Surface creepage distance	mm (inch)	33.30 (1.311)		
D _a	Air strike distance	mm (inch)	22.50 (0.886)		

PART NUMBERING GUIDE						NOTES										
DF	443	320	44	H4	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><td>Symbol of group</td><td>H4</td><td>E4</td><td>C4</td><td>B4</td></tr><tr><td>t_{rr}, μs</td><td>4.00</td><td>5.00</td><td>6.30</td><td>8.00</td></tr></table>	Symbol of group	H4	E4	C4	B4	t _{rr} , μs	4.00	5.00	6.30	8.00
Symbol of group	H4	E4	C4	B4												
t _{rr} , μs	4.00	5.00	6.30	8.00												



All dimensions in millimeters (inches)

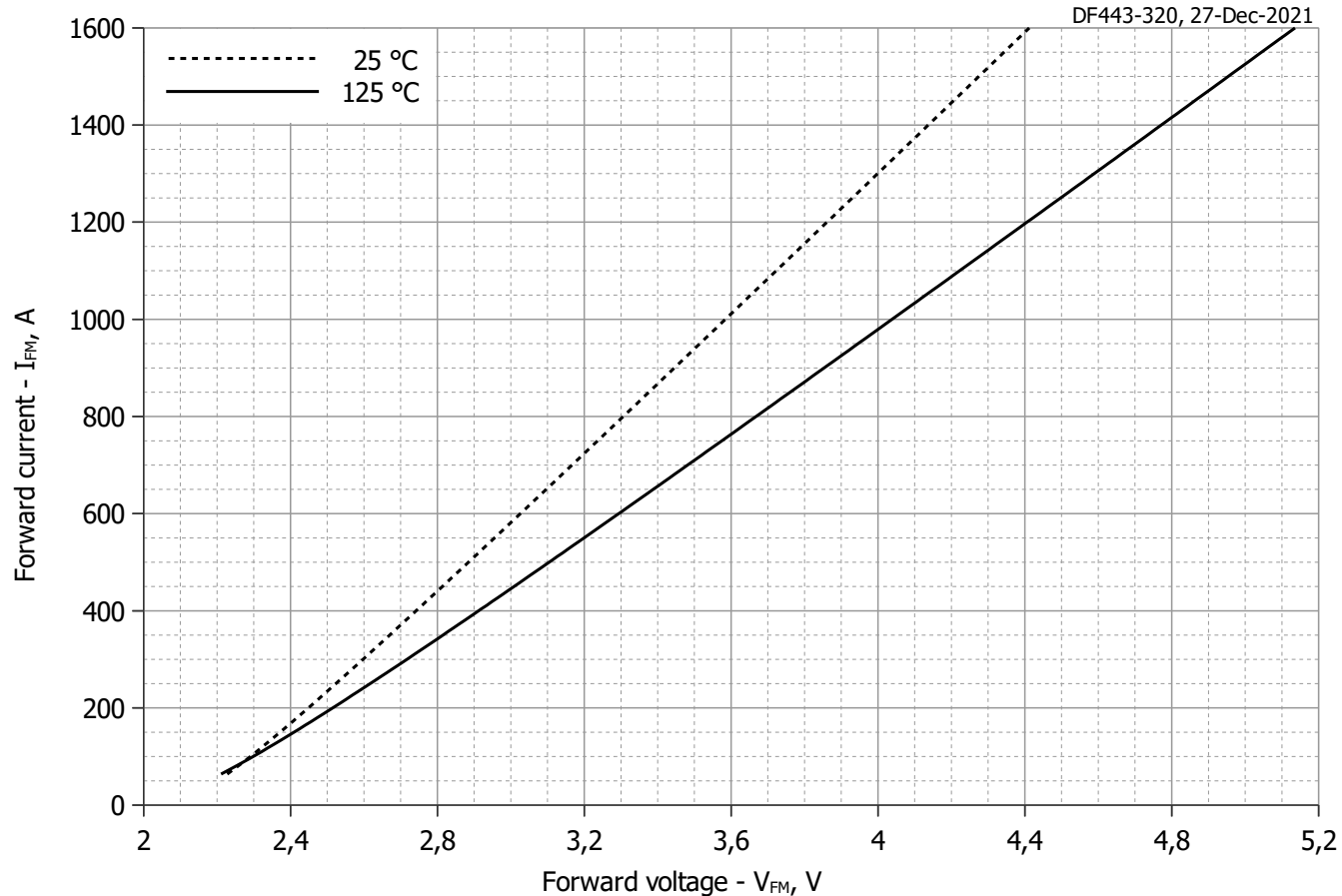


Fig 1 – Forward characteristics of Limit device

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	
	$T_j = 25^\circ\text{C}$	$T_j = T_{j \max}$
A	2.00752374	1.90634570
B	0.00135282	0.00174994
C	0.03172127	0.03953743
D	0.00015313	0.00344342

Forward characteristic model (see Fig. 1).

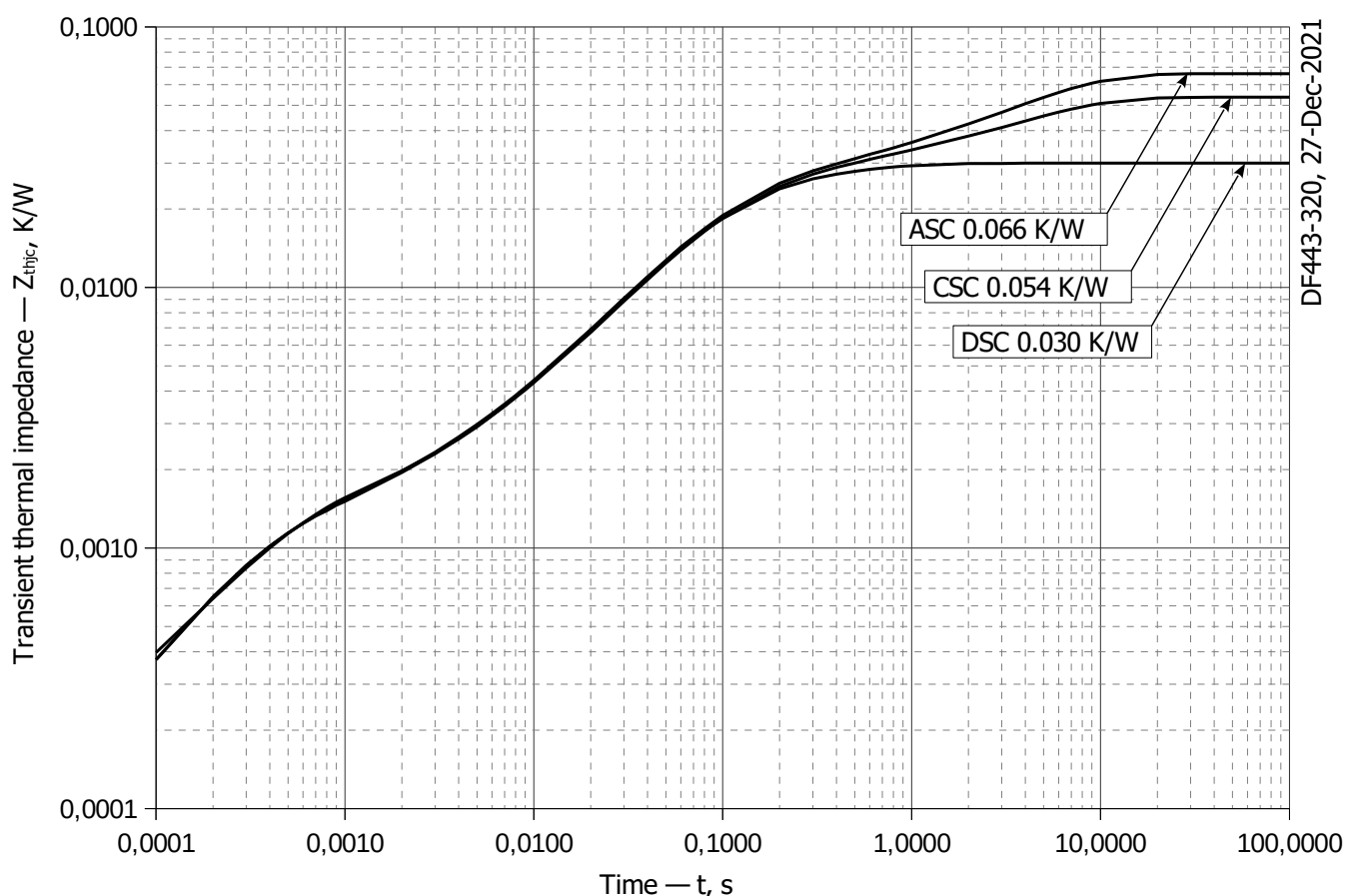


Fig 2 – Transient thermal impedance Z_{thjc} vs. time t

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 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)

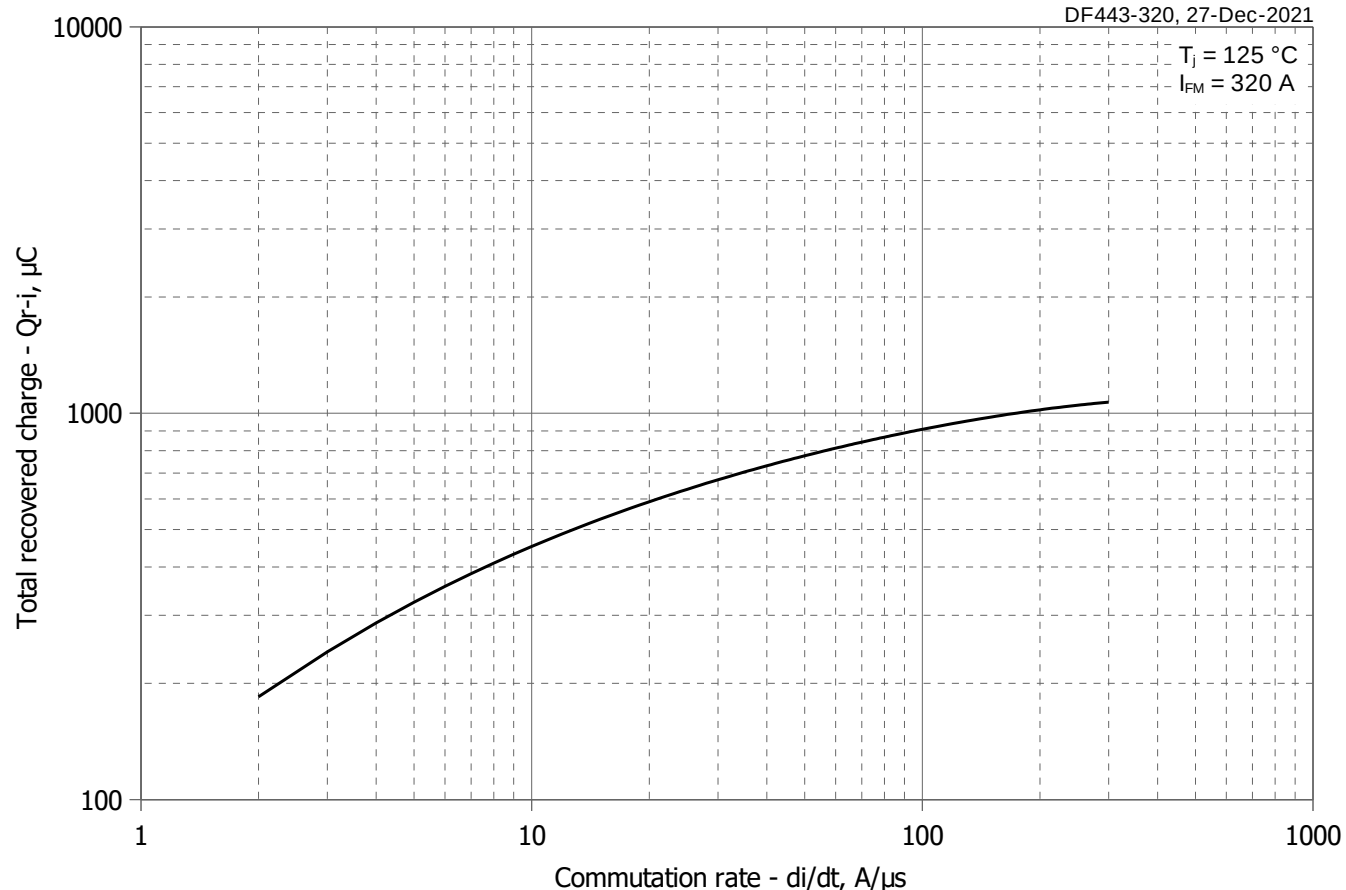


Fig 3 - Total recovered charge Q_{r-i} (integral) vs. commutation rate di_R/dt

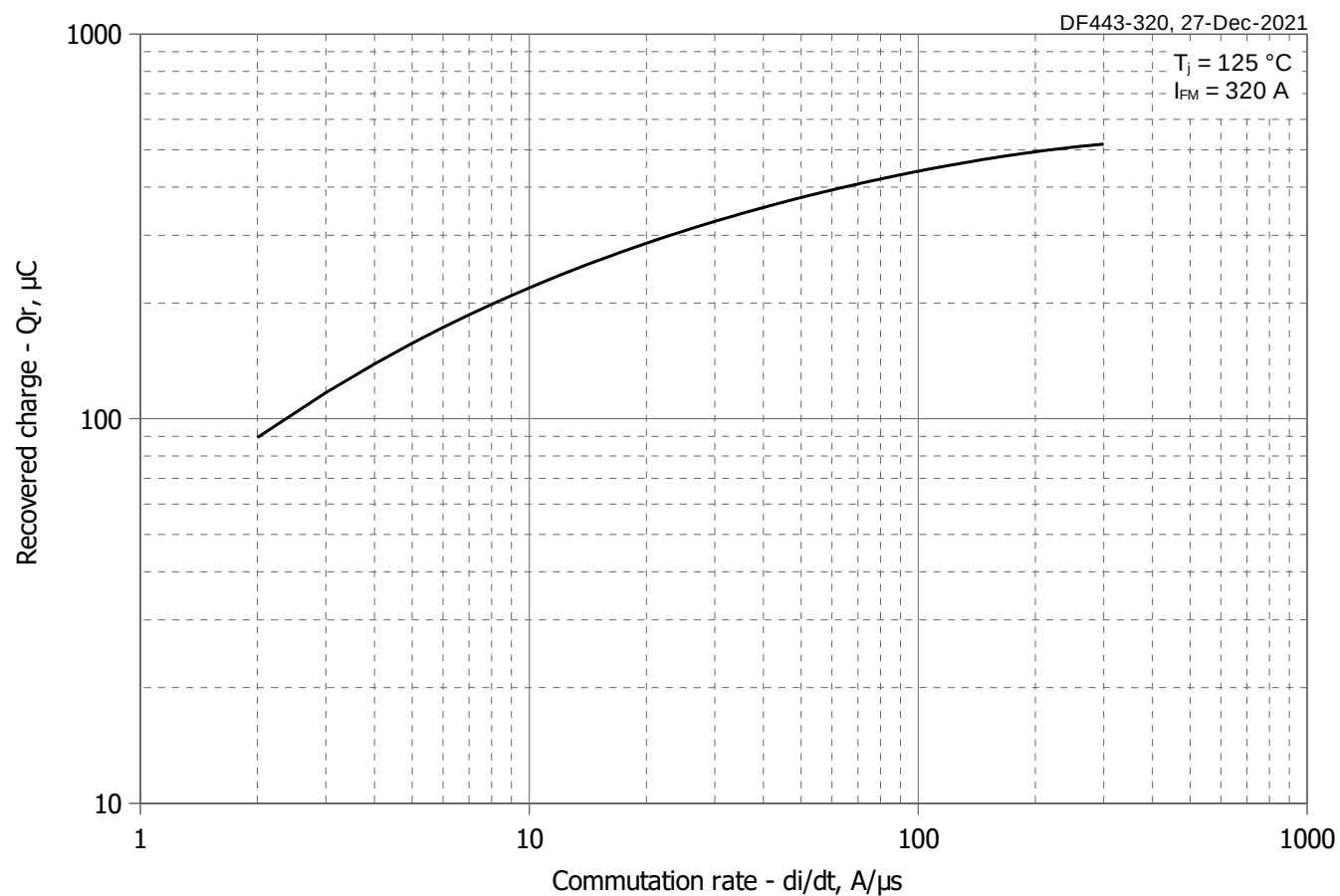


Fig 4 - Maximum recovered charge Q_r vs. commutation rate di_R/dt (50% chord)

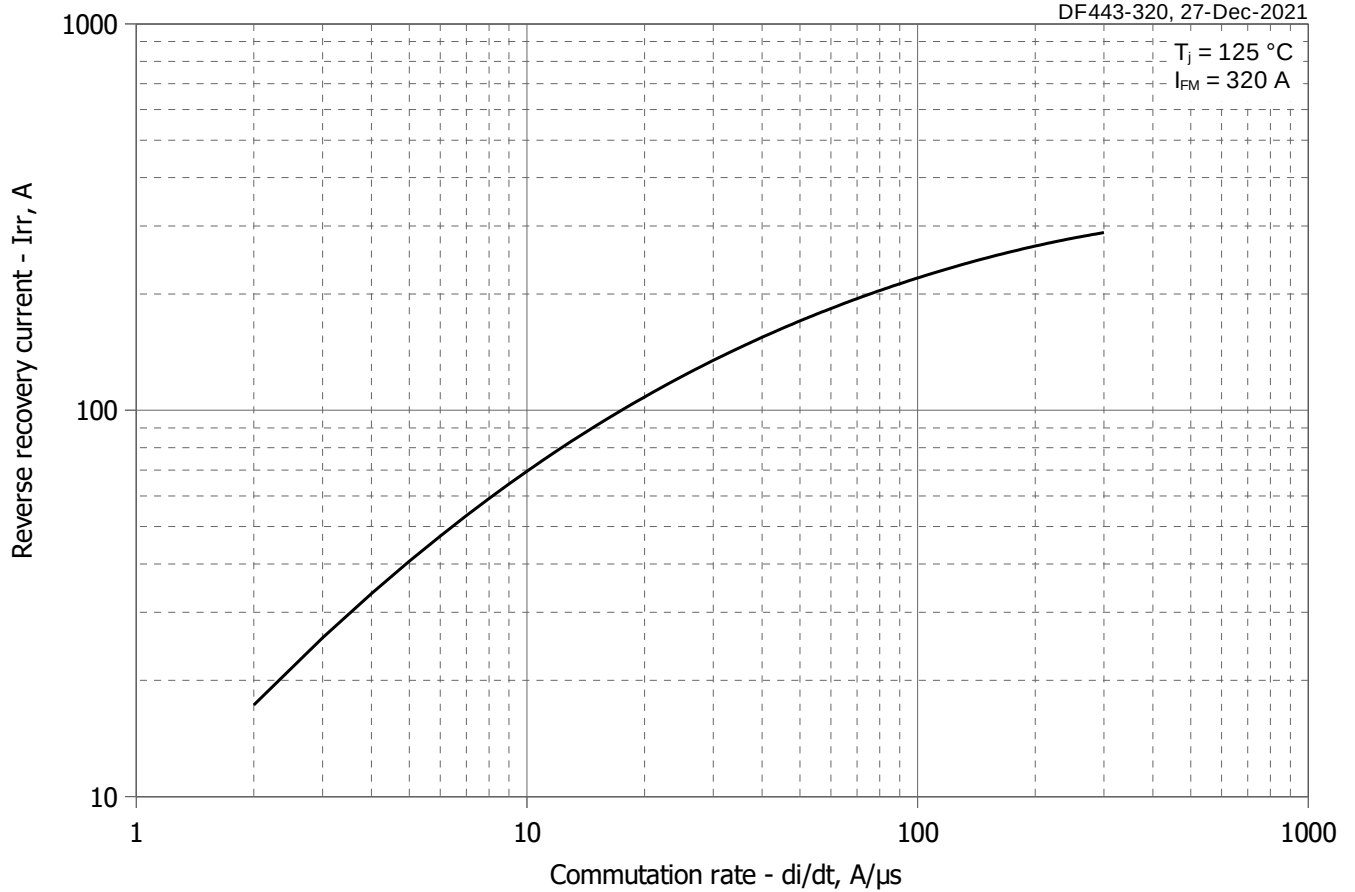


Fig 5 - Maximum reverse recovery current I_{rr} vs. commutation rate di_R/dt

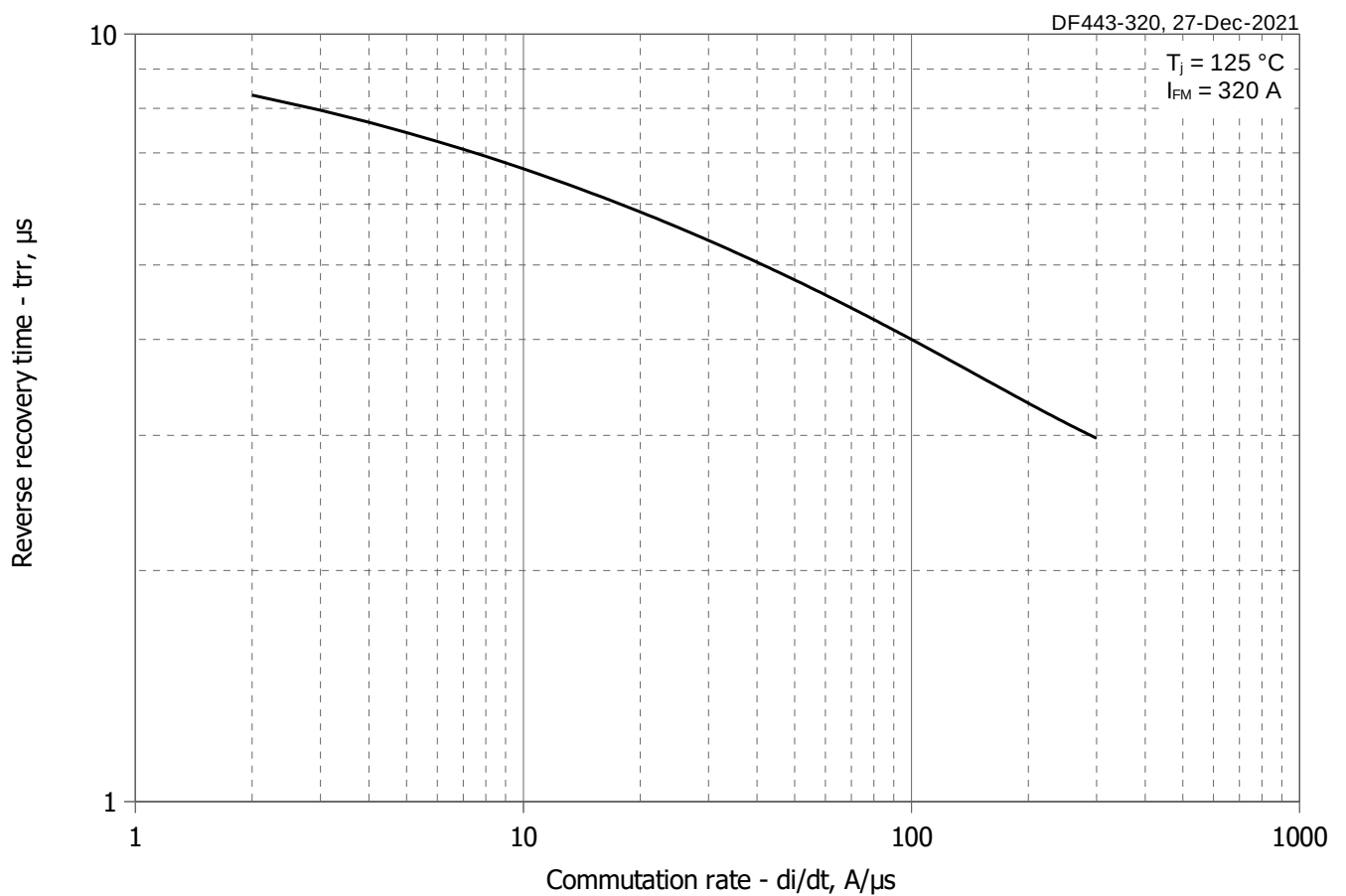


Fig 6 - Maximum recovery time t_{rr} vs. commutation rate di_R/dt (50% chord)

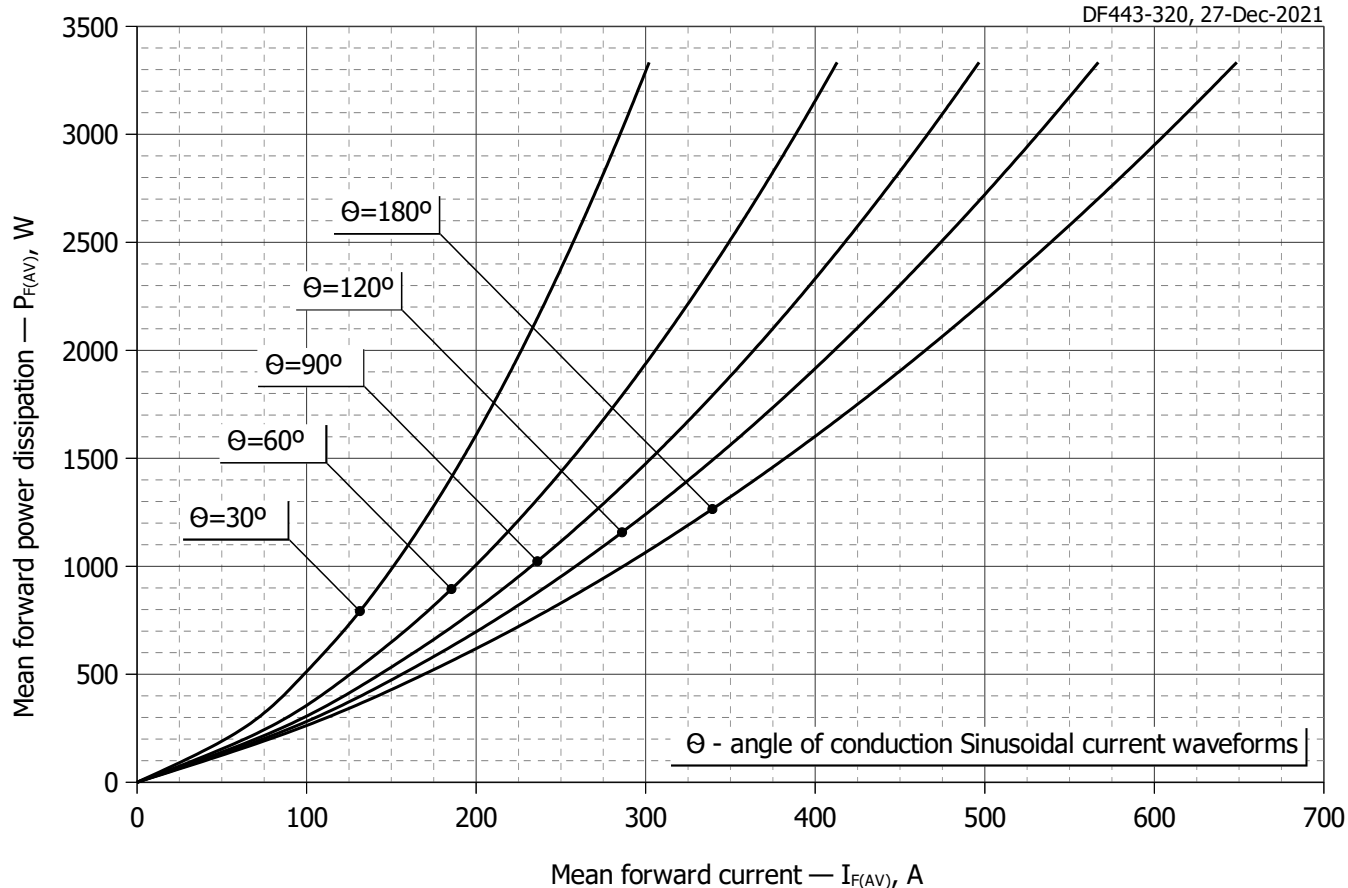


Fig. 7 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

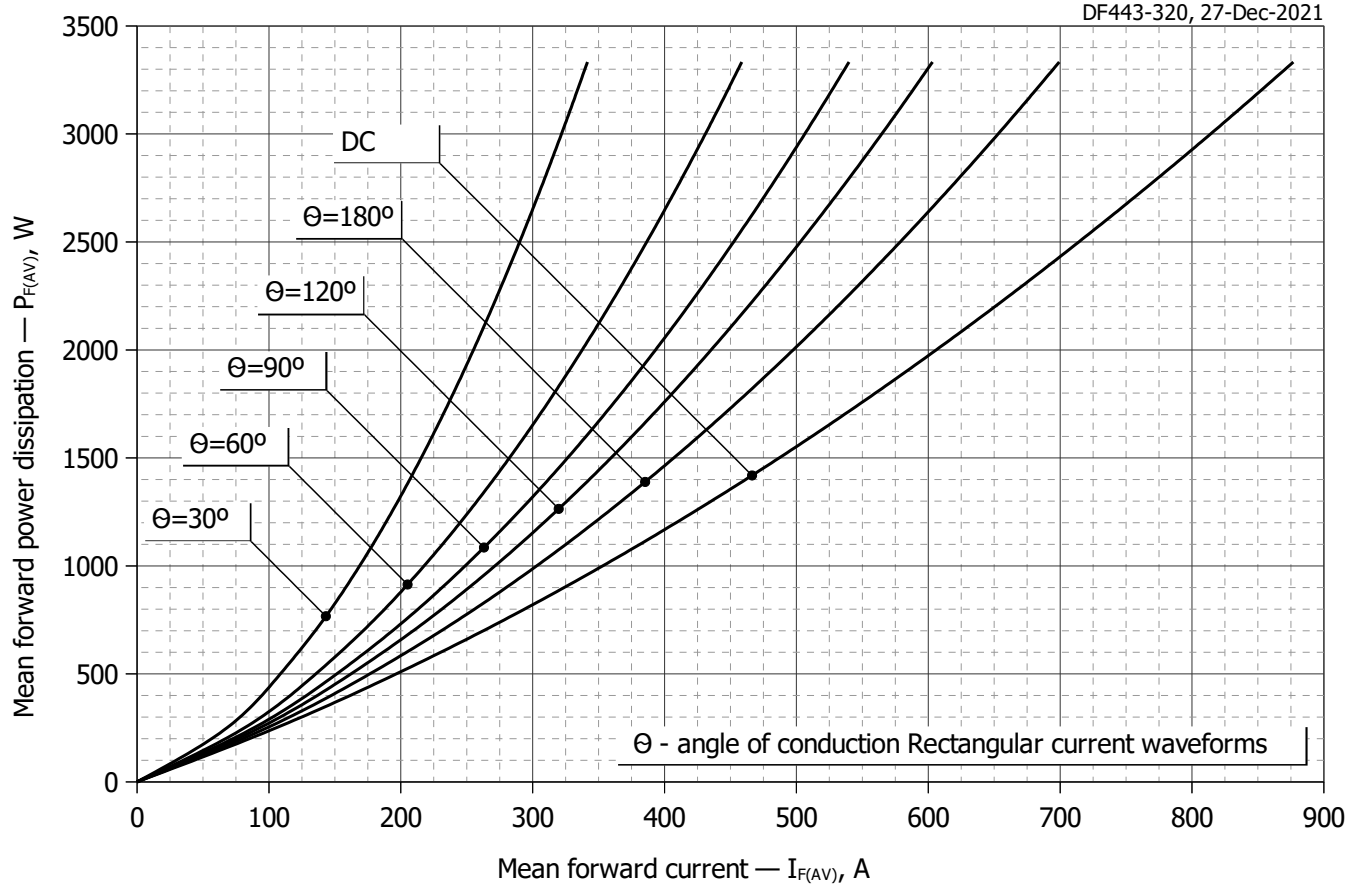


Fig. 8 - Mean forward power dissipation P_{FAV} vs. mean forward current I_{FAV} for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

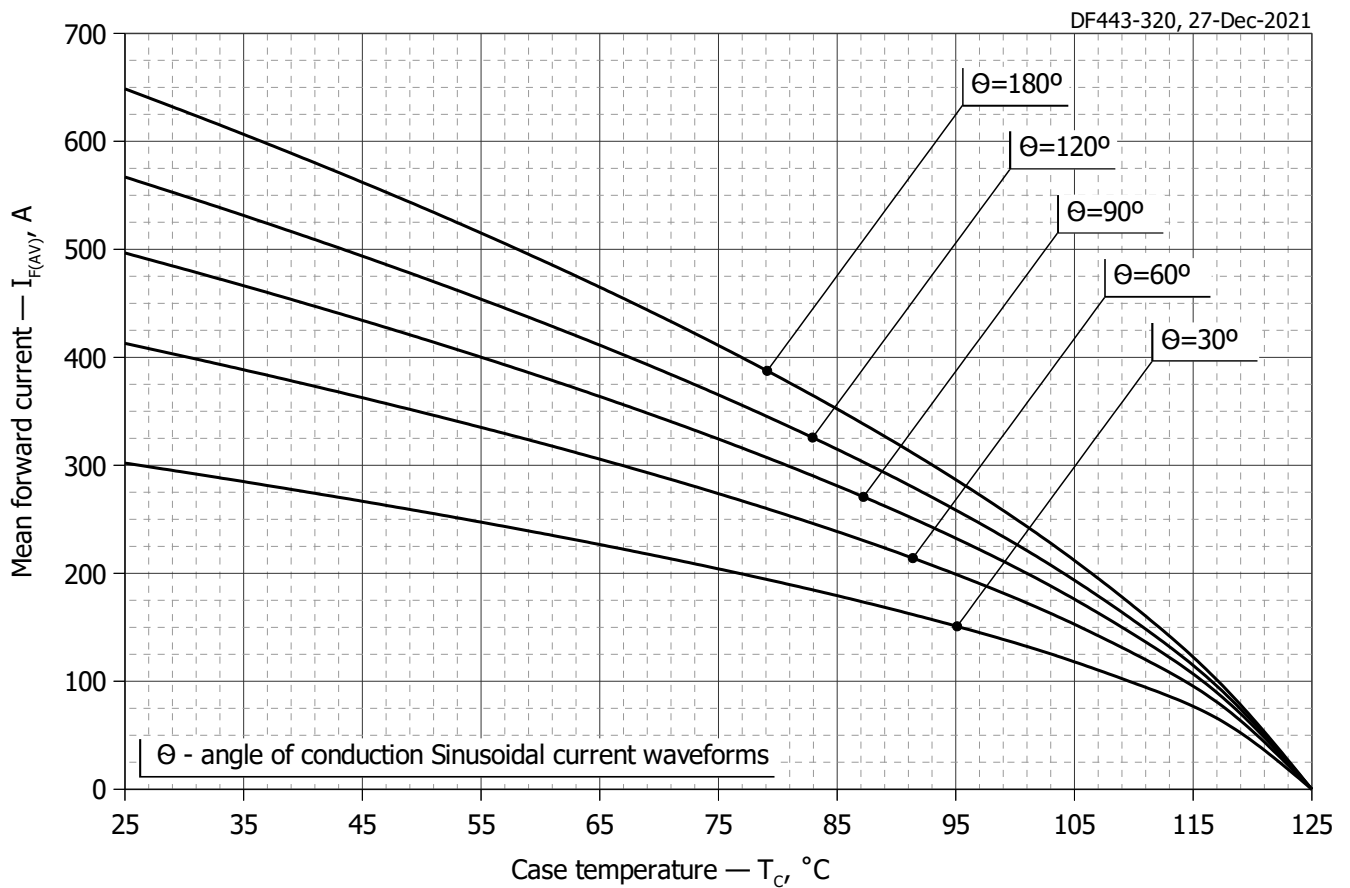


Fig. 9 – Mean forward current I_{FAV} vs. case temperature T_C for sinusoidal current waveforms at different conduction angles ($f=50\text{Hz}$, DSC)

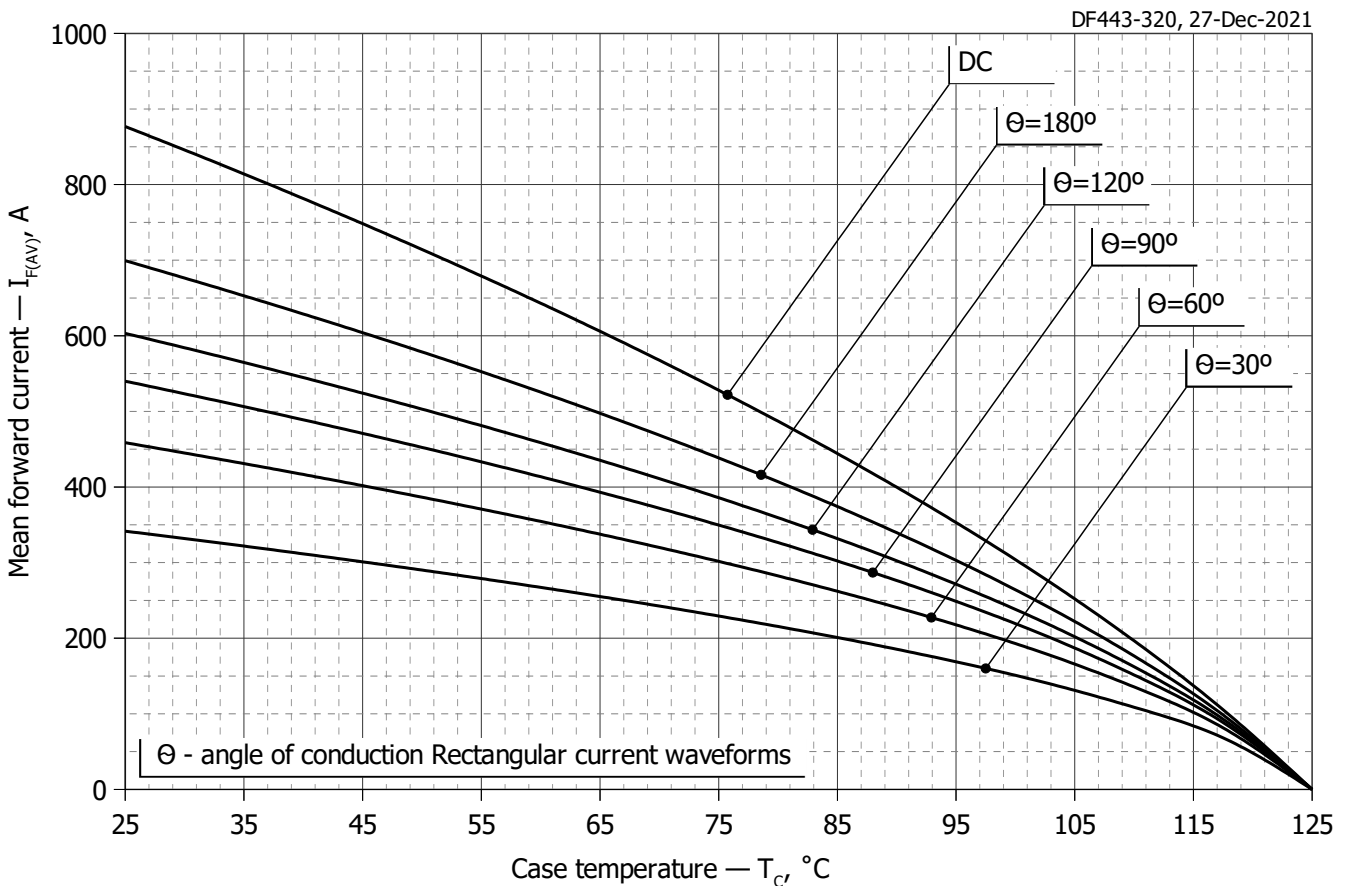


Fig. 10 - Mean forward current I_{FAV} vs. case temperature T_C for rectangular current waveforms at different conduction angles and for DC ($f=50\text{Hz}$, DSC)

