

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}	4.0 μ s	
V_{RRM}	3800	4000	4200	4400
Voltage code				
T_{jv} °C		- 60 ÷ 125		

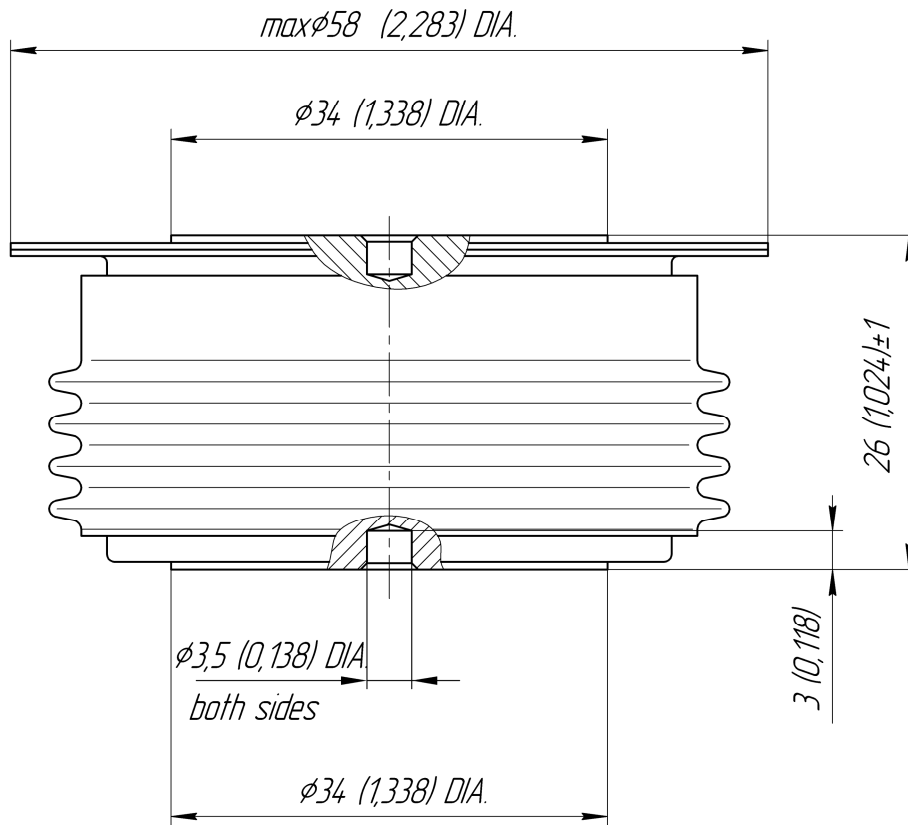
MAXIMUM ALLOWABLE RATINGS

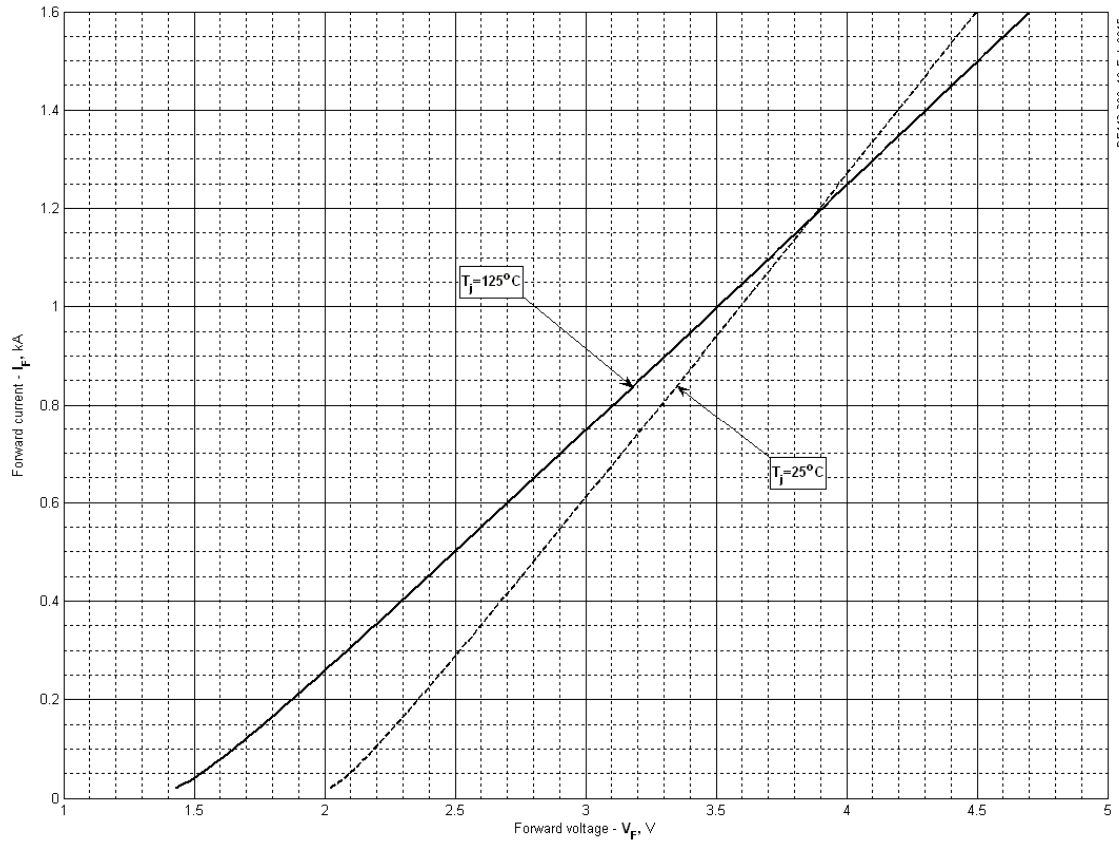
Symbols and parameters		Units	Values	Test conditions
ON-STATE				
I_{FAV}	Average forward current	A	320 350 500	$T_c=90$ °C; Double side cooled; $T_c=85$ °C; Double side cooled; $T_c=55$ °C; Double side cooled; 180° half-sine wave; 50 Hz
I_{FRMS}	RMS forward current	A	502	$T_c=90$ °C; Double side cooled; 180° half-sine wave; 50 Hz
I_{FSM}	Surge forward current	kA	6.0 7.0	$T_j=T_{jmax}$ $T_j=25$ °C 180° half-sine wave; 50 Hz ($t_p=10$ ms); single pulse; $V_R=0$ V;
			7.0 8.0	$T_j=T_{jmax}$ $T_j=25$ °C 180° half-sine wave; 60 Hz ($t_p=8.3$ ms); single pulse; $V_R=0$ V;
I^2t	Safety factor	$A^2s \cdot 10^3$	180 245	$T_j=T_{jmax}$ $T_j=25$ °C 180° half-sine wave; 50 Hz ($t_p=10$ ms); single pulse; $V_R=0$ V;
			200 265	$T_j=T_{jmax}$ $T_j=25$ °C 180° half-sine wave; 60 Hz ($t_p=8.3$ ms); single pulse; $V_R=0$ V;
BLOCKING				
V_{RRM}	Repetitive peak reverse voltages	V	3800÷4400	$T_{jmin} < T_j < T_{jmax}$; 180° half-sine wave; 50 Hz;
V_{RSM}	Non-repetitive peak reverse voltages	V	3900÷4500	$T_{jmin} < T_j < T_{jmax}$; 180° half-sine wave; 50 Hz; single pulse;
V_R	Reverse continuous voltages	V	0.75V	$T_j=T_{jmax}$;
THERMAL				
T_{stg}	Storage temperature	°C	- 60 ÷ 125	
T_j	Operating junction temperature	°C	- 60 ÷ 125	
MECHANICAL				
F	Mounting force	kN	14.0 ÷ 16.0	
a	Acceleration	m/s^2	50	Device unclamped
			100	Device clamped

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V_{FM}	Peak forward voltage, max	V	3.60	$T_j=25\text{ }^\circ\text{C}; I_{FM}=1005\text{ A}$	
$V_{F(TO)}$	Forward threshold voltage, max	V	1.50	$T_j=T_{j\text{ max}}$	
r_T	Forward slope resistance, max	m Ω	2.000	$0.5\pi I_{FAV} < I_T < 1.5\pi I_{FAV}$	
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	50	$T_j=T_{j\text{ max}}$ $V_R=V$	
SWITCHING					
Q		μC	500	$T_j=T_{j\text{ max}}; I_{FM}=600\text{ A};$	
t		μs	4.0	$di_R/dt=-100\text{ A}/\mu\text{s};$	
I	Peak reverse recovery current, typ		250	$V_R=100\text{ V};$	
THERMAL					
R_{thjc}	Thermal resistance, junction to case, max	$^\circ\text{C}/\text{W}$	0.0350	Direct current	Double side cooled
R_{thjc-A}			0.0770		Anode side cooled
R_{thjc-K}			0.0630		Cathode side cooled
R_{thck}	Thermal resistance, case to heatsink, max	$^\circ\text{C}/\text{W}$	0.0060	Direct current	
MECHANICAL					
w	Weight, typ	g	280		
D_s	Surface creepage distance	mm (inch)	33.30 (1.311)		
D_a	Air strike distance	mm (inch)	22.50 (0.886)		

P					
DF	443	320		H4	
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					
			Group Symbol	H4	
			$t_{rr}, \mu\text{s}$	4.0	





DF443-320, 16-Feb-2015

Fig 1 – On-

Analytical function for On-state 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	1.953764	1.339134
B	1.469464	1.940586
C	-0.266391	-0.355785
D	0.354121	0.472954

On-state characteristic model (see Fig. 1

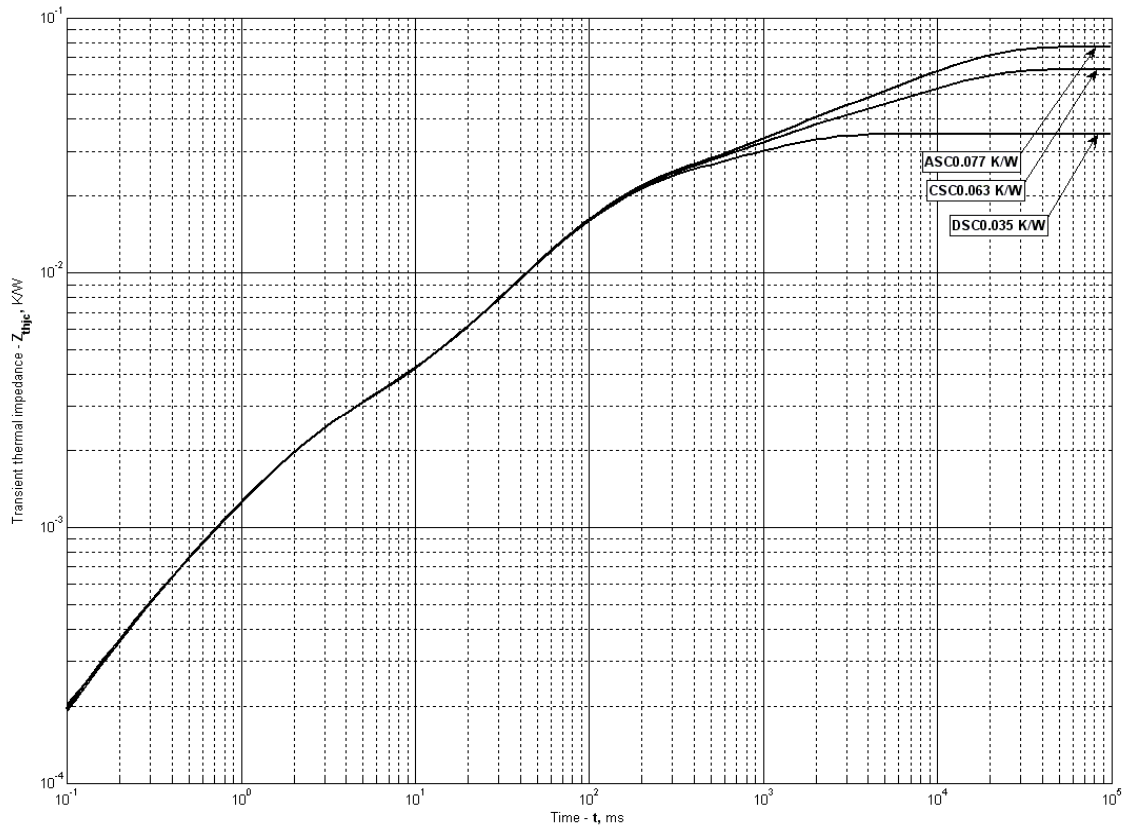


Fig 2 –

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

R_i , K/W	2.007e-005	0.01412	0.01797	0.0007764	0.00193	0.0001844
τ_i	4.957	0.9362	0.09335	0.04227	0.001702	0.0002492

DC Cathode side cooled

R_i , K/W	0.02781	0.0007698	0.01797	0.001931	0.000209	0.01416
τ_i	9.752	0.186	0.08881	0.001757	0.0002747	1.004

DC Anode side cooled

R_i , K/W	0.04173	0.01173	0.01847	0.001981	0.0001722	0.002719
τ_i	9.751	1.085	0.09044	0.00175	0.0001916	0.791

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

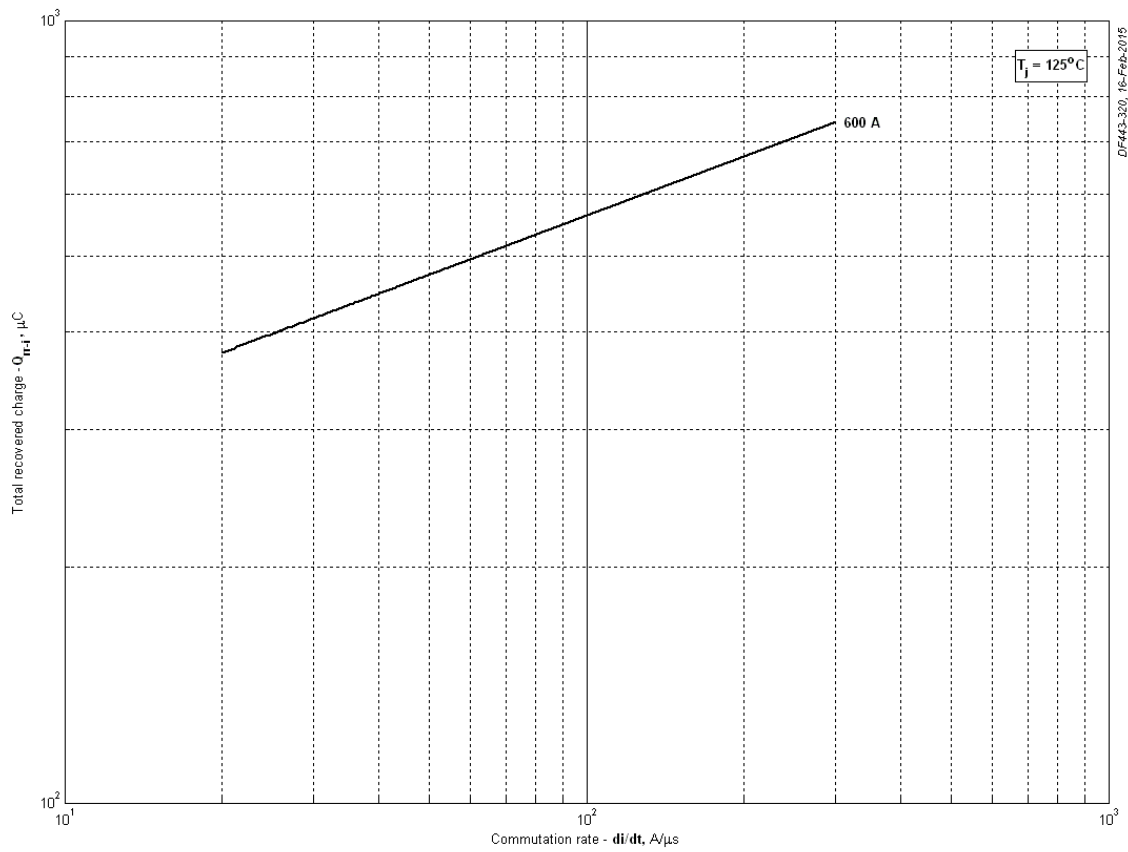


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

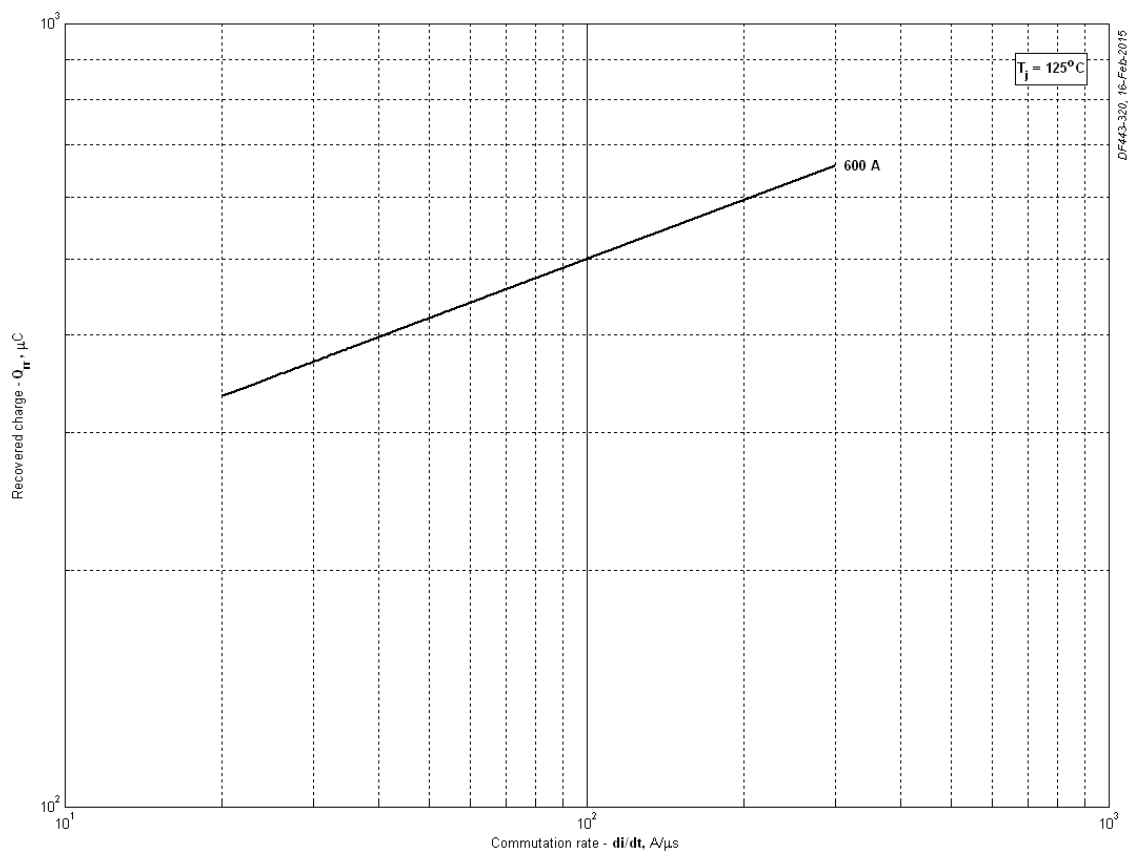


Fig 4 - Recovered charge, Q_{rr} (linear)

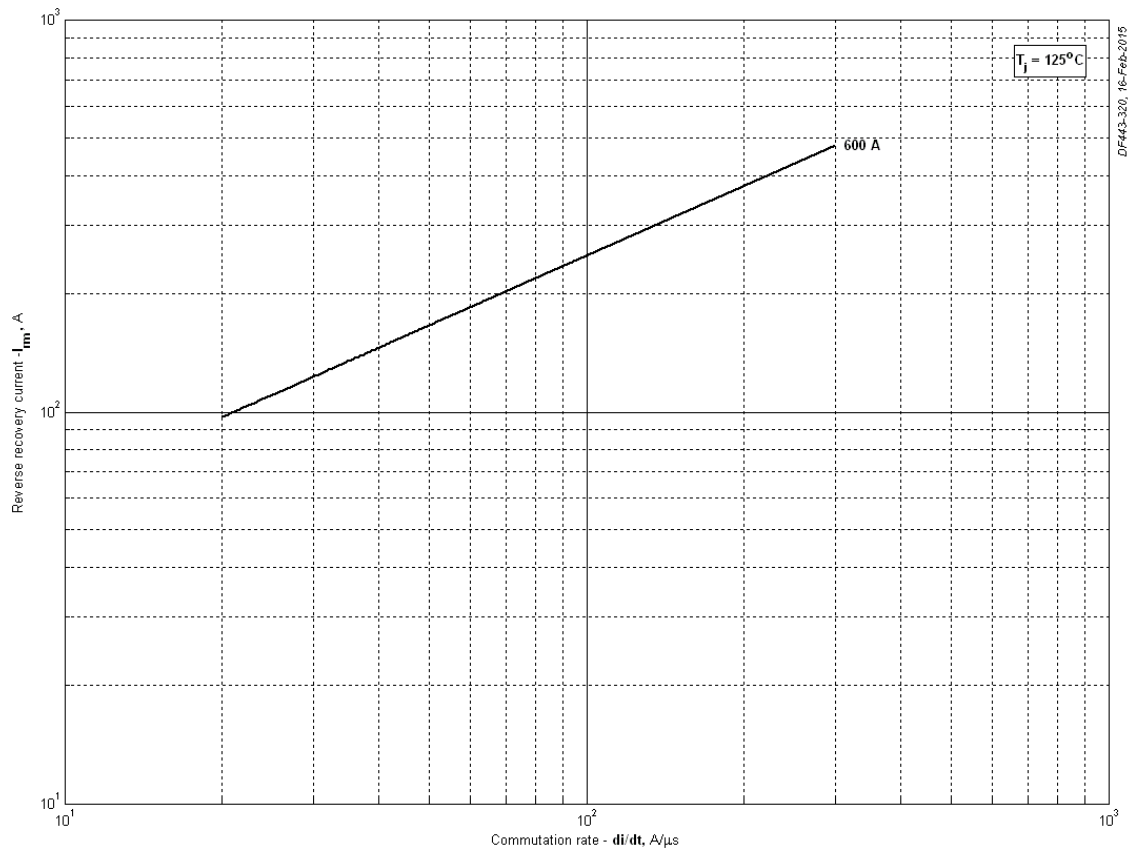


Fig 5 – Peak reverse recovery current, I_{rm}

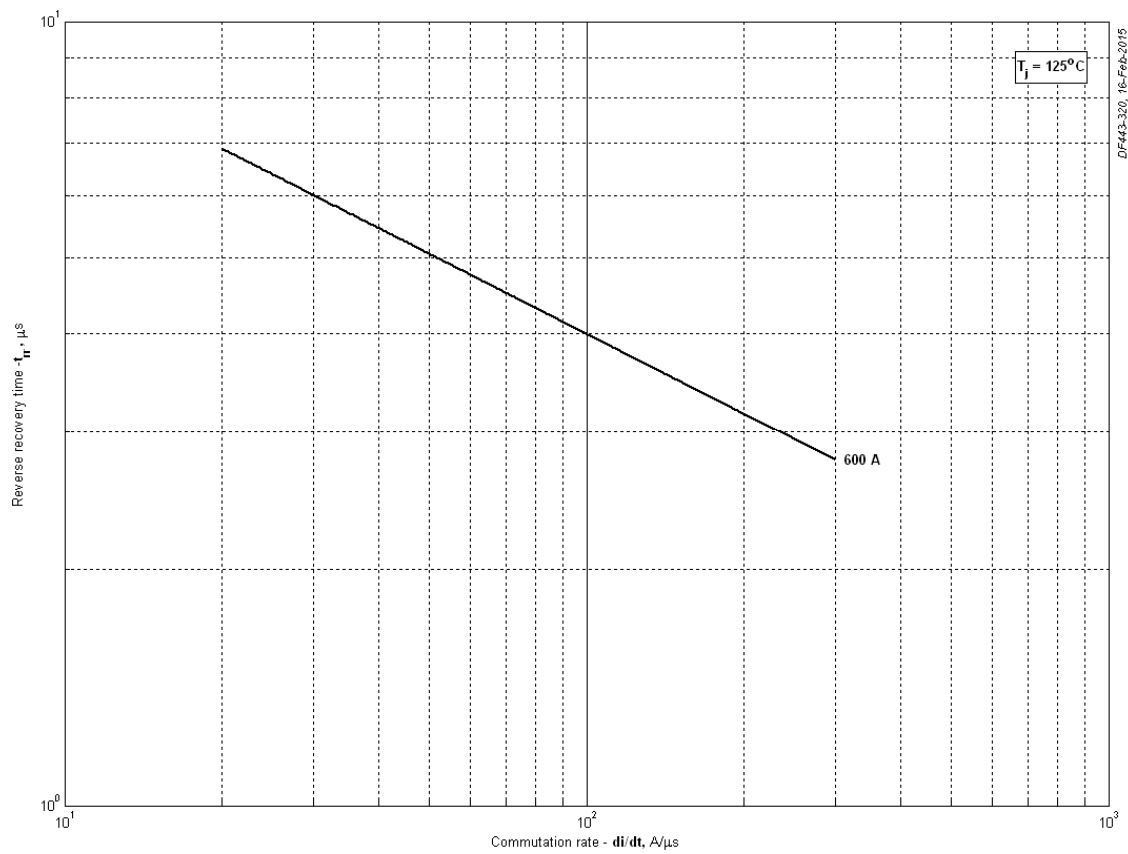


Fig 6 – Maximum recovery time, t_{rr} (linear)

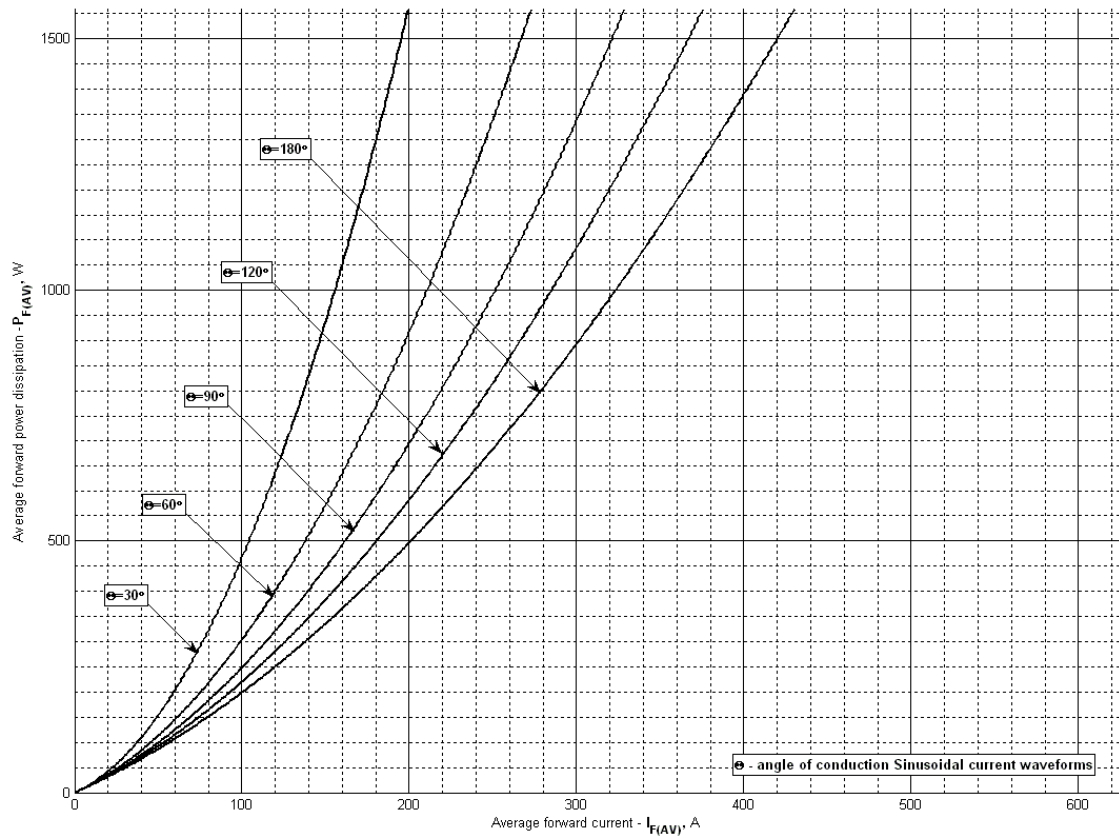


Fig 7 – On-state power loss (sinusoidal current waveforms)

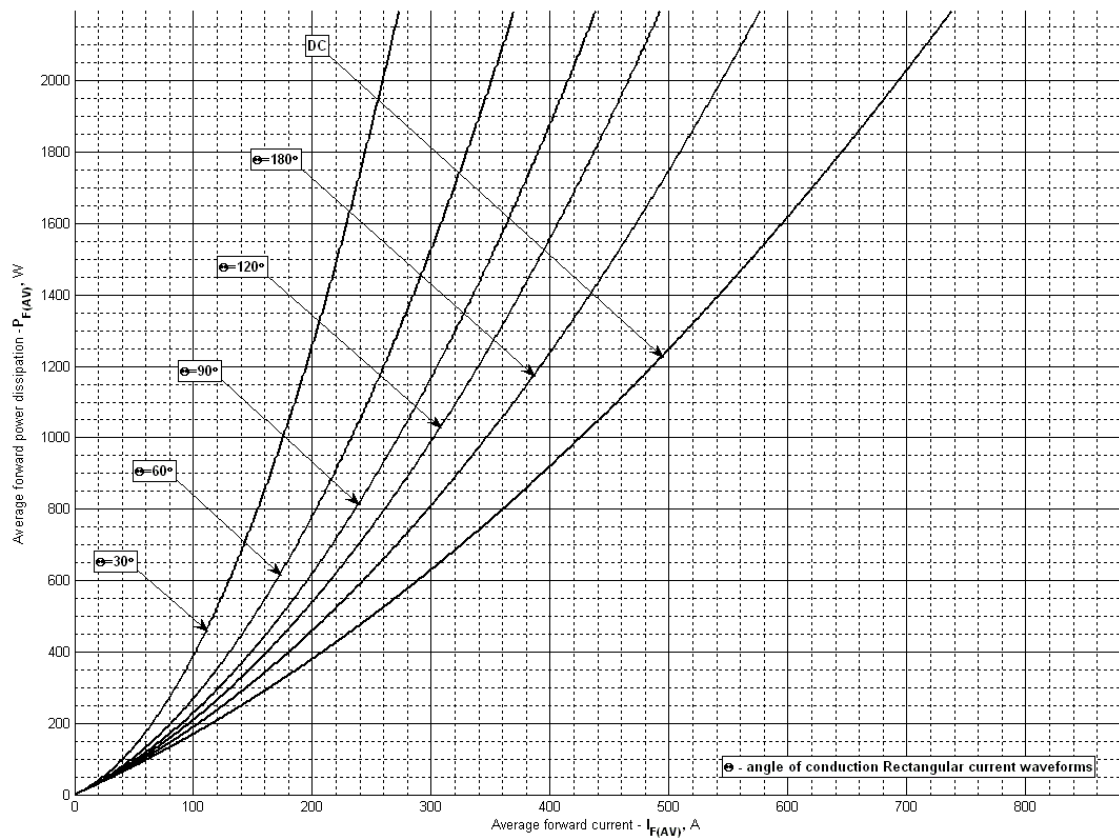
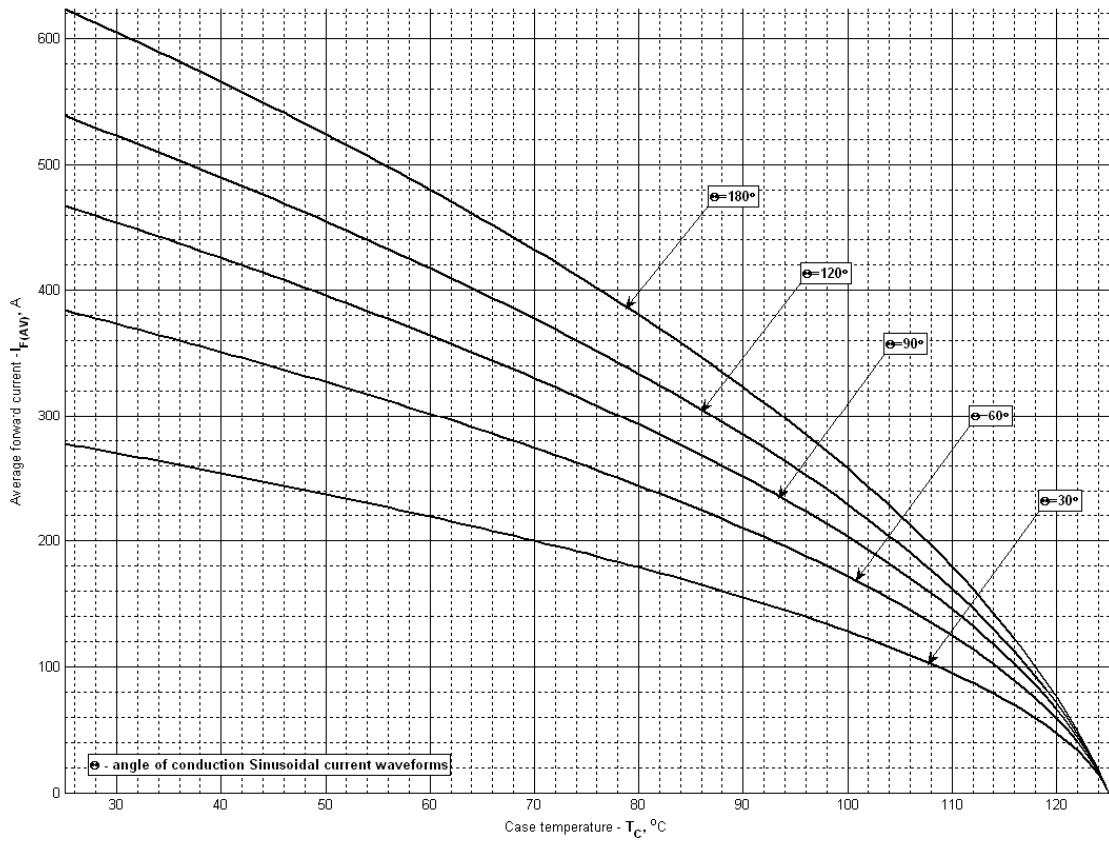
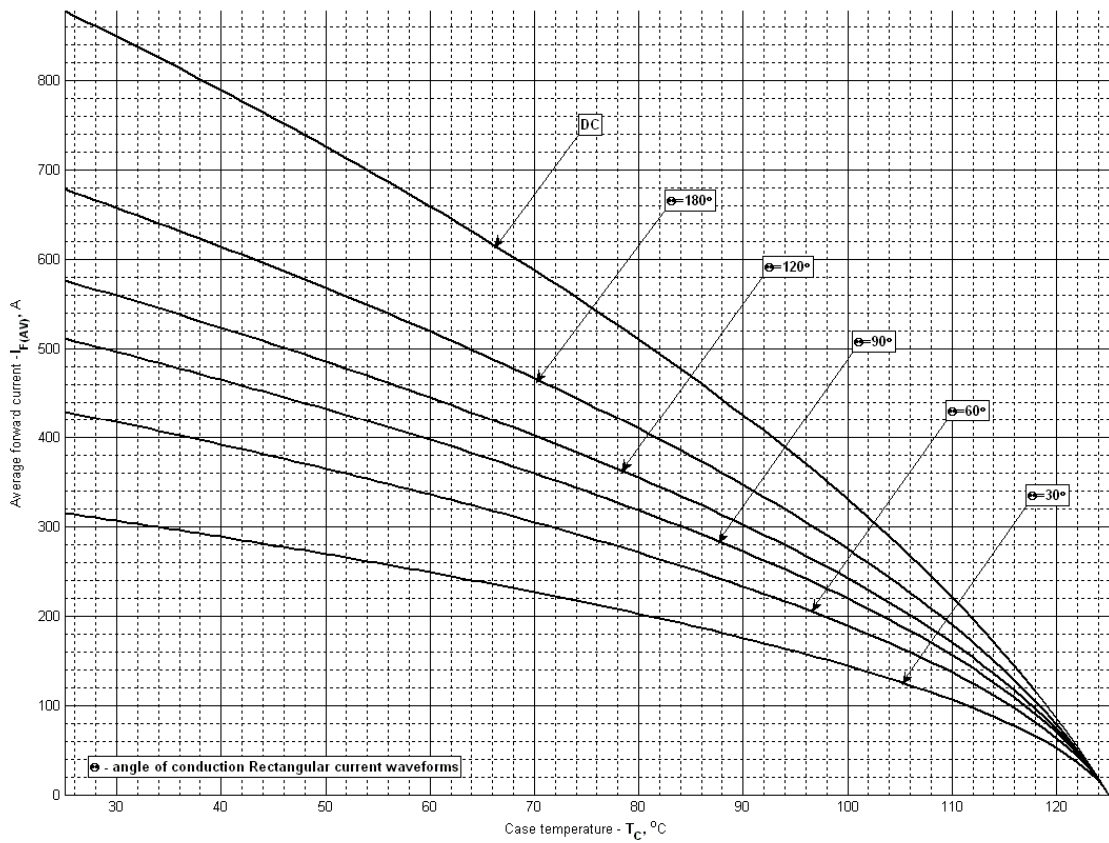


Fig 8 – On-state power loss (rectangular current waveforms)



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Fig 9 – Maximum case temperature DSC (sinusoidal current waveforms)



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Fig 10 – Maximum case temperature DSC (rectangular current waveforms)

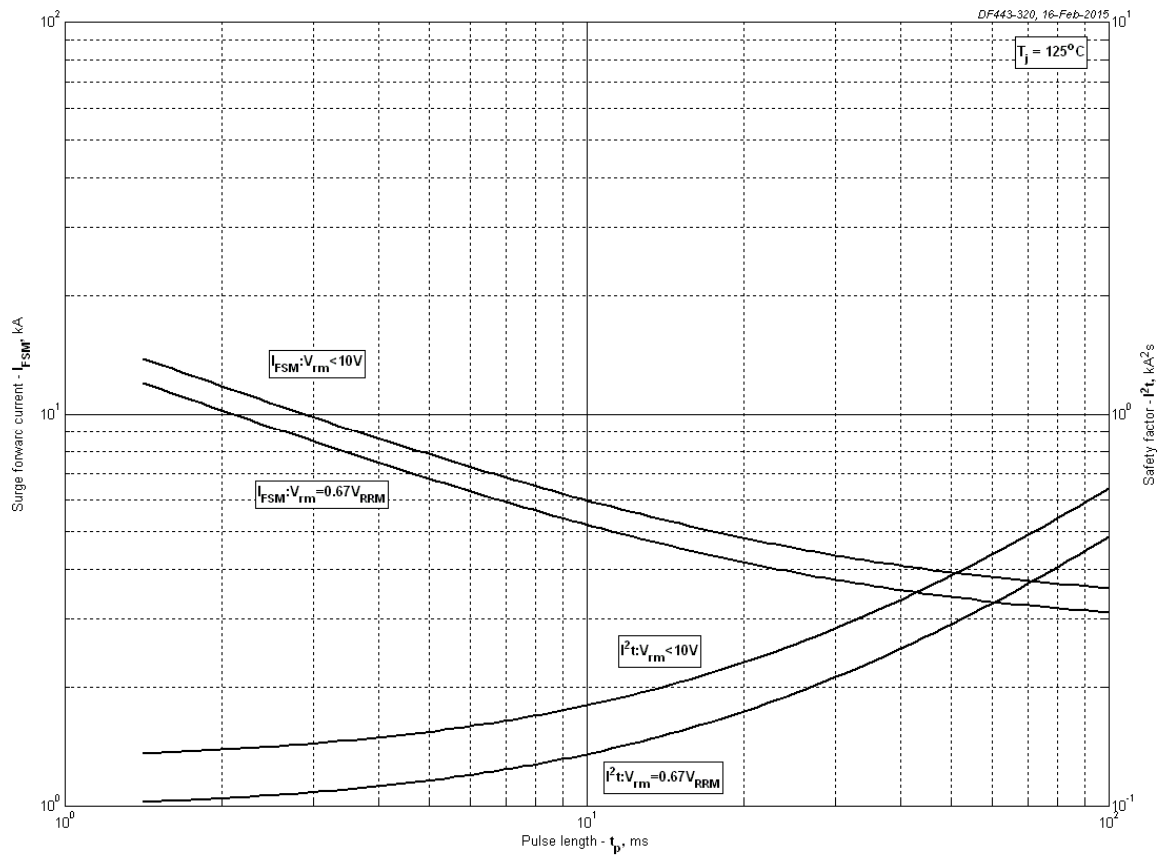


Fig 11 – Maximum surge and I^2t ratings

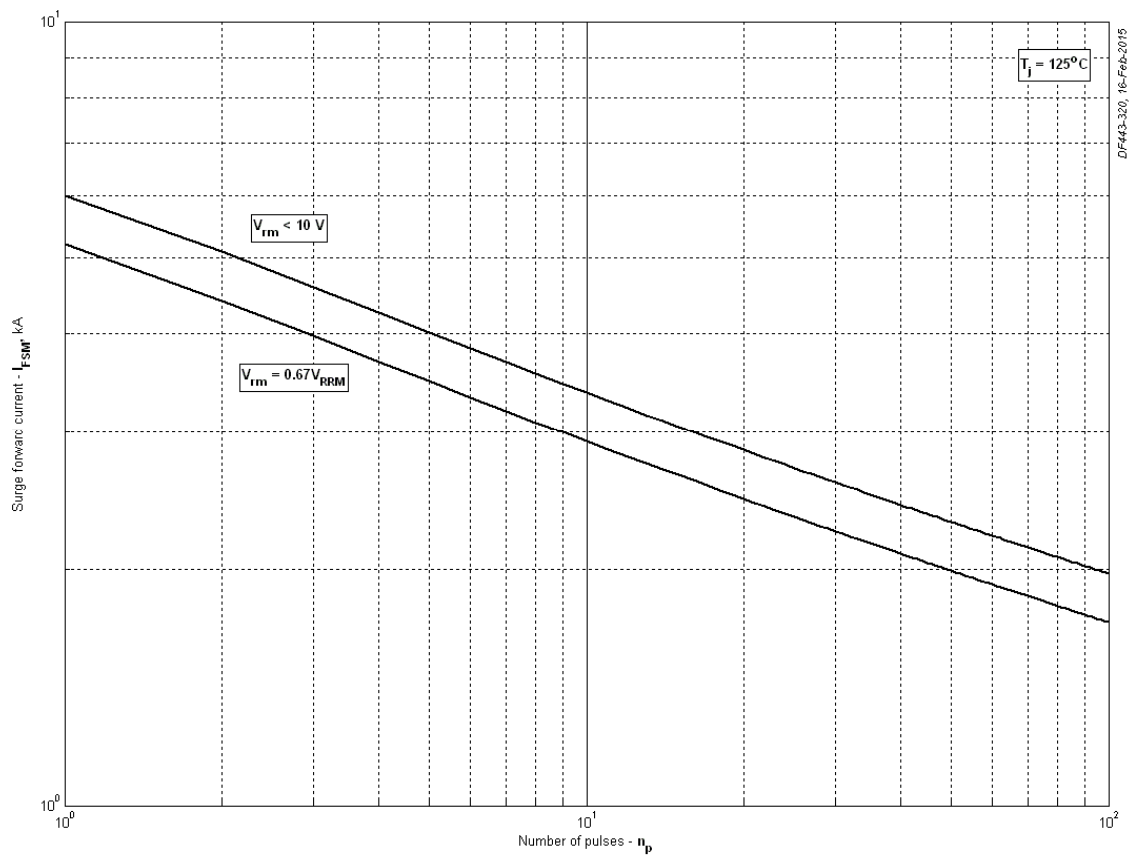


Fig 12 – Maximum surge ratings