ChunZheng

High-end Power Semiconductor Manufacturer

ZK630A 1000-1800V
Fast Recovery Diode

- Low switching losses
- Low reverse recovery charge High
- power cycling capability

Average forward current			I_{FAV}	630 A	
Repetitive peak reverse voltage			V_{RRM}	1000 – 1800 V	
Reverse recovery time			t_{rr}	3.2 μs	
V_{RRM}, V	1000	1200	1400	1600	1800
Voltage code	10	12	14	16	18
T_j, °C	– 60 – 125				

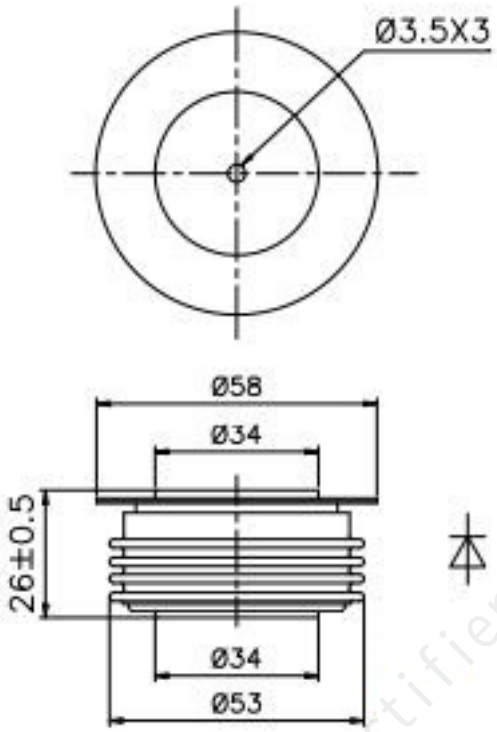
MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{FAV}	Average forward current	A	630	T_c=85°C; Double side cooled; 180° half-sine wave; 50 Hz	
I_{FRMS}	RMS forward current	A	989	T_c=85°C; Double side cooled; 180° half-sine wave; 50 Hz	
I_{FSM}	Surge forward current	kA	14.0 16.0	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 50 Hz (t_p=10 ms); single pulse; V_R=0 V;
			15.0 17.0	T_j=$T_{j\,max}$ 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	$A^2s{\cdot}10^3$	980 1280	T_j=$T_{j\,max}$ T_j=25 °C	180° half-sine wave; 50 Hz (t_p=10 ms); single pulse; V_R=0 V;
			930 1195	T_j=$T_{j\,max}$ 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	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; 50 Hz;single pulse;	
V_R	Reverse continuous voltages	V	0.75·V_{RRM}	T_j=$T_{j\,max}$;	
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	50 100	Device unclamped Device clamped	

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V_{FM}	Peak forward voltage, max	V	2.30	T_j=25 °C; I_{FM}=1978 A	
$V_{F(TO)}$	Forward threshold voltage, max	V	1.20	$T_j=T_{j\ max}$; $0.5\ \pi\ I_{FAV} < I_T < 1.5\ \pi\ I_{FAV}$	
r_T	Forward slope resistance, max	mΩ	0.300		
BLOCKING					
I_{RRM}	Repetitive peak reverse current, max	mA	35	$T_j=T_{j\ max}$; $V_R=V_{RRM}$	
SWITCHING					
Q_{rr}	Total recovered charge, max	μC	110	$T_j=T_{j\ max}$; $I_{FM}=I_{FAV}$; di_R/dt=-100 A/μs; V_R=100 V;	
t_{rr}	Reverse recovery time, max	μs	2.6		
I_{rrM}	Peak reverse recovery current, max	A	188		
THERMAL					
R_{thjc}	Thermal resistance, junction to case, max	°C/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	°C/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)		

OVERALL DIMENSIONS



ZT40

All dimensions in millimeters

Fig 1 – On-state characteristics of Limit device

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°C	$T_j = T_{j\,max}$
A		
B		
C		
D		

On-state 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.

$\mathbf{Z_{thjc}}$ = Thermal resistance at time t.

$\mathbf{R_i}$ = Amplitude of p_{th} term.

τ_i = Time constatnt of r_{th} term.

DC Double side cooled

i	1	2	3	4	5	6
R_i, K/W						
τ_i, s						

DC Anode side cooled

i	1	2	3	4	5	6
R_i, K/W						
τ_i, s						

DC Cathode side cooled

i	1	2	3	4	5	6
R_i, K/W						
τ_i, s						

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

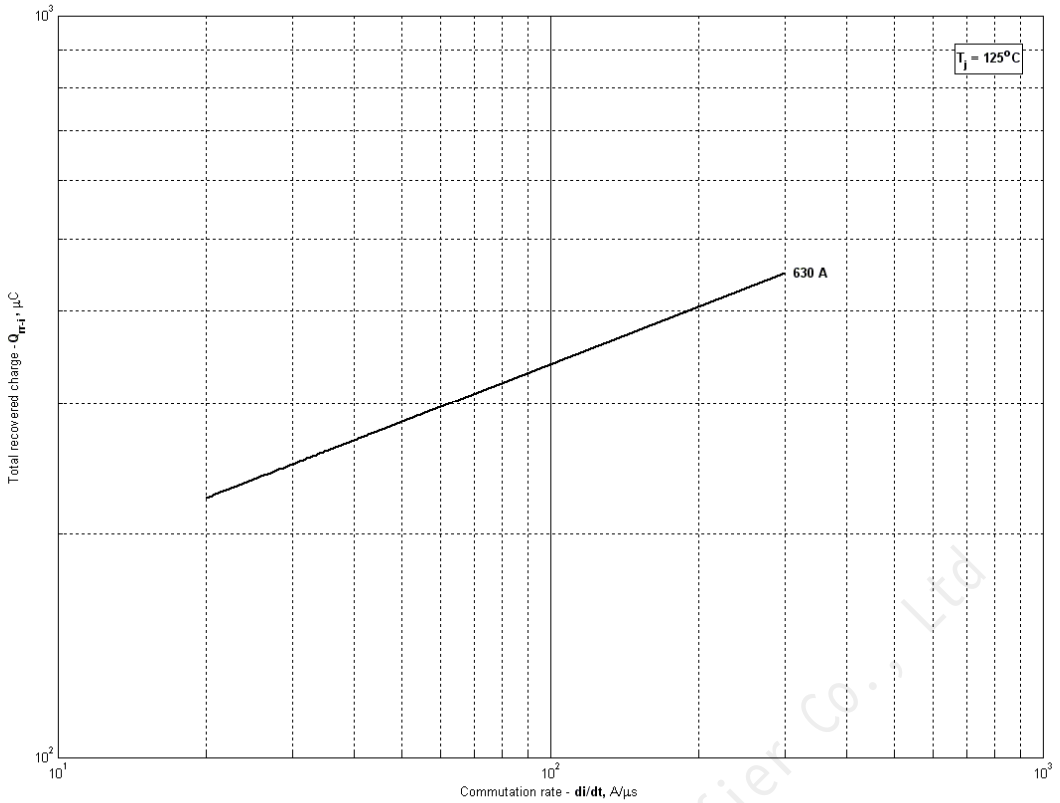


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

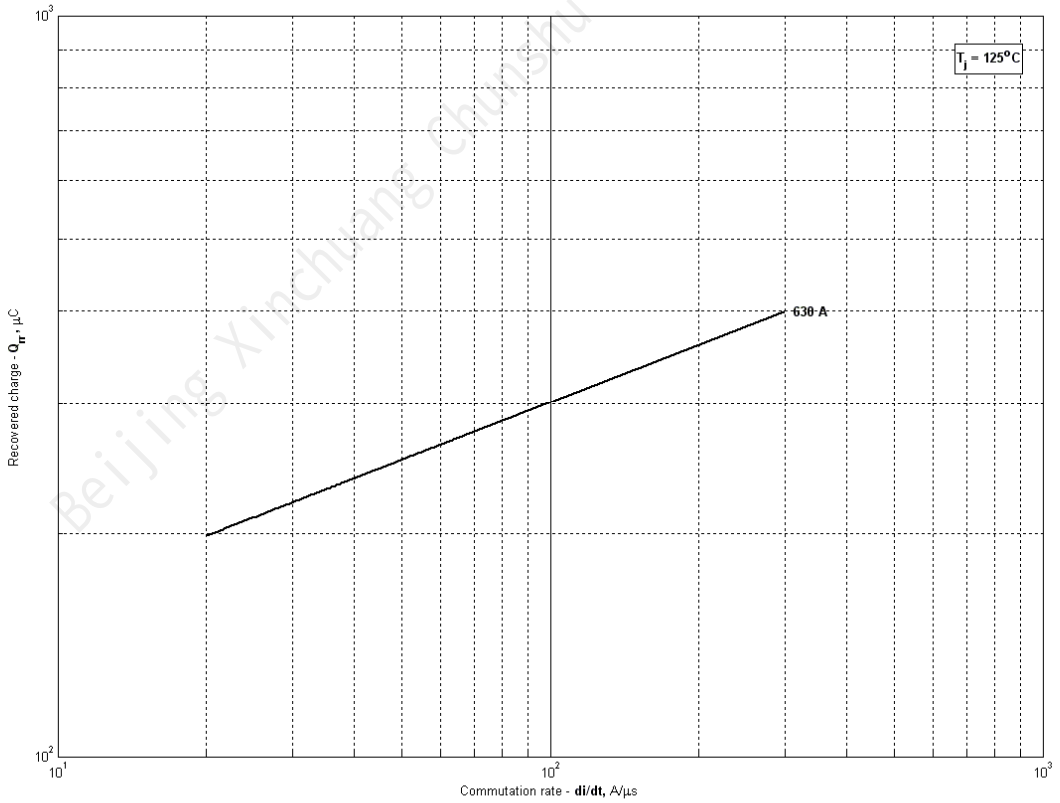


Fig 4 - Recovered charge, Q_{rr} (linear)

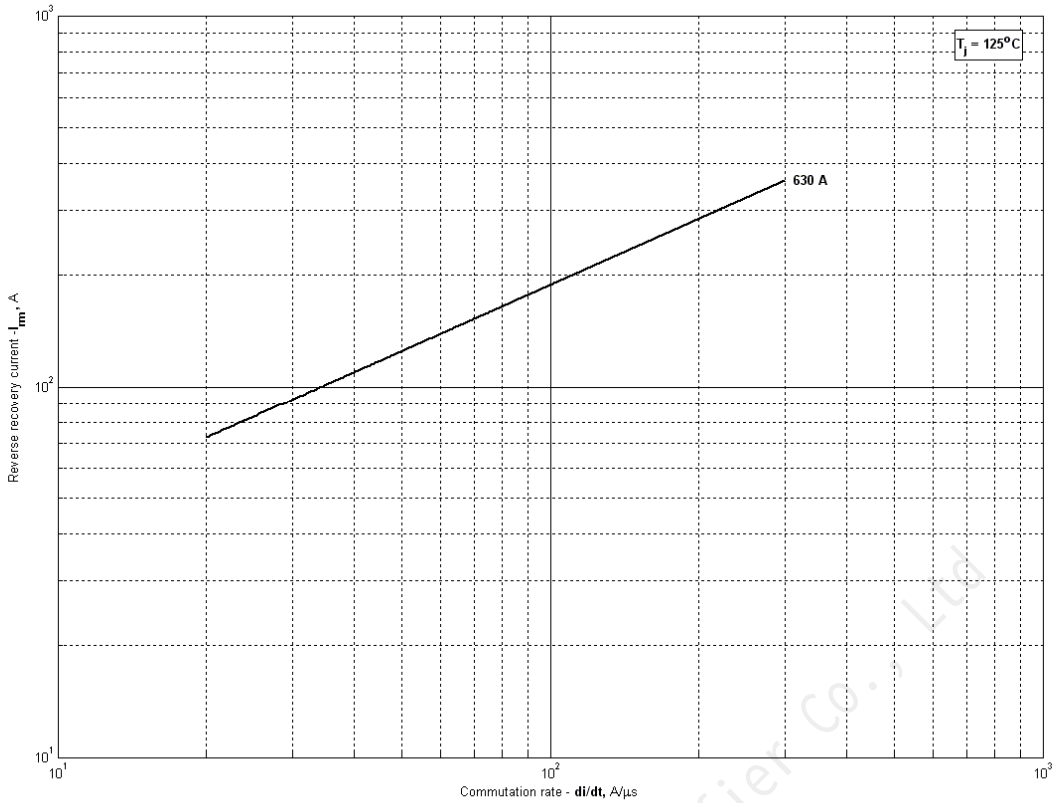


Fig 5 – Peak reverse recovery current, I_{rm}

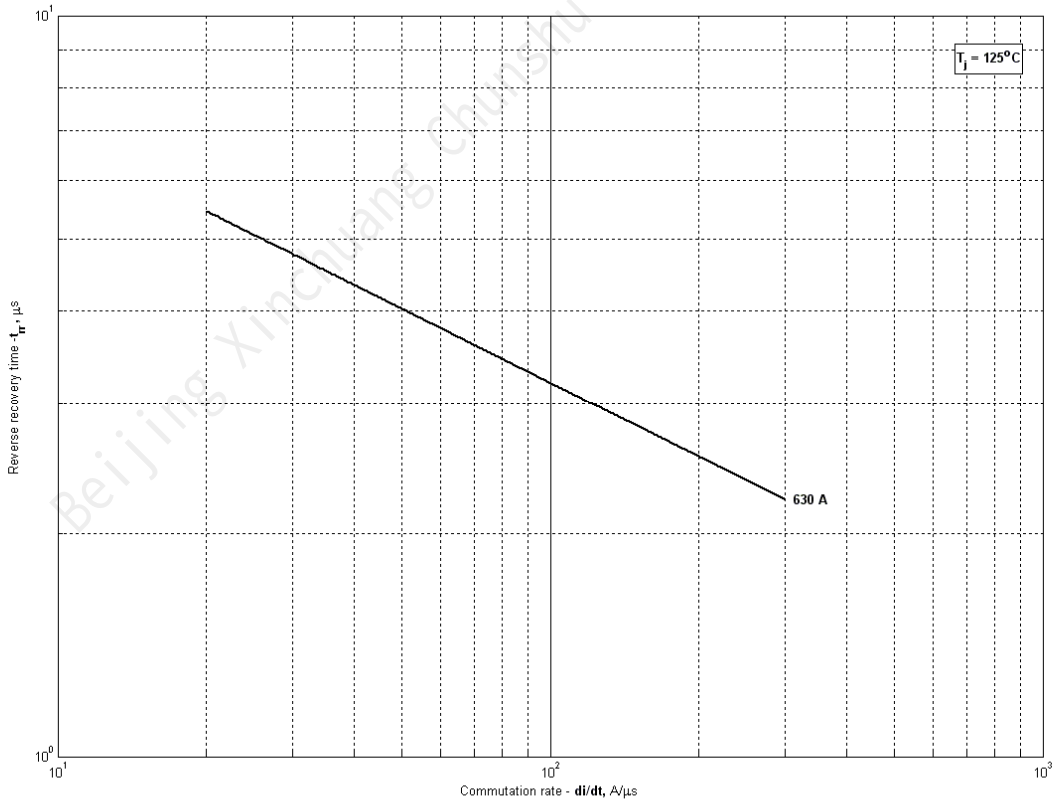


Fig 6 – Maximum recovery time, t_{rr} (linear)

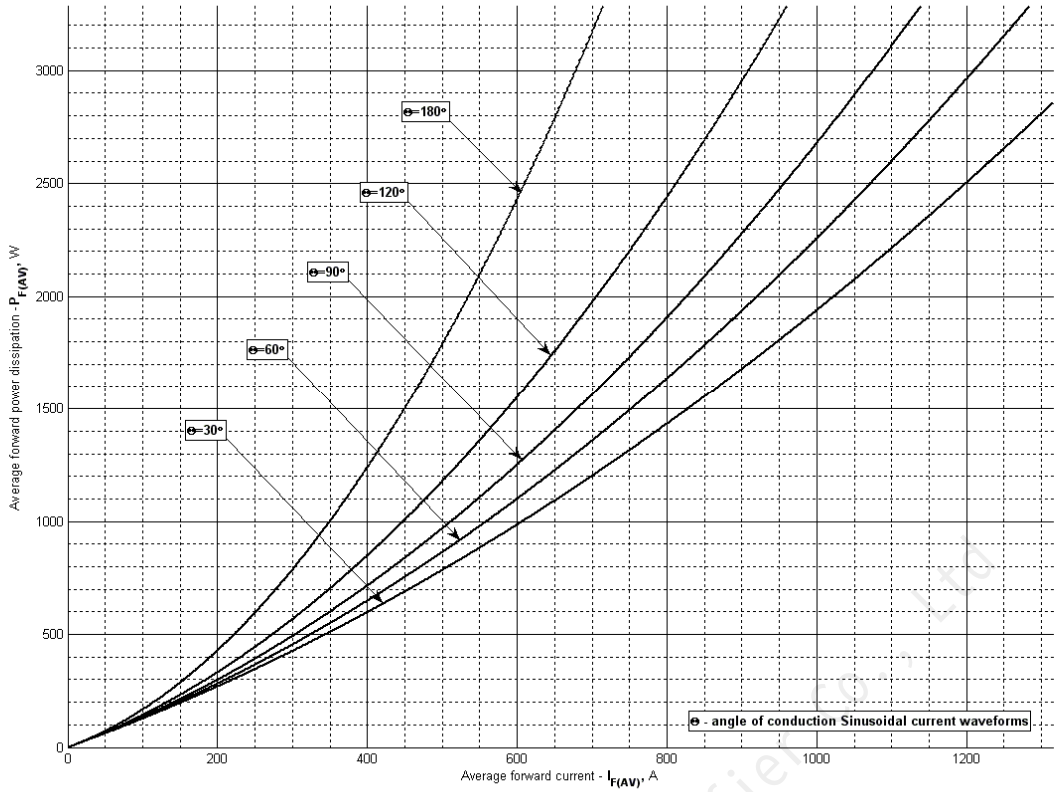


Fig 7 – On-state power loss (sinusoidal current waveforms)

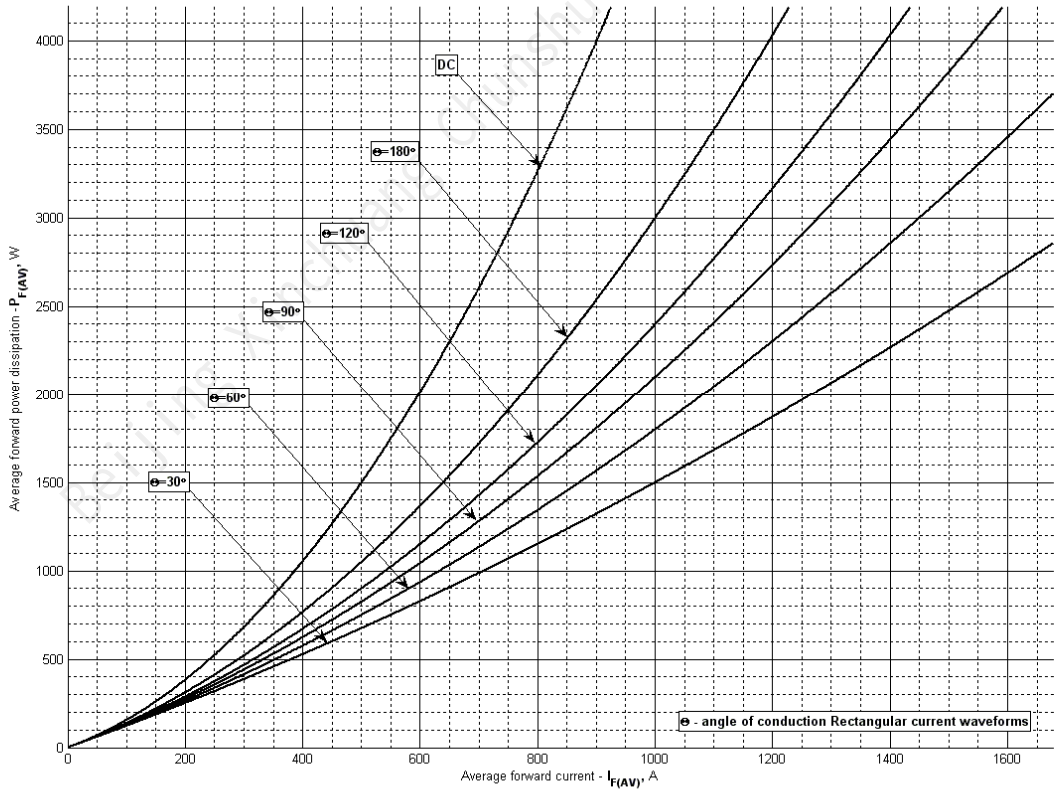


Fig 8 – On-state power loss (rectangular current waveforms)

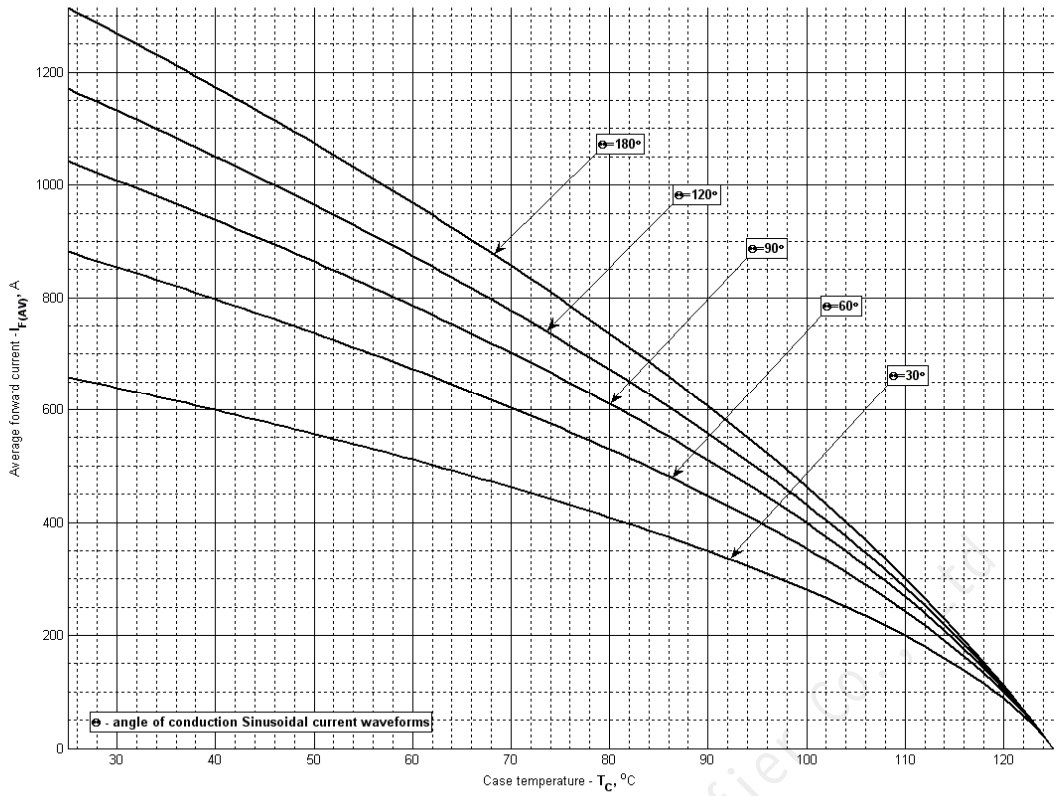


Fig 9 – Maximum case temperature DSC (sinusoidal current waveforms)

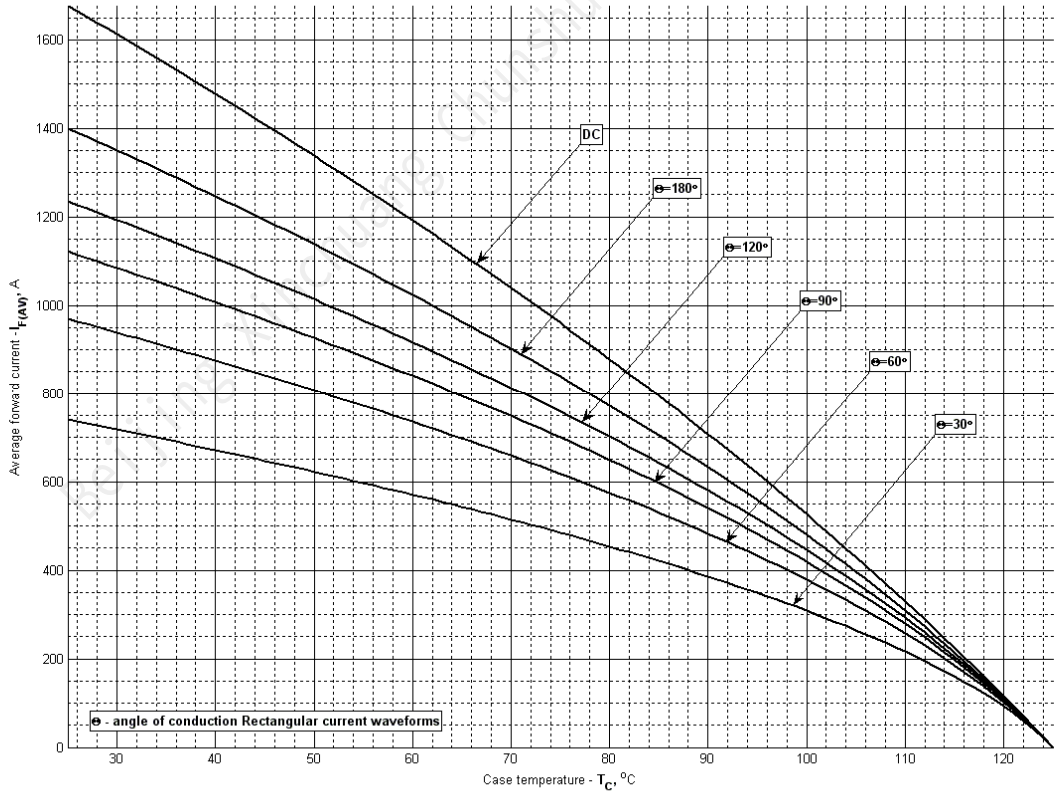


Fig 10 – Maximum case temperature DSC (rectangular current waveforms)

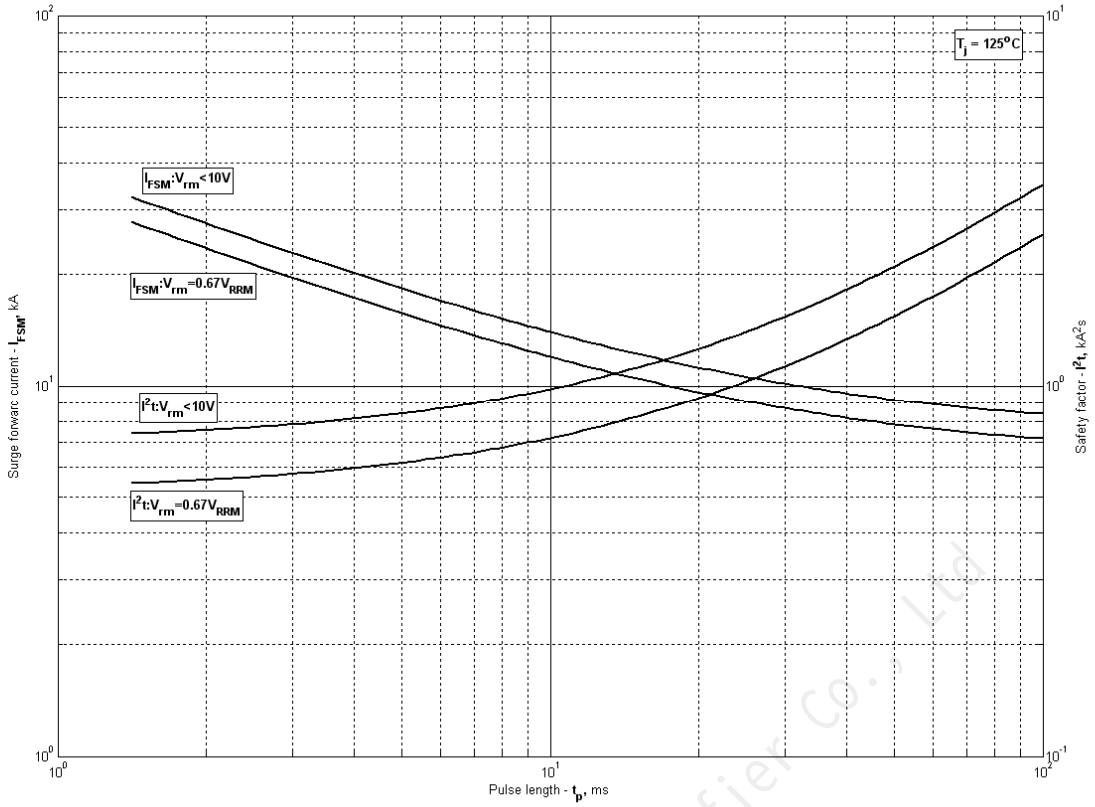


Fig 11 – Maximum surge and I^2t ratings

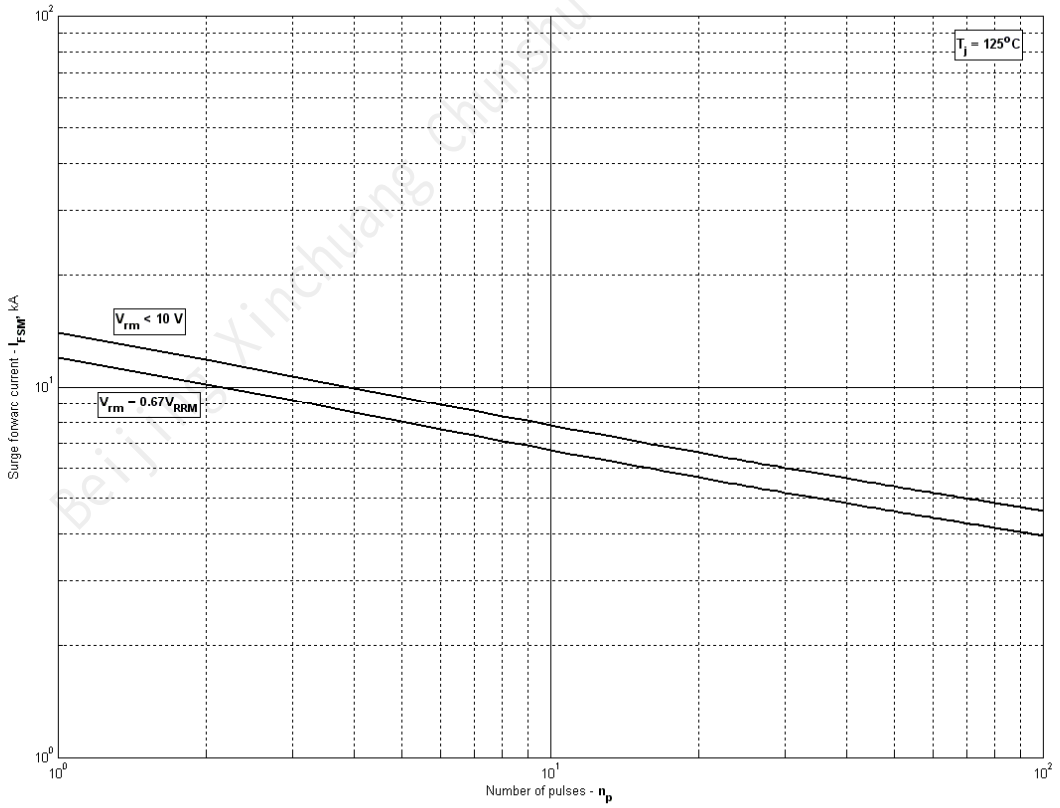


Fig 12 – Maximum surge ratings

