Ruttonsha International Rectifier Ltd.

SILICON CONTROLLED RECTIFIERS

High Power Thyristor
Hockey Puk Version
U-PUK Series 3000PU

Types : 3000PU 450 to 3000PU 520

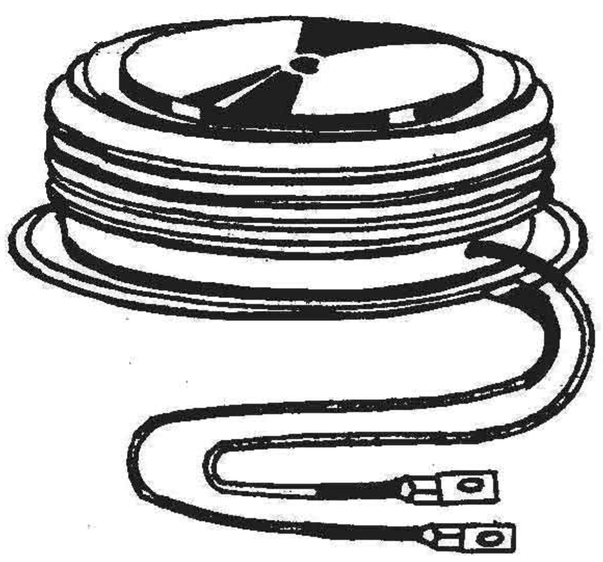
FEATURES

- *Center amplifying gate.*
- *Metal case with ceramic insulator*
- *High profile hockey - puk.*

TYPICAL APPLICATIONS

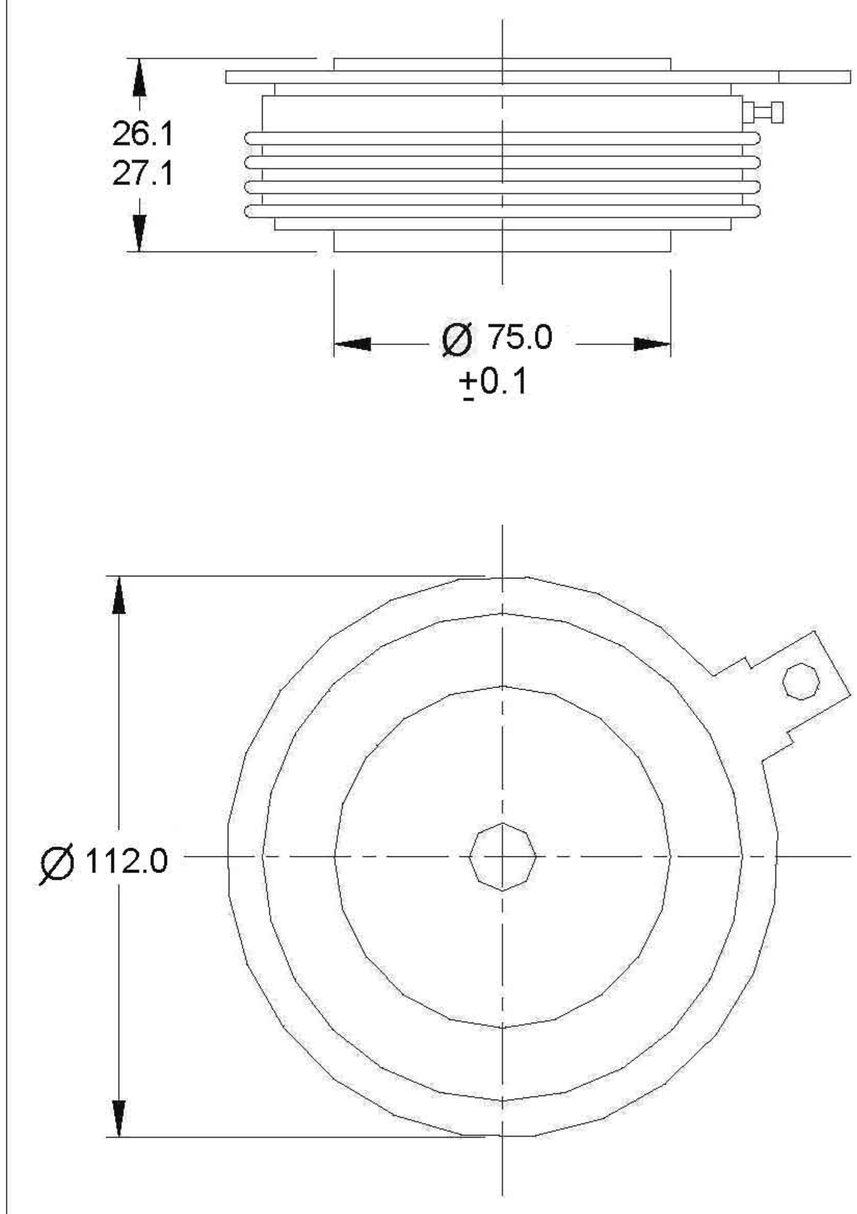
- *DC motor control (e.g. for machine tools).*
- *Controlled rectifiers (e.g. for battery charging, Uninterrupted Power Supply).*
- *AC controllers (e.g. for temperature control, lights control).*

3000PU (U - PUK)



Major Ratings and Characteristics

Parameter		**3000PU**	Units
$I_{T(AV)}$		2960	A
	@ T_{hs}	55	℃
$I_{T(RMS)}$		5825	A
	@ T_{hs}	55	℃
I_{TSM}	@ 50 Hz	36	KA
I^2t	@ 50 Hz	6480	KA^2s
V_{DRM}/V_{RRM}		4500 to 5200	V
t_q	typical	800	µs
T_J		-40 to +125	℃



All dimension in millimeters

ELECTRICAL SPECIFICATIONS — Types : 3000 PU Series

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM}, max repetitive peak and off-state voltage V	V_{RSM},maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max. mA
3000PU	450	4500 / 4500	4600	150
	480	4800 / 4800	4900	
	500	5000 / 5000	5100	
	520	5200 / 5200	5300	

On - state Conduction

	Parameter	3000PU	Units	Conditions		
$I_{T(AV)}$	Max. average on-state current	2960	A	180° conduction, half sine wave		
	@ Heatsink temperature	55	°C	double side cooled		
$I_{T(RMS)}$	Max RMS on-state current	5825	A	DC@55°C heatsink temperature double side cooled		
I_{TSM}	Max. peak, one-cycle non-repetitive surge current	36	KA	t = 10 ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J=T_J$ max.
I^2t	Maximum I^2t for fusing	6480	KA^2s	t = 10 ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J=T_J$ max.
$V_{T(TO)}$	Threshold voltage	1.3	V	$T_J=T_J$ max.		
r_t	On-state slope resistance	0.24	mΩ	$T_J=T_J$ max.		
V_{TM}	Max. on state voltage	2.1	V	I_{PK} = 4000 A, $T_J=T_J$ max, t_P = 10 ms sine pulse		
I_H	Maximum holding current	1000	mA	T_J = 25°C , anode supply 12 V resistive load		

Types : 3000 PU Series

Switching

	Parameter	3000PU	Units	Conditions
di/dt	Max. non-repetitive rate of rise of turned-on current	100	A/µs	Gate drive 20V, 20Ω , $t_r \leq 0.5\mu s$ $I_{FG} = 2A$ $T_J=T_J$ max. anode voltage ≤ 60% V_{DRM}
t_q	Typical turn-off time	800	µs	I_{TM} = 4000 A, $T_J=T_J$ max. di/dt = 10 A/µs ,V_R =100V dv/dt = 20 V/µs, 0.8 V_{DRM} Reapplied , t_p = 2ms

Blocking

	Parameter	3000PU	Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	V/µs	$T_J = T_J$ max.
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	150	mA	$T_J = T_J$ max. rated V_{DRM} /V_{RRM} applied

Triggering

	Parameter	3000PU	Units	Conditions	
P_{GM}	Maximum peak gate power	50	W	$T_J = T_J$ max., $t_p \leq 5$ ms	
$P_{G(AV)}$	Maximum average gate power	5		$T_J = T_J$ max., f = 50Hz, d% = 50	
I_{GM}	Max. peak positive gate current	3.0	A	$T_J = T_J$ max., $t_p \leq 5$ ms	
$+V_{GM}$	Maximum peak positive gate voltage	20	V	$T_J = T_J$ max., $t_p \leq 5$ ms	
$-V_{GM}$	Maximum peak negative gate voltage	5.0			
I_{GT}	DC gate current required to trigger	300	mA	T_J = 25°C	Max.required gate trigger/ current/voltage are the lowest value which will trigger all units 12 V anode-to-cathode applied
V_{GT}	DC gate voltage required to trigger	3.0	V	T_J = 25°C	
I_{GD}	DC gate current not to trigger	10	mA	$T_J = T_J$ max.	Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated V_{DRM} anode-to-cathode applied
V_{GD}	DC gate voltage not to trigger	0.25	V		

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Thermal and Mechanical Specifications

	Parameter	3000PU	Units	Conditions
T_J	Max.operating temperature range	-40 TO +125	°C	
T_{stg}	Max.storage temperature range	-40 TO +150		
R_{thJ-hs}	Max. thermal resistance, junction to heatsink	0.008	K/W	DC operation double side cooled
F	Mounting force, ± 10% ,	63 TO 77	KN	
wt.	Approximate weight	1200	g	
	Case style	**U - PUK**		See Outline Table

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Curves

Figure 1 - On-state characteristics of Limit device

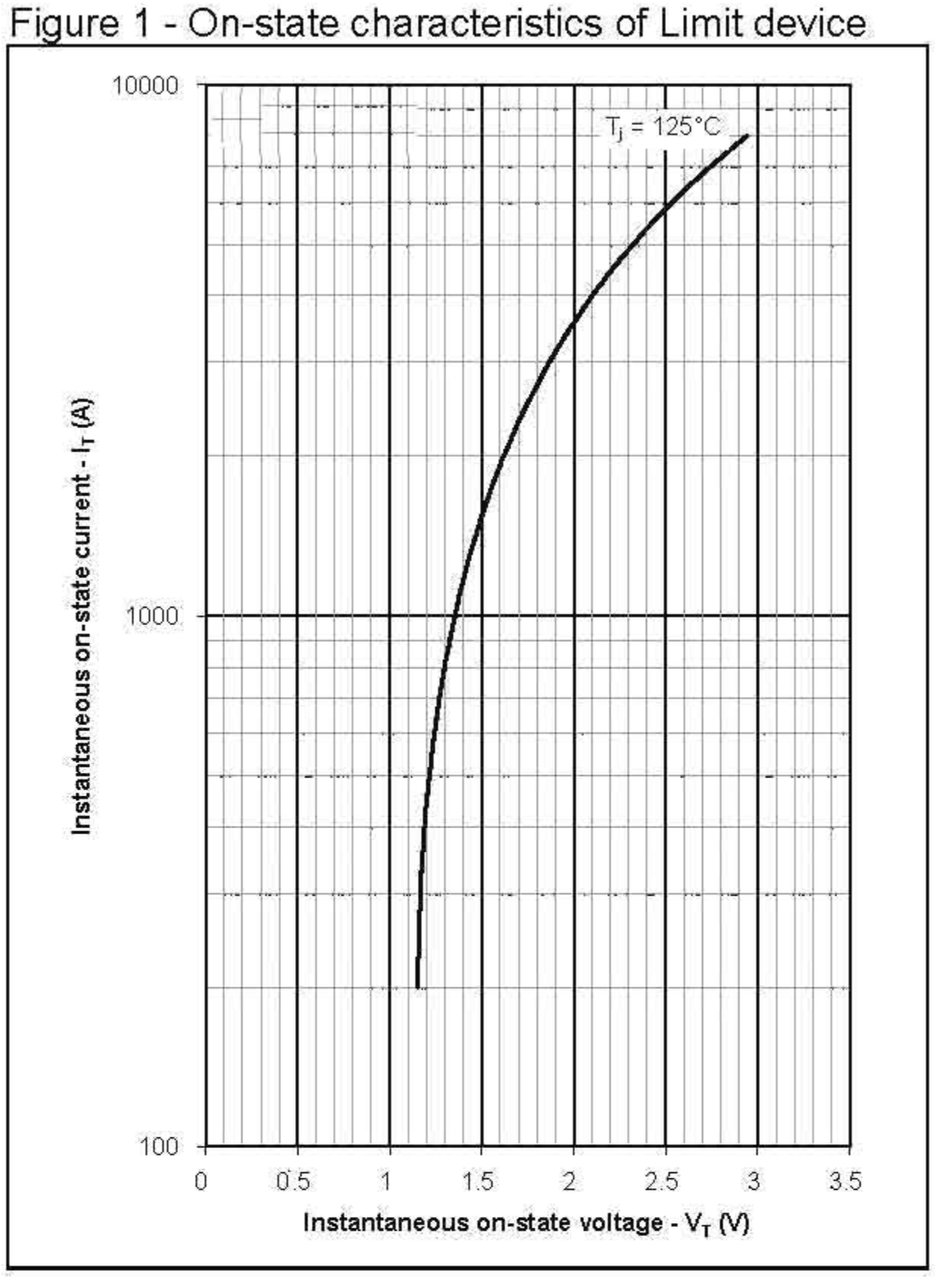

Figure 2 - Transient thermal impedance

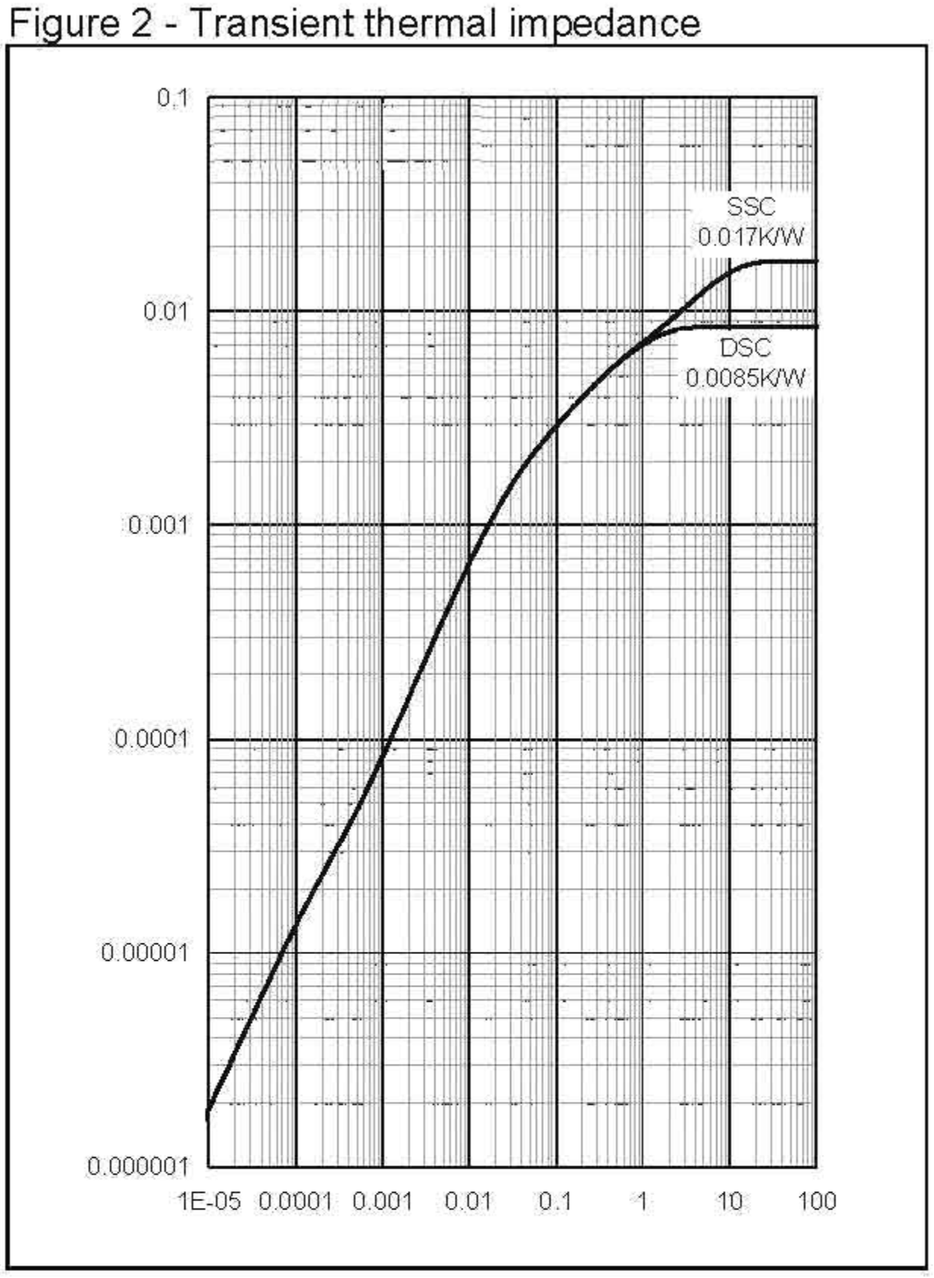

Figure 3 – On-state current vs. Power dissipation – Double Side Cooled (Sine wave)

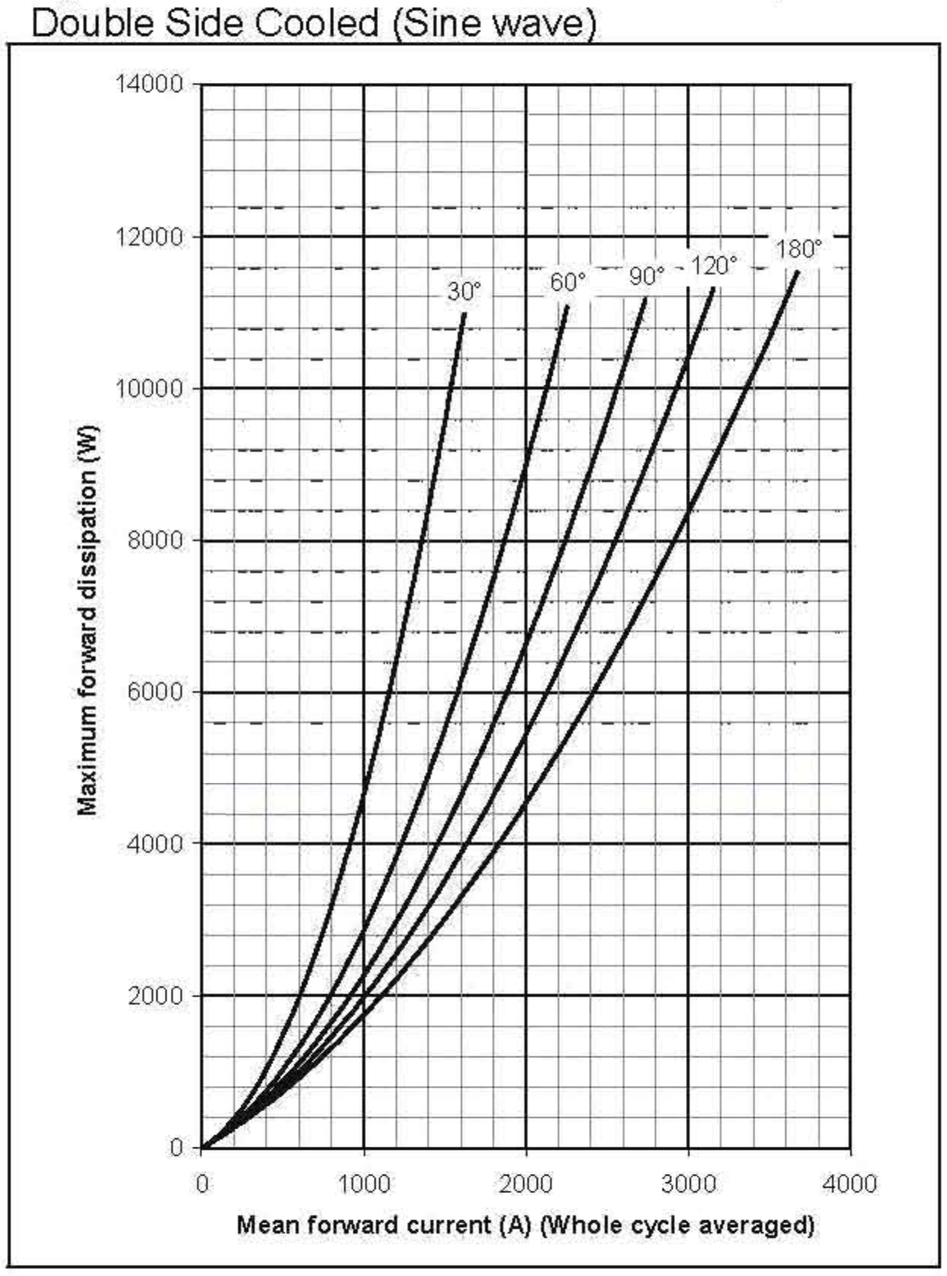

Figure 4 – On-state current vs. Heatsink temperature - Double Side Cooled (Sine wave)

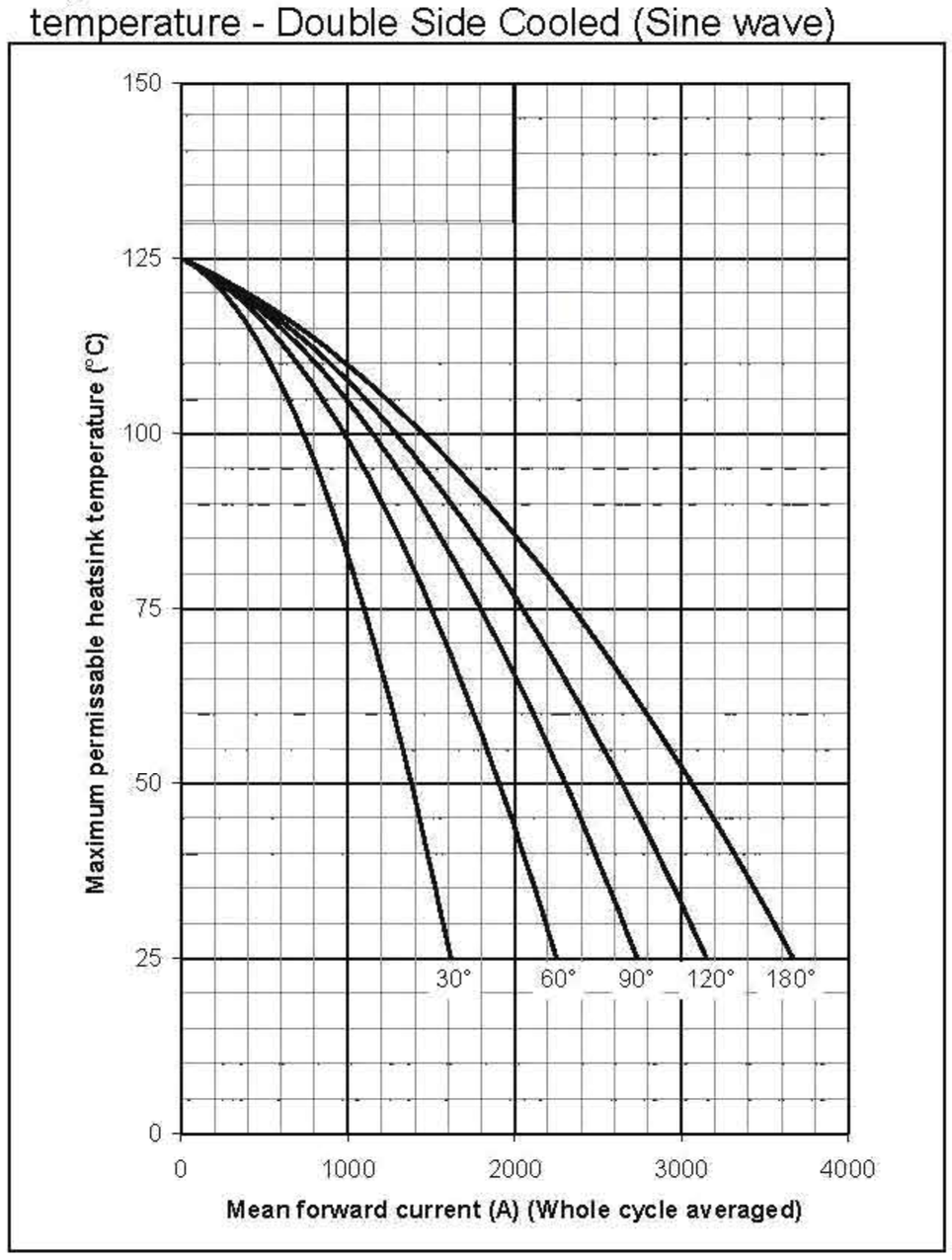

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Figure 5 - Maximum surge and I^2t Ratings