Data Sheet No. PD-3.073

INTERNATIONAL RECTIFIER IOR

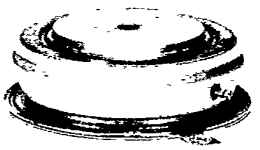
T-25-20

940A RMS Hockey Puk Thyristors

600PE SERIES

Description

The 600PE series of converter type hockey puk thyristors use centre amplified gate junction technology. These devices with their high current capability and small package size are ideal for use in phase control applications in converters, battery chargers, regulated power supplies, lighting circuits and temperature and motor speed control circuits, where compactness is an advantage.

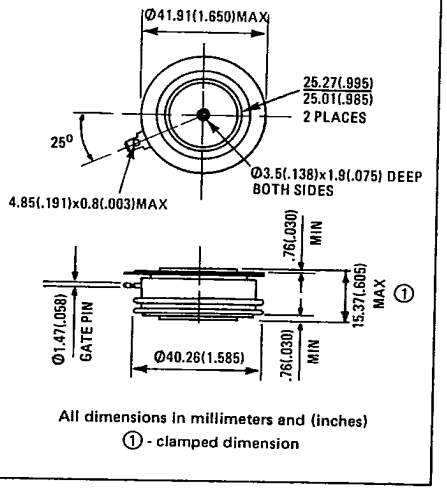


Features

- Centre Amplified Gate
- High di/dt and dv/dt capabilities
- High surge capabilities
- Available up to 1800V V_{RRM}, V_{DRM}
- Fully characterised information

Major ratings and characteristics

		600PE...	Units
$I_{T(AV)}$		600	A
$I_{T(RMS)}$		940	A
I_{TSM}	50Hz	6730	A
	60Hz	7040	A
I^2t	50Hz	226,000	A^2s
	60Hz	207,000	A^2s
$I^2\sqrt{t}$		3 200 000	$A^2\sqrt{s}$
V_{RRM}		800 to 1800	V
T_J		–40 to 125	°C



All dimensions in millimeters and (inches)

① - clamped dimension

ELECTRICAL SPECIFICATIONS

Forward conduction

		600PE...		Units	Conditions		
$I_{T(AV)}$	Average on state current	600		A	180° conduction, half sine wave, double side cooled, T_c = 70°C		
$I_{T(RMS)}$	Nominal continuous RMS on-state current	940		A			
I_{TRM}	Maximum peak repetitive on-state current	5540		A	30° sinusoidal conduction, T_c = 70°C		
	Mounting force ± 10%	8920(2000)	4460(1000)	N(lbf)			
I_{TSM}	Maximum peak, one cycle non repetitive on state current	8000	6000	A	t = 10ms	No voltage reapplied	Sinusoidal half wave
		8370	6300	A	t = 8.3ms		
		6730	5050	A	t = 10ms	100% V_{RRM} reapplied	Initial T_J = 125°C
		7040	5300	A	t = 8.3ms		
I^2t	Maximum I^2t for fusing	320	180	kA^2s	t = 10ms	No voltage reapplied	
		292	165	kA^2s	t = 8.3ms		
		226	127	kA^2s	t = 10ms	100% V_{RRM} reapplied	Initial T_J = 125°C
		207	116	kA^2s	t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	3200	1800	$kA^2\sqrt{s}$	t = 0.1 – 10ms, no voltage reapplied		
V_{TM}	Maximum peak on state voltage	1.90		V	T_J = 25°C, 180° conduction, I_{TM} = π x $I_{T(AV)}$ (1885 A peak)		
di/dt	Maximum non repetitive rate of rise of turned on current	800		A/μs	JEDEC STD RS–397, 5.2.2.6.: T_c = 125°C, V_{DM} = V_{DRM}, I_{TM} = 1600A gate source 20V open circuit 20Ω t_r = 0.5μs, t_p = 20μs.		
I_H	Maximum holding current	250		mA	T_J = 25°C, anode supply = 6V, resistive load, gate open circuit		
I_L	Maximum latching current	500		mA	T_J = 25°C, anode supply = 6V, resistive load		

Triggering

P_{GM}	Maximum peak gate power	10	W	$t_p \leq 5ms$	
$P_{G(AV)}$	Maximum average gate power	2	W	T_J = 25 to 125°C	
I_{GM}	Maximum peak gate current	3	A		
V_{GM}	Maximum peak gate voltage	20	V		
$-V_{GM}$	Maximum peak negative gate voltage	5	V		
V_{GT}	Maximum gate voltage required to trigger	3.0	V	T_J = –40°C	Anode supply = 6V resistive load
		2.5	V	T_J = 25°C	
		1.7	V	T_J = 125°C	
I_{GT}	Maximum gate current required to trigger	300	mA	T_J = –40°C	Anode supply = 6V resistive load
		150	mA	T_J = 25°C	
		100	mA	T_J = 125°C	
V_{GD}	Maximum gate voltage that will not trigger	0.2	V	T_J = 125°C, rated V_{DRM} applied	

Switching

t_d	Maximum delay time	1.0	μs	T_J = 25°C, V_D = 0.8 V_{DRM}, I_{TM} = 500A, gate source 20V open circuit, R_{source} = 20Ω, resistive load, t_r (pulse rise time) 0.5μs, t_p = 20μs
t_q	Typical turn-off time	220	μs	T_J = 125°C, I_{TM} = 500A for 200μs, V_R = 50V reapplied dv/dt = 20V/μs linear to 0.8 V_{DRM}, di/dt = –25 A/μs
Q_{rr}	Typical stored charge	470	μc	T_J = 125°C, I_{TM} = 400A, –di/dt = 20 A/μs

Blocking

dv/dt	Minimum critical rate of rise of off state voltage	500	V/μs	T_J = 125°C, linear to 0.8 V_{DRM}, gate open circuit

Voltage ratings

Part number	V_{RRM}, maximum repetitive peak reverse voltage $V_g \leq 0$ ①	V_{RSM} maximum non repetitive peak reverse voltage	V_{DRM}, maximum repetitive peak off state voltage, gate open circuit ①	I_{RM}, I_{DM}, maximum peak reverse and off-state leakage current at V_{RRM}, V_{DRM}, T_J = 125°C, gate open circuit
	V	V	V	mA
600PE80	800	900	800	30
600PE100	1000	1100	1000	30
600PE120	1200	1300	1200	30
600PE140	1400	1500	1400	30
600PE160	1600	1700	1600	30
600PE180	1800	1900	1800	30

① For V_{RRM}, V_{DRM} ≤1200V T_J = –40°C to 125°C
>1200V T_J = 0°C to 125°C

For V_{RRM}, V_{DRM} >1200V and T_J = –40°C to 0°C, derate V_{RRM}, V_{DRM} by 5%

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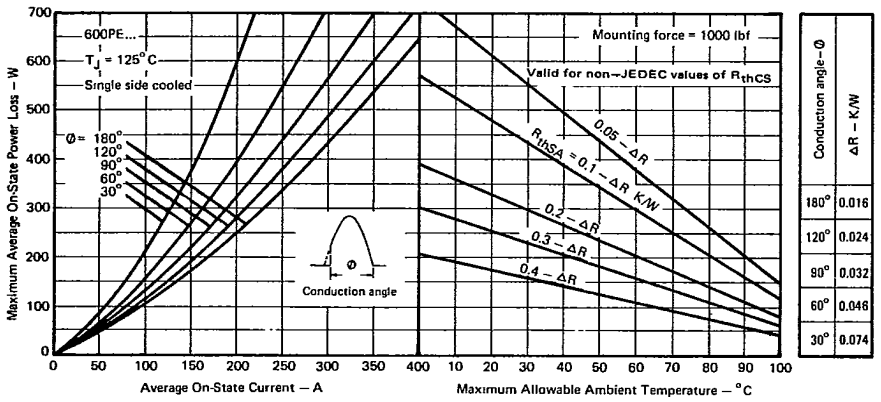
THERMAL AND MECHANICAL SPECIFICATIONS

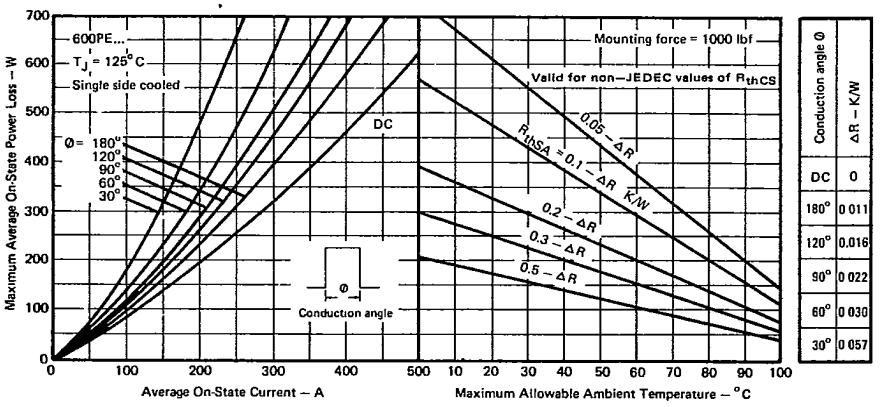
			600PE...	Units	Conditions	
T_J	Junction operating temperature range		–40 to 125	°C		
T_{stg}	Storage temperature range		–40 to 150	°C		
R_{thJC}	Maximum thermal impedance, junction to case.	Single side cooled	0.08	K/W	DC Operation	
		Double side cooled	0.04	K/W		
R_{thCS}	Maximum thermal resistance, one pole piece to one heat exchanger		0.04 (0.05)	K/W	1000 lbf	Mounting surface smooth flat and greased (JEDEC STD RS–397, 7.9.4)
			0.03 (0.04)	K/W	2000 lbf	
	Mounting force ± 10%		1000 (4460)	lbf (N)		
			2000 (8920)	lbf (N)		
W	Approximate weight		3	oz		
			85	g		

Fig. 1 — Current Ratings — sinusoidal waveforms, 50–400Hz



Conduction angle–Ø	ΔR – K/W
180°	0.016
120°	0.024
90°	0.032
60°	0.048
30°	0.074

Fig. 2 — Current Ratings — rectangular waveforms, 50–400Hz



Conduction angle Ø	ΔR – K/W
DC	0
180°	0.011
120°	0.016
90°	0.022
60°	0.030
30°	0.057

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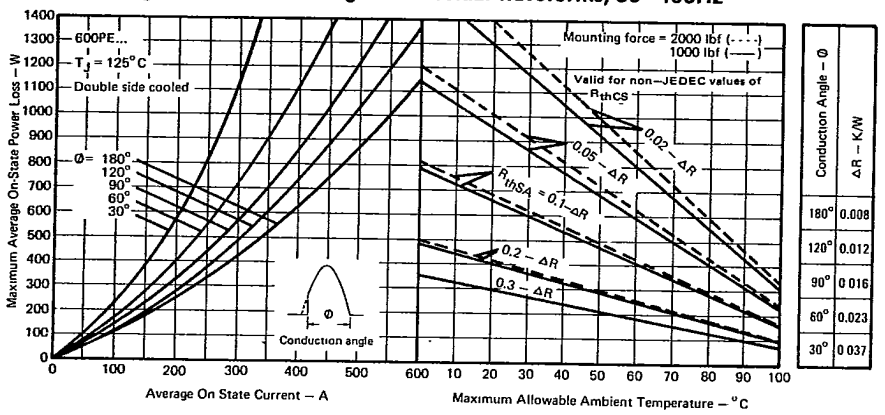
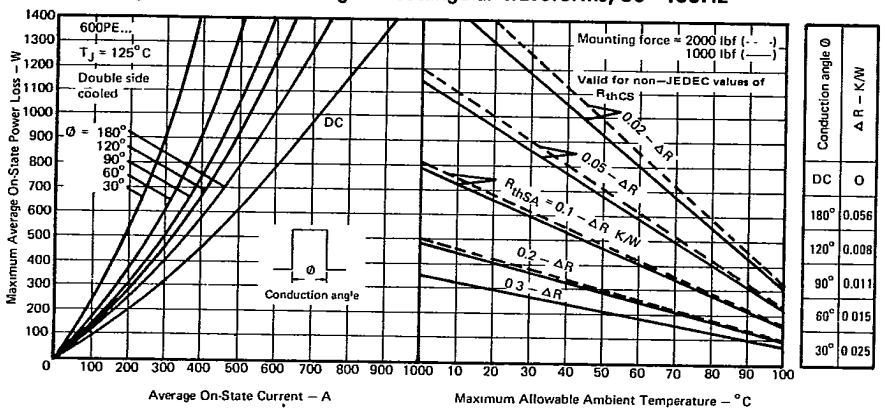
Fig. 3 — Current Ratings — sinusoidal waveforms, 50—400Hz



Conduction Angle – Ø	ΔR – K/W
180°	0.008
120°	0.012
90°	0.016
60°	0.023
30°	0.037

Fig. 4 — Current Ratings — rectangular waveforms, 50—400Hz



Conduction angle Ø	ΔR – K/W
DC	0
180°	0.056
120°	0.008
90°	0.011
60°	0.015
30°	0.025

Fig. 5 — Case Temperature Ratings

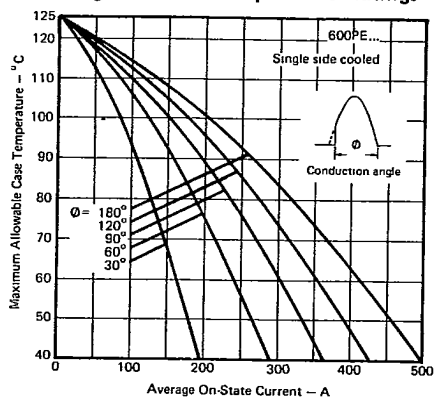


Fig. 6 — Case Temperature Ratings

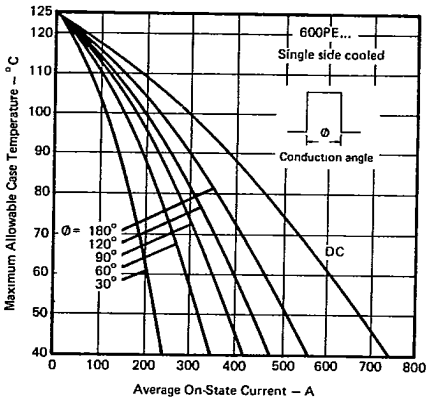


Fig. 7 — Case Temperature Ratings

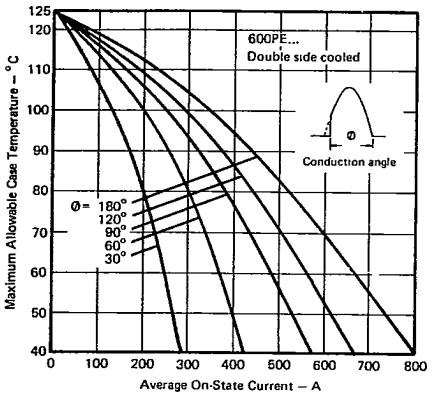


Fig. 8 — Case Temperature Ratings

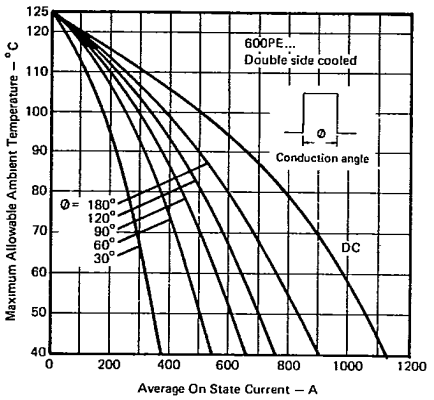


Fig. 9 — Power Loss Characteristics

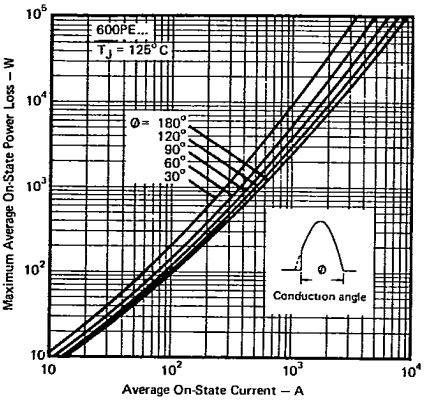


Fig. 10 — Power Loss Characteristics

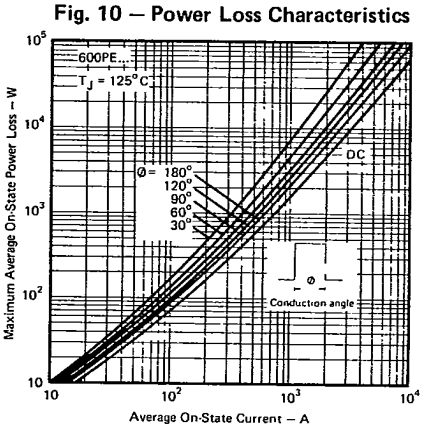


Fig. 11 — On-State Characteristics

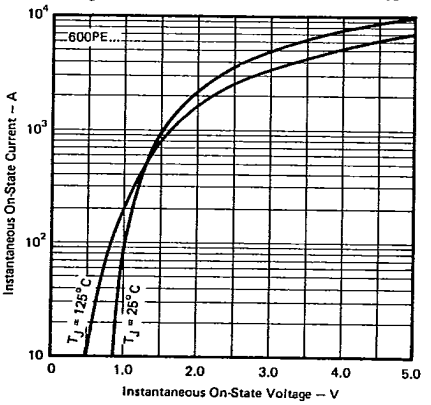


Fig. 12 — Gate Characteristics

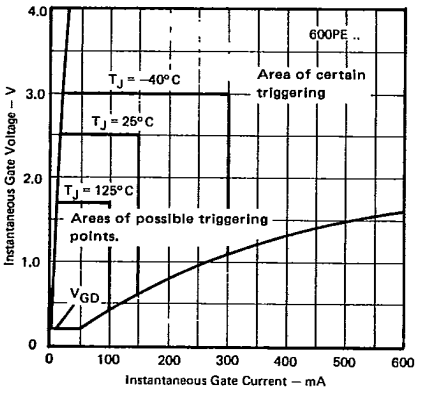


Fig. 13 — Transient Thermal Impedance

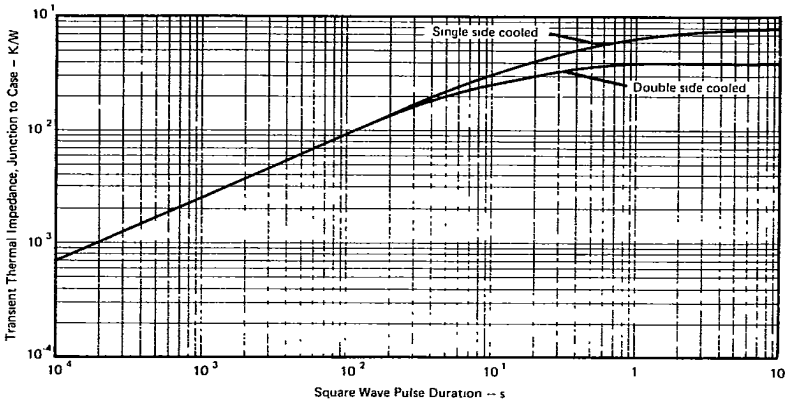


Fig. 14 — Non-Repetitive Surge Ratings

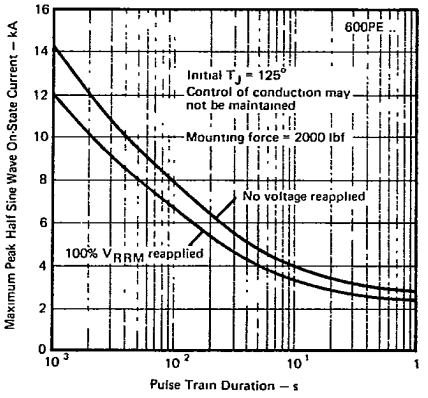
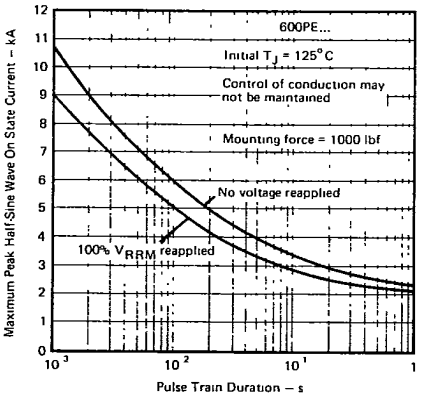


Fig. 15 — Non-Repetitive Surge Ratings



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