

INTERNATIONAL RECTIFIER



T-25-20

1410A, 1100A RMS Hockey Puk Thyristors

900PE, 700PE SERIES

Description

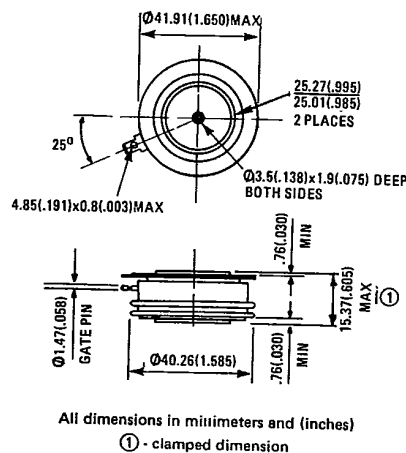
The 700PE and 900PE series of converter type hockey puk thyristors use centre amplified gate junction technology. These devices with their high current capability and small package size are ideal for use in phase control applications in converters, battery chargers, regulated power supplies, lighting circuits and temperature and motor speed control circuits, where compactness is an advantage.

Features

- * Centre Amplified Gate
- * High di/dt capability
- * High dv/dt capability
- * High surge capability
- * Available up to 1200V V_{RRM} , V_{DRM}
- * Fully characterised information

Major ratings and characteristics

	900PE..	700PE...	Units
$I_T(AV)$	885	700	A
$I_T(RMS)$	1410	1100	A
I_{TSM}	50Hz	10,000	A
	60Hz	10,500	A
I^2_t	50Hz	500,000	A^2s
	60Hz	456,000	A^2s
$I^2\sqrt{t}$	7,200,000	4,050,000	$A^2\sqrt{s}$
V_{RRM}	100 to 600	100 to 1200	V
T_J	-40 to 125		$^{\circ}C$



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ELECTRICAL SPECIFICATIONS

Forward conduction

	900PE...	700PE...	Units	Conditions
$I_{T(AV)}$ Average on state current	885	700	A	180° conduction, half-sine wave, double side cooled, $T_c = 70^\circ\text{C}$
$I_{T(RMS)}$ Continuous RMS on-state current	1410	1100	A	
I_{TRM} Maximum peak repetitive on-state current	8300	6475	A	30° sinusoidal conduction, $T_c = 70^\circ\text{C}$
Mounting force $\pm 10\%$	2000	1000	2000	1000
	12000	11 000	9000	8000
I_{TSM} Maximum peak, one cycle non repetitive on state current	12500	11500	9400	8300
	10 000	8250	7500	6700
	10 500	8700	7800	7000
$I^2 t$ Maximum $I^2 t$ for fusing	720	605	405	320
	656	551	370	290
	500	428	280	225
	466	390	256	205
I_{VT} Maximum I_{VT} for fusing	7200	6050	4050	3200
V_{TM} Maximum peak on-state voltage	1.50	1.66	V	$T_J = 25^\circ\text{C}$, 180° conduction, $I_{TM} = \pi \times I_{T(AV)} \left(\frac{2200A \text{ peak for } 700PE}{2825A \text{ peak for } 900PE} \right)$
di/dt Maximum non repetitive rate of rise of turned on current	800	800	A/μs	JEDEC STD HS-397 5.3.2.6. $T_c = 125^\circ\text{C}$, $V_{DM} = V_{DRM}$, $I_{TM} = 1800A$ for the 900PE and 1600A for the 700PE gate source 20V open circuit 20% $t_p = 0.5\mu\text{s}$, $t_r = 20\mu\text{s}$
I_H Maximum holding current	250	250	mA	$T_J = 25^\circ\text{C}$, anode supply = 6V, resistive load, gate open circuit
I_L Maximum latching current	500	500	mA	$T_J = 25^\circ\text{C}$, anode supply = 6V, resistive load.

Triggering

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

Switching

t_d Maximum delay time	1.0	1.2	μs	$T_J = 25^\circ\text{C}$, $V_D = 0.8 V_{DRM}$, $I_{TM} = 260A$, gate source 20V open circuit, $R_{source} = 20\Omega$, resistive load, t_r (pulse rise time) $0.5\mu\text{s}$, $t_p = 20\mu\text{s}$
t_q Typical turn-off time	180	200	μs	$T_J = 125^\circ\text{C}$, $I_{TM} = 500A$ for 200μs, $V_R = 50V$ reapplied $dv/dt = 20 V/\mu\text{s}$ linear to $0.8 V_{DRM}$ $di/dt = 25A/\mu\text{s}$
Q_{rr} Typical stored charge	370	470	μC	$T_J = 125^\circ\text{C}$, $I_{TM} = 400A$, $-di/dt = 20 A/\mu\text{s}$

Blocking

dV/dt Minimum critical rate of rise of off-state voltage	300	500V	V/μs	$T_J = 125^\circ\text{C}$, linear to $0.8 V_{DRM}$, gate open circuit
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Voltage ratings

Part number	V_{RRM} , maximum repetitive peak reverse voltage $V_g \leq 0$ $T_J = -40^\circ\text{C}$ to 125°C	V_{RSM} , maximum non repetitive peak reverse voltage, $T_J = 25$ to 125°C	V_{DRM} , maximum repetitive peak off-state voltage, gate open circuit $T_J = -40^\circ\text{C}$ to 125°C	I_{RM} , I_{DM} , maximum peak reverse and off state leakage current at V_{RRM} , V_{DRM} , $T_J = 125^\circ\text{C}$, gate open circuit
	V	V	V	mA
900PE10	100	200	100	30
900PE20	200	300	200	30
900PE40	400	500	400	30
900PE60	600	700	600	30
700PE60	800	900	800	30
700PE100	1000	1100	1000	30
700PE120	1200	1300	1200	30

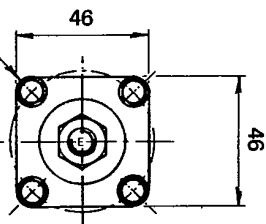
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THERMAL AND MECHANICAL SPECIFICATIONS

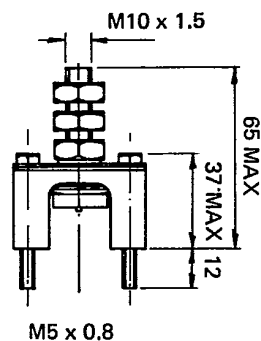
			900PE...	700PE...	Units	Conditions	
T _J	Junction operating temperature range		-40 to 125		°C		
T _{stg}	Storage temperature range		-40 to 150		°C		
R _{thJC}	Maximum thermal impedance, junction to case.	Single side cooled	0.08		K/W	DC Operation	
		Double side cooled	0.04		K/W		
R _{thCS}	Maximum thermal resistance, one pole piece to one heat exchanger		0.04 (0.05)		K/W	1000 lbf (4460N)	Mounting surface smooth flat and greased (JEDEC STD RS-397, 7.9.4)
			0.03 (0.04)		K/W	2000 lbf (8920N)	
	Mounting force ± 10%		1000 (4460)		lbf (N)		
			2000 (8920)		lbf (N)		
W	Approximate weight		3		oz		
			85		g		

BOX CLAMP FOR SINGLE-SIDE COOLING

4 FIXING SCREWS ON A
50mm PITCH CIRCLE DIAMETER



K22-0323

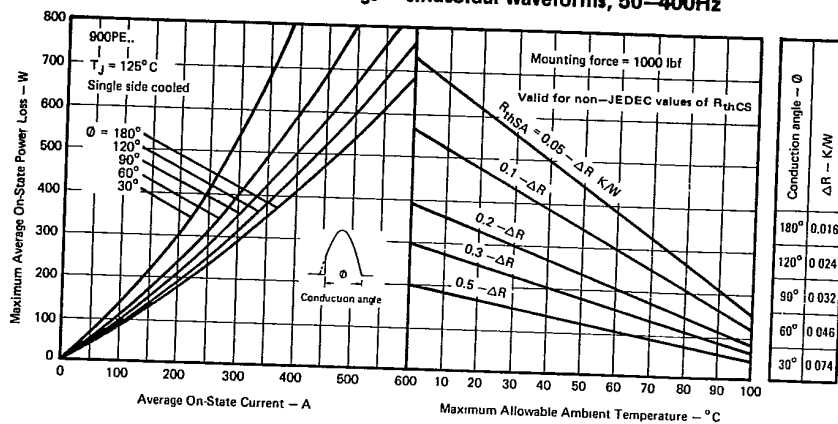


The box clamp offers a quick and convenient method of clamping the "E" package range of hockey puck thyristors for single-side cooling. The correct clamping force of 4460N (1000lbf) is achieved by evenly tightening the four retaining screws until the box makes contact with the heatsink.

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



Use of the Heatsink Selection Nomogram

These nomograms may be used to obtain rapidly the required sink to ambient thermal resistance for a particular application. The example shows the method.

From the starting point A, the known average on-state current, proceed to point 'B', the operating conduction angle. At this point the maximum average power dissipation may be read off at C. If the maximum ambient temperature is known, proceed vertically from this figure at point E to cross the extension of line C—B at D. The thermal impedance may now be found by taking the lines on either side of point D and choosing the lower figure or by interpolation. The final figure is then found by subtracting the ΔR figure appropriate to the conduction angle in the right hand table.

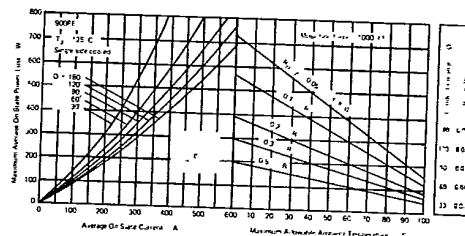
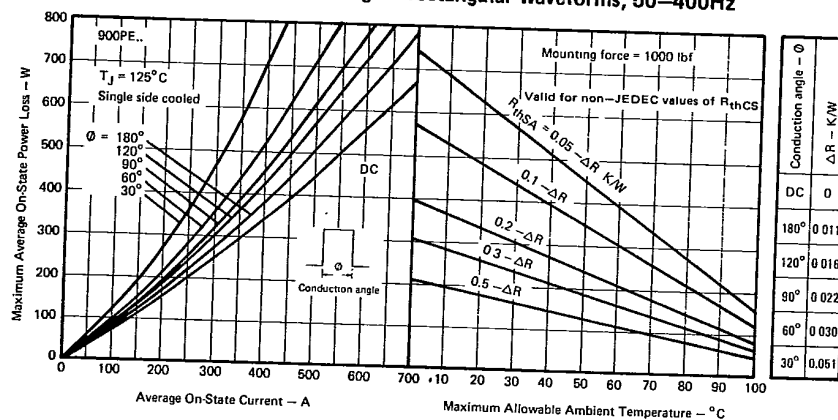


Fig. 2 — Current Ratings — rectangular waveforms, 50–400Hz



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

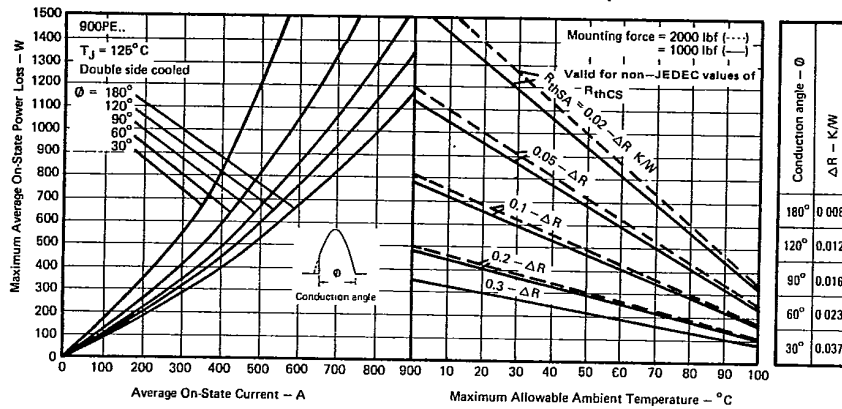


Fig. 4 — Current Ratings — rectangular waveforms, 50–400Hz

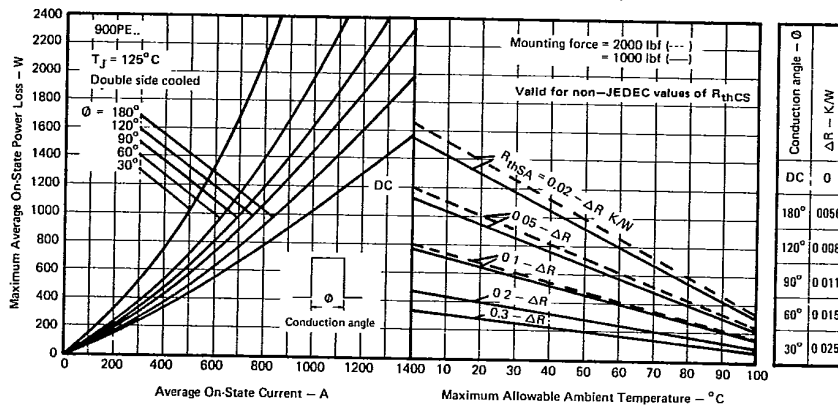
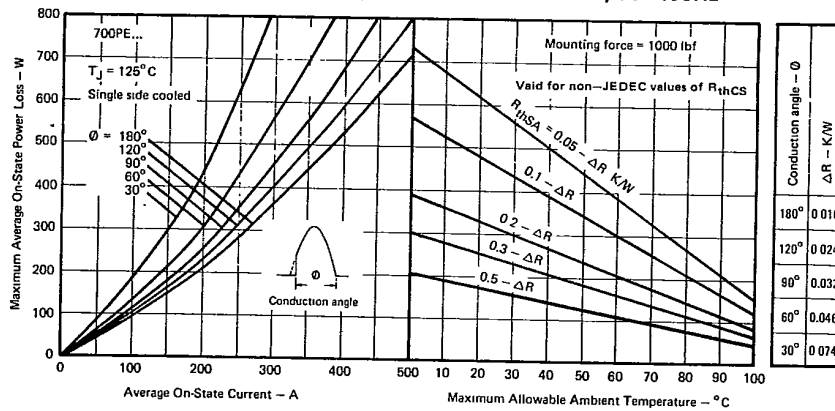


Fig. 5 — Current Ratings — sinusoidal waveforms, 50–400Hz



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Fig. 6 – Current Ratings – rectangular waveforms, 50–400Hz

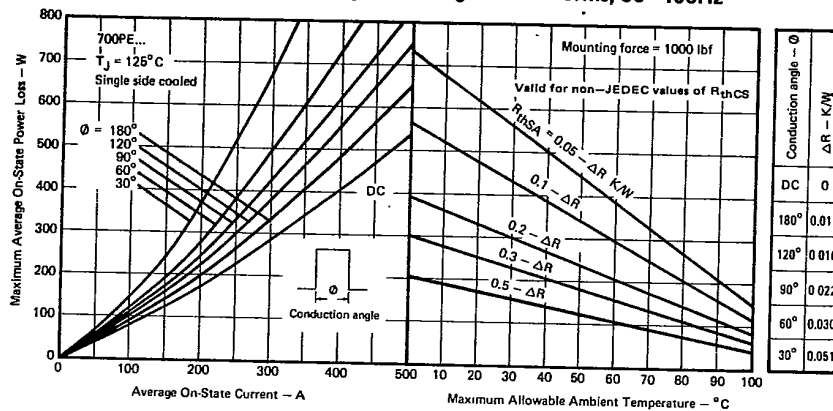


Fig. 7 – Current Ratings – sinusoidal Waveforms, 50–400Hz

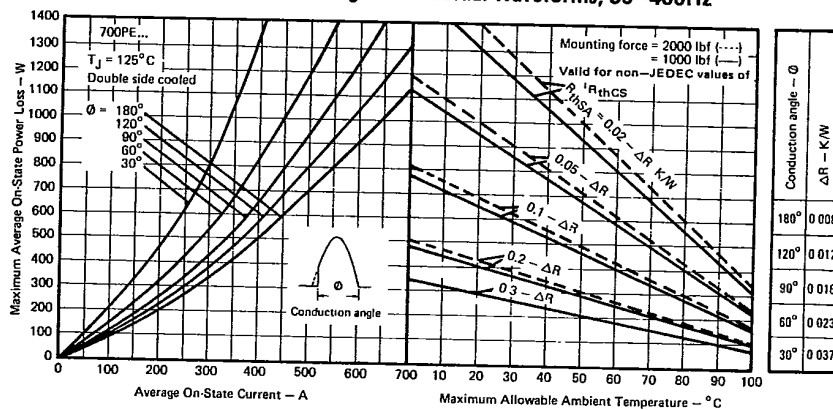


Fig. 8 – Current Ratings – rectangular waveforms, 50–400Hz

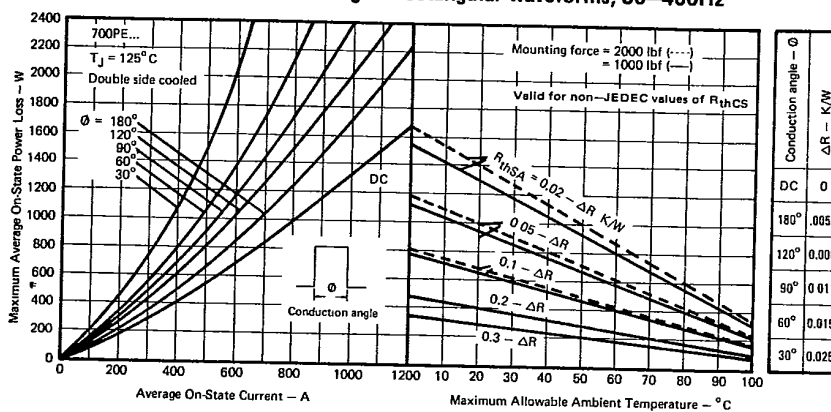


Fig. 9 – Case Temperature Ratings

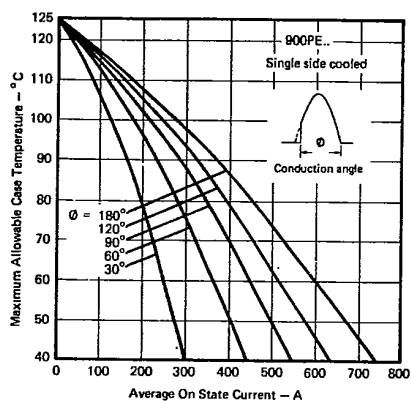


Fig. 10 – Case Temperature Ratings

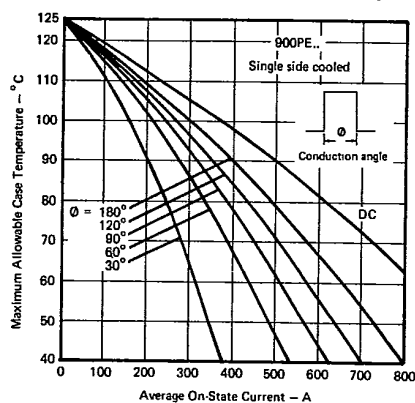


Fig. 11 – Case Temperature Ratings

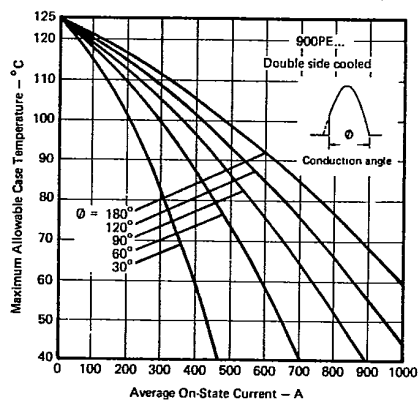


Fig. 12 – Case Temperature Ratings

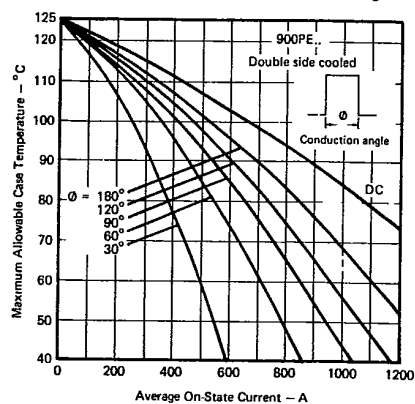


Fig. 13 – Case Temperature Ratings

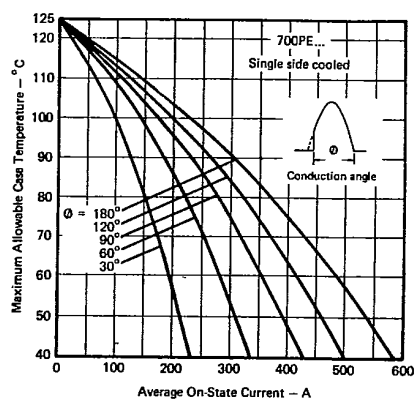


Fig. 14 – Case Temperature Ratings

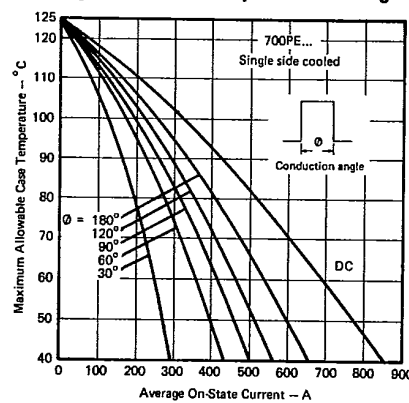


Fig. 15 — Case Temperature Ratings

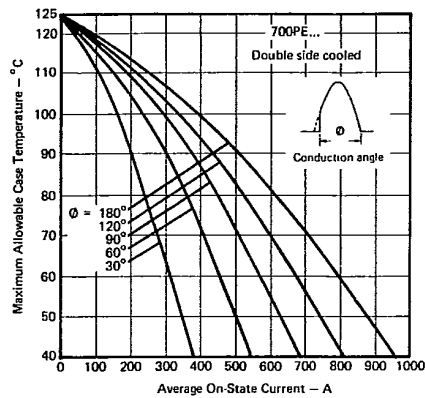


Fig. 16 — Case Temperature Ratings

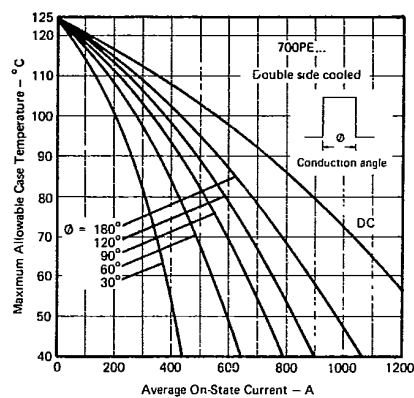


Fig. 17 — Power Loss Characteristics

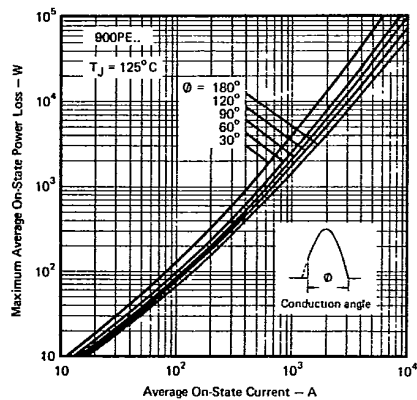


Fig. 18 — Power Loss Characteristics

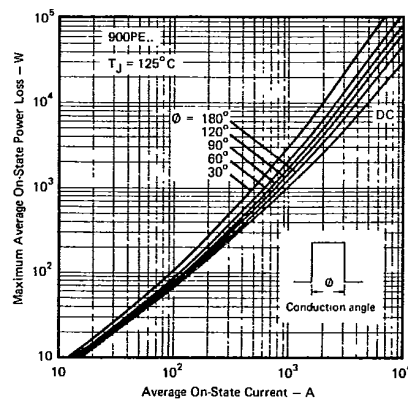


Fig. 19 — Power Loss Characteristics

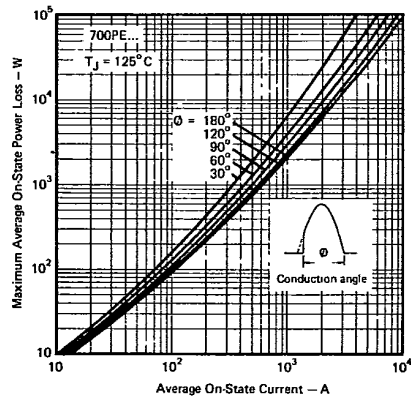
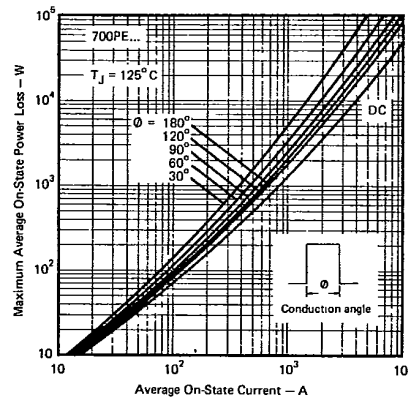


Fig. 20 — Power Loss Characteristics



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Fig. 21 — On-State Characteristics

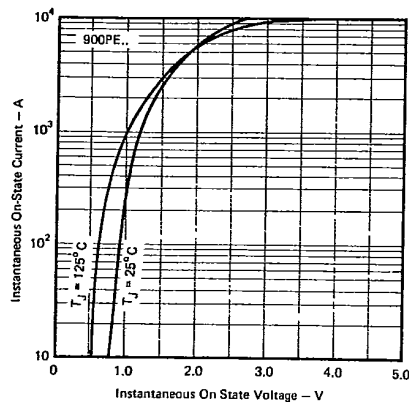


Fig. 22 — On-State Characteristics

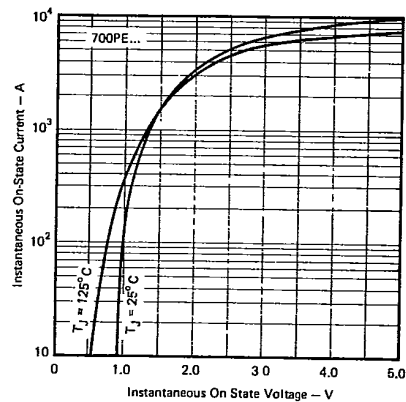


Fig. 23 — Gate Characteristics

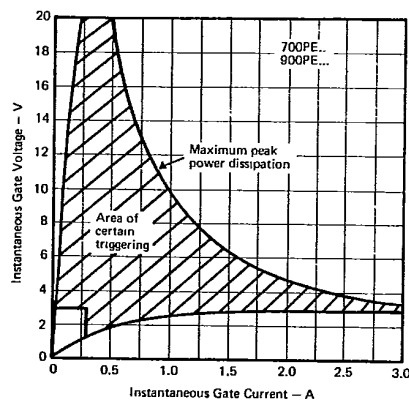


Fig. 24 — Gate Characteristics

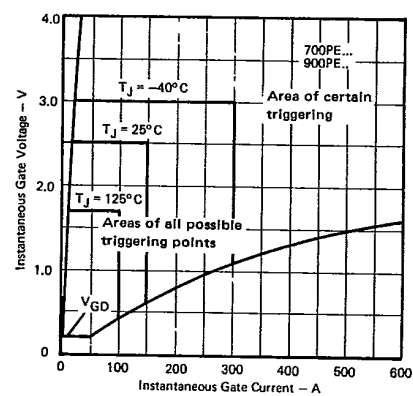


Fig. 25 — Transient Thermal Impedance

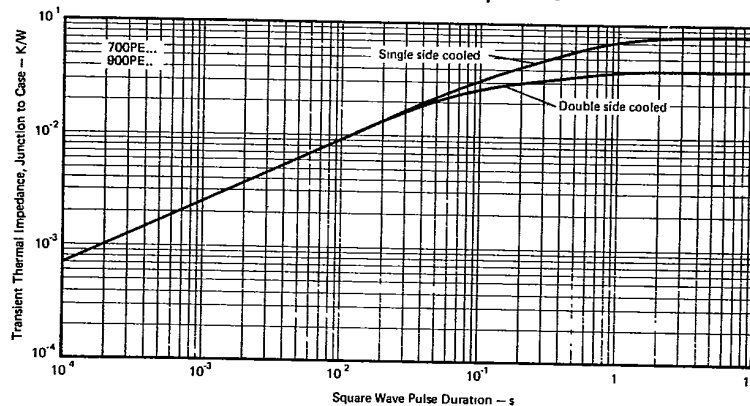


Fig. 26 — Non-Repetitive Surge Ratings

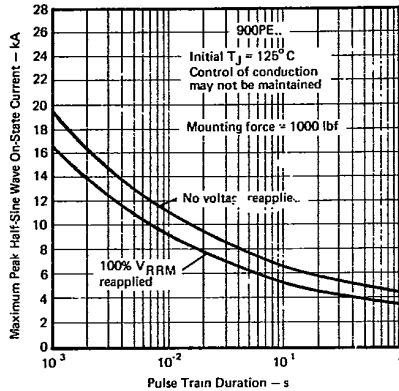


Fig. 27 — Non-Repetitive Surge Ratings

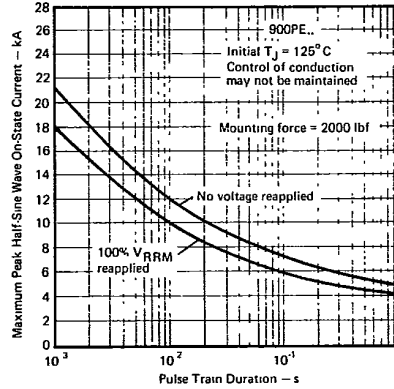


Fig. 28 — Non-Repetitive Surge Ratings

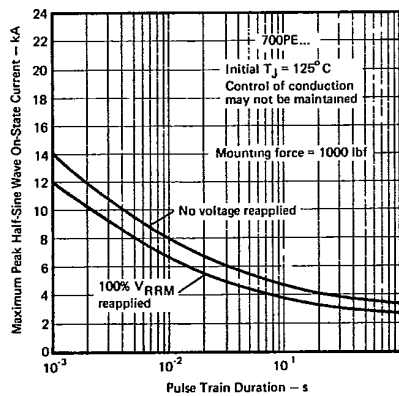
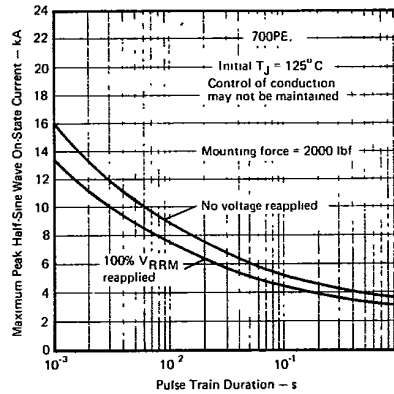


Fig. 29 — Non-Repetitive Surge Ratings



INTERNATIONAL RECTIFIER



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