Data Sheet No. PD-3.067

INTERNATIONAL RECTIFIER IOR

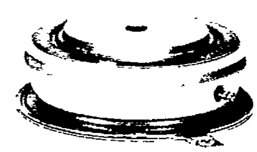
T-25-20

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.

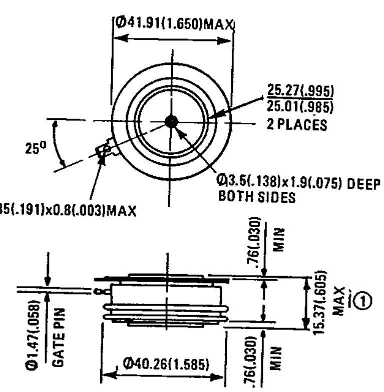


Features

* 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	7500	A
	60Hz	10,500	7800	A
I^2t	50Hz	500,000	280,000	A^2s
	60Hz	456,000	256,000	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		°C



All dimensions in millimeters and (inches)
① - clamped dimension

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°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°C
	Mounting force ± 10%	2000	1000	2000	1000	lbf	
I_{TSM}	Maximum peak, one cycle non repetitive on state current	12000	11 000	9000	8000	A	t = 10ms; No voltage reapplied; Sinusoidal half-wave, Initial T_J = 125°C
		12500	11500	9400	8300	A	t = 8.3ms; No voltage reapplied
		10 000	9250	7500	6700	A	t = 10ms; 100% V_{RRM} reapplied
		10 500	9700	7800	7000	A	t = 8.3ms; 100% V_{RRM} reapplied
I^2t	Maximum I^2t for fusing	720	605	405	320	kA^2s	t = 10ms; No voltage reapplied; Initial T_J = 125°C
		656	551	370	290	kA^2s	t = 8.3ms; No voltage reapplied
		500	428	280	225	kA^2s	t = 10ms; 100% V_{RRM} reapplied
		456	390	256	205	kA^2s	t = 8.3ms; 100% V_{RRM} reapplied
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	7200	6050	4050	3200	$kA^2\sqrt{s}$	t = 0.1 – 10ms, no voltage reapplied
V_{TM}	Maximum peak on-state voltage	1.50		1.66		V	T_J = 25°C, 180° conduction, $I_{TM} = \pi \times I_{T(AV)}$ (2200A peak for 700PE, 2825A peak for 900PE)
di/dt	Maximum non repetitive rate of rise of turned on current	800		800		A/µs	JEDEC STD RS–397 5.2.2.6. T_c = 125°C, V_{DM}=V_{DRM}, I_{TM} = 1800A for the 900PE and 1600A for the 700PE gate source 20V open circuit 20Ω t_r = 0.5µs, t_p = 20µs
I_H	Maximum holding current	250		250		mA	T_J = 25°C, anode supply = 6V, resistive load, gate open circuit
I_L	Maximum latching current	500		500		mA	T_J = 25°C, anode supply = 6V, resistive load.

Triggering

		900PE	700PE	Units	Conditions
P_{GM}	Maximum peak gate power	10	10	W	t_p≤5ms
$P_{G(AV)}$	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		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	0.2	V	T_J = 125°C, rated V_{DRM} applied

Switching

		900PE	700PE	Units	Conditions
t_d	Maximum delay time	1.0	1.2	µs	T_J = 25°C, V_D = 0.8 V_{DRM}, I_{TM} = 260A, 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	180	200	µs	T_J = 125°C, I_{TM} = 500A for 200µs, V_R = 50V reapplied dv/dt = 20 V/µs linear to 0.8 V_{DRM} di/dt = 25A/µs
Q_{rr}	Typical stored charge	370	470	µc	T_J = 125°C, I_{TM} = 400A, –di/dt = 20 A/µs

Blocking

		900PE	700PE	Units	Conditions
dV/dt	Minimum critical rate of rise of off-state voltage	300	500V	V/µs	T_J = 125°C, linear to 0.8 V_{DRM}, gate open circuit

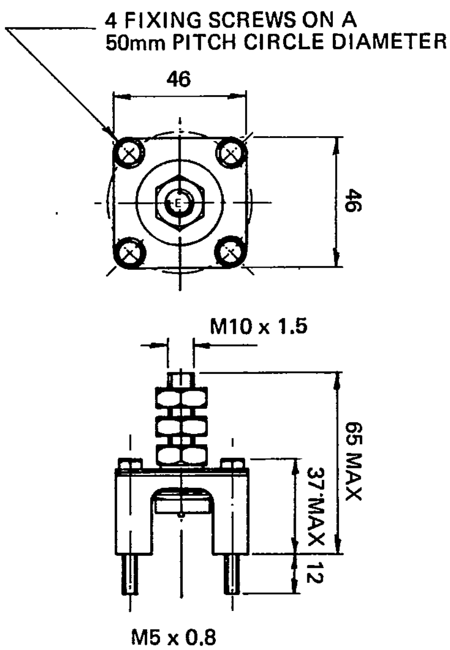
Voltage ratings

Part number		V_{RRM}, maximum repetitive peak reverse voltage $V_g \leq 0$ T_J = –40°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°C to 125°C	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
900PE10	700PE10	100	200	100	30
900PE20	700PE20	200	300	200	30
900PE40	700PE40	400	500	400	30
900PE60	700PE60	600	700	600	30
	700PE80	800	900	800	30
	700PE100	1000	1100	1000	30
	700PE120	1200	1300	1200	30

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



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The box clamp offers a quick and convenient method of clamping the "E" package range of hockey puk 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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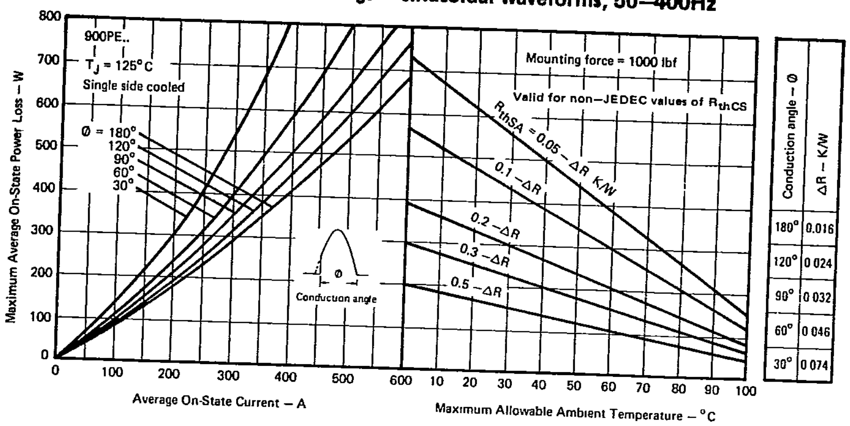
Fig. 1 — Current Ratings — sinusoidal waveforms, 50–400Hz



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.

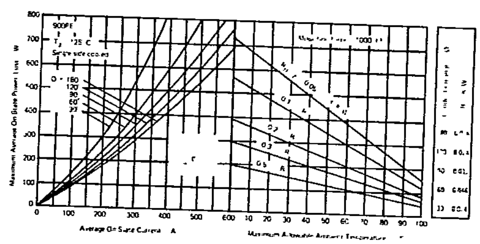


Fig. 2 — Current Ratings — rectangular waveforms, 50–400Hz

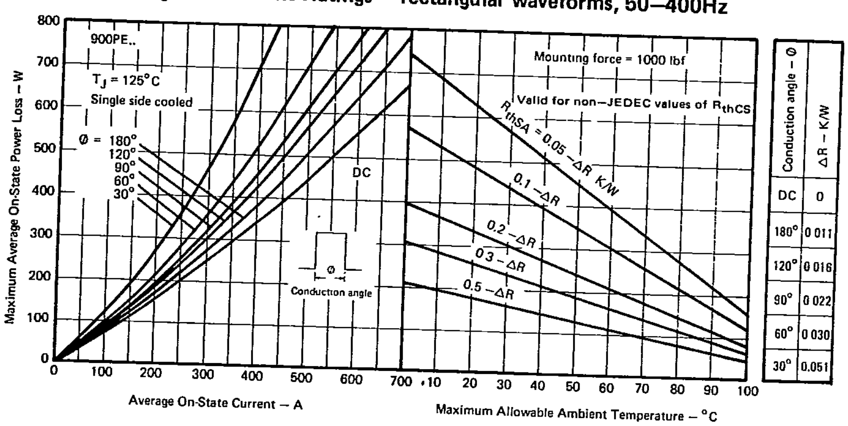
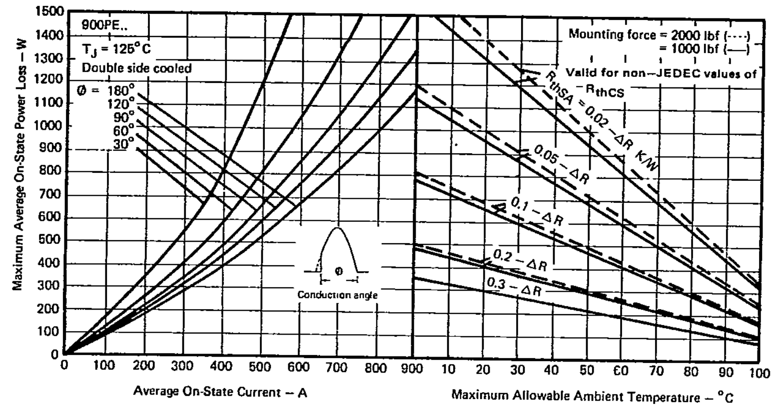
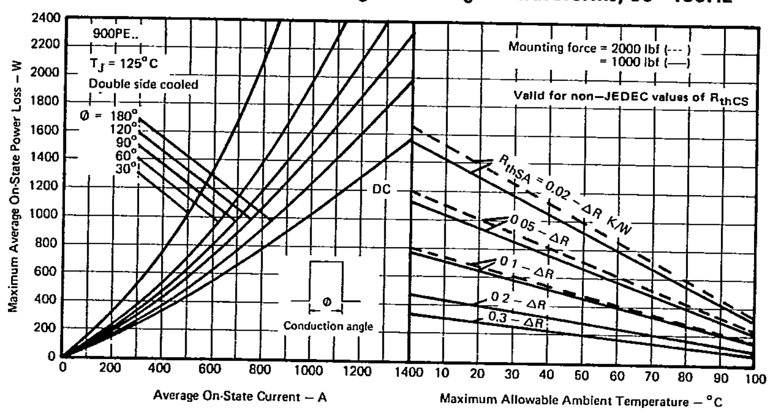


Fig. 3 — Current Ratings — sinusoidal waveforms, 50—400Hz



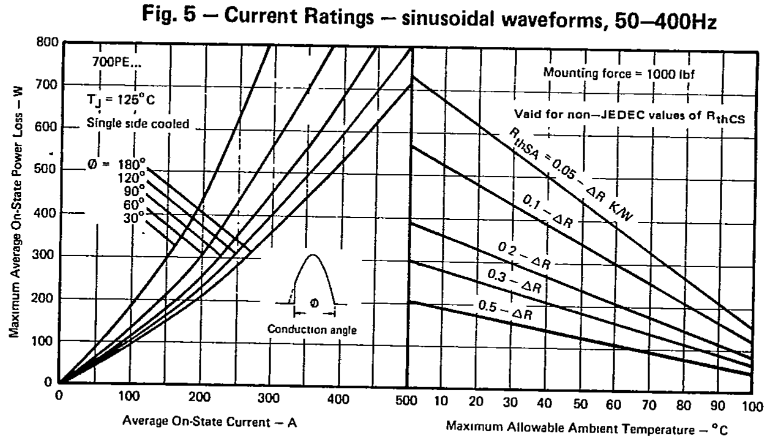
Conduction angle – Ø	ΔR – K/W
180°	0.008
120°	0.012
90°	0.016
60°	0.023
30°	0.037

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



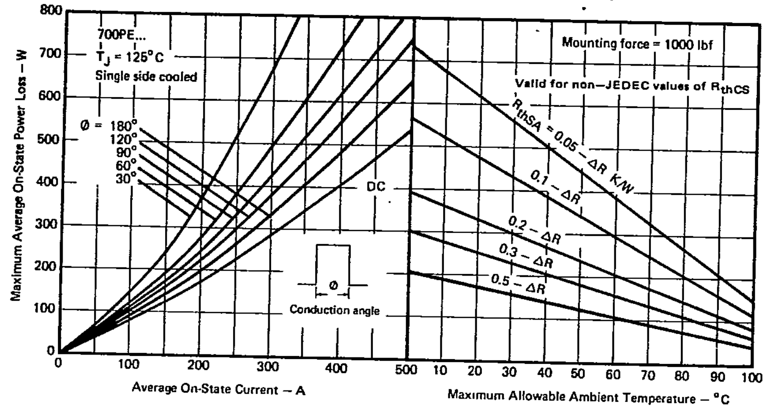
Conduction angle – Ø	ΔR – K/W
DC	0
180°	0056
120°	0.008
90°	0.011
60°	0.015
30°	0.025

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



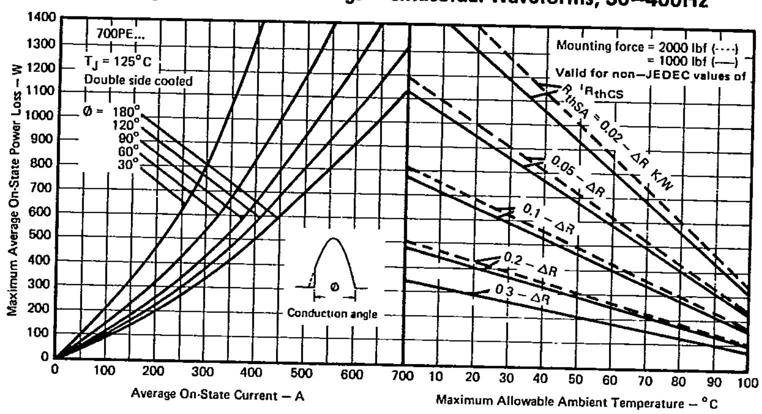
Conduction angle – Ø	ΔR – K/W
180°	0.016
120°	0.024
90°	0.032
60°	0.046
30°	0.074

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



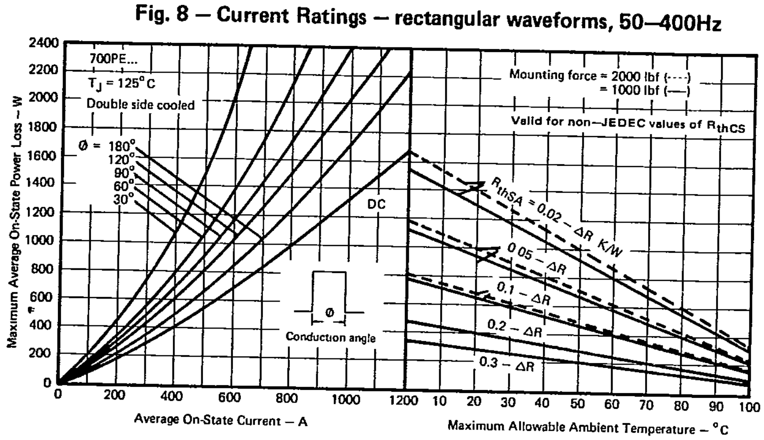
Conduction angle – Ø	ΔR – K/W
DC	0
180°	0.011
120°	0.016
90°	0.022
60°	0.030
30°	0.051

Fig. 7 — 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. 8 — Current Ratings — rectangular waveforms, 50–400Hz



Conduction angle – Ø	ΔR – K/W
DC	0
180°	.0056
120°	0.008
90°	0.011
60°	0.015
30°	0.025

Fig. 9 — Case Temperature Ratings

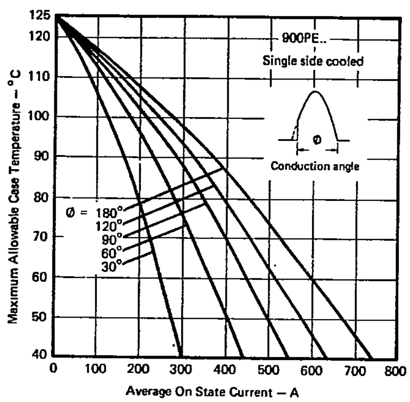


Fig. 10 — Case Temperature Ratings

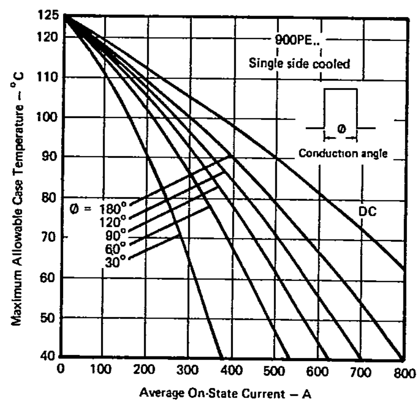


Fig. 11 — Case Temperature Ratings

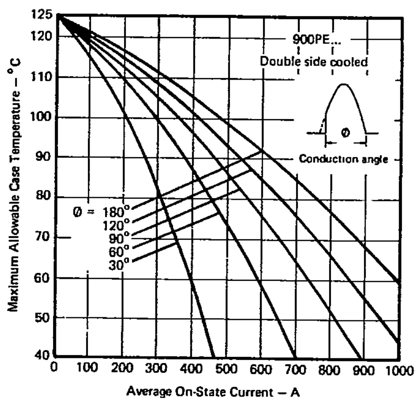


Fig. 12 — Case Temperature Ratings

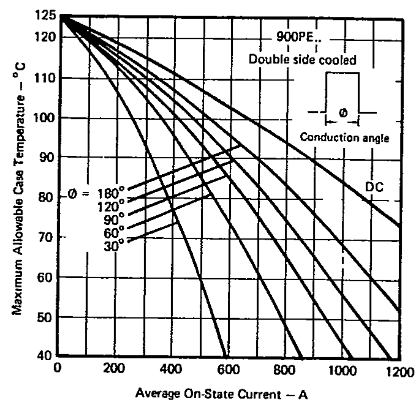


Fig. 13 — Case Temperature Ratings

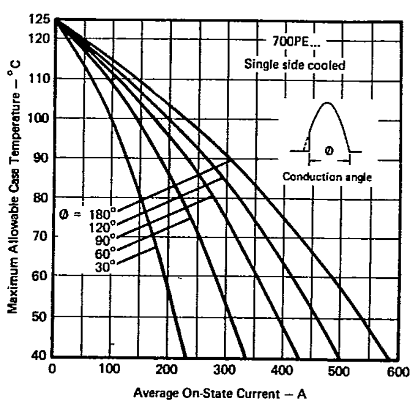


Fig. 14 — Case Temperature Ratings

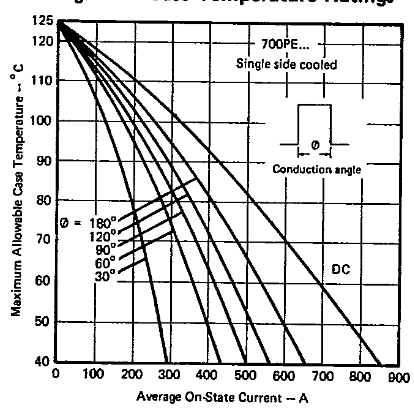


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Fig. 15 — Case Temperature Ratings

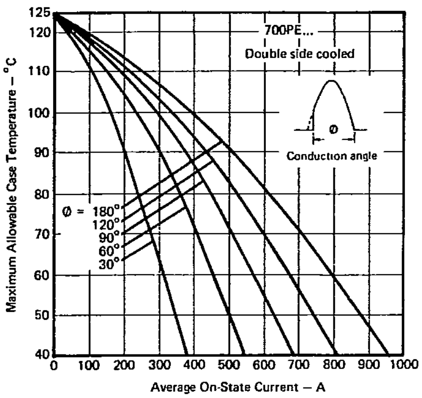


Fig. 16 — Case Temperature Ratings

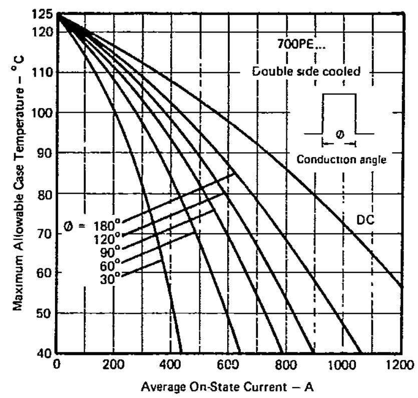


Fig. 17 — Power Loss Characteristics

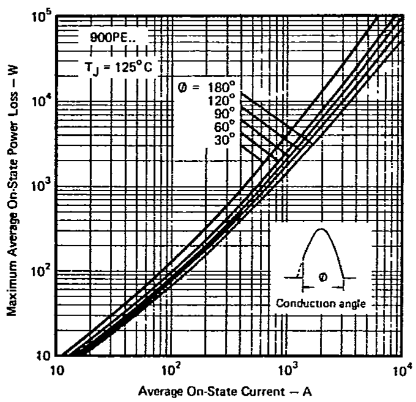


Fig. 18 — Power Loss Characteristics

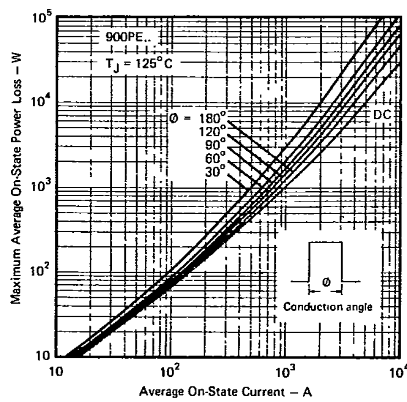


Fig. 19 — Power Loss Characteristics

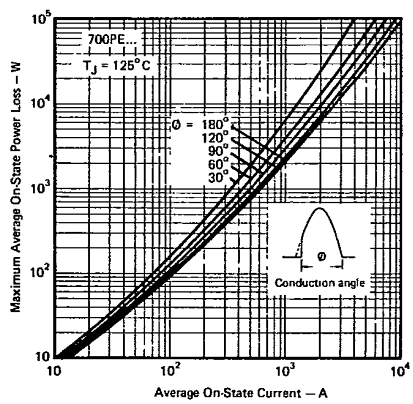


Fig. 20 — Power Loss Characteristics

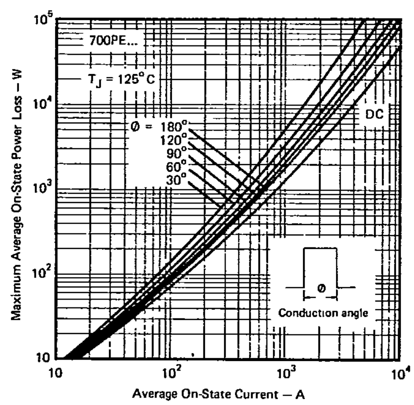


Fig. 21 — On-State Characteristics

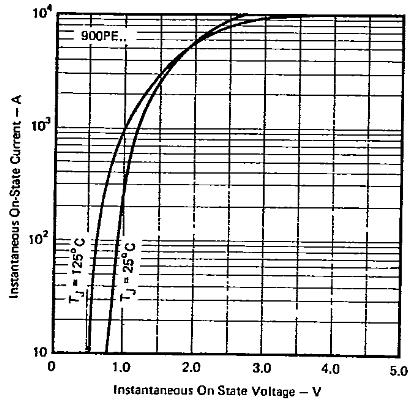


Fig. 22 — On-State Characteristics

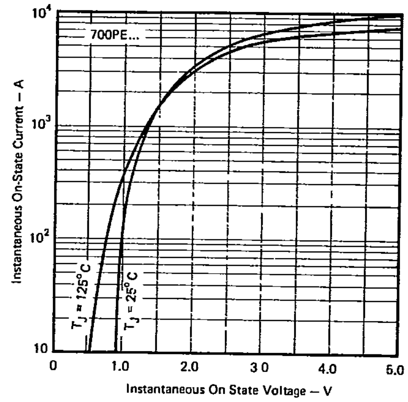


Fig. 23 — Gate Characteristics

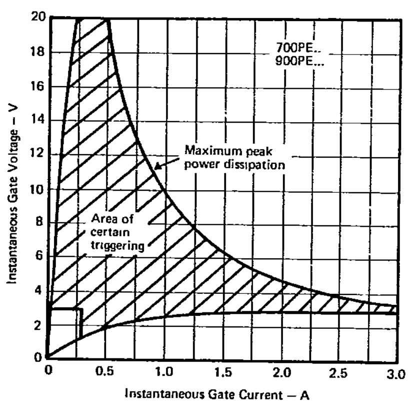


Fig. 24 — Gate Characteristics

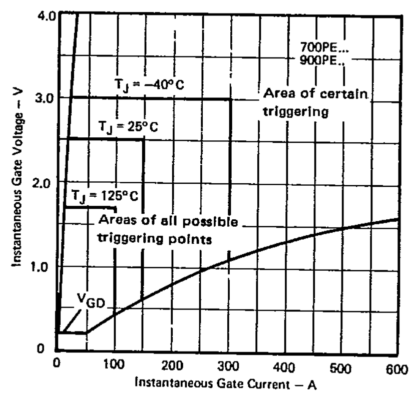


Fig. 25 — Transient Thermal Impedance

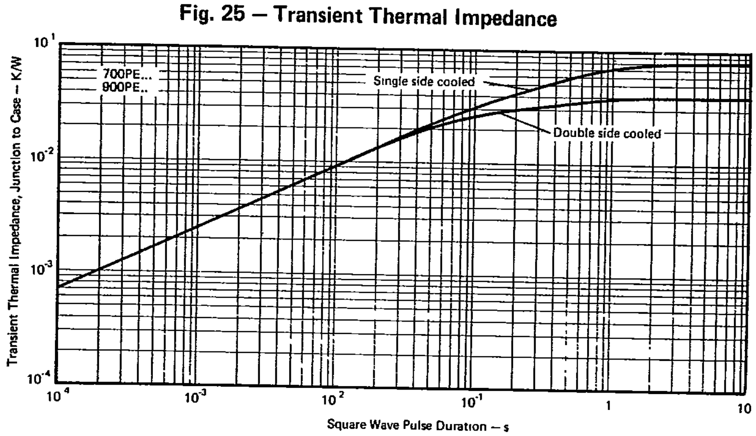


Fig. 26 — Non-Repetitive Surge Ratings

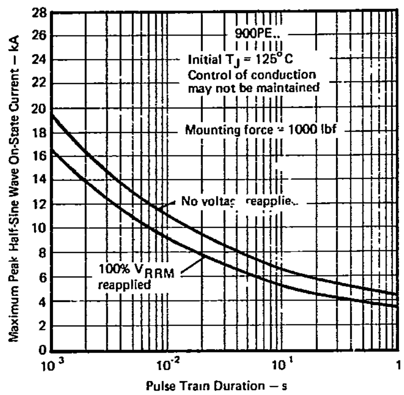


Fig. 27 — Non-Repetitive Surge Ratings

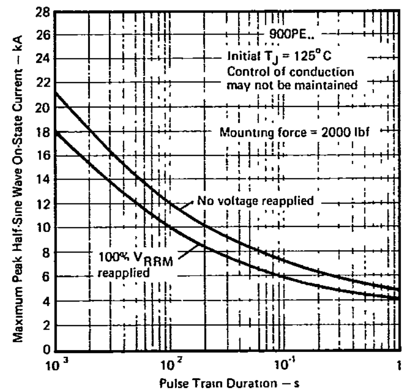


Fig. 28 — Non-Repetitive Surge Ratings

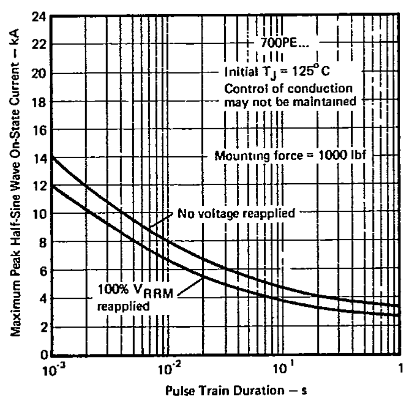
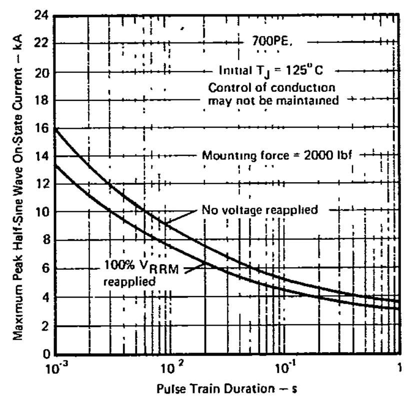


Fig. 29 — Non-Repetitive Surge Ratings



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