Ruttonsha International Rectifier Ltd.

PHASE CONTROL THYRISTORS

HOCKEY PUCK VERSION

Type : 1400 PK 120 To 280

1473A

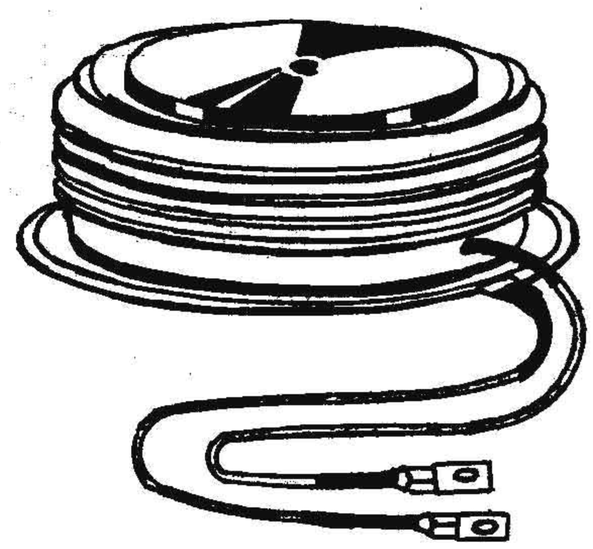
Features

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case (K-PUK)
- High profile hockey-puk

Typical Applications

- D C motor controls
- Controlled D C power supplies
- A C controllers

1400 PK (K - PUK)



Major Ratings and Characteristics :-

PARAMETERS	1400 PK	UNITS
$I_{T(AV)}$	1473	A
@T_{hs}	55	°C
$I_{T(RMS)}$	2913	A
@T_{hs}	55	°C
I_{TSM} @50Hz	20.0	KA
I^2t @50Hz	2000	KA^2s
$I^2\sqrt{t}$	20000	$KA^2\sqrt{s}$
V_{DRM} / V_{RRM}	1200 to 2800	V
T_q typical	300	µs
T_J	- 40 to 125	°C

ELECTRICAL SPECIFICATIONS 1400 PK 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
1400 PK	160	1600	1700	100
	200	2000	2100	
	220	2200	2300	
	240	2400	2500	
	260	2600	2700	
	280	2800	2900	

On - state Conduction

	Parameter	1400 PK	Units	Conditions		
$I_{T(AV)}$	Max. average on-state current	1473	A	180° conduction, half sine wave		
	@ Heatsink temperature	55	°C	double side cooled		
$I_{T(RMS)}$	Max RMS on-state current	6540	A	DC@55°C heatsink temperature double side cooled		
I_{TSM}	Max. peak, one-cycle non-repetitive surge current	20.0	KA	t = 10 ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J=T_J$ max.
I^2t	Maximum I^2t for fusing	2000	KA^2s	t = 10 ms	No voltage reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	20000	$KA^2\sqrt{s}$	t = 0.1 to 10 ms, no voltage reapplied		
$V_{T(TO)}$	Threshold voltage	0.950	V	$T_J=T_J$ max.		
r_t	On-state slope resistance	0.283	mΩ	$T_J=T_J$ max.		
V_{TM}	Max. on state voltage drop	1.80	V	I_{PK} = 3000A,T_J= 125°C, t_P = 10 ms sine pulse		
I_H	Maximum holding current	600	mA	T_J = 25°C , anode supply 12 V resistive load		
I_L	Typical latching current	1000				

1400 PK Series

Switching

	Parameter	1400 PK	Units	Conditions
di/dt	Max. non-repetitive rate of rise of turned-on current	100	A/µs	Gate drive 20V, 20Ω , $t_r \leq 1\mu s$ T_J=T_J max. anode voltage ≤ 80% V_{DRM}
t_d	Typical delay time	1.9	µs	Gate current 1A, di_g/dt = 1A/µs V_d = 0.67% V_{DRM} , T_J = 25° C
t_q	Typical turn-off time	300	A/µs	I_{TM} = 550A, T_J=T_J max. di/dt = 40A/µs ,V_R = 50V dv/dt = 20V/µs , Gate OV 100 Ω, t_p = 500µs

Blocking

	Parameter	1400 PK	Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	V/µs	T_J = T_J max. linear to 80% rated V_{DRM}
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	100	µs	T_J = T_J max. rated V_{DRM} /V_{RRM} applied

Triggering

	Parameter	1400 PK	Units	Conditions
P_{GM}	Maximum peak gate power	16	W	T_J = T_J max., $t_p \leq 5$ ms
$P_{G(AV)}$	Maximum average gate power	3	W	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 voltage required to trigger	250	mA	T_J = 25°C
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.
V_{GD}	DC gate voltage not to trigger	0.25	V	

Max.required gate trigger/ current/voltage are the lowest value which will trigger all units 12 V anode-to-cathode applied

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

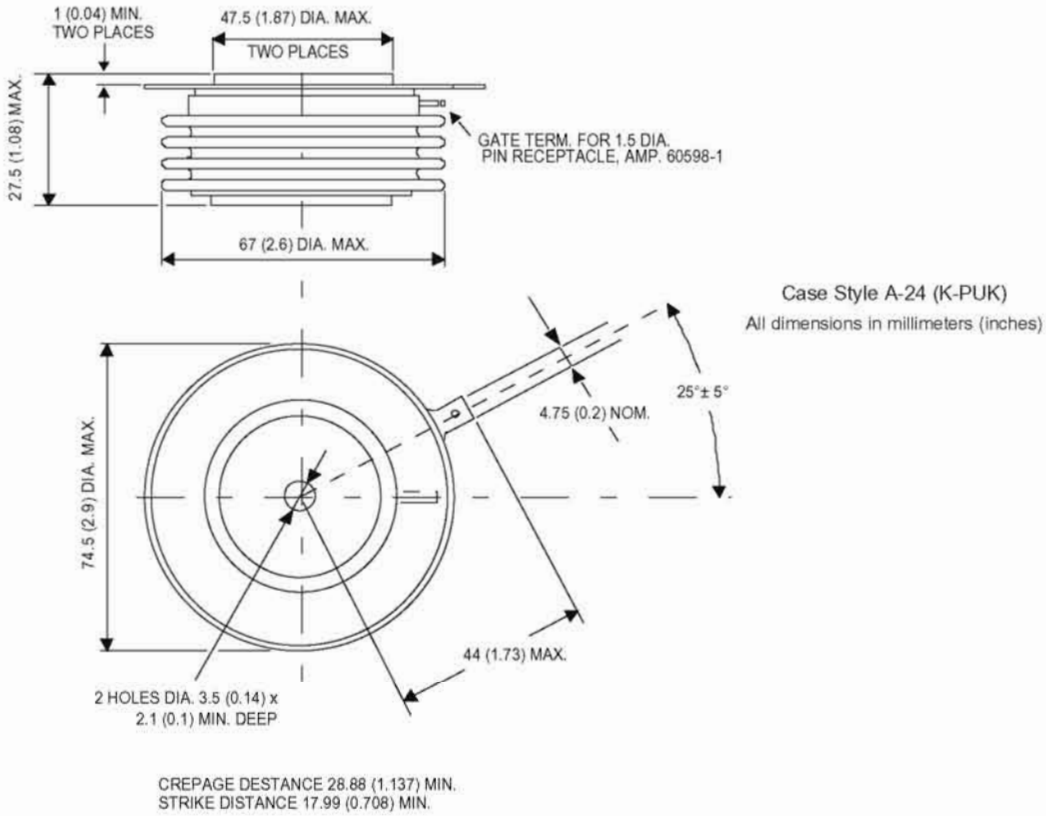
1400 PK Series

Thermal and Mechanical Specifications

	Parameter	1400 PK	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	0.024	K/W	DC operation double side cooled
R_{thC-hs}	Max. thermal resistance, case to heatsink	0.003	K/W	DC operation double side cooled
F	Mounting force, ± 10%	24500 (2500)	N (Kg.)	
wt	Approximate weight	425	g	
	Case style	A-24(K-PUK)		See Outline Table

1400 PK Series

Outline Table



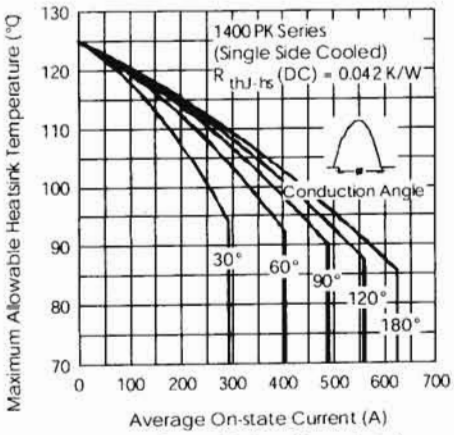


Fig. 1 - Current Ratings Characteristics

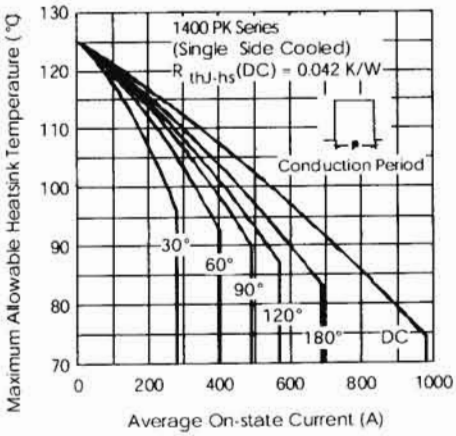


Fig. 2 - Current Ratings Characteristics

1400 PK Series

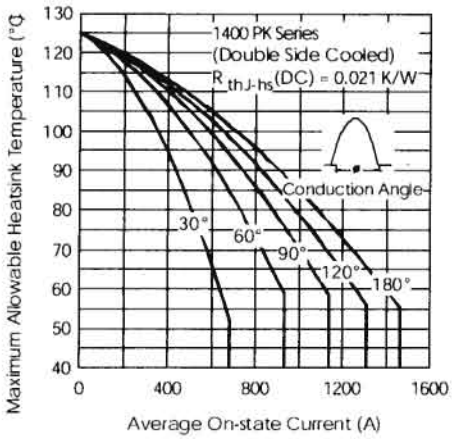


Fig. 3 - Current Ratings Characteristics

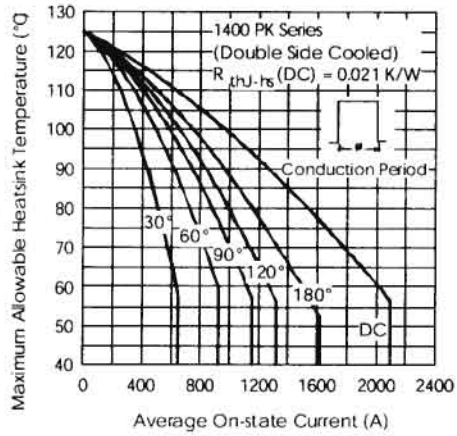


Fig. 4 - Current Ratings Characteristics

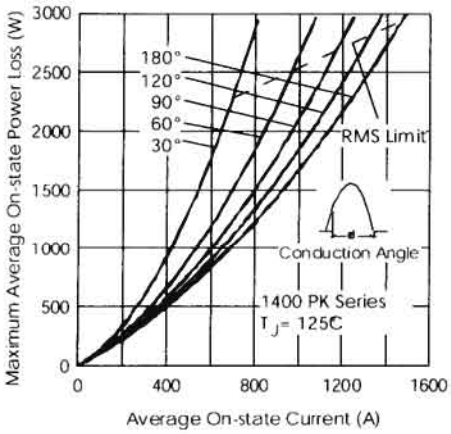


Fig. 5- On-state Power Loss Characteristics

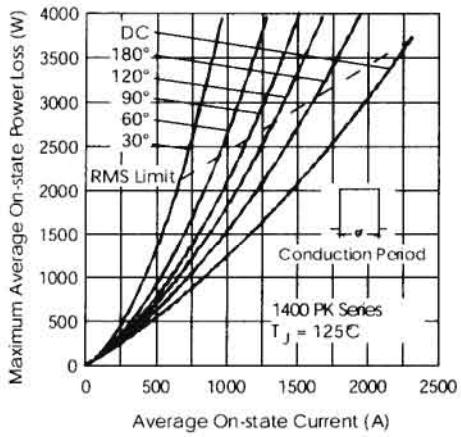


Fig. 6- On-state Power Loss Characteristics

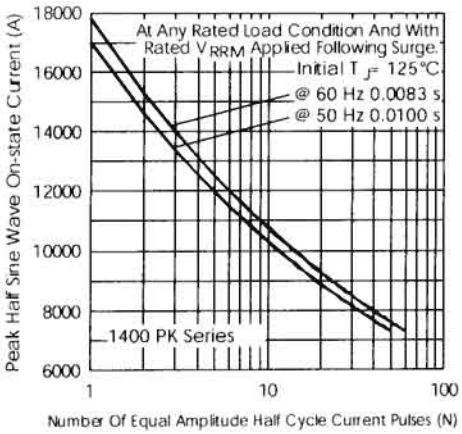


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

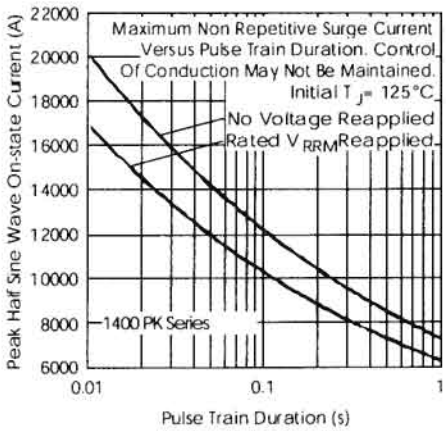


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

1400 PK Series

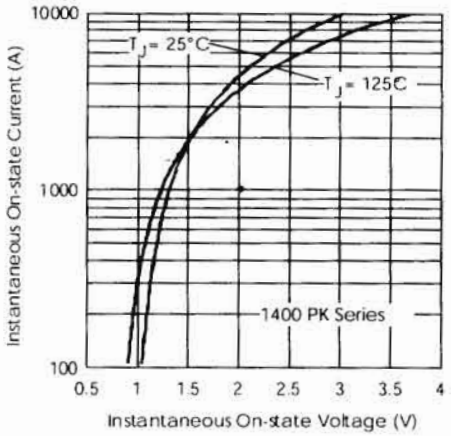


Fig. 9 - On-state Voltage Drop Characteristics

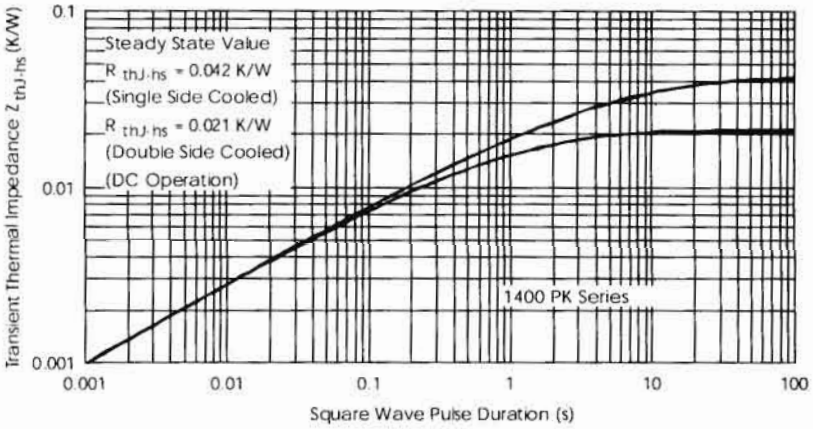


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

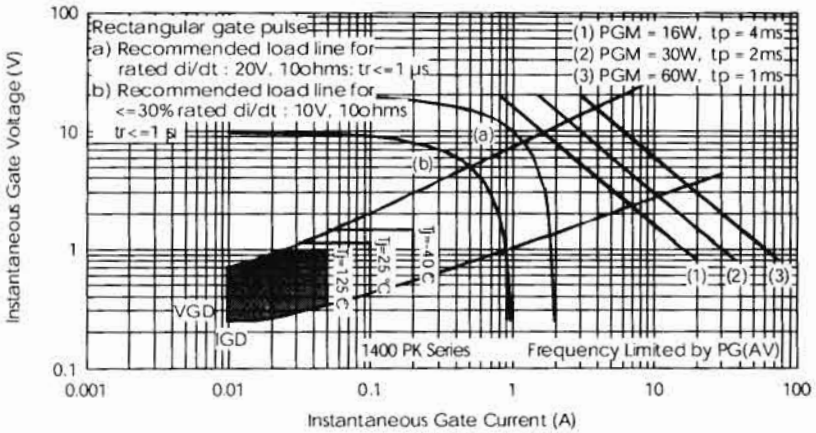


Fig. 11 - Gate Characteristics