

Bulletin I25197 rev. B 02/00

International
IOR Rectifier

ST1900C..R SERIES

PHASE CONTROL THYRISTORS

Hockey Puk Version

Features

- Double side cooling
- High surge capability
- High mean current
- Fatigue free

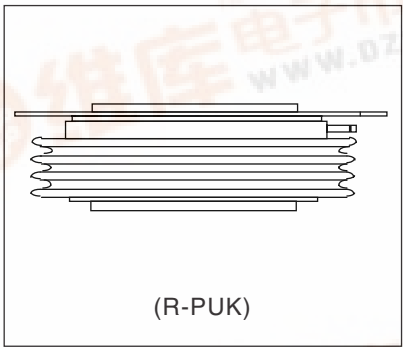
Typical Applications

- DC motor controls
- Controlled DC power supplies
- AC controllers

Major Ratings and Characteristics

Parameters	ST1900C..R	Units
$I_{T(AV)}$	1625	A
@ T_C	80	°C
$I_{T(AV)}$	1940	A
@ T_{hs}	55	°C
$I_{T(RMS)}$	3500	A
@ T_{hs}	25	°C
I_{TSM}	@ 50Hz	27500
	@ 60Hz	29000
I^2t	@ 50Hz	3780
	@ 60Hz	3490
V_{DRM}/V_{RRM}	4500 to 5200	V
t_q	typical	500
T_J	max.	125
		°C

1940A



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ELECTRICAL SPECIFICATIONS

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. @ $T_C = 125^\circ\text{C}$ mA
ST1900C..R	45	4500	4600	250
	46	4600	4700	
	48	4800	4900	
	50	5000	5100	
	52	5200	5300	

On-state Conduction

Parameter	ST1900C..R	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Case temperature	1625 (1030) 80	A $^\circ\text{C}$	180° conduction, half sine wave double side (single side [anode side]) cooled
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	1940 (800) 55 (85)	A $^\circ\text{C}$	
$I_{T(RMS)}$ Max. RMS on-state current	3500	A	
I_{TSM} Max. peak, one-cycle non-repetitive surge current	27500 29000 22000 23500	A	Sinusoidal half wave, Initial $T_C = 125^\circ\text{C}$
I^2t Maximum I^2t for fusing	3780		
	3490		
	2420		
	2290		
$V_{T(TO)}$ Max. value of threshold voltage	1.4	V	$T_J = T_J \text{ max.}$
r_t Max. value of on-state slope resistance	0.31	m Ω	$T_J = T_J \text{ max.}$
V_{TM} Max. on-state voltage	2.1	V	$I_{pk} = 2900\text{A}$, $T_C = 25^\circ\text{C}$
I_L Typical latching current	300	mA	$T_J = 25^\circ\text{C}$, $V_D = 5\text{V}$

Switching

Parameter	ST1900C..R	Units	Conditions
di/dt Max. repetitive 50Hz (no repetitive) rate of rise of turned-on current	150 (300)	A/ μs	From 67% V_{DRM} to 1000A gate drive 20V, 10 Ω , $t_r = 0.5\mu\text{s}$ to 1A, $T_J = T_J \text{ max.}$
t_d Maximum delay time	2.5	μs	Gate drive 30V, 15 Ω , $V_d = 67\% V_{DRM}$, $T_J = 25^\circ\text{C}$ Rise time 0.5 μs
t_q Typical turn-off time	500		$I_T = 1000\text{A}$, $t_p = 1\text{ms}$, $T_J = T_J \text{ max.}$, $V_{RM} = 50\text{V}$, $dI_{RR}/dt = 20\text{A}/\mu\text{s}$, $V_{DR} = 67\% V_{DRM}$, $dV_{DR}/dt = 8\text{V}/\mu\text{s}$ linear

Blocking

Parameter	ST1900C..R	Units	Conditions
dv/dt Maximum linear rate of rise of off-state voltage	500	V/ μ s	$T_J = T_J \text{ max. to } 67\% \text{ rated } V_{\text{DRM}}$
I_{RRM} I_{DRM} Max. peak reverse and off-state leakage current	250	mA	$T_J = 125^\circ\text{C}$ rated $V_{\text{DRM}}/V_{\text{RRM}}$ applied

Triggering

Parameter	ST1900C..R	Units	Conditions
P_{GM} Maximum peak gate power	150	W	$t_p = 100\mu\text{s}$
$P_{\text{G(AV)}}$ Maximum average gate power	10		
I_{GM} Max. peak positive gate current	30	A	Anode positive with respect to cathode
V_{GM} Max. peak positive gate voltage	30	V	Anode positive with respect to cathode
$-V_{\text{GM}}$ Max. peak negative gate voltage	0.25	V	Anode negative with respect to cathode
I_{GT} Maximum DC gate current required to trigger	400	mA	$T_C = 25^\circ\text{C}$, $V_{\text{DRM}} = 5\text{V}$
V_{GT} Maximum gate voltage required to trigger	4	V	$T_C = 25^\circ\text{C}$, $V_{\text{DRM}} = 5\text{V}$
V_{GD} DC gate voltage not to trigger	0.25	V	$T_C = 125^\circ\text{C}$ 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

Thermal and Mechanical Specification

Parameter	ST1900C..R	Units	Conditions
$T_J \text{ max.}$ Max. operating temperature	125	$^\circ\text{C}$	On-state (conducting)
T_{stg} Max. storage temperature range	-55 to 125		
$R_{\text{thJ-C}}$ Thermal resistance, junction to case	0.019 0.0095	K/W	DC operation single side cooled DC operation double side cooled
$R_{\text{th(C-h)}}$ Thermal resistance, case to heatsink	0.004 0.002	K/W	Single side cooled Double side cooled
F Mounting force $\pm 10\%$	43000 (4400)	N (Kg)	Clamping force 43KN with mounting compound
wt Approximate weight	1600	g	
Case style	(R-PUK)		See Outline Table

$\Delta R_{\text{thJ-C}}$ Conduction

(The following table shows the increment of thermal resistance $R_{\text{thJ-C}}$ when devices operate at different conduction angles than DC)

Conduction angle	Single side	Double side	Units	Conditions
180°	0.0010	0.0010	K/W	$T_J = T_J \text{ max.}$
120°	0.0017	0.0017		
60°	0.0044	0.0044		

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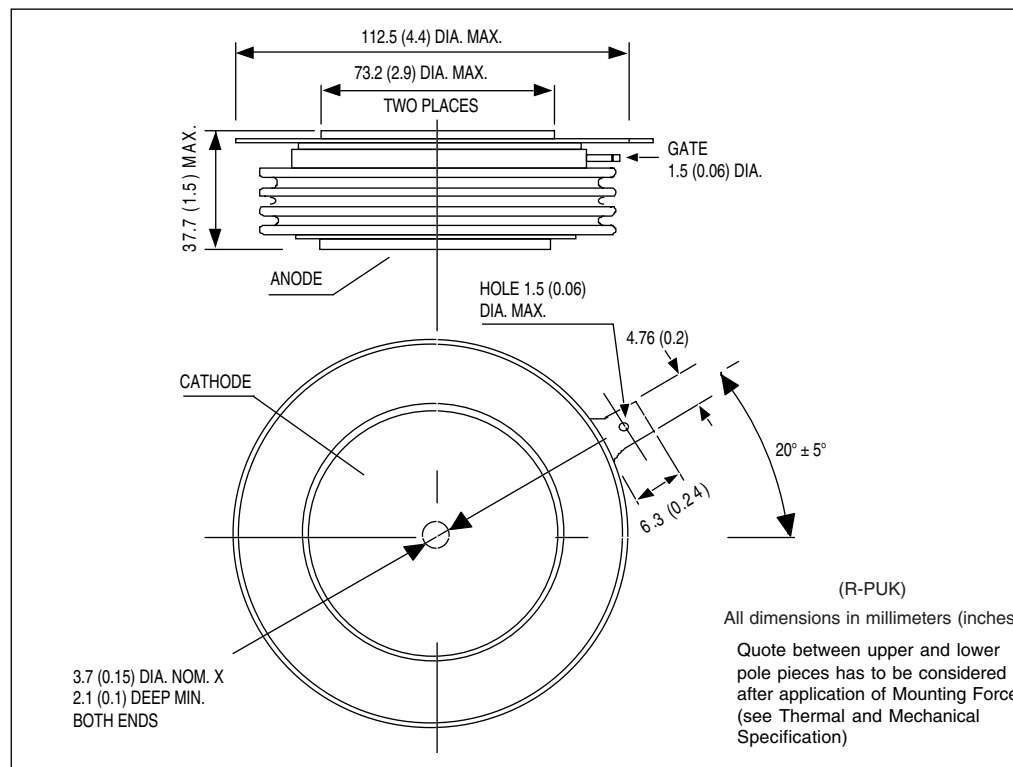
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Ordering Information Table

Device Code							
	ST	190	0	C	52	R	1
	①	②	③	④	⑤	⑥	⑦
⑧							
①	- Thyristor						
②	- Essential part number						
③	- 0 = Converter grade						
④	- C = Ceramic Puk						
⑤	- Voltage code: Code x 100 = V_{RRM} (See Voltage Rating Table)						
⑥	- R = Puk Case						
⑦	- 0 = Eyelet terminals (Gate and Auxiliary Cathode Unsoldered Leads)						
	1 = Fast-on terminals (Gate and Auxiliary Cathode Unsoldered Leads)						
	2 = Eyelet terminals (Gate and Auxiliary Cathode Soldered Leads)						
	3 = Fast-on terminals (Gate and Auxiliary Cathode Soldered Leads)						
⑧	- Critical dv/dt: None = 500V/μsec (Standard selection)						
	L = 1000V/μsec (Special selection)						

Outline Table



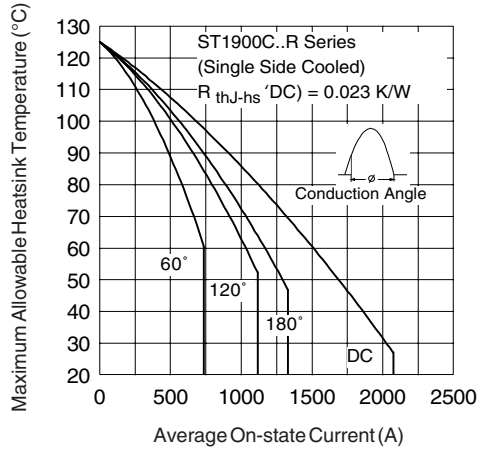


Fig. 1 - Current Ratings Characteristics

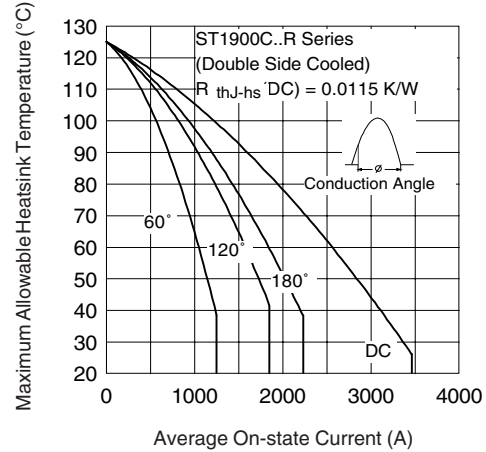


Fig. 2 - Current Ratings Characteristics

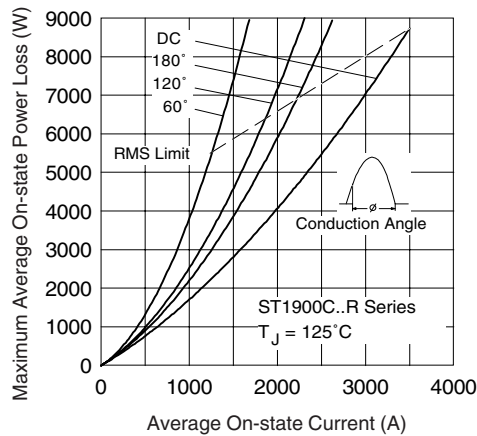


Fig. 3 - On-state Power Loss Characteristics

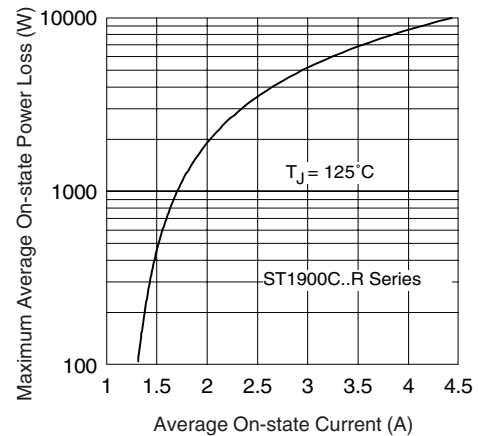


Fig. 4 - On-state Power Loss Characteristics

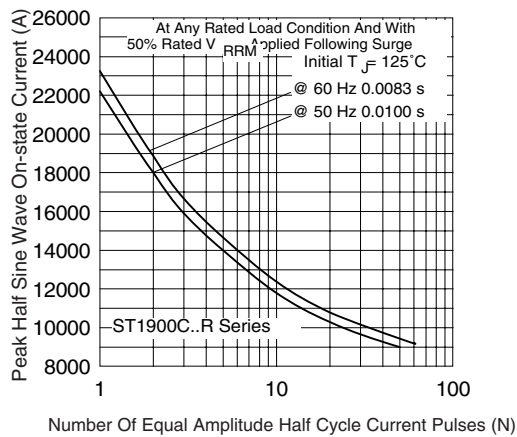


Fig. 5 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

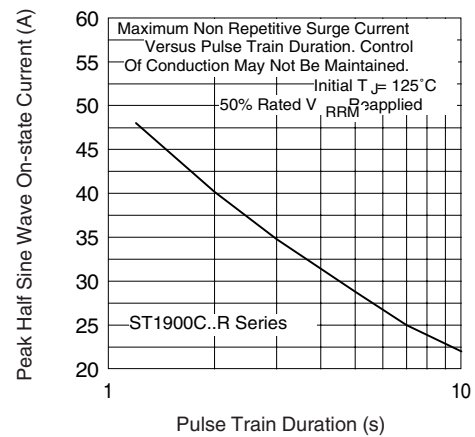


Fig. 6 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

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