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***DISCRETE POWER DIODES and THYRISTORS***  
***DATA BOOK***

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## 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

1940A



(R-PUK)

#### 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	A
	@ 60Hz 29000	A
$I^2t$	@ 50Hz 3780	KA <sup>2</sup> s
	@ 60Hz 3490	KA <sup>2</sup> s
$V_{DRM}/V_{RRM}$	4500 to 5200	V
$t_q$ typical	500	μs
$T_J$ max.	125	°C

## ST1900C..R Series

### 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)	A	180° conduction, half sine wave double side (single side [anode side]) cooled
	80	°C	
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	1940 (800)	A	
	55 (85)	°C	
$I_{T(RMS)}$ Max. RMS on-state current	3500	A	DC @ 25°C heatsink temperature double side cooled
$I_{TSM}$ Max. peak, one-cycle non-repetitive surge current	27500	A	t = 10ms No voltage reappplied
	29000		t = 8.3ms
	22000		t = 10ms 50% $V_{RRM}$ reappplied
	23500		t = 8.3ms
$I^2t$ Maximum $I^2t$ for fusing	3780	KA <sup>2</sup> s	t = 10ms No voltage reappplied
	3490		t = 8.3ms
	2420		t = 10ms 50% $V_{RRM}$ reappplied
	2290		t = 8.3ms
$V_{T(TO)}$ Max. value of threshold voltage	1.4	V	$T_J = T_J$ max.
$r_t$ Max. value of on-state slope resistance	0.31	mΩ	$T_J = T_J$ max.
$V_{TM}$ Max. on-state voltage	2.1	V	$I_{pk} = 2900A$ , $T_C = 25^\circ\text{C}$
$I_L$ Typical latching current	300	mA	$T_J = 25^\circ\text{C}$ , $V_D = 5V$

#### 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, 10Ω, $t_r = 0.5\mu\text{s}$ to 1A, $T_J = T_J$ max.
$t_d$ Maximum delay time	2.5	μs	Gate drive 30V, 15Ω, $V_d = 67\% V_{DRM}$ , $T_J = 25^\circ\text{C}$ Rise time 0.5μs
$t_q$ Typical turn-off time	500		$I_T = 1000A$ , $t_p = 1\text{ms}$ , $T_J = T_J$ max, $V_{RM} = 50V$ , $di_{RR}/dt = 20A/\mu\text{s}$ , $V_{DR} = 67\% V_{DRM}$ , $dV_{DR}/dt = 8V/\mu\text{s}$ linear

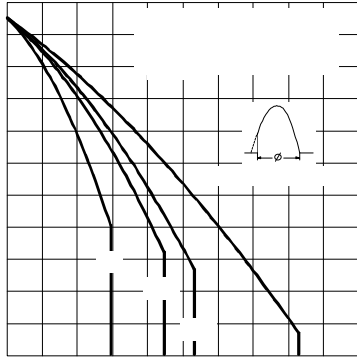


Fig. 1 - Current Ratings Characteristics

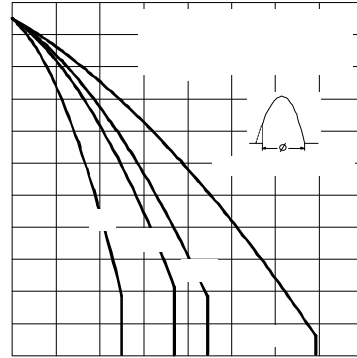


Fig. 2 - Current Ratings Characteristics

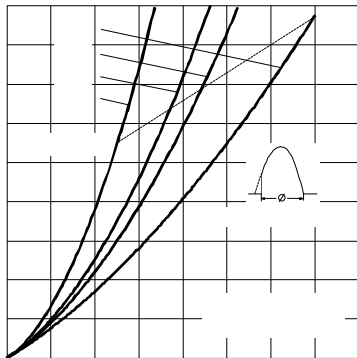


Fig. 3 - On-state Power Loss Characteristics

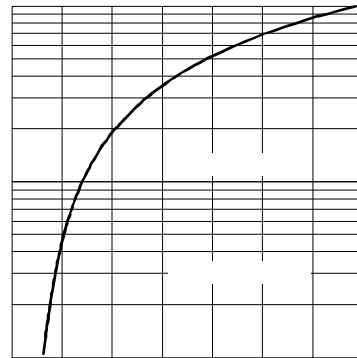


Fig. 4 - On-state Voltage Drop Characteristics

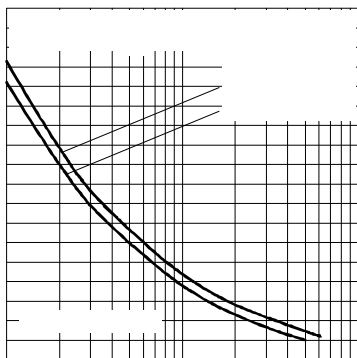


Fig. 5 - Maximum Non-Repetitive Surge Current

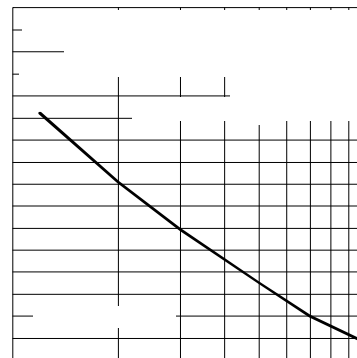


Fig. 6 - Maximum Non-Repetitive Surge Current

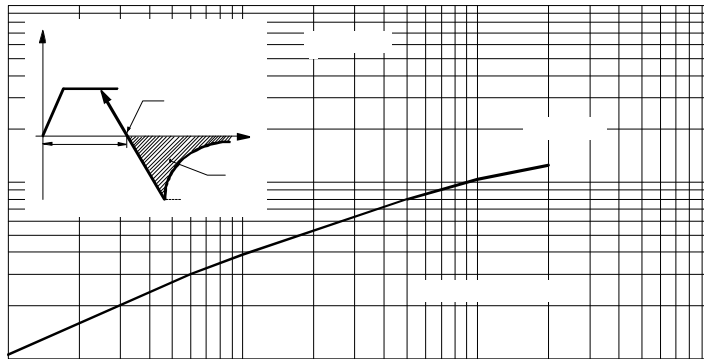


Fig. 7 - Stored Charged

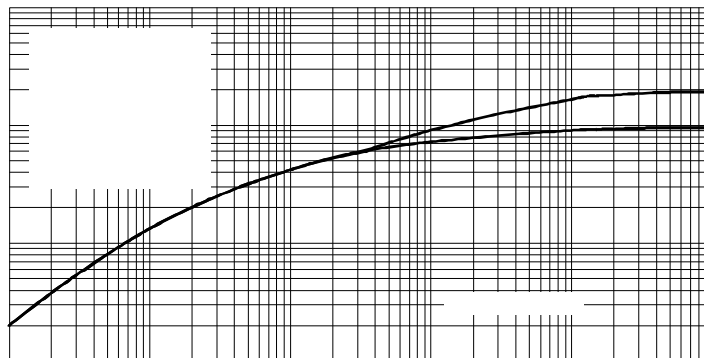


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

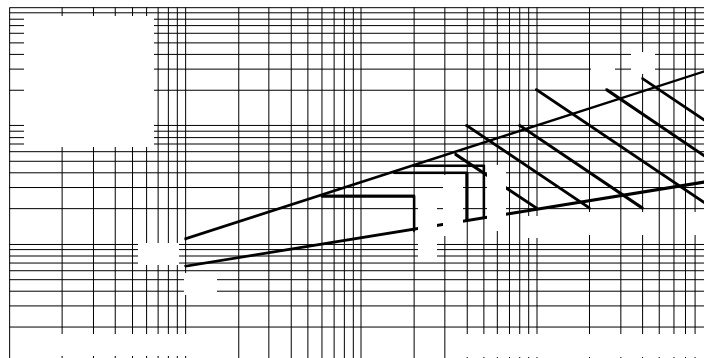


Fig. 9 - Gate Characteristics

## ST1900C..R Series

### Blocking

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

### Triggering

Parameter	ST1900C..R	Units	Conditions
$P_{GM}$ Maximum peak gate power	150	W	$t_p = 100\mu\text{s}$
$P_{G(AV)}$ 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
$-V_{GM}$ 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	$T_C = 25^\circ\text{C}$ , $V_{DRM} = 5V$
$V_{GT}$ Maximum gate voltage required to trigger	4	V	$T_C = 25^\circ\text{C}$ , $V_{DRM} = 5V$
$V_{GD}$ 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		
$R_{thJ-C}$ Thermal resistance, junction to case	0.019 0.0095	K/W	DC operation single side cooled DC operation double side cooled
$R_{th(C-h)}$ 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)	
wt Approximate weight	1600	g	
Case style	(R-PUK)		See Outline Table

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

(The following table shows the increment of thermal resistance  $R_{thJ-C}$  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		

ST1900C..R Series

Ordering Information Table

Device Code							
1	2	3	4	5	6	7	8
ST	190	0	C	52	R	1	
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/ $\mu$ sec (Standard selection)						
	L = 1000V/ $\mu$ sec (Special selection)						

Outline Table

