

# International IR Rectifier

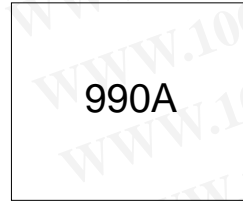
## ST730C..L SERIES

### PHASE CONTROL THYRISTORS

### Hockey Puk Version

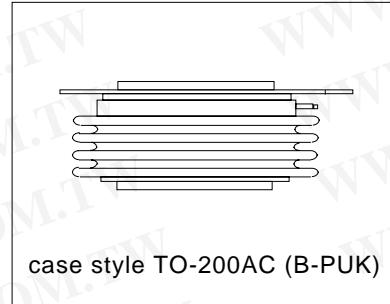
#### Features

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)



#### Typical Applications

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



#### Major Ratings and Characteristics

Parameters	ST730C..L	Units
$I_{T(AV)}$	990	A
@ $T_{hs}$	55	°C
$I_{T(RMS)}$	2000	A
@ $T_{hs}$	25	°C
$I_{TSM}$	@ 50Hz 17800	A
	@ 60Hz 18700	A
$I^2t$	@ 50Hz 1591	KA <sup>2</sup> s
	@ 60Hz 1452	KA <sup>2</sup> s
$V_{DRM}/V_{RRM}$	800 to 2000	V
$t_q$	typical 150	μs
$T_J$	- 40 to 125	°C

**勝特力材料 886-3-5753170**  
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Bulletin I25191 rev. D 04/03

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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. @ $T_J = T_J$ max mA
ST730C..L	08	800	900	80
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

#### On-state Conduction

Parameter	ST730C..L	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	990 (375)	A	180° conduction, half sine wave double side (single side) cooled
	55 (85)	°C	
$I_{T(RMS)}$ Max. RMS on-state current	2000		DC @ 25°C heatsink temperature double side cooled
$I_{TSM}$ Max. peak, one-cycle non-repetitive surge current	17800	A	t = 10ms No voltage reappplied
	18700		t = 8.3ms reappplied
	15000		t = 10ms 100% $V_{RRM}$ reappplied
	15700		t = 8.3ms reappplied
$I^2t$ Maximum $I^2t$ for fusing	1591	KA <sup>2</sup> s	t = 10ms No voltage reappplied
	1452		t = 8.3ms reappplied
	1125		t = 10ms 100% $V_{RRM}$ reappplied
	1027		t = 8.3ms reappplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	15910	KA <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied
$V_{T(TO)1}$ Low level value of threshold voltage	0.98	V	(16.7% x $\pi$ x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$V_{T(TO)2}$ High level value of threshold voltage	1.12		( $I > \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$r_{t1}$ Low level value of on-state slope resistance	0.32	mΩ	(16.7% x $\pi$ x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$r_{t2}$ High level value of on-state slope resistance	0.27		( $I > \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$V_{TM}$ Max. on-state voltage	1.62	V	$I_{pk} = 2000A$ , $T_J = T_J$ max, $t_p = 10ms$ sine pulse
$I_H$ Maximum holding current	600	mA	$T_J = 25^\circ C$ , anode supply 12V resistive load
$I_L$ Typical latching current	1000		

#### Switching

Parameter	ST730C..L	Units	Conditions
$di/dt$ Max. non-repetitive rate of rise of turned-on current	1000	A/μs	Gate drive 20V, 20Ω, $t_r \leq 1\mu s$ $T_J = T_J$ max, anode voltage $\leq 80\% V_{DRM}$
$t_d$ Typical delay time	1.0	μs	Gate current 1A, $di_g/dt = 1A/\mu s$ $V_d = 0.67\% V_{DRM}$ , $T_J = 25^\circ C$
$t_q$ Typical turn-off time	150		$I_{TM} = 750A$ , $T_J = T_J$ max, $di/dt = 60A/\mu s$ , $V_R = 50V$ $dv/dt = 20V/\mu s$ , Gate 0V 100Ω, $t_p = 500\mu s$

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**Blocking**

Parameter	ST730C..L	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/μs	T <sub>J</sub> = T <sub>J</sub> max. linear to 80% rated V <sub>DRM</sub>
I <sub>DRM</sub> I <sub>RRM</sub> Max. peak reverse and off-state leakage current	80	mA	T <sub>J</sub> = T <sub>J</sub> max, rated V <sub>DRM</sub> /V <sub>RRM</sub> applied

**Triggering**

Parameter	ST730C..L		Units	Conditions
P <sub>GM</sub> Maximum peak gate power	10.0		W	T <sub>J</sub> = T <sub>J</sub> max, t <sub>p</sub> ≤ 5ms
P <sub>G(AV)</sub> Maximum average gate power	2.0			T <sub>J</sub> = T <sub>J</sub> max, f = 50Hz, d% = 50
I <sub>GM</sub> Max. peak positive gate current	3.0		A	T <sub>J</sub> = T <sub>J</sub> max, t <sub>p</sub> ≤ 5ms
+V <sub>GM</sub> Maximum peak positive gate voltage	20		V	T <sub>J</sub> = T <sub>J</sub> max, t <sub>p</sub> ≤ 5ms
-V <sub>GM</sub> Maximum peak negative gate voltage	5.0			
I <sub>GT</sub> DC gate current required to trigger	TYP.	MAX.	mA	T <sub>J</sub> = - 40°C T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	200	-		
	100	200		
V <sub>GT</sub> DC gate voltage required to trigger	2.5	-	V	T <sub>J</sub> = - 40°C T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C
	1.8	3.0		
	1.1	-		
I <sub>GD</sub> DC gate current not to trigger	10		mA	Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated V <sub>DRM</sub> anode-to-cathode applied
V <sub>GD</sub> DC gate voltage not to trigger	0.25		V	

**Thermal and Mechanical Specification**

Parameter	ST730C..L	Units	Conditions
T <sub>J</sub> Max. operating temperature range	-40 to 125	°C	
T <sub>stg</sub> Max. storage temperature range	-40 to 150		
R <sub>thJ-hs</sub> Max. thermal resistance, junction to heatsink	0.073	K/W	DC operation single side cooled
	0.031		DC operation double side cooled
R <sub>thC-hs</sub> Max. thermal resistance, case to heatsink	0.011	K/W	DC operation single side cooled
	0.006		DC operation double side cooled
F Mounting force, ±10%	14700 (1500)	N (Kg)	
wt Approximate weight	255	g	
Case style	TO-200AC (B-PUK)		See Outline Table

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

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

Conduction angle	Sinusoidal conduction		Rectangular conduction		Units	Conditions
	Single Side	Double Side	Single Side	Double Side		
180°	0.009	0.009	0.006	0.006	K/W	$T_j = T_j \text{ max.}$
120°	0.011	0.011	0.010	0.011		
90°	0.014	0.014	0.015	0.015		
60°	0.020	0.020	0.021	0.021		
30°	0.036	0.036	0.036	0.036		

### Ordering Information Table

Device Code							
ST	73	0	C	20	L	1	
①	②	③	④	⑤	⑥	⑦	⑧
<b>1</b>	- Thyristor	<b>2</b>	- Essential part number	<b>3</b>	- 0 = Converter grade	<b>4</b>	- C = Ceramic Puk
<b>5</b>	- Voltage code: Code x 100 = $V_{RRM}$ (See Voltage Rating Table)	<b>6</b>	- L = Puk Case TO-200AC (B-PUK)	<b>7</b>	- 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)
<b>7</b>	- 1 = Fast-on terminals (Gate and Auxiliary Cathode Unsoldered Leads)	<b>7</b>	- 2 = Eyelet terminals (Gate and Auxiliary Cathode Soldered Leads)	<b>7</b>	- 3 = Fast-on terminals (Gate and Auxiliary Cathode Soldered Leads)	<b>8</b>	- Critical dv/dt: None = 500V/ $\mu$ sec (Standard selection)
<b>8</b>	- L = 1000V/ $\mu$ sec (Special selection)	<b>8</b>	- Critical dv/dt: L = 1000V/ $\mu$ sec (Special selection)	<b>8</b>	- Critical dv/dt: L = 1000V/ $\mu$ sec (Special selection)	<b>8</b>	- Critical dv/dt: L = 1000V/ $\mu$ sec (Special selection)

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Outline Table

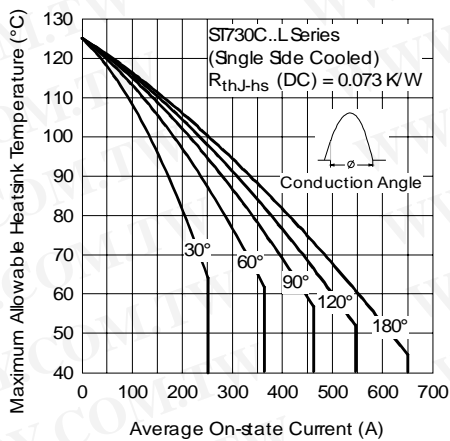
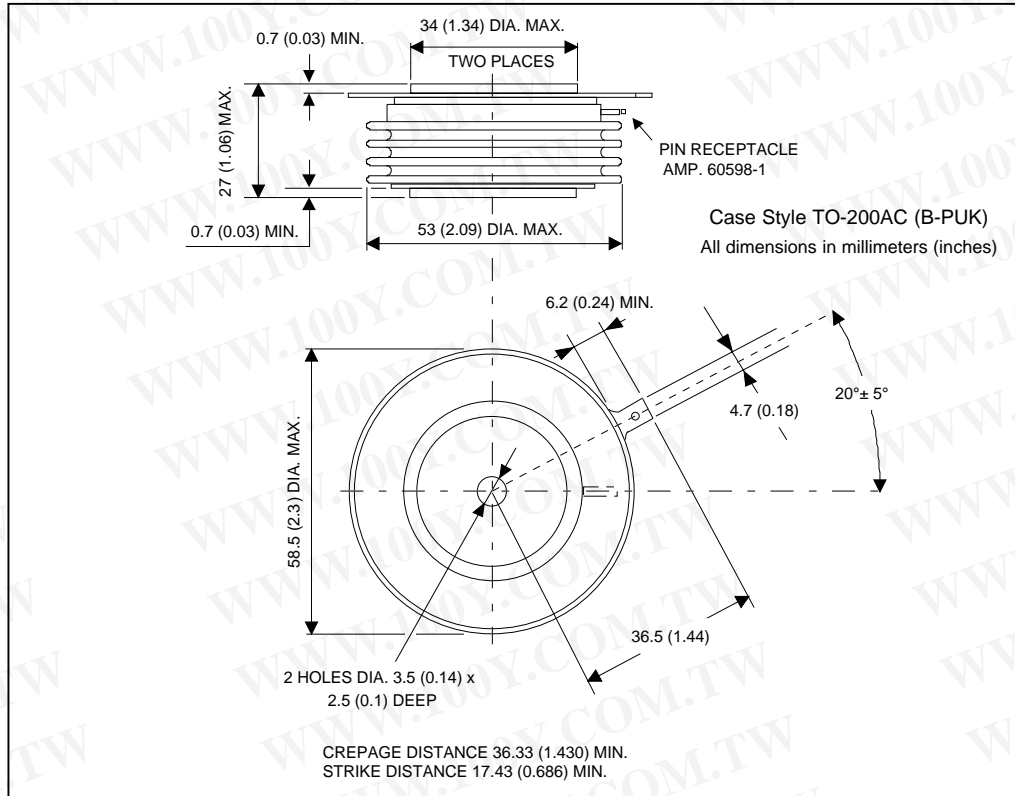


Fig. 1 - Current Ratings Characteristics

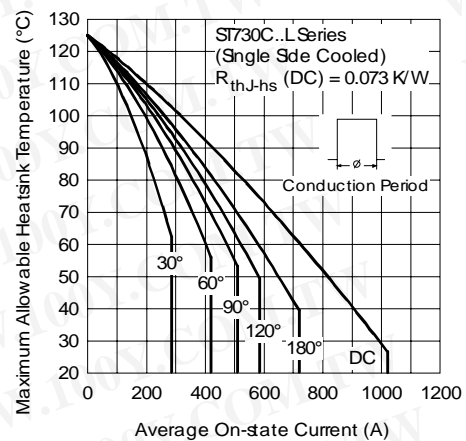


Fig. 2 - Current Ratings Characteristics

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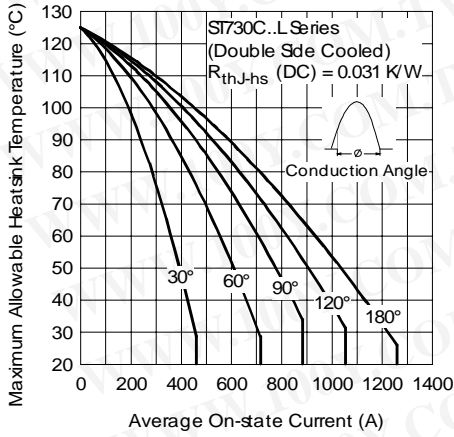


Fig. 3 - Current Ratings Characteristics

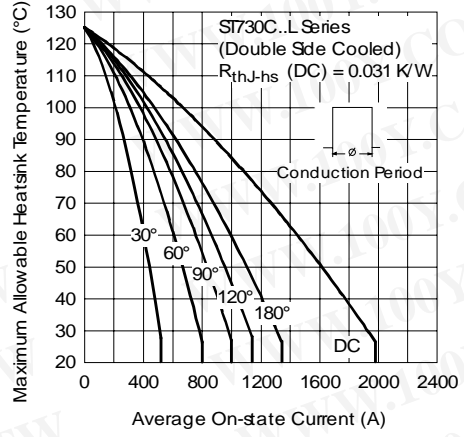


Fig. 4 - Current Ratings Characteristics

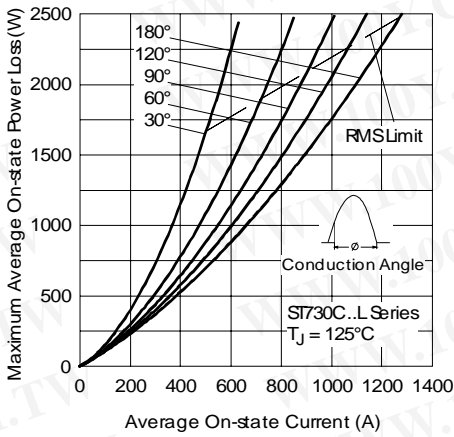


Fig. 5 - On-state Power Loss Characteristics

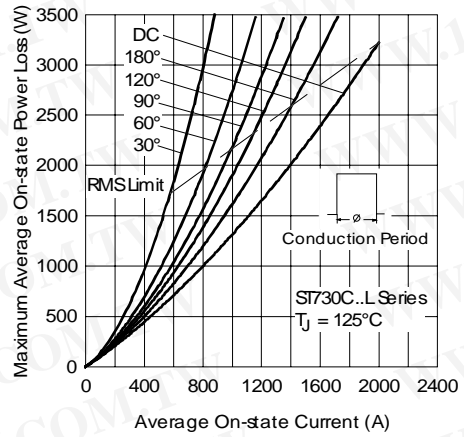


Fig. 6 - On-state Power Loss Characteristics

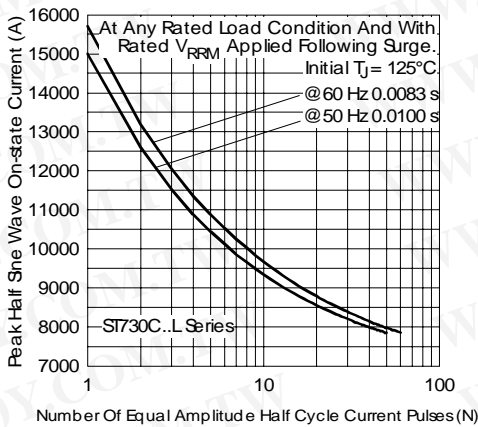


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

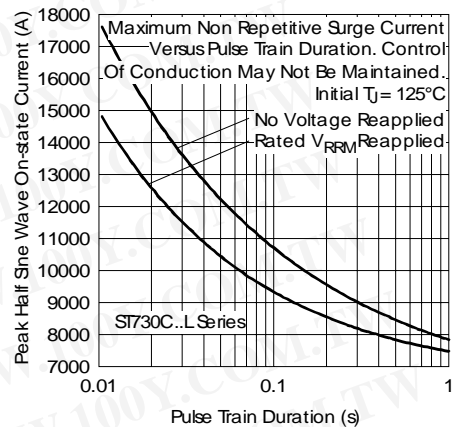


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

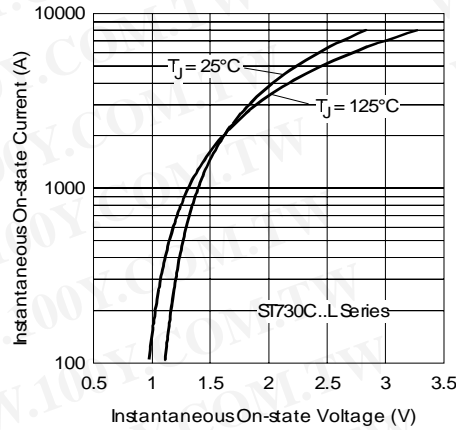


Fig. 9 - On-state Voltage Drop Characteristics

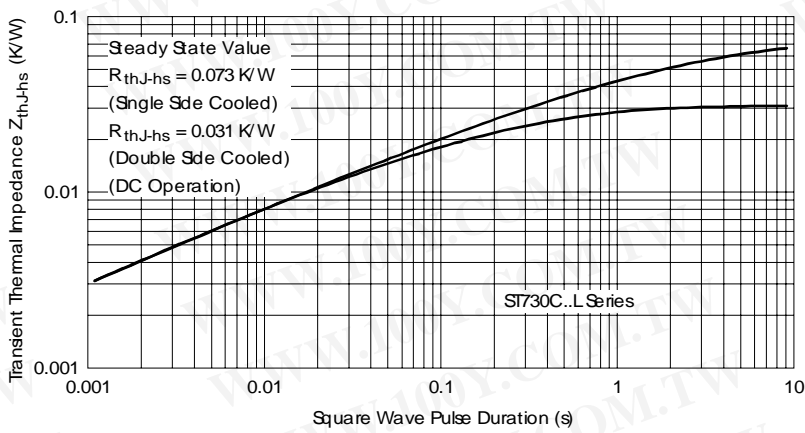


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

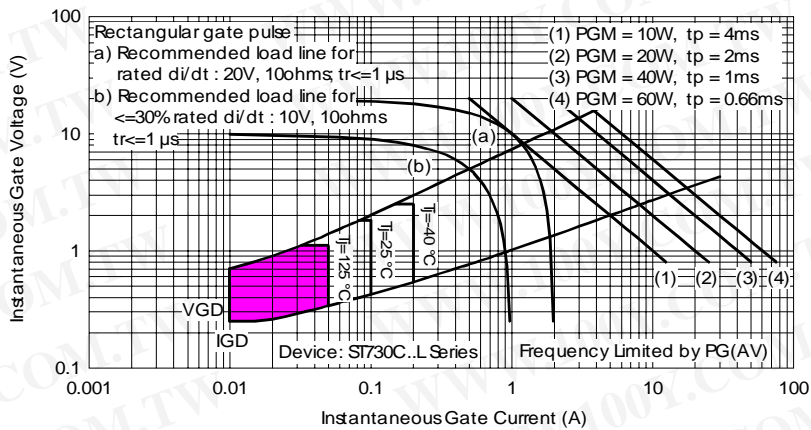


Fig. 11 - Gate Characteristics

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Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level.  
Qualification Standards can be found on IR's Web site.

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