

International  
**IR** Rectifier

## ST730C..L SERIES

PHASE CONTROL THYRISTORS

Hockey Puk Version

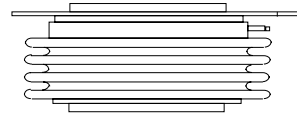
### Features

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

990A

### Typical Applications

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



case style TO-200AC (B-PUK)

### 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                |

## ST730C..L Series

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<br>V | $V_{RSM}$ , maximum non-repetitive peak voltage<br>V | $I_{DRM}/I_{RRM}$ max.<br>@ $T_J = T_J \text{ max}$<br>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)<br>55 (85) | A<br>°C            | 180° conduction, half sine wave<br>double side (single side) cooled                          |
| $I_{T(RMS)}$ 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                                                                                    |
|                                                                  | 15000                |                    | t = 10ms 100% $V_{RRM}$ reappplied                                                           |
|                                                                  | 15700                |                    | t = 8.3ms                                                                                    |
| $I^2t$ Maximum $I^2t$ for fusing                                 | 1591                 | KA <sup>2</sup> s  | t = 10ms No voltage reappplied                                                               |
|                                                                  | 1452                 |                    | t = 8.3ms                                                                                    |
|                                                                  | 1125                 |                    | t = 10ms 100% $V_{RRM}$ reappplied                                                           |
|                                                                  | 1027                 |                    | t = 8.3ms                                                                                    |
| $I^2\sqrt{t}$ 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% $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$ ), $T_J = T_J \text{ max}$ . |
| $V_{T(TO)2}$ High level value of threshold voltage               | 1.12                 |                    | ( $I > \pi \times I_{T(AV)}$ ), $T_J = T_J \text{ max}$ .                                    |
| $r_{t1}$ Low level value of on-state slope resistance            | 0.32                 | mΩ                 | (16.7% $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$ ), $T_J = T_J \text{ max}$ . |
| $r_{t2}$ High level value of on-state slope resistance           | 0.27                 |                    | ( $I > \pi \times I_{T(AV)}$ ), $T_J = T_J \text{ max}$ .                                    |
| $V_{TM}$ Max. on-state voltage                                   | 1.62                 | V                  | $I_{pk} = 2000A$ , $T_J = T_J \text{ max}$ , $t_p = 10ms$ 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, $t_r \leq 1\mu s$<br>$T_J = T_J \text{ max}$ , anode voltage $\leq 80\% V_{DRM}$                                 |
| $t_d$ Typical delay time                                      | 1.0       | μs    | Gate current 1A, $di_g/dt = 1A/\mu s$<br>$V_d = 0.67\% V_{DRM}$ , $T_J = 25^\circ C$                                                  |
| $t_q$ Typical turn-off time                                   | 150       |       | $I_{TM} = 750A$ , $T_J = T_J \text{ max}$ , $di/dt = 60A/\mu s$ , $V_R = 50V$<br>$dv/dt = 20V/\mu s$ , Gate 0V 100Ω, $t_p = 500\mu s$ |

### Blocking

| Parameter                                                              | ST730C..L | Units      | Conditions                                                      |
|------------------------------------------------------------------------|-----------|------------|-----------------------------------------------------------------|
| $dv/dt$ Maximum critical rate of rise of off-state voltage             | 500       | V/ $\mu$ s | $T_J = T_J \text{ max. linear to } 80\% \text{ rated } V_{DRM}$ |
| $I_{DRM}$<br>$I_{RRM}$ Max. peak reverse and off-state leakage current | 80        | mA         | $T_J = T_J \text{ max, rated } V_{DRM}/V_{RRM} \text{ applied}$ |

### Triggering

| Parameter                                    | ST730C..L | Units | Conditions                                                                                                                                                                                                        |
|----------------------------------------------|-----------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $P_{GM}$ Maximum peak gate power             | 10.0      | W     | $T_J = T_J \text{ max, } t_p \leq 5\text{ms}$                                                                                                                                                                     |
| $P_{G(AV)}$ Maximum average gate power       | 2.0       |       | $T_J = T_J \text{ max, } f = 50\text{Hz, } d\% = 50$                                                                                                                                                              |
| $I_{GM}$ Max. peak positive gate current     | 3.0       | A     | $T_J = T_J \text{ max, } t_p \leq 5\text{ms}$                                                                                                                                                                     |
| $+V_{GM}$ Maximum peak positive gate voltage | 20        | V     | $T_J = T_J \text{ max, } t_p \leq 5\text{ms}$                                                                                                                                                                     |
| $-V_{GM}$ Maximum peak negative gate voltage | 5.0       |       |                                                                                                                                                                                                                   |
| $I_{GT}$ DC gate current required to trigger | TYP.      | MAX.  | $T_J = -40^\circ\text{C}$<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$<br>Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied |
|                                              | 200       | -     |                                                                                                                                                                                                                   |
|                                              | 100       | 200   |                                                                                                                                                                                                                   |
|                                              | 50        | -     |                                                                                                                                                                                                                   |
| $V_{GT}$ DC gate voltage required to trigger | 2.5       | -     | $T_J = -40^\circ\text{C}$                                                                                                                                                                                         |
|                                              | 1.8       | 3.0   | $T_J = 25^\circ\text{C}$                                                                                                                                                                                          |
|                                              | 1.1       | -     | $T_J = 125^\circ\text{C}$                                                                                                                                                                                         |
| $I_{GD}$ DC gate current not to trigger      | 10        | mA    | $T_J = T_J \text{ max}$<br>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                                               |
| $V_{GD}$ DC gate voltage not to trigger      | 0.25      | V     |                                                                                                                                                                                                                   |

### Thermal and Mechanical Specification

| Parameter                                                  | ST730C..L        | Units            | Conditions                                                         |
|------------------------------------------------------------|------------------|------------------|--------------------------------------------------------------------|
| $T_J$ Max. operating temperature range                     | -40 to 125       | $^\circ\text{C}$ |                                                                    |
| $T_{stg}$ Max. storage temperature range                   | -40 to 150       |                  |                                                                    |
| $R_{thJ-hs}$ Max. thermal resistance, junction to heatsink | 0.073<br>0.031   | K/W              | DC operation single side cooled<br>DC operation double side cooled |
| $R_{thC-hs}$ Max. thermal resistance, case to heatsink     | 0.011<br>0.006   | K/W              | DC operation single side cooled<br>DC operation double side cooled |
| F Mounting force, $\pm 10\%$                               | 14700<br>(1500)  | N<br>(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 |

- 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** - L = Puk Case TO-200AC (B-PUK)
- 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

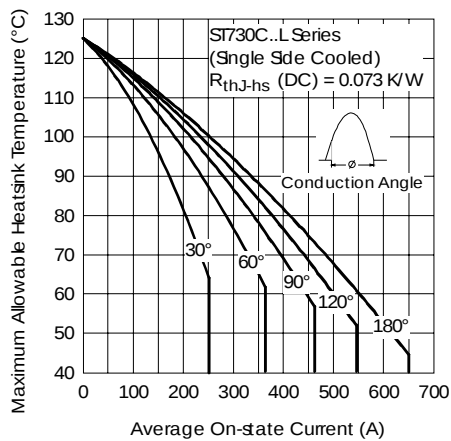
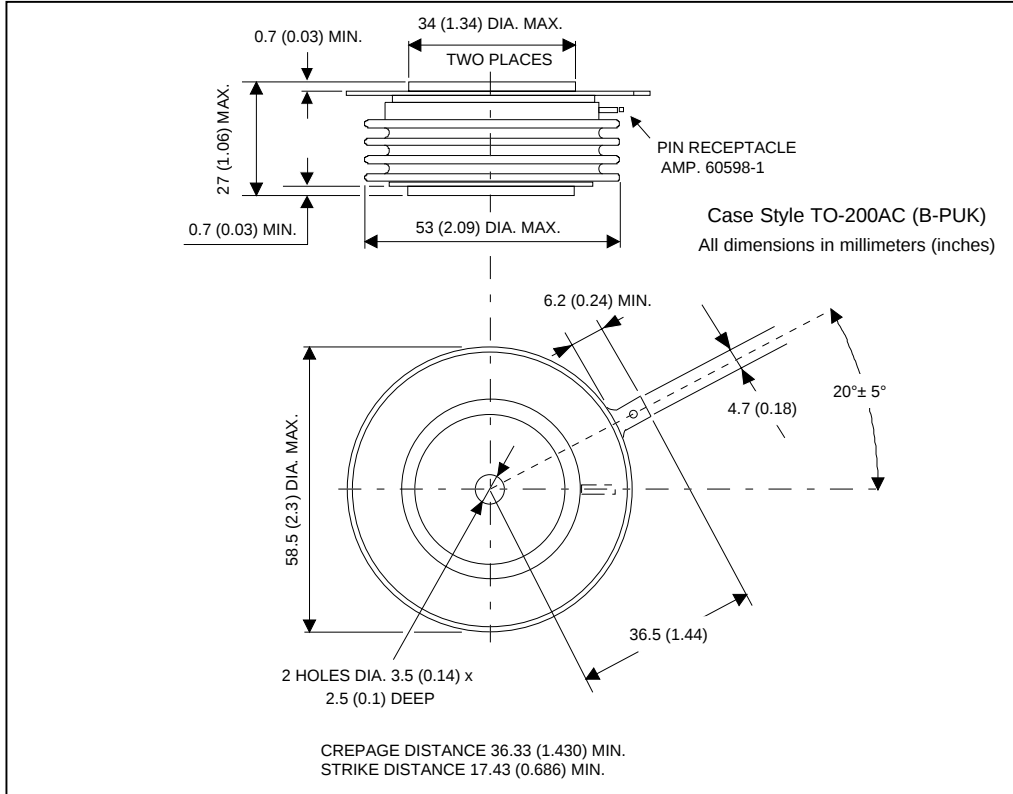


Fig. 1 - Current Ratings Characteristics

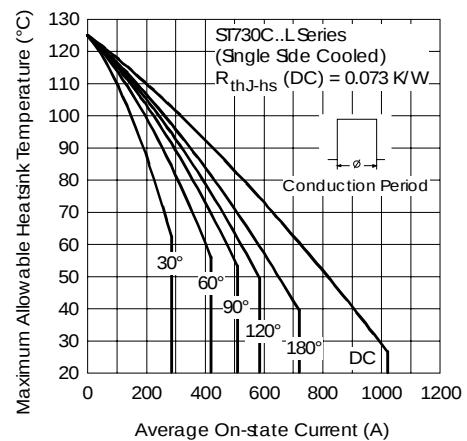


Fig. 2 - Current Ratings Characteristics

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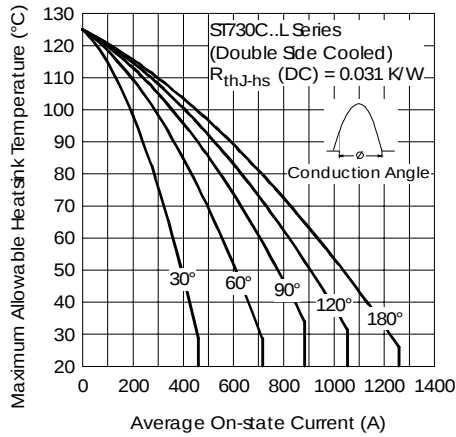


Fig. 3 - Current Ratings Characteristics

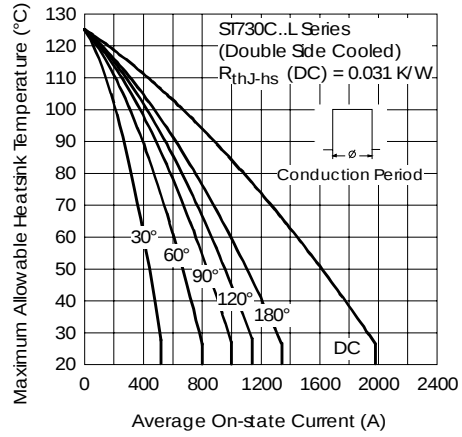


Fig. 4 - Current Ratings Characteristics

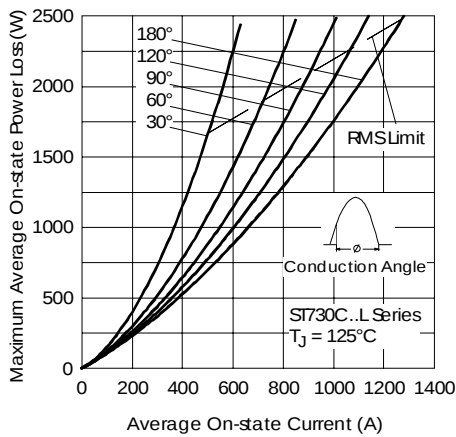


Fig. 5 - On-state Power Loss Characteristics

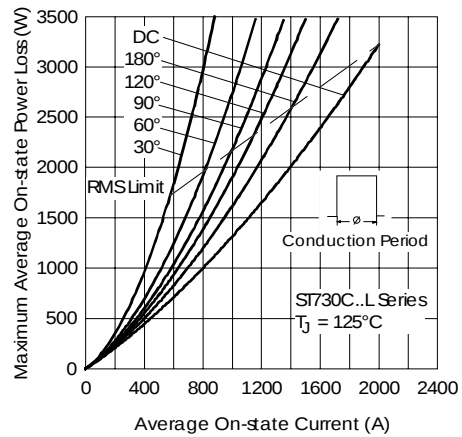


Fig. 6 - On-state Power Loss Characteristics

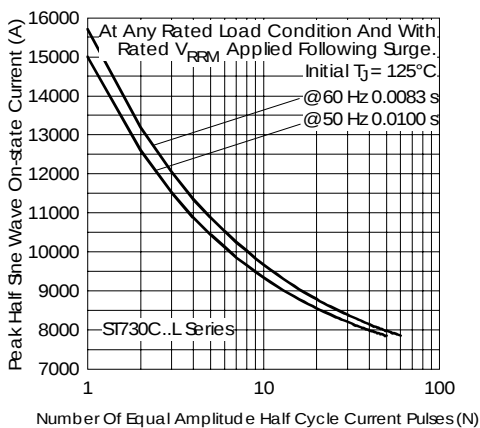


Fig. 7 - Maximum Non-Repetitive Surge Current  
Single and Double Side Cooled

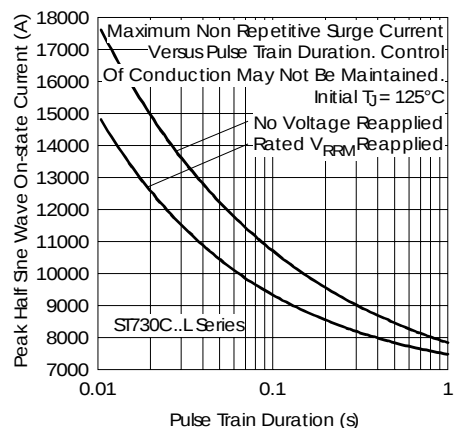


Fig. 8 - Maximum Non-Repetitive Surge Current  
Single and Double Side Cooled

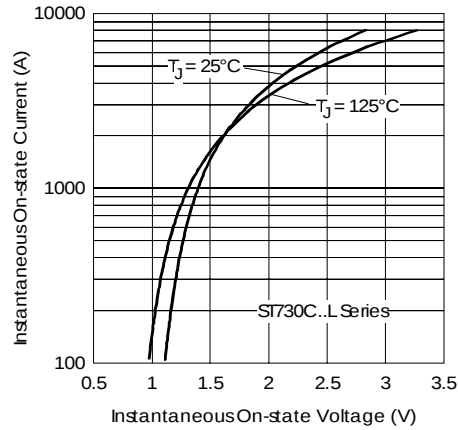


Fig. 9 - On-state Voltage Drop Characteristics

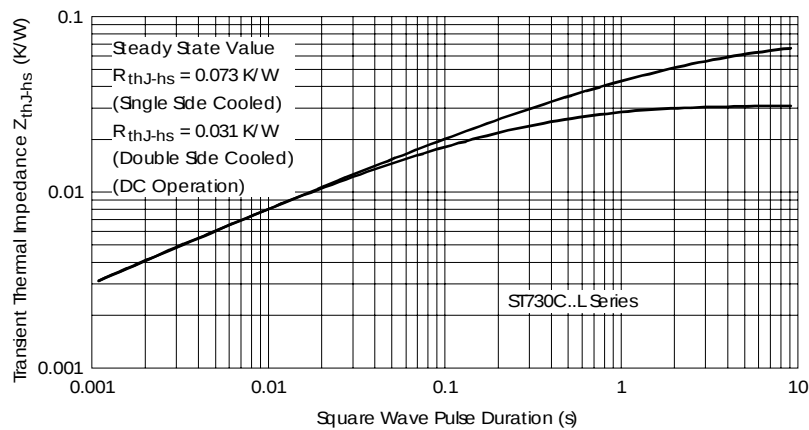


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

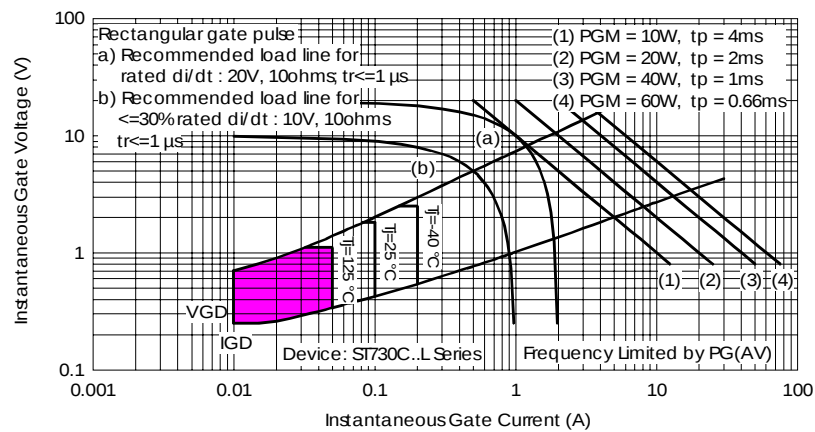


Fig. 11 - Gate Characteristics

## **ST730C..L Series**

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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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