

### PHASE CONTROL THYRISTORS

### Hockey Puk Version

#### Features

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

#### Typical Applications

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

#### Major Ratings and Characteristics

| Parameters        | ST330C..C   | Units |
|-------------------|-------------|-------|
| $I_{T(AV)}$       | 720         | A     |
| @ $T_{hs}$        | 55          | °C    |
| $I_{T(RMS)}$      | 1420        | A     |
| @ $T_{hs}$        | 25          | °C    |
| $I_{TSM}$         | @ 50Hz      | 9000  |
|                   | @ 60Hz      | 9420  |
| $I^2t$            | @ 50Hz      | 405   |
|                   | @ 60Hz      | 370   |
| $V_{DRM}/V_{RRM}$ | 400 to 1600 | V     |
| $t_q$ typical     | 100         | μs    |
| $T_J$             | - 40 to 125 | °C    |

720A



case style TO-200AB (E-PUK)

## ST330C..C Series

Bulletin I25155 rev. C 04/00

International  
IRF Rectifier

### 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>@ $T_J = T_J$ max<br>mA |
|-------------|--------------|---|--|---|
| ST330C..C   | 04           | 400   | 500  | 50  |
|             | 08           | 800   | 900  |   |
|             | 12           | 1200  | 1300   |   |
|             | 14           | 1400  | 1500   |   |
|             | 16           | 1600  | 1700   |   |

#### On-state Conduction

| Parameter   | ST330C..C | Units              | Conditions   |                       |
|---|-----------|--------------------|--|-----------------------|
| $I_{T(AV)}$ Max. average on-state current<br>@ Heatsink temperature | 720 (350) | A                  | 180° conduction, half sine wave  |                       |
|   | 55 (75)   | °C                 | double side (single side) cooled   |                       |
| $I_{T(RMS)}$ Max. RMS on-state current                              | 1420      | A                  | DC @ 25°C heatsink temperature double side cooled                                    |                       |
| $I_{TSM}$ Max. peak, one-cycle non-repetitive surge current         | 9000      |                    | t = 10ms   | No voltage reappplied |
|   | 9420      |                    | t = 8.3ms  | reappplied            |
|   | 7570      |                    | t = 10ms   | 100% $V_{RRM}$        |
|   | 7920      |                    | t = 8.3ms  | reappplied            |
| $I^2t$ Maximum $I^2t$ for fusing                                    | 405       | KA <sup>2</sup> s  | t = 10ms   | No voltage reappplied |
|   | 370       |                    | t = 8.3ms  | reappplied            |
|   | 287       |                    | t = 10ms   | 100% $V_{RRM}$        |
|   | 262       |                    | t = 8.3ms  | reappplied            |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing                      | 4050      | KA <sup>2</sup> √s | t = 0.1 to 10ms, no voltage reappplied   |                       |
| $V_{T(TO)1}$ Low level value of threshold voltage                   | 0.91      | V                  | $(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$ , $T_J = T_J$ max. |                       |
| $V_{T(TO)2}$ High level value of threshold voltage                  | 0.92      |                    | $(I > \pi \times I_{T(AV)})$ , $T_J = T_J$ max.                                      |                       |
| $r_{t1}$ Low level value of on-state slope resistance               | 0.58      | mΩ                 | $(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$ , $T_J = T_J$ max. |                       |
| $r_{t2}$ High level value of on-state slope resistance              | 0.57      |                    | $(I > \pi \times I_{T(AV)})$ , $T_J = T_J$ max.                                      |                       |
| $V_{TM}$ Max. on-state voltage                                      | 1.96      | V                  | $I_{pk} = 1810A$ , $T_J = T_J$ 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   | ST330C..C | 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>$T_J = T_J$ 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                                   | 100       |       | $I_{TM} = 550A$ , $T_J = T_J$ max, $di/dt = 40A/\mu s$ , $V_R = 50V$<br>$dv/dt = 20V/\mu s$ , Gate 0V 100Ω, $t_p = 500\mu s$ |

**Blocking**

| Parameter  | ST330C..C | 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>RRM</sub><br>I <sub>DRM</sub> Max. peak reverse and off-state leakage current | 50        | mA    | T <sub>J</sub> = T <sub>J</sub> max, rated V <sub>DRM</sub> /V <sub>RRM</sub> applied |

**Triggering**

| Parameter   | ST330C..C | 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.  | T <sub>J</sub> = - 40°C<br>T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°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   |   |
| V <sub>GT</sub> DC gate voltage required to trigger | 2.5       | -     | T <sub>J</sub> = - 40°C<br>T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°C  |
|   | 1.8       | 3.0   |   |
|   | 1.1       | -     |   |
| I <sub>GD</sub> DC gate current not to trigger      | 10        | mA    | T <sub>J</sub> = T <sub>J</sub> max<br>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   | ST330C..C          | 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 | 0.09<br>0.04       | K/W       | DC operation single side cooled<br>DC operation double side cooled |
| R <sub>thC-hs</sub> Max. thermal resistance, case to heatsink     | 0.02<br>0.01       | K/W       | DC operation single side cooled<br>DC operation double side cooled |
| F Mounting force, ± 10%   | 9800<br>(1000)     | N<br>(Kg) |  |
| wt Approximate weight   | 83                 | g         |  |
| Case style  | TO - 200AB (E-PUK) |           | See Outline Table  |

## ST330C..C Series

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International  
**IR** Rectifier

### $\Delta R_{thJ-hs}$ 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°             | 0.012                 | 0.011       | 0.008                  | 0.007       | K/W   | $T_J = T_{J \text{ max.}}$ |
| 120°             | 0.014                 | 0.012       | 0.014                  | 0.013       |       |                            |
| 90°              | 0.017                 | 0.015       | 0.019                  | 0.017       |       |                            |
| 60°              | 0.025                 | 0.022       | 0.026                  | 0.023       |       |                            |
| 30°              | 0.043                 | 0.036       | 0.043                  | 0.037       |       |                            |

### Ordering Information Table

| Device Code |   |          |                                 |           |  |          |   |
|-------------|---|----------|---------------------------------|-----------|--|----------|---|
| <b>ST</b>   | <b>33</b>   | <b>0</b> | <b>C</b>                        | <b>16</b> | <b>C</b>   | <b>1</b> | <b> </b>  |
| 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> | - C = Puk Case TO-200AB (E-PUK) | <b>7</b>  | - 0 = Eyelet terminals (Gate and Auxiliary Cathode Unsoldered Leads)<br>1 = Fast-on terminals (Gate and Auxiliary Cathode Unsoldered Leads)<br>2 = Eyelet terminals (Gate and Auxiliary Cathode Soldered Leads)<br>3 = Fast-on terminals (Gate and Auxiliary Cathode Soldered Leads) | <b>8</b> | - Critical dv/dt: None = 500V/ $\mu$ sec (Standard selection)<br>L = 1000V/ $\mu$ sec (Special selection) |

Outline Table



Fig. 1 - Current Ratings Characteristics



Fig. 2 - Current Ratings Characteristics

# ST330C..C Series

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Fig. 3 - Current Ratings Characteristics

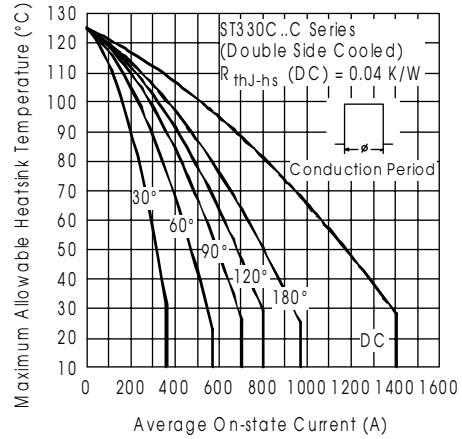


Fig. 4 - Current Ratings Characteristics

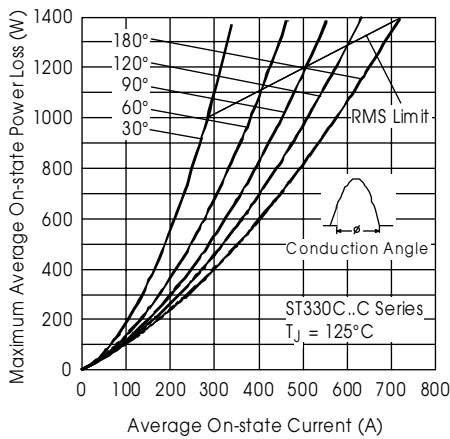


Fig. 5 - On-state Power Loss Characteristics

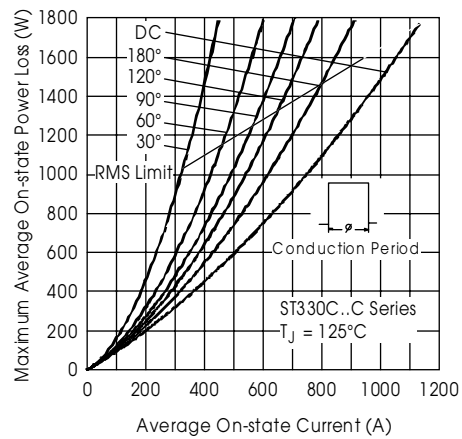


Fig. 6 - On-state Power Loss Characteristics

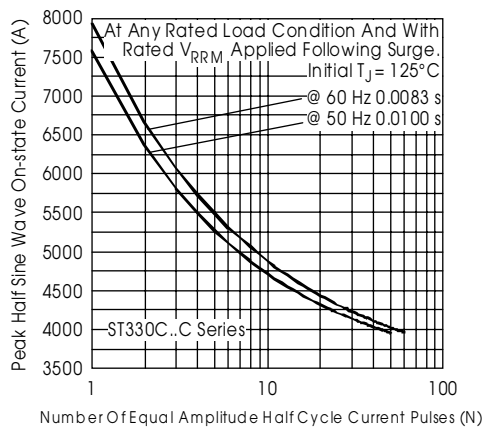


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

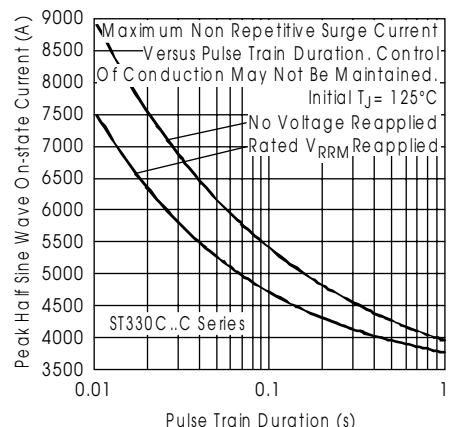


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

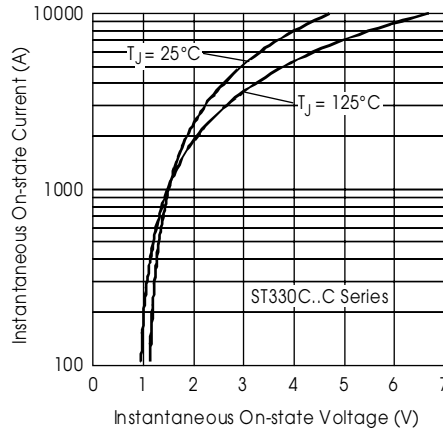


Fig. 9 - On-state Voltage Drop Characteristics

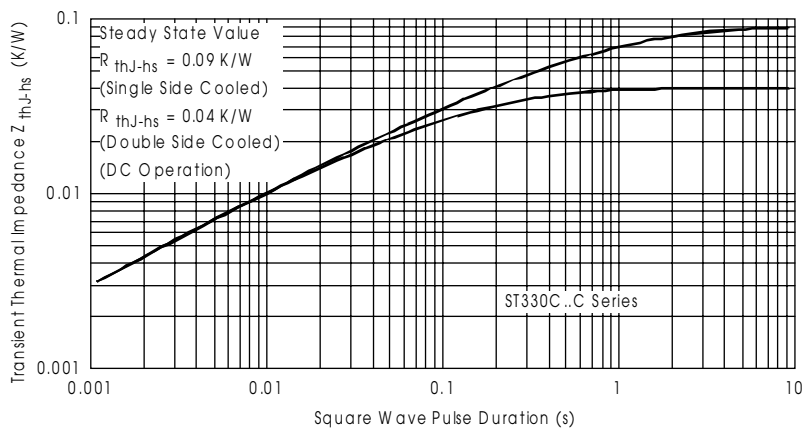


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

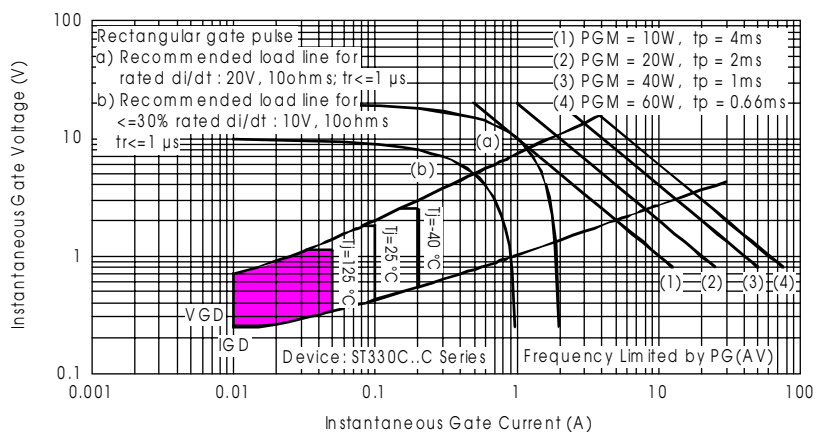


Fig. 11 - Gate Characteristics

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- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
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- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
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Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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