

PHASE CONTROL THYRISTORS

Hockey Puk Version

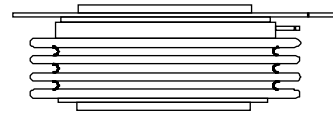
Features

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case A-24 (K-PUK)
- High profile hockey-puk

1473A

Typical Applications

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



case style A-24 (K-PUK)

Major Ratings and Characteristics

| Parameters | ST1000C..K | Units |
|-------------------------|--------------|--------------------|
| $I_{T(AV)}$ | 1473 | A |
| @ T_{hs} | 55 | °C |
| $I_{T(RMS)}$ | 2913 | A |
| @ T_{hs} | 25 | °C |
| I_{TSM} | @ 50Hz | 20.0 |
| | @ 60Hz | 21.2 |
| | | KA |
| I^2t | @ 50Hz | 2000 |
| | @ 60Hz | 1865 |
| | | KA ² s |
| $I^2\sqrt{t}$ | 20000 | KA ² /s |
| V_{DRM}/V_{RRM} range | 1200 to 2600 | V |
| t_q typical | 300 | μs |
| T_J range | -40 to 125 | °C |

ST1000C..K Series

Bulletin I25202 rev. A 01/00

International
IR Rectifier**ELECTRICAL SPECIFICATIONS****Voltage Ratings**

| Type number | Voltage Code | V_{RRM} , maximum repetitive peak reverse voltage V | V_{RSM} , maximum non-repetitive peak rev. voltage V | I_{RRM} max. @ $T_J = 125^\circ\text{C}$ mA |
|-------------|--------------|--|---|---|
| ST1000C..K | 12 | 1200 | 1300 | 100 |
| | 16 | 1600 | 1700 | |
| | 20 | 2000 | 2100 | |
| | 22 | 2200 | 2300 | |
| | 24 | 2400 | 2500 | |
| | 26 | 2600 | 2700 | |

On-state Conduction

| Parameter | ST1000C..K | Units | Conditions |
|---|------------|-------|--|
| $I_{T(AV)}$ Maximum average on-state current @ Heatsink temperature | 1473 (630) | A | 180° conduction, half sine wave |
| | 55 (85) | °C | Double side (single side) cooled |
| $I_{T(RMS)}$ Maximum RMS on-state current | 6540 | A | DC @ 25°C heatsink temp. double side cooled |
| I_{TSM} Maximum peak, one-cycle, non-repetitive surge current | 20.0 | KA | t = 10ms No voltage |
| | 21.2 | | t = 8.3ms reapplied |
| | 17.0 | | t = 10ms 100% V_{RRM} |
| | 18.1 | | t = 8.3ms reapplied |
| I^2t Maximum I^2t for fusing | 2000 | KA²s | t = 10ms No voltage |
| | 1865 | | t = 8.3ms reapplied |
| | 1445 | | t = 10ms 100% V_{RRM} |
| | 1360 | | t = 8.3ms reapplied |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing | 20000 | KA²√s | t = 0.1 to 10ms, no voltage reapplied |
| $V_{T(TO)1}$ Low level value of threshold voltage | 0.950 | 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 | 1.024 | | $(I > \pi \times I_{T(AV)})$, $T_J = T_J \text{ max.}$ |
| r_{t1} Low level value of on-state slope resistance | 0.283 | 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 | 0.265 | | $(I > \pi \times I_{T(AV)})$, $T_J = T_J \text{ max.}$ |
| V_{TM} Maximum on-state voltage drop | 1.80 | V | $I_{pk} = 3000\text{A}$, $T_J = 125^\circ\text{C}$, $t_p = 10\text{ms}$ sine pulse |
| I_H Maximum holding current | 600 | mA | $T_J = 25^\circ\text{C}$, anode supply 12V resistive load |
| I_L Typical latching current | 1000 | | |

Switching

| Parameter | ST1000C..K | Units | Conditions |
|---|------------|-------|---|
| di/dt Maximum non repetitive rate of rise of turned-on current | 1000 | A/μs | Gate drive 20V, 20Ω, $t_r \leq 1\mu s$ $T_J = T_J \text{ max.}$, anode voltage $\leq 80\% V_{DRM}$ |
| t_d Typical delay time | 1.9 | 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 | 300 | A/μs | $I_{TM} = 550A$, $T_J = T_J \text{ max.}$, $di/dt = 40A/\mu s$, $V_R = 50V$ $dv/dt = 20V/\mu s$, Gate 0V 100Ω, $t_p \leq 500\mu s$ |

Blocking

| Parameter | ST1000C..K | Units | Conditions |
|---|------------|-------|--|
| dv/dt Maximum critical rate of rise of off-state voltage | 500 | V/μs | $T_J = T_J \text{ max.}$, linear to 80% rated V_{DRM} |
| I_{RRM} Maximum peak reverse and off-state leakage current I_{DRM} | 100 | μs | $T_J = T_J \text{ max.}$, rated V_{DRM}/V_{RRM} applied |

Triggering

| Parameter | | ST1000C...K | | Units | Conditions |
|--------------------|-------------------------------------|-------------|------|-------|---|
| P _{GM} | Maximum peak gate power | 16 | | W | T _J = T _J max., t _p ≤ 5ms |
| P _{G(AV)} | Maximum peak average gate power | 3 | | W | T _J = T _J max., f = 50Hz, d% = 50 |
| I _{GM} | Maximum peak positive gate current | 3.0 | | A | T _J = T _J max., t _p ≤ 5ms |
| + V _{GM} | Maximum peak positive gate voltage | 20 | | V | |
| - V _{GM} | Maximum peak negative gate voltage | 5.0 | | V | |
| I _{GT} | DC gate current required to trigger | TYP. | MAX. | mA | |
| | | 200 | - | | |
| | | 100 | 200 | | |
| | | 50 | - | | |
| V _{GT} | DC gate voltage required to trigger | 1.4 | - | V | T _J = -40°C T _J = 25°C T _J = 125°C |
| | | 1.1 | 3.0 | | |
| | | 0.9 | - | | |
| I _{GD} | DC gate current not to trigger | 10 | | mA | T _J = T _J max. Max. gate current / voltage not to trigger is the max. value which will not trigger any units with rated V _{DRM} anode-to-cathode applied |
| V _{GD} | DC gate voltage not to trigger | 0.25 | | V | |

ST1000C..K Series

Bulletin I25202 rev. A 01/00

Thermal and Mechanical Specifications

| Parameter | ST1000C..K | Units | Conditions |
|---|-----------------|-----------|---------------------------------|
| T _J Max. junction operating temperature range | - 40 to 125 | °C | |
| T _{stg} Max. storage temperature range | - 40 to 150 | | |
| R _{thJ-hs} Max. thermal resistance, junction to heatsink | 0.042 | K/W | DC operation single side cooled |
| | 0.021 | | DC operation double side cooled |
| R _{thC-hs} Max. thermal resistance, case to heatsink | 0.006 | K/W | DC operation single side cooled |
| | 0.003 | | DC operation double side cooled |
| F Mounting force, ± 10% | 24500 (2500) | N (Kg) | |
| wt Approximate weight | 425 | g | |
| Case style | A-24 (K-PUK) | | See outline table |

ΔR_{thJC} Conduction

(The following table shows the increment of thermal resistance R_{thJC} 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° | 0.003 | 0.003 | 0.002 | 0.002 | K/W | T _J = T _J max. |
| 120° | 0.004 | 0.004 | 0.004 | 0.004 | | |
| 90° | 0.005 | 0.005 | 0.005 | 0.005 | | |
| 60° | 0.007 | 0.007 | 0.007 | 0.007 | | |
| 30° | 0.012 | 0.012 | 0.012 | 0.012 | | |

Ordering Information Table

| Device Code | | | | | | | |
|-------------|---|---|---|----|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| ST | 100 | 0 | C | 26 | K | 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 Ratings Table) | | | | | | |
| 6 | - K = Puk Case A-24 (K-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/μsec (Standard selection) | | | | | | |
| | L = 1000V/μsec (Special selection) | | | | | | |

Outline Table

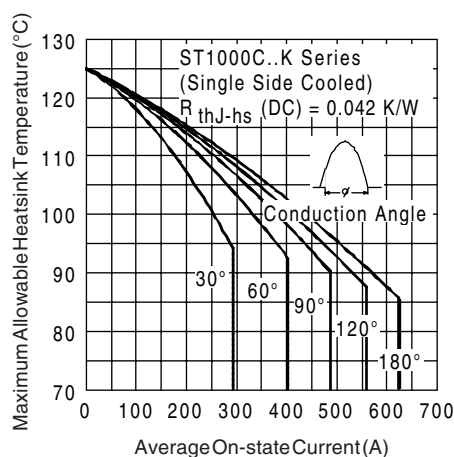
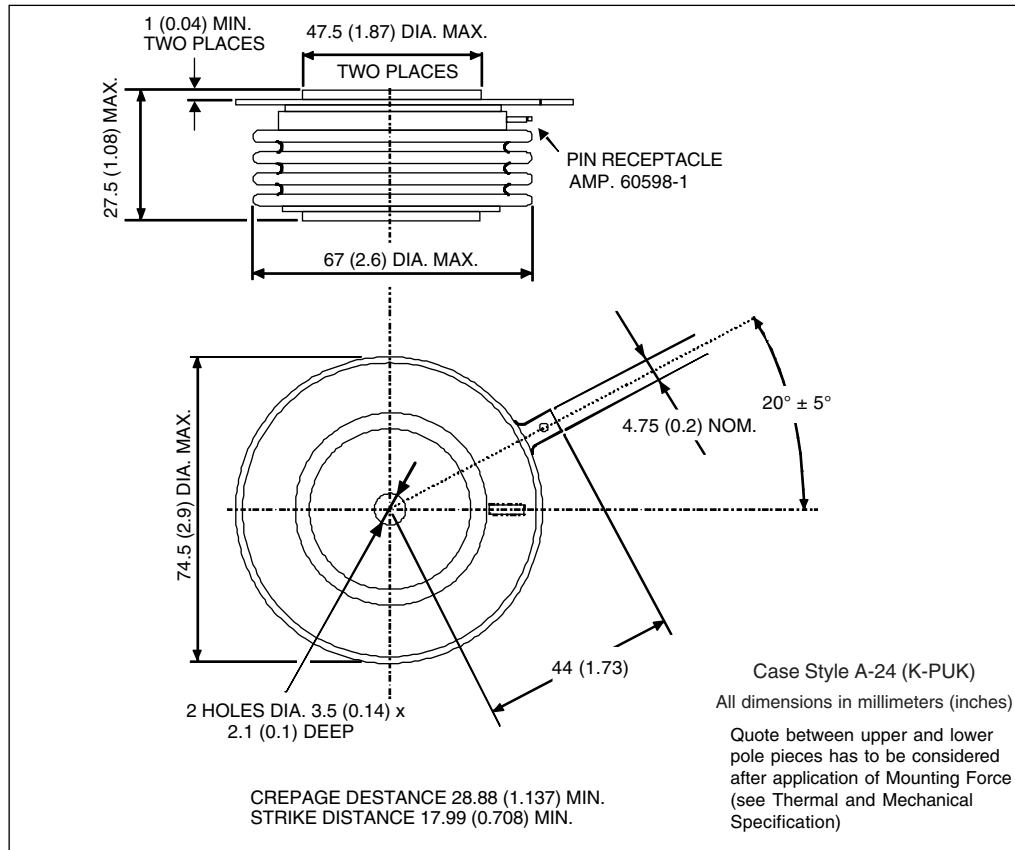


Fig. 1 - Current Ratings Characteristics

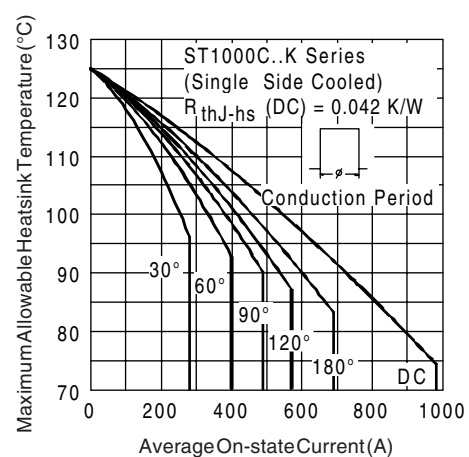


Fig. 2 - Current Ratings Characteristics

ST1000C..K Series

Bulletin I25202 rev. A 01/00

International
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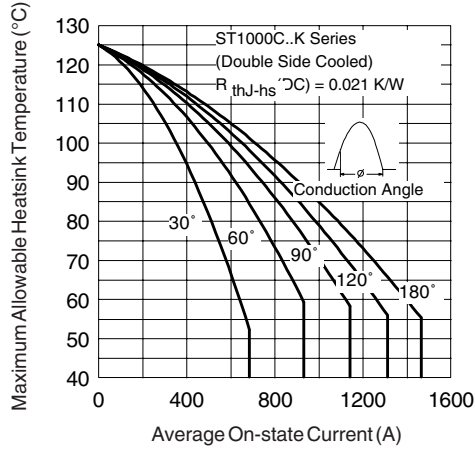


Fig. 3 - Current Ratings Characteristics

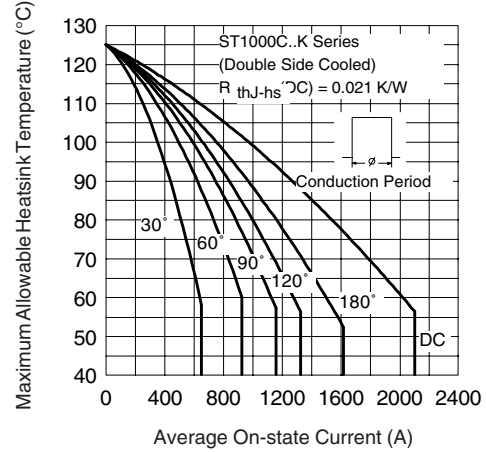


Fig. 4 - Current Ratings Characteristics

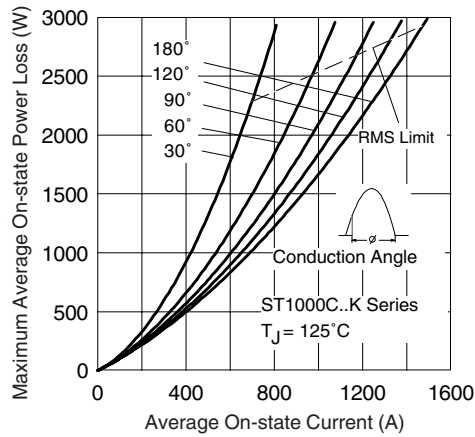


Fig. 5 - On-state Power Loss Characteristics

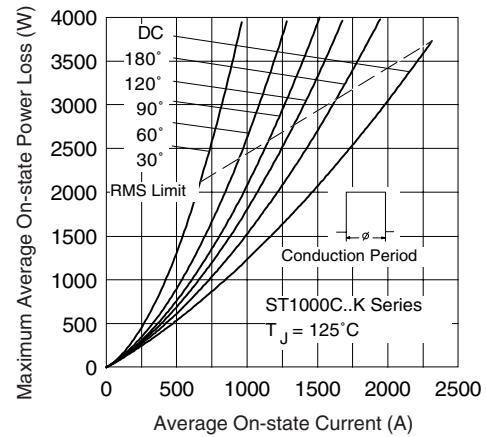


Fig. 6 - On-state Power Loss Characteristics

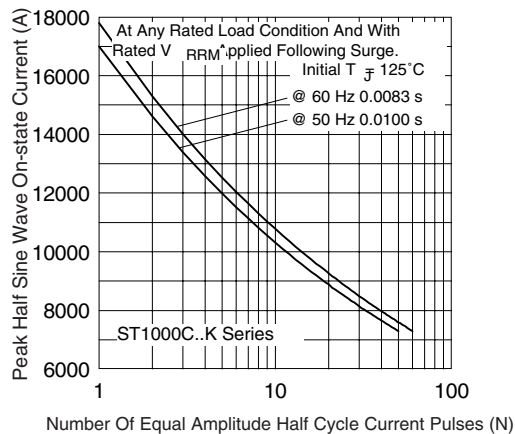


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

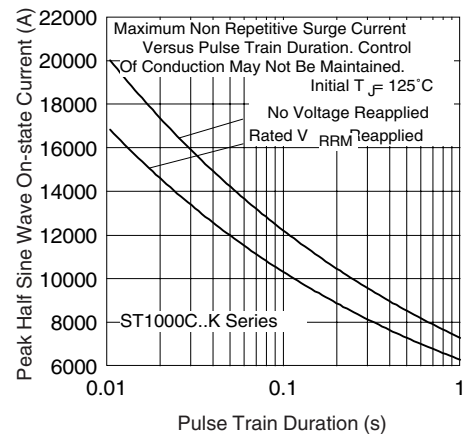


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

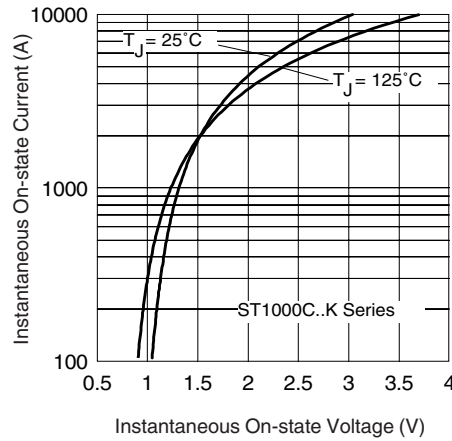


Fig. 9 - On-state Voltage Drop Characteristics

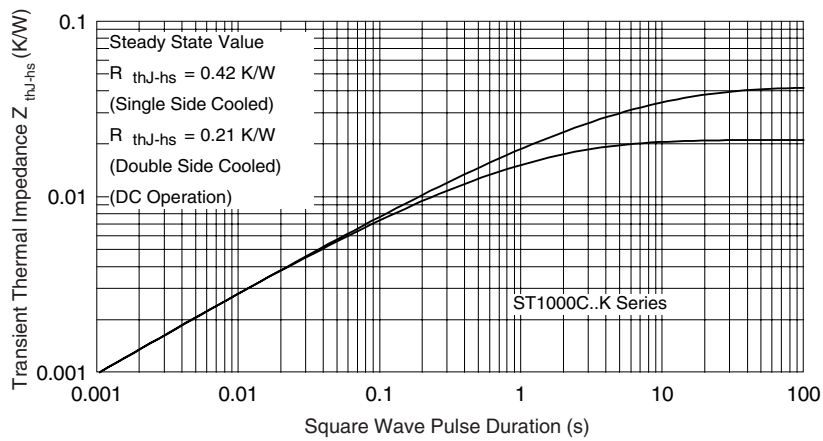


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

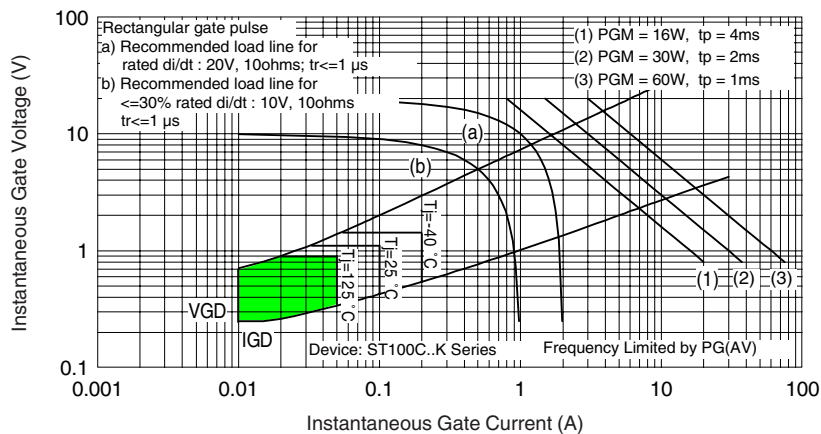


Fig. 11 - Gate Characteristics