



## HIGH POWER THYRISTOR FOR INVERTER APPLICATIONS

## Features:

- . All Diffused Structure
- . Amplifying Gate Configuration
- . Blocking capability up to 1600 volts
- . High dV/dt Capability
- . Pressure Assembled Device

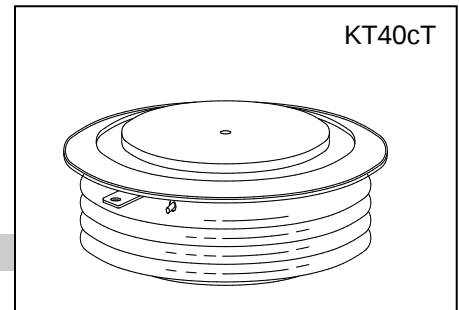
## ELECTRICAL CHARACTERISTICS AND RATINGS

## Blocking - Off State

| Device Type | V <sub>RRM</sub> (1) | V <sub>DRM</sub> (1) | V <sub>RSM</sub> (1) |
|-------------|----------------------|----------------------|----------------------|
| C448PB      | 1200                 | 1200                 | 1300                 |
| C448PD      | 1400                 | 1400                 | 1500                 |
| C448PM      | 1600                 | 1600                 | 1700                 |

V<sub>RRM</sub> = Repetitive peak reverse voltageV<sub>DRM</sub> = Repetitive peak off state voltageV<sub>RSM</sub> = Non repetitive peak reverse voltage (2)

|                                                       |                                    |                   |
|-------------------------------------------------------|------------------------------------|-------------------|
| Repetitive peak reverse leakage and off state leakage | I <sub>RRM</sub> /I <sub>DRM</sub> | 5 mA<br>45 mA (3) |
| Critical rate of voltage rise                         | dV/dt (4)                          | 500 V/sec (min)   |



## Notes:

All ratings are specified for T<sub>j</sub>=25 °C unless otherwise stated.

(1) All voltage ratings are specified for an applied 50Hz/60Hz sinusoidal waveform over the temperature range -40 to +125 °C.

(2) 10 msec. max. pulse width

(3) Maximum value for T<sub>j</sub> = 125 °C.(4) Minimum value for linear and exponential waveshape to 80% rated V<sub>DRM</sub>. Gate open. T<sub>j</sub> = 125 °C.

(5) The value of di/dt is established in accordance with EIA/NIMA Standard RS-397, Section 5-2-2-6.

## Conducting - on state

| Parameter                                     | Symbol             | Min. | Max.                | Typ. | Units            | Conditions                                                                        |
|-----------------------------------------------|--------------------|------|---------------------|------|------------------|-----------------------------------------------------------------------------------|
| Average value of on-state current             | I <sub>T(AV)</sub> |      | 700                 |      | A                | Sinewave, 180° conduction, T <sub>c</sub> =55°C                                   |
| RMS value of on-state current                 | I <sub>TRMS</sub>  |      | 1099                |      | A                | Nominal value                                                                     |
| Peak one cycle surge (non repetitive) current | I <sub>TSM</sub>   |      | 8400                |      | A                | 10.0 msec (50Hz), sinusoidal wave-shape, 180° conduction, T <sub>j</sub> = 125 °C |
| I square t                                    | I <sup>2</sup> t   |      | 3.5x10 <sup>5</sup> |      | A <sup>2</sup> s | 10 msec                                                                           |
| Latching current                              | I <sub>L</sub>     |      | 1000                |      | mA               | V <sub>D</sub> = 12 V; R <sub>L</sub> = 12 ohms                                   |
| Holding current                               | I <sub>H</sub>     |      | 200                 |      | mA               | V <sub>D</sub> = 12 V; I = 2.5 A                                                  |
| Peak on-state voltage                         | V <sub>TM</sub>    |      | 2.9                 |      | V                | I <sub>TM</sub> = 2000 A; T <sub>j</sub> = 25 °C                                  |
| Threshold voltage, Low-level                  | V <sub>TO</sub>    |      | 1.15                |      | V                | T <sub>j</sub> =125°C                                                             |
| Slope Resistance, Low-level                   | r <sub>T</sub>     |      | 0.5                 |      | mΩ               | 1500A...2500A                                                                     |
| Critical rate of rise of on-state current (5) | di/dt              |      | 200                 |      | A/μs             | Repetitive                                                                        |

## Gating

| Parameter                                  | Symbol      | Min. | Max.            | Typ. | Units          | Conditions                                                                                                                                                                                                                                              |
|--------------------------------------------|-------------|------|-----------------|------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peak gate power dissipation                | $P_{GM}$    |      | 20              |      | W              |                                                                                                                                                                                                                                                         |
| Average gate power dissipation             | $P_{G(AV)}$ |      | 4               |      | W              |                                                                                                                                                                                                                                                         |
| Gate current required to trigger all units | $I_{GT}$    |      | 300<br>150<br>5 |      | mA<br>mA<br>mA | $V_D = 6\text{ V}; R_L = 3\text{ ohms}; T_j = -40\text{ }^{\circ}\text{C}$<br>$V_D = 6\text{ V}; R_L = 3\text{ ohms}; T_j = +25\text{ }^{\circ}\text{C}$<br>$V_D = 6\text{ V}; R_L = 3\text{ ohms}; T_j = +125\text{ }^{\circ}\text{C}$                 |
| Gate voltage required to trigger all units | $V_{GT}$    | 0.30 | 5<br>3          |      | V<br>V<br>V    | $V_D = 6\text{ V}; R_L = 3\text{ ohms}; T_j = -40\text{ }^{\circ}\text{C}$<br>$V_D = 6\text{ V}; R_L = 3\text{ ohms}; T_j = 0-125\text{ }^{\circ}\text{C}$<br>$V_D = \text{Rated } V_{DRM}; R_L = 1000\text{ ohms}; T_j = +125\text{ }^{\circ}\text{C}$ |
| Peak negative voltage                      | $V_{GRM}$   |      | 5               |      | V              |                                                                                                                                                                                                                                                         |

## Dynamic

| Parameter                                 | Symbol   | Min. | Max. | Typ. | Units         | Conditions                                                                                                                                                                                                        |
|-------------------------------------------|----------|------|------|------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delay time                                | $t_d$    |      | 3.0  | 1.5  | $\mu\text{s}$ | $I_{TM} = 50\text{ A}; V_D = 67\% V_{DRM}$<br>Gate pulse: $V_G = 30\text{ V}; R_G = 10\text{ ohms}; t_r = 0.1\mu\text{s}; t_p = 20\mu\text{s}$                                                                    |
| Turn-off time (with $V_R = -5\text{ V}$ ) | $t_q$    |      | 35   |      | $\mu\text{s}$ | $I_{TM} = 500\text{ A}; di/dt = -25\text{ A}/\mu\text{s}; V_R = 50\text{ V};$ Re-applied $dV/dt = 200\text{ V}/\mu\text{s}$ linear to $80\% V_{DRM}; T_j = 125\text{ }^{\circ}\text{C};$ Duty cycle $\geq 0.01\%$ |
| Reverse recovery current                  | $I_{rr}$ |      |      |      | A             | $I_{TM} = 500\text{ A}; di/dt = -25\text{ A}/\mu\text{s}; V_R = -50\text{ V}; T_j = 125\text{ }^{\circ}\text{C}$                                                                                                  |

## THERMAL AND MECHANICAL CHARACTERISTICS AND RATINGS

| Parameter                             | Symbol            | Min. | Max.           | Typ.  | Units                       | Conditions                                   |
|---------------------------------------|-------------------|------|----------------|-------|-----------------------------|----------------------------------------------|
| Operating temperature                 | $T_j$             | -40  | +125           |       | $^{\circ}\text{C}$          |                                              |
| Storage temperature                   | $T_{stg}$         | -40  | +140           |       | $^{\circ}\text{C}$          |                                              |
| Thermal resistance - junction to case | $R_{\theta(j-c)}$ |      | 0.04<br>0.08   |       | $^{\circ}\text{C}/\text{W}$ | Double sided cooled<br>Single sided cooled   |
| Thermal resistance - case to sink     | $R_{\theta(c-s)}$ |      | 0.008<br>0.016 |       | $^{\circ}\text{C}/\text{W}$ | Double sided cooled *<br>Single sided cooled |
| Mounting force                        | P                 | 13   | 17             | 15    | kN                          |                                              |
| Weight                                | W                 |      |                | 0.252 | kg.                         |                                              |

\* Mounting surfaces smooth, flat and greased

