



# KP4200-POWER THYRISTOR

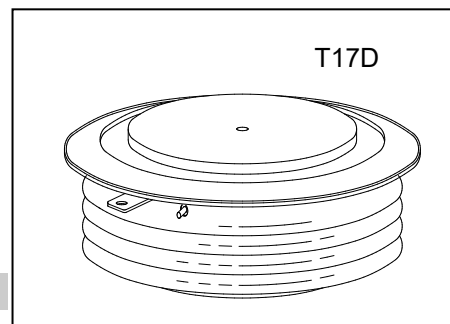
4000-4500 V<sub>DRM</sub>

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## FREE FLOATING TYPE THYRISTOR FOR PHASE CONTROL APPLICATIONS

### Features:

- . Free-floating silicon technology
- . Low on-state and switching losses
- . Optimum power handling capability
- . Blocking capability up to 4500 volts
- . Distributed amplifying gate



## ELECTRICAL CHARACTERISTICS AND RATINGS

### Blocking - Off State

| Device Type | V <sub>RRM</sub> (1) | V <sub>DRM</sub> (1) | V <sub>RSM</sub> (1) |
|-------------|----------------------|----------------------|----------------------|
| KP4200/40   | 4000                 | 4000                 | 4100                 |
| KP4200/42   | 4200                 | 4200                 | 4300                 |
| KP4200/45   | 4500                 | 4500                 | 4600                 |

V<sub>RRM</sub> = Repetitive peak reverse voltage

V<sub>DRM</sub> = Repetitive peak off state voltage

V<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>200 mA (3) |
| Critical rate of voltage rise                         | dv/dt (4)                          | 1000 V/μs          |

Notes:

- (1) All voltage ratings are specified for an applied 50Hz sinusoidal waveform over the temperature range -40 °C 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 67% 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 JB/T 8950.2-2013

### Conducting - On State

| Parameter                                     | Symbol             | Min. | Max.                | Typ. | Units            | Conditions                                                                                     |
|-----------------------------------------------|--------------------|------|---------------------|------|------------------|------------------------------------------------------------------------------------------------|
| Average value of on-state current             | I <sub>T(AV)</sub> |      | 4200                |      | A                | Sinewave, 180° conduction, T <sub>c</sub> =70°C                                                |
| RMS value of on-state current                 | I <sub>TRMS</sub>  |      | 6594                |      | A                | Nominal value                                                                                  |
| Peak one cycle surge (non repetitive) current | I <sub>TSM</sub>   |      | 60000               |      | A                | 10.0 msec (50Hz), sinusoidal wave-shape, 180° conduction, T <sub>j</sub> = 125 °C              |
| I square t                                    | I <sup>2</sup> t   |      | 1.8x10 <sup>7</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>    |      | 1.5                 |      | V                | I <sub>TM</sub> =3000A; T <sub>j</sub> =25°C                                                   |
| Threshold voltage, low-level                  | V <sub>TO</sub>    |      | 0.97                |      | V                | T <sub>j</sub> =125°C                                                                          |
| Slope resistance, low-level                   | r <sub>T</sub>     |      | 0.126               |      | mΩ               | 1000A to 5000A                                                                                 |
| Critical rate of rise of on-state current(5)  | di/dt              |      | 200                 |      | A/μs             | T <sub>j</sub> =125°C; V <sub>D</sub> = 0.67 V <sub>DRM</sub> ; f=50Hz; I <sub>TM</sub> =5000A |

**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-trigger current           | $I_{GT}$    |      | 250  |      | mA    | $V_D = 12\text{ V}; R_L = 3\text{ ohms}; T_j = +25\text{ }^\circ\text{C}$ |
| Gate- trigger voltage          | $V_{GT}$    | 0.7  | 3.0  |      | V     | $V_D = 12\text{ V}; R_L = 3\text{ ohms}; T_j = +25\text{ }^\circ\text{C}$ |
| Peak negative voltage          | $V_{GRM}$   |      | 10   |      | V     |                                                                           |

**Dynamic**

| Parameter                                 | Symbol   | Min. | Max. | Typ. | Units         | Conditions                                                                                                                                            |
|-------------------------------------------|----------|------|------|------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delay time                                | $t_d$    |      |      | 3.0  | $\mu\text{s}$ | $I_{TM}=100\text{A}; V_D=67\%V_{DRM}$<br>Gate pulse: $V_G=30\text{V}; R_G=10\text{ohms};$<br>$t_r=0.1\mu\text{s}; t_p=20\mu\text{s}$                  |
| Turn-off time (with $V_R = -5\text{ V}$ ) | $t_q$    |      |      | 600  | $\mu\text{s}$ | $I_{TM}=2000\text{A}; di/dt=-10\text{A}/\mu\text{s};$<br>$V_R=100\text{V}; dv/dt=30\text{V}/\mu\text{s};$<br>$V_D=67\%V_{DRM}; T_j=125^\circ\text{C}$ |
| Reverse recovery charge                   | $Q_{rr}$ |      |      |      | $\mu\text{C}$ | $I_{TM}=2000\text{A}; di/dt=-10\text{A}/\mu\text{s};$<br>$V_R=100\text{V}; T_j=125^\circ\text{C}$                                                     |

**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 | $R_{\Theta(j-c)}$ |      | 0.0057 |      | $^\circ\text{C/W}$ | Double sided cooled |
| Thermal resistance - case to heatsink | $R_{\Theta(c-s)}$ |      | 0.0015 |      | $^\circ\text{C/W}$ | Double sided cooled |
| Mounting force                        | F                 | 86   | 94     | 90   | kN                 |                     |
| Weight                                | m                 |      |        | 2.5  | kg                 |                     |

\* Mounting surfaces smooth, flat and greased

