



# TPS SERIES 38MM

1000-2400  $V_{RRM}$ , 750  $A_{AVG}$   
Standard Recovery Thyristor

## Features:

- All Diffused Structure
- Center Amplifying Gate Configuration
- Blocking capability up to 2400 volts
- Guaranteed Maximum Turn-Off Time
- High  $dV/dt$  Capability
- Pressure Assembled Device



## ELECTRICAL CHARACTERISTICS AND RATINGS

### Blocking - Off State

| Device Type  | $V_{RRM}^{(1)}$ | $V_{DRM}^{(1)}$ | $V_{RSM}^{(1)}$ |
|--------------|-----------------|-----------------|-----------------|
| T38P750S1000 | 1000            | 1000            | 1100            |
| T38P750S1100 | 1100            | 1100            | 1200            |
| T38P750S1200 | 1200            | 1200            | 1300            |
| T38P750S1400 | 1400            | 1400            | 1500            |
| T38P750S1600 | 1600            | 1600            | 1700            |
| T38P750S1800 | 1800            | 1800            | 1900            |
| T38P750S2000 | 2000            | 2000            | 2100            |
| T38P750S2400 | 2400            | 2400            | 2500            |

$V_{RRM}$  = Repetitive peak reverse voltage

$V_{DRM}$  = Repetitive peak off state voltage

$V_{RSM}$  = Non repetitive peak reverse voltage<sup>(2)</sup>

|   |                     |                               |
|---|---------------------|-------------------------------|
| Repetitive peak reverse leakage and off state leakage | $I_{RRM} / I_{DRM}$ | 15 mA<br>35 mA <sup>(3)</sup> |
| Critical rate of voltage rise <sup>(4)</sup>          | $dV/dt$             | 200 V/ $\mu$ sec              |

### Conducting - On State

| Parameter                                     | Symbol      | Min | Max    | Typ | Units  | Conditions  |
|---|-------------|-----|--------|-----|--------|---|
| Average value of on-state current             | $I_{T(AV)}$ |     | 750    |     | A      | Sinewave, 180° conduction, $T_C=67^\circ C$                                   |
| RMS value of on-state current                 | $I_{TRMS}$  |     | 1175   |     | A      | Nominal value   |
| Peak one cycle surge (non-repetitive) current | $I_{TSM}$   |     | 11000  |     | A      | 8.3 msec (60Hz), sinusoidal wave-shape, 180° conduction, $T_J = 125^\circ C$  |
|   |             |     | 10000  |     | A      | 10.0 msec (50Hz), sinusoidal wave-shape, 180° conduction, $T_J = 125^\circ C$ |
| I square t                                    | $I^2t$      |     | 500000 |     | $A^2s$ | 8.3 msec and 10.0 msec  |
| Latching current                              | $I_L$       |     | 800    |     | mA     | $V_D = 24 V$ ; $R_L = 12$ ohms  |
| Holding current                               | $I_H$       |     | 400    |     | mA     | $V_D = 24 V$ ; $I = 2.5 A$  |

### Notes:

All ratings are specified for  $T_J=25^\circ C$  unless otherwise stated.

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

(2) 10 msec. max. pulse width

(3) Maximum value for  $T_J = 125^\circ C$ .

(4) Minimum value for linear and exponential waveshape to 80% rated  $V_{DRM}$ . Gate open.  $T_J = 125^\circ C$ .

(5) Non-repetitive value.

(6) The value of  $di/dt$  is established in accordance with EIA/NIMA Standard RS-397, Section 5-2-2-6. The value defined would be in addition to that obtained from a snubber circuit, comprising a 0.2  $\mu F$  capacitor and 20 ohms resistance in parallel with the thyristor under test.



|   |          |  |      |  |            |  |
|---|----------|--|------|--|------------|--|
| Peak on-state voltage                                       | $V_{TM}$ |  | 1.80 |  | V          | $I_{TM} = 2200A$ ; Duty cycle $\leq 0.01\%$          |
| Critical rate of rise of on-state current <sup>(5, 6)</sup> | $di/dt$  |  | 400  |  | A/ $\mu s$ | Switching from $V_{DRM} \leq 1000$ V, non-repetitive |
| Critical rate of rise of on-state current <sup>(6)</sup>    | $di/dt$  |  | 150  |  | A/ $\mu s$ | Switching from $V_{DRM} \leq 1000$ V                 |

**Gating**

| Parameter                                  | Symbol      | Min  | Max               | Typ | Units          | Conditions  |
|--|-------------|------|-------------------|-----|----------------|---|
| Peak gate power dissipation                | $P_{GM}$    |      | 200               |     | W              | $t_p = 40 \mu s$  |
| Average gate power dissipation             | $P_{G(AV)}$ |      | 5                 |     | W              |   |
| Peak gate current                          | $I_{GM}$    |      | 10                |     | A              |   |
| Gate current required to trigger all units | $I_{GT}$    |      | 300<br>150<br>125 |     | mA<br>mA<br>mA | $V_D = 6$ V; $R_L = 3$ ohms; $T_J = -40^\circ C$<br>$V_D = 6$ V; $R_L = 3$ ohms; $T_J = +25^\circ C$<br>$V_D = 6$ V; $R_L = 3$ ohms; $T_J = +125^\circ C$                       |
| Gate voltage required to trigger all units | $V_{GT}$    | 0.15 | 5<br>3            |     | V<br>V<br>V    | $V_D = 6$ V; $R_L = 3$ ohms; $T_J = -40^\circ C$<br>$V_D = 6$ V; $R_L = 3$ ohms; $T_J = 125^\circ C$<br>$V_D = \text{Rated } V_{DRM}$ ; $R_L = 1000$ ohms; $T_J = +125^\circ C$ |
| Peak negative voltage                      | $V_{GRM}$   |      | 5                 |     | V              |   |

**Dynamic**

| Parameter                             | Symbol   | Min | Max | Typ | Units   | Conditions  |
|---------------------------------------|----------|-----|-----|-----|---------|---|
| Delay time                            | $t_d$    |     | 1.5 | 0.7 | $\mu s$ | $I_{TM} = 50$ A; $V_D = \text{Rated } V_{DRM}$<br>Gate pulse: $V_G = 20$ V; $R_G = 20$ ohms;<br>$t_r = 0.1 \mu s$ ; $t_p = 20 \mu s$  |
| Turn-off time<br>(with $V_R = -50$ V) | $t_q$    |     | 200 | 125 | $\mu s$ | $I_{TM} = 500$ A; $di/dt = 25$ A/ $\mu s$ ;<br>$V_R \geq -50$ V; Re-applied $dV/dt = 20$<br>V/ $\mu s$ linear to $80\% V_{DRM}$ ; $V_G = 0$ ;<br>$T_J = 125^\circ C$ ; Duty cycle $\geq 0.01\%$ |
| Reverse recovery charge               | $Q_{rr}$ |     | *   |     | $\mu C$ | $I_{TM} = 500$ A; $di/dt = 25$ A/ $\mu s$ ;<br>$V_R \geq -50$ V   |

\* For guaranteed max. value contact factory.



**THERMAL AND MECHANICAL CHARACTERISTICS AND RATINGS**

| Parameter                             | Symbol              | Min          | Max            | Typ      | Units     | Conditions                                     |
|---------------------------------------|---------------------|--------------|----------------|----------|-----------|--|
| Operating temperature                 | T <sub>J</sub>      | -40          | +125           |          | °C        |  |
| Storage temperature                   | T <sub>stg</sub>    | -40          | +150           |          | °C        |  |
| Thermal resistance - junction to case | R <sub>θ(j-c)</sub> |              | 0.040<br>0.080 |          | °C/W      | Double sided cooled<br>Single sided cooled     |
| Thermal resistance - case to sink     | R <sub>θ(c-s)</sub> |              | 0.015<br>0.030 |          | °C/W      | Double sided cooled *<br>Single sided cooled * |
| Mounting force                        | P                   | 3000<br>13.3 | 3500<br>15.5   |          | lb.<br>kN |  |
| Weight                                | W                   |              |                | 9<br>225 | oz.<br>g  |  |

\* Mounting surfaces smooth, flat, and greased.

**CASE OUTLINE AND DIMENSIONS**

