

## DESCRIPTION:

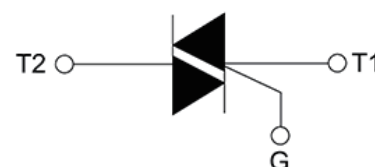
The chip triac is suitable for general purpose AC switching. It can be used as an ON/OFF function in applications such as heating regulation, induction motor starting circuits, for phase control operation in light dimmers, motor speed controllers. The chip embeds a TVS structure to absorb the inductive turn-off energy such as those described in the IEC 61000-4-5 standards. At the same time, the triac shields the positive signal trigger to reduce the proba-



TO-252

## MAIN FEATURES

| Symbol             | Value    | Unit |
|--------------------|----------|------|
| $I_{T(RMS)}$       | 8        | A    |
| $V_{DRM}/V_{RRM}$  | 800      | V    |
| $I_{GT\ I/II/III}$ | 35/35/35 | mA   |



## ABSOLUTE MAXIMUM RATINGS

| Parameter                                                                                            | Symbol       | Value   | Unit             |
|------------------------------------------------------------------------------------------------------|--------------|---------|------------------|
| Storage junction temperature range                                                                   | $T_{stg}$    | -40-150 | °C               |
| Operating junction temperature range                                                                 | $T_j$        | -40-150 | °C               |
| Repetitive peak off-state voltage ( $T_j=25^{\circ}C$ )                                              | $V_{DRM}$    | 800     | V                |
| Repetitive peak reverse voltage ( $T_j=25^{\circ}C$ )                                                | $V_{RRM}$    | 800     | V                |
| RMS on-state current ( $T_c \leq 132^{\circ}C$ )                                                     | $I_{T(RMS)}$ | 8       | A                |
| Non repetitive surge peak on-state current (full cycle , $t_p=20ms$ , $T_j=25^{\circ}C$ )            | $I_{TSM}$    | 80      | A                |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6ms$ , $T_j=25^{\circ}C$ )          |              | 88      |                  |
| $I^2t$ value for fusing ( $t_p=10ms$ , $T_j=25^{\circ}C$ )                                           | $I^2t$       | 32      | A <sup>2</sup> s |
| Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ , $f=100Hz$ , $T_j=150^{\circ}C$ ) | $di/dt$      | 100     | A/ $\mu$ s       |
| Peak gate current ( $t_p=20\mu s$ , $T_j=150^{\circ}C$ )                                             | $I_{GM}$     | 4       | A                |
| Average gate power dissipation ( $T_j=150^{\circ}C$ )                                                | $P_{G(AV)}$  | 1       | W                |
| Peak gate power                                                                                      | $P_{GM}$     | 10      | W                |

|                                                                                     |          |   |    |
|-------------------------------------------------------------------------------------|----------|---|----|
| Peak pulse voltage<br>( $T_j=25^{\circ}\text{C}$ ; non-repetitive, off-state; FIG ) | $V_{pp}$ | 3 | kV |
|-------------------------------------------------------------------------------------|----------|---|----|

**ELECTRICAL CHARACTERISTICS** ( $T_j=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol      | Test Condition                                                                     | Quadrant    | Value |      | Unit             |
|-------------|------------------------------------------------------------------------------------|-------------|-------|------|------------------|
| $I_{GT}$    | $V_D=12\text{V}$ $R_L=33\Omega$                                                    | I - II -III | MAX.  | 35   | mA               |
| $V_{GT}$    |                                                                                    | I - II -III | MAX.  | 1    | V                |
| $V_{GD}$    | $V_D=V_{DRM}$ $T_j=150^{\circ}\text{C}$<br>$R_L=3.3\text{k}\Omega$                 | I - II -III | MIN.  | 0.2  | V                |
| $I_L$       | $I_G=1.2I_{GT}$                                                                    | I -III      | MAX.  | 50   | mA               |
|             |                                                                                    | II          |       | 70   |                  |
| $I_H$       | $I_T=100\text{mA}$                                                                 |             | MAX.  | 45   | mA               |
| $dV/dt$     | $V_D=540\text{V}$ Gate Open $T_j=150^{\circ}\text{C}$                              |             | MIN.  | 1000 | V/ $\mu\text{s}$ |
| $(dI/dt)_c$ | $(dV/dt)_c=20\text{V}/\mu\text{s}$ , $T_j=150^{\circ}\text{C}$                     |             | MIN.  | 5    | A/ms             |
| $t_{on}$    | $I_G=40\text{mA}$ $I_A=200\text{mA}$ $I_R=20\text{mA}$<br>$T_j=25^{\circ}\text{C}$ |             | TYP.  | 3    | $\mu\text{s}$    |
| $t_{off}$   |                                                                                    |             |       | 30   |                  |

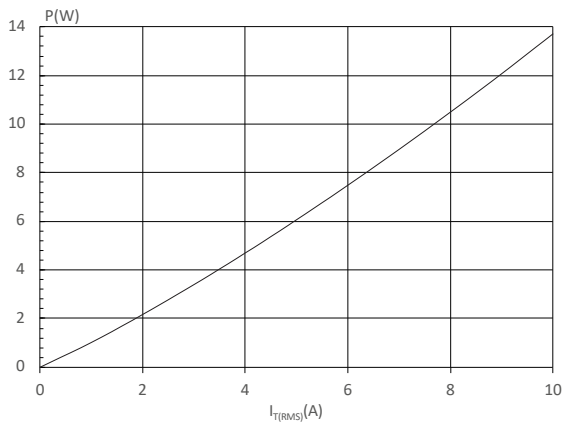
**STATIC CHARACTERISTICS**

| Symbol    | Parameter                                |                           | Value(MAX.) | Unit             |
|-----------|------------------------------------------|---------------------------|-------------|------------------|
| $V_{TM}$  | $I_{TM}=11\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^{\circ}\text{C}$  | 1.4         | V                |
| $V_{TO}$  | Threshold voltage                        | $T_j=150^{\circ}\text{C}$ | 0.78        | V                |
| $R_D$     | Dynamic resistance                       | $T_j=150^{\circ}\text{C}$ | 55          | $\text{m}\Omega$ |
| $I_{DRM}$ | $V_D=V_{DRM}$ $V_R=V_{RRM}$              | $T_j=25^{\circ}\text{C}$  | 5           | $\mu\text{A}$    |
| $I_{RRM}$ |                                          | $T_j=150^{\circ}\text{C}$ | 1           | mA               |

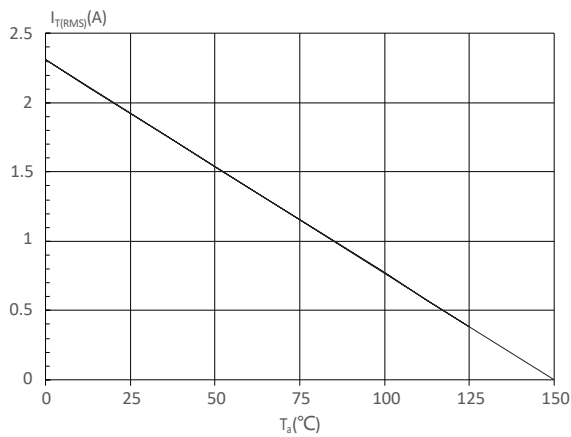
**THERMAL RESISTANCES**

| Symbol        | Parameter                | Value | Unit                        |
|---------------|--------------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | junction to case (AC)    | 1.7   | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | junction to ambient (AC) | 70    | $^{\circ}\text{C}/\text{W}$ |

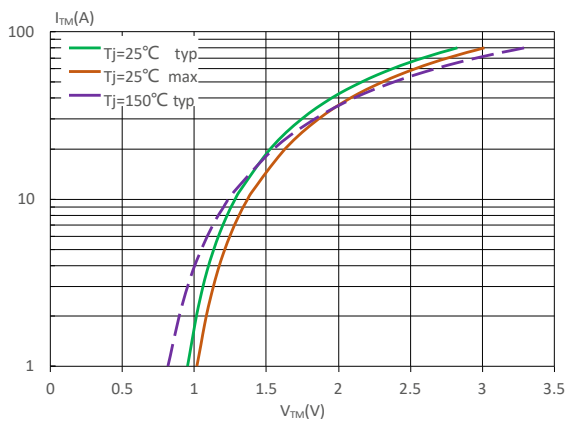
**FIG :** Maximum power dissipation versus RMS on-state current



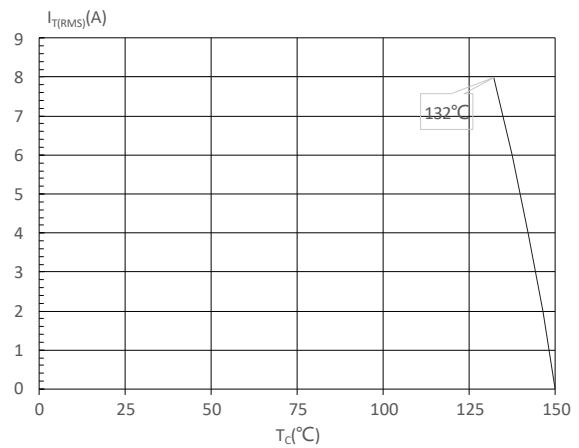
**FIG :** RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35 $\mu$ m)(full cycle)



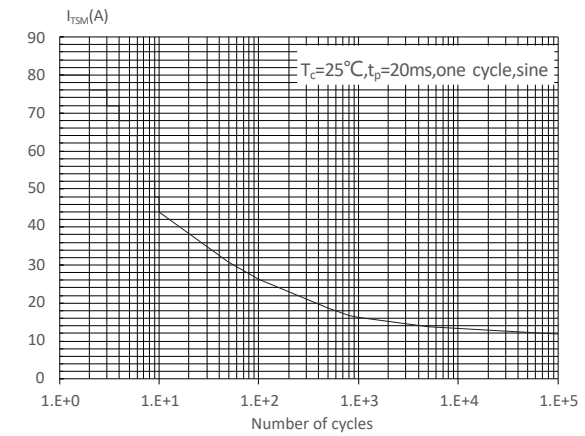
**FIG :** On-state characteristics



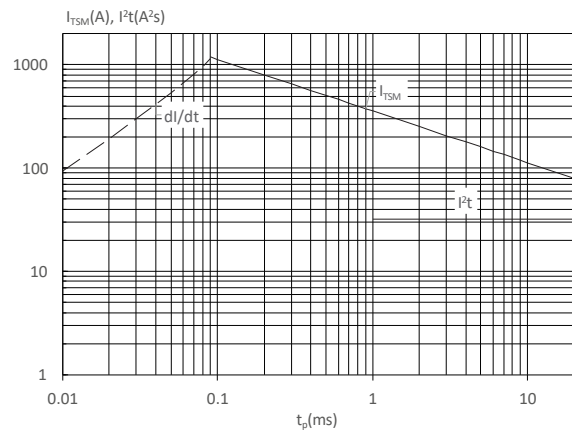
**FIG :** RMS on-state current versus case temperature



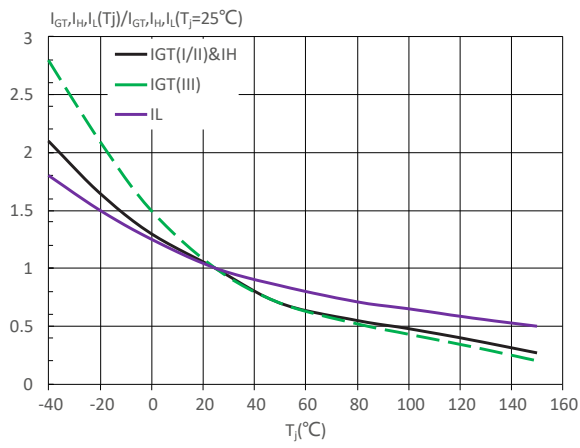
**FIG :** Surge peak on-state current versus number of cycles

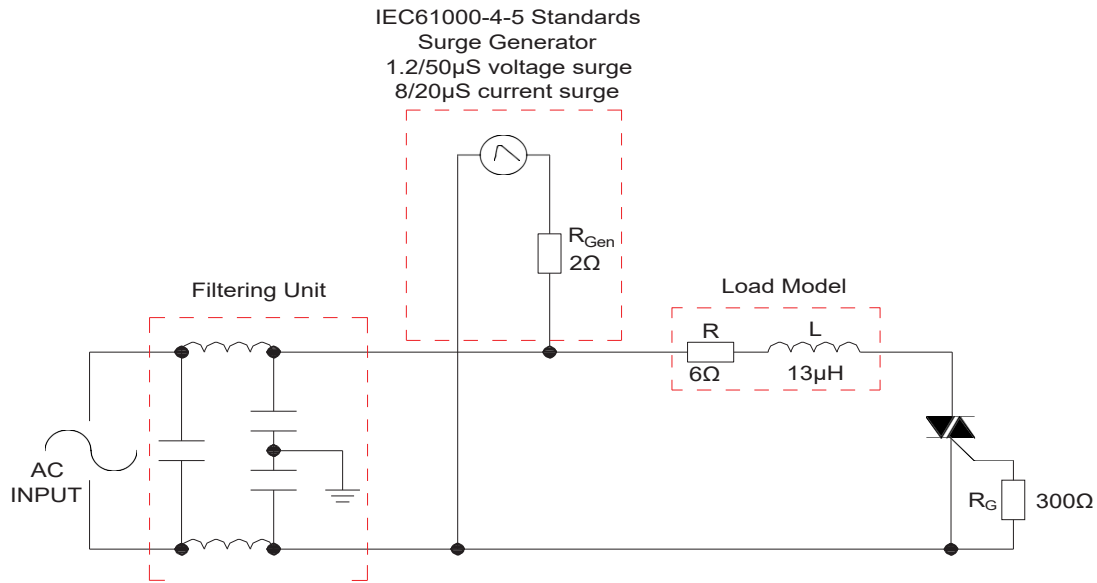


**FIG :** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20ms$ , and corresponding value of  $I^2t$  ( $di/dt < 100A/\mu s$ )



**FIG :** Relative variations of gate trigger current, holding current and latching current versus junction temperature



**FIG : Test circuit for inductive and resistive loads to IEC-61000-4-5 standards**


## SOLDERING PARAMETERS

| Reflow Condition                                            |                                   | Pb-Free assembly<br>(see figure at right) |
|-------------------------------------------------------------|-----------------------------------|-------------------------------------------|
| Pre Heat                                                    | -Temperature Min ( $T_{s(min)}$ ) | +150 $^{\circ}$ C                         |
|                                                             | -Temperature Max( $T_{s(max)}$ )  | +200 $^{\circ}$ C                         |
|                                                             | -Time (Min to Max) ( $t_s$ )      | 60-180 secs.                              |
| Average ramp up rate<br>(Liquidus Temp ( $T_L$ ) to peak)   |                                   | 3 $^{\circ}$ C/sec. Max                   |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                        |                                   | 3 $^{\circ}$ C/sec. Max                   |
| Reflow                                                      | -Temperature( $T_L$ )(Liquidus)   | +217 $^{\circ}$ C                         |
|                                                             | -Temperature( $t_L$ )             | 60-150 secs.                              |
| Peak Temp ( $T_p$ )                                         |                                   | +260(+0/-5) $^{\circ}$ C                  |
| Time within 5 $^{\circ}$ C of actual<br>Peak Temp ( $t_p$ ) |                                   | 20-40secs.                                |
| Ramp-down Rate                                              |                                   | 6 $^{\circ}$ C/sec. Max                   |
| Time 25 $^{\circ}$ C to Peak Temp ( $T_p$ )                 |                                   | 8 min. Max                                |
| Do not exceed                                               |                                   | +260 $^{\circ}$ C                         |

