

## High temperature 25 A Snubberless™ TRIAC

### Features

- Medium current TRIAC
- 150 °C max. Tj turn-off commutation
- Low thermal resistance with clip bonding
- Very high 3 quadrant commutation capability
- RoHS (2002/95/EC) compliant package

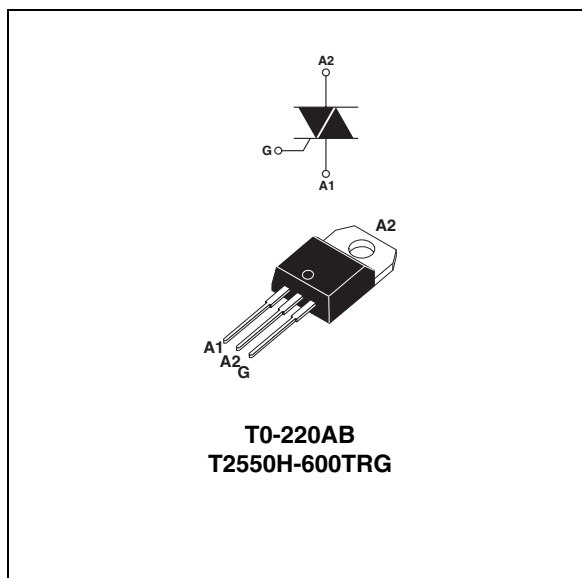
### Applications

Specifically designed for use in high temperature environment (found in hot appliances such as cookers, ovens, hobs, electric heaters, coffee machines).

### Description

This 25 A T2550H TRIAC provides an enhanced performance in terms of reduced power loss and thermal dissipation. This allows for the optimization of the heatsinking dimensions, leading to space and cost effectiveness when compared to electro-mechanical solutions.

Based on ST snubberless technology, the T2550H offers high commutation switching capabilities and high noise immunity levels. Thanks to the clip assembly technique, it provides a superior performance in surge current handling.



**Table 1. Device summary**

| Symbol            | Value | Unit |
|-------------------|-------|------|
| $I_{T(RMS)}$      | 25    | A    |
| $V_{DRM}/V_{RRM}$ | 600   | V    |
| $I_{GT} (Q_1)$    | 50    | mA   |

# 1 Characteristics

**Table 2. Absolute maximum ratings**

| Symbol             | Parameter                                                                                              |                               |                                     | Value                          | Unit                 |
|--------------------|--------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------|--------------------------------|----------------------|
| $I_{T(RMS)}$       | RMS on-state current (full sine wave)                                                                  |                               | $T_c = 125\text{ }^{\circ}\text{C}$ | 25                             | A                    |
| $I_{TSM}$          | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ }^{\circ}\text{C}$ ) | F = 50 Hz                     | t = 20 ms                           | 250                            | A                    |
|                    |                                                                                                        | F = 60 Hz                     | t = 16.7 ms                         | 260                            |                      |
| $I^2t$             | $I^2t$ Value for fusing                                                                                | $t_p = 10\text{ ms}$          |                                     | 340                            | $\text{A}^2\text{s}$ |
| di/dt              | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$        | F = 120 Hz                    | $T_j = 150\text{ }^{\circ}\text{C}$ | 50                             | A/ $\mu\text{s}$     |
| $V_{DSM}/V_{RSM}$  | Non repetitive surge peak off-state voltage                                                            | $t_p = 10\text{ ms}$          | $T_j = 25\text{ }^{\circ}\text{C}$  | 700                            | V                    |
| $I_{GM}$           | Peak gate current                                                                                      | $t_p = 20\text{ }\mu\text{s}$ | $T_j = 150\text{ }^{\circ}\text{C}$ | 4                              | A                    |
| $P_{G(AV)}$        | Average gate power dissipation                                                                         |                               | $T_j = 150\text{ }^{\circ}\text{C}$ | 1                              | W                    |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                             |                               |                                     | - 40 to + 150<br>- 40 to + 150 | $^{\circ}\text{C}$   |

**Table 3. Electrical characteristics ( $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

| Symbol                              | Test Conditions                                                                | Quadrant     |      | Value | Unit             |
|-------------------------------------|--------------------------------------------------------------------------------|--------------|------|-------|------------------|
| $I_{GT}^{(1)}$                      | $V_D = 12\text{ V}$ $R_L = 33\text{ }\Omega$                                   | I - II - III | MAX. | 50    | mA               |
| $V_{GT}$                            |                                                                                | I - II - III | MAX. | 1.3   | V                |
| $V_{GD}$                            | $V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 150\text{ }^{\circ}\text{C}$ | I - II - III | MIN. | 0.15  | V                |
| $I_H^{(2)}$                         | $I_T = 500\text{ mA}$                                                          |              | MAX. | 75    | mA               |
| $I_L$                               | $I_G = 1.2 I_{GT}$                                                             | I - II - III | MAX. | 90    | mA               |
| dV/dt <sup>(2)</sup>                | $V_D = 67\% V_{DRM}$ gate open $T_j = 150\text{ }^{\circ}\text{C}$             |              | MIN. | 500   | V/ $\mu\text{s}$ |
| (di/dt) <sub>c</sub> <sup>(2)</sup> | Without snubber $T_j = 150\text{ }^{\circ}\text{C}$                            |              | MIN. | 11.1  | A/ms             |

1. minimum  $I_{GT}$  is guaranteed at 10% of  $I_{GT}$  max.

2. for both polarities of A2 referenced to A1.

**Table 4. Static Characteristics**

| Symbol                 | Test Conditions                                          |                                     |      | Value | Unit          |
|------------------------|----------------------------------------------------------|-------------------------------------|------|-------|---------------|
| $V_T^{(1)}$            | $I_{TM} = 35\text{ A}$ $t_p = 380\text{ }\mu\text{s}$    | $T_j = 25\text{ }^{\circ}\text{C}$  | MAX. | 1.5   | V             |
| $V_{to}^{(1)}$         | Threshold voltage                                        | $T_j = 150\text{ }^{\circ}\text{C}$ | MAX. | 0.80  | V             |
| $R_d^{(1)}$            | Dynamic resistance                                       | $T_j = 150\text{ }^{\circ}\text{C}$ | MAX. | 19    | m $\Omega$    |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}$                                      | $T_j = 25\text{ }^{\circ}\text{C}$  | MAX. | 5     | $\mu\text{A}$ |
|                        |                                                          | $T_j = 150\text{ }^{\circ}\text{C}$ |      | 8.5   | mA            |
|                        | $V_{DRM}/V_{RRM} = 400\text{ V}$ (at mains peak voltage) | $T_j = 150\text{ }^{\circ}\text{C}$ |      | 5.5   |               |

1. for both polarities of A2 referenced to A1.

Table 5. Thermal resistance

| Symbol        | Parameter             | Value | Unit |
|---------------|-----------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case (AC) | 0.8   | °C/W |

Figure 1. Maximum power dissipation versus RMS on-state current (full cycle)

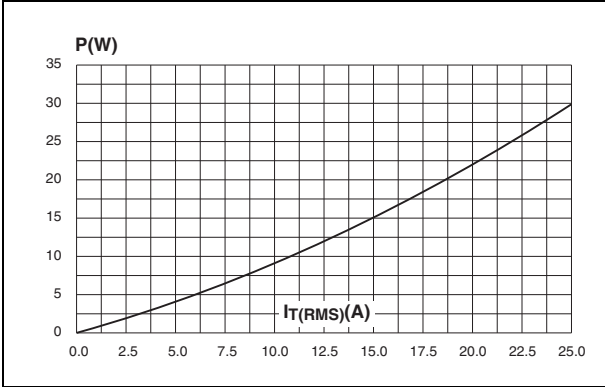


Figure 2. RMS on-state current versus case temperature (full cycle)

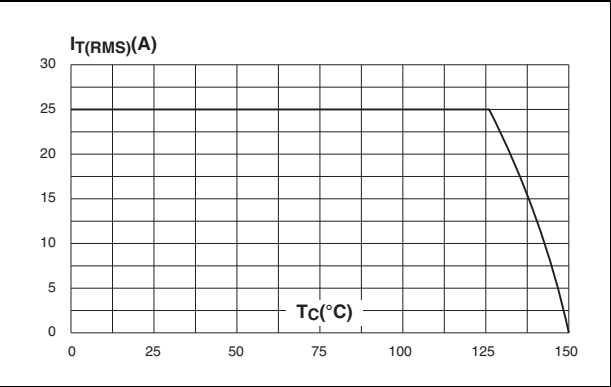


Figure 3. Relative variation of thermal impedance versus pulse duration

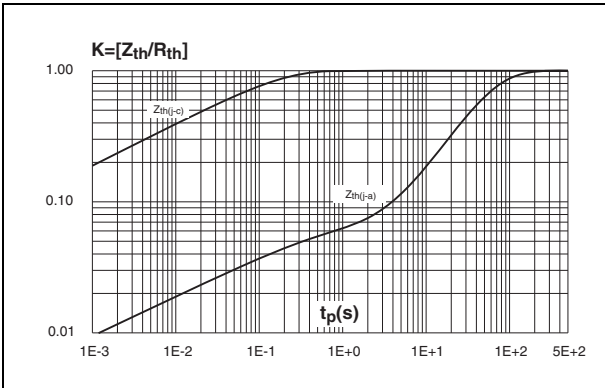


Figure 4. On-state characteristics (maximum values)

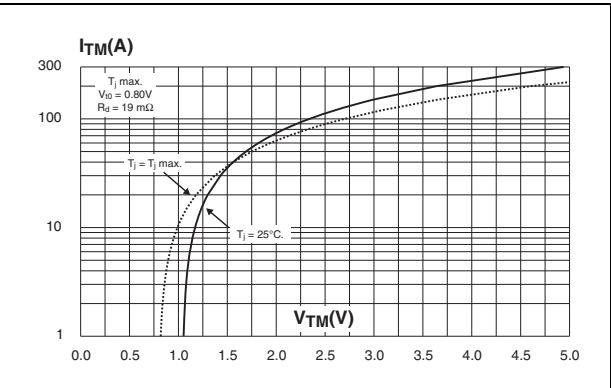


Figure 5. Surge peak on-state current versus number of cycles

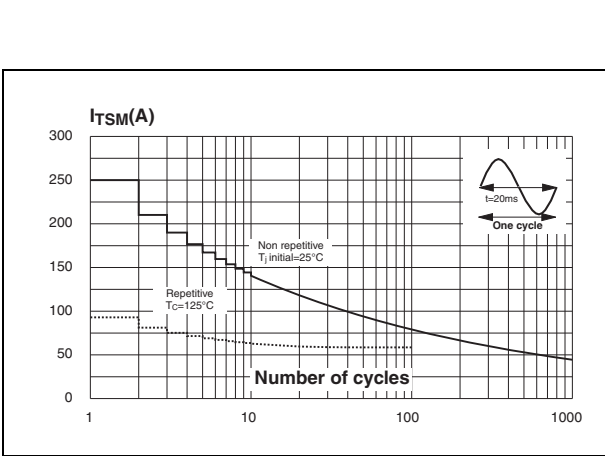
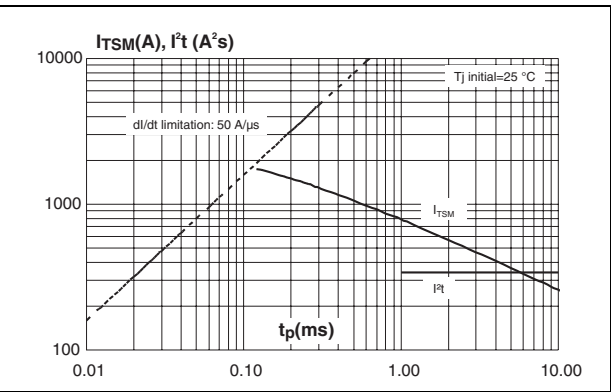
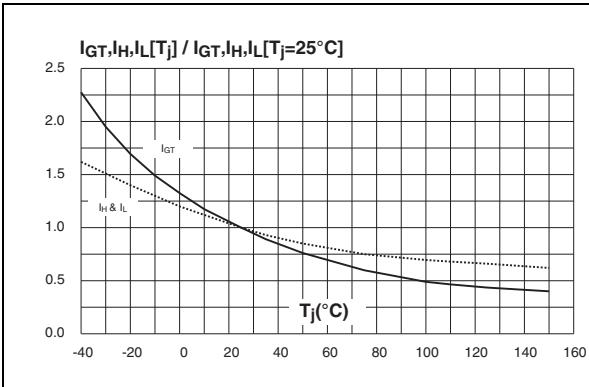


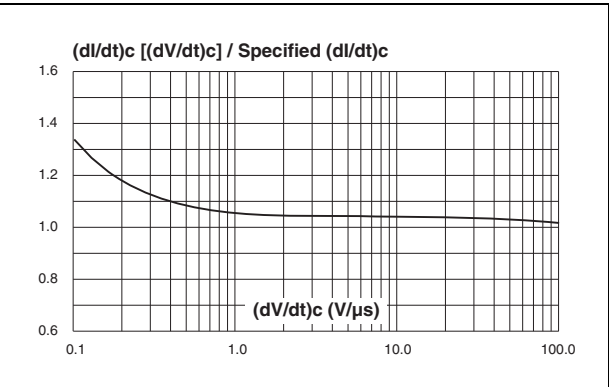
Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms and corresponding value of  $I^2t$



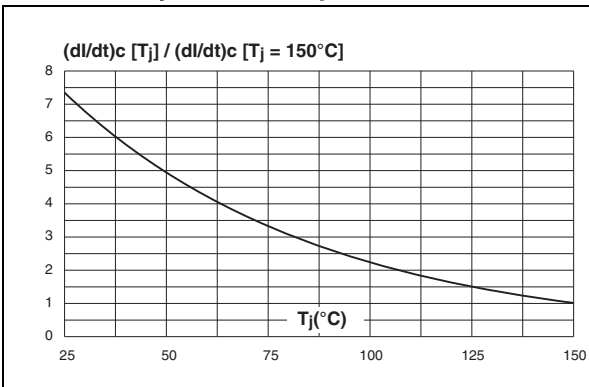
**Figure 7. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)**



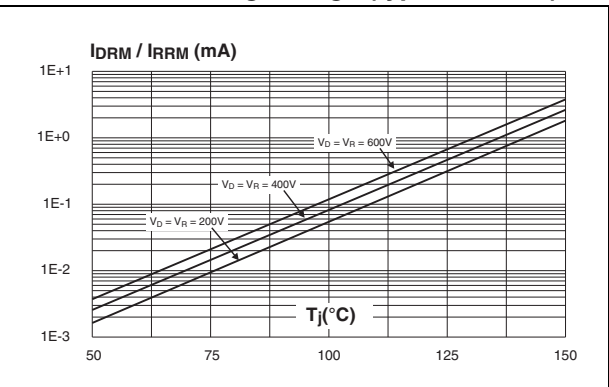
**Figure 8. Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values)**



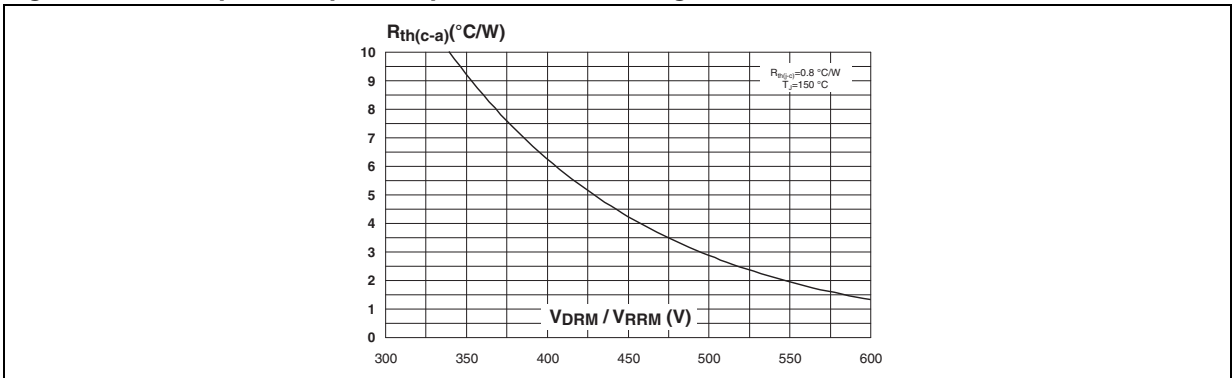
**Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature**



**Figure 10. Leakage current versus junction temperature for different values of blocking voltage (typical values)**

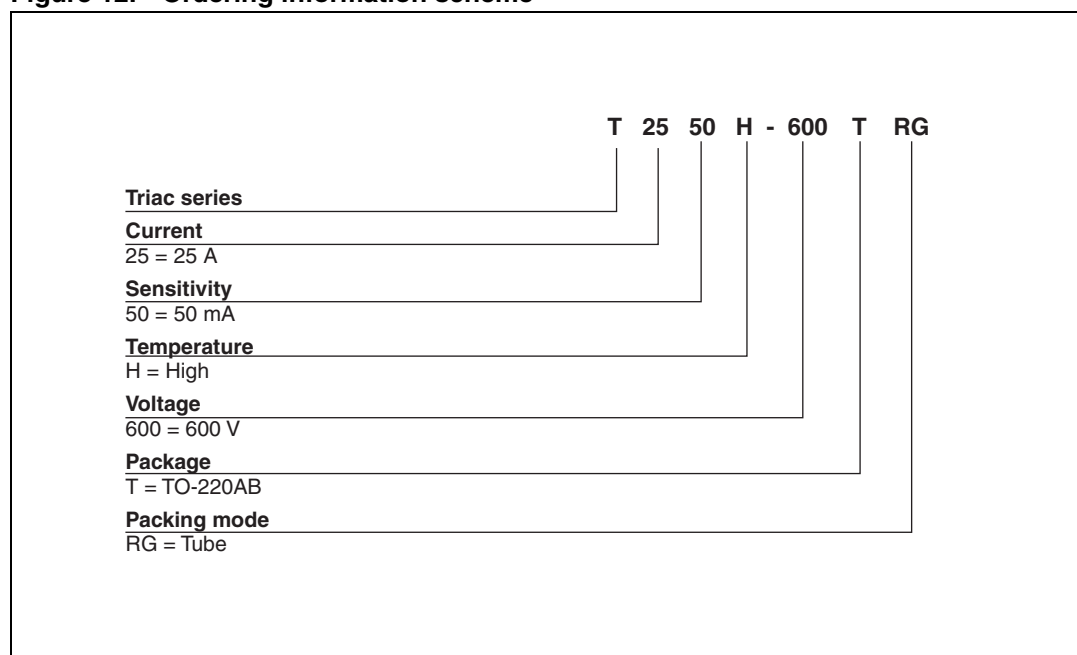


**Figure 11. Acceptable repetitive peak off-state voltage versus case-ambient thermal resistance**



## 2 Ordering information scheme

Figure 12. Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0
- Recommended torque 0.4 to 0.6 N-m

In order to meet environmental requirements, ST offers these devices in ECOPACK<sup>®</sup> packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at [www.st.com](http://www.st.com).

**Table 6. TO-220AB Dimensions**

| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 15.20       |       | 15.90 | 0.598  |       | 0.625 |
| a1   |             | 3.75  |       |        | 0.147 |       |
| a2   | 13.00       |       | 14.00 | 0.511  |       | 0.551 |
| B    | 10.00       |       | 10.40 | 0.393  |       | 0.409 |
| b1   | 0.61        |       | 0.88  | 0.024  |       | 0.034 |
| b2   | 1.23        |       | 1.32  | 0.048  |       | 0.051 |
| C    | 4.40        |       | 4.60  | 0.173  |       | 0.181 |
| c1   | 0.49        |       | 0.70  | 0.019  |       | 0.027 |
| c2   | 2.40        |       | 2.72  | 0.094  |       | 0.107 |
| e    | 2.40        |       | 2.70  | 0.094  |       | 0.106 |
| F    | 6.20        |       | 6.60  | 0.244  |       | 0.259 |
| ØI   | 3.75        |       | 3.85  | 0.147  |       | 0.151 |
| I4   | 15.80       | 16.40 | 16.80 | 0.622  | 0.646 | 0.661 |
| L    | 2.65        |       | 2.95  | 0.104  |       | 0.116 |
| I2   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| I3   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| M    |             | 2.60  |       |        | 0.102 |       |

## 4 Ordering information

Table 7. Ordering information

| Order code    | Marking    | Package  | Weight | Base qty | Delivery mode |
|---------------|------------|----------|--------|----------|---------------|
| T2550H-600TRG | T2550H600T | TO-220AB | 2.3 g  | 50       | Tube          |

## 5 Revision history

Table 8. Document revision history

| Date        | Revision | Changes                                                                       |
|-------------|----------|-------------------------------------------------------------------------------|
| Apr-2002    | 5A       | Last update.                                                                  |
| 13-Feb-2006 | 6        | TO-220AB delivery mode changed from bulk to tube.<br>ECOPACK statement added. |
| 20-Jun-2006 | 7        | Reformatted to current standards. Figures 6 and 11 replaced.                  |
| 27-May-2008 | 8        | Reformatted to current standards. ECOPACK statement updated.                  |

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