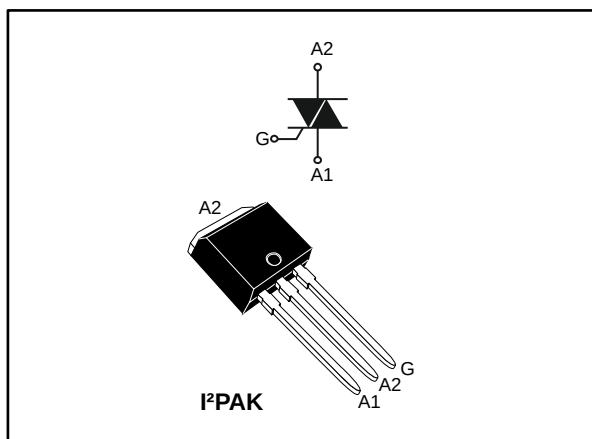


## 12 A Snubberless™ Triac

Datasheet - production data



### Description

Housed in an I²PAK package this device is dedicated to low profile compact applications.

Its fully rated 150 °C junction temperature allows high AC commutation capability for on/off or phase control applications without snubber aid circuit.

Table 1: Device summary

| Symbol            | Value | Unit |
|-------------------|-------|------|
| $V_{DRM}/V_{RRM}$ | 800   | V    |
| $I_{GT}$          | 35    | mA   |
| $T_j$             | 150   | °C   |

### Features

- 12 A medium current Triac
- Three triggering quadrants device
- Very high noise immunity and dynamic commutation
- ECOPACK®2 compliant component

### Applications

- General purpose AC line load control
- Motor control circuits
- Home, kitchen and tools appliances
- Lighting
- Inrush current limiting circuits

# 1 Characteristics

**Table 2: Absolute ratings (limiting values),  $T_j = 25\text{ °C}$ , unless otherwise specified**

| Symbol                              | Parameter                                                                                       |                        | Value                    | Unit        |                  |
|-------------------------------------|-------------------------------------------------------------------------------------------------|------------------------|--------------------------|-------------|------------------|
| I <sub>T(RMS)</sub>                 | RMS on-state current (full sine wave)                                                           |                        | T <sub>C</sub> = 128 °C  | 12          | A                |
| I <sub>TSM</sub>                    | Non repetitive surge peak on-state current (full cycle, T <sub>j</sub> initial = 25 °C)         |                        | t <sub>p</sub> = 20 ms   | 90          | A                |
|                                     |                                                                                                 |                        | t <sub>p</sub> = 16.7 ms | 95          |                  |
| I <sup>2</sup> t                    | I <sup>2</sup> t value for fusing                                                               |                        | t <sub>p</sub> = 10 ms   | 66          | A <sup>2</sup> s |
| di/dt                               | Critical rate of rise of on-state current<br>I <sub>G</sub> = 2 x I <sub>GT</sub> , tr ≤ 100 ns |                        | f = 100 Hz               | 100         | A/μs             |
| V <sub>DRM</sub> / V <sub>RRM</sub> | Repetitive peak off-state voltage                                                               |                        | T <sub>j</sub> = 125 °C  | 800         | V                |
|                                     |                                                                                                 |                        | T <sub>j</sub> = 150 °C  | 600         |                  |
| V <sub>DSM</sub> / V <sub>RSM</sub> | Non repetitive surge peak off-state voltage                                                     |                        | t <sub>p</sub> = 10 ms   | 900         |                  |
| I <sub>GM</sub>                     | Peak forward gate current                                                                       | t <sub>p</sub> = 20 μs | T <sub>j</sub> = 150 °C  | 4           | A                |
| P <sub>G(AV)</sub>                  | Average gate power dissipation                                                                  |                        | T <sub>j</sub> = 150 °C  | 1           | W                |
| T <sub>stg</sub>                    | Storage junction temperature range                                                              |                        |                          | -40 to +150 | °C               |
| T <sub>j</sub>                      | Operating junction temperature range                                                            |                        |                          | -40 to +150 | °C               |

**Table 3: Electrical characteristics ( $T_j = 25\text{ °C}$  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. | 35    | mA         |
| $V_{GT}$          |                                                                      |                       | Max. | 1     | V          |
| $V_{GD}$          | $V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $T_j = 150\text{ °C}$ | I - II - III          | Min. | 0.15  | V          |
| $I_H^{(1)}$       | $I_T = 500\text{ mA}$ , gate open                                    |                       | Max. | 35    | mA         |
| $I_L$             | $I_G = 1.2 \times I_{GT}$                                            | I - III               | Max. | 50    | mA         |
|                   |                                                                      | II                    |      | 80    |            |
| $dV/dt^{(2)}$     | $V_D = 536\text{ V}$ , gate open                                     | $T_j = 125\text{ °C}$ | Min. | 2000  | V/ $\mu$ s |
|                   | $V_D = 402\text{ V}$ , gate open                                     | $T_j = 150\text{ °C}$ |      | 1000  |            |
| $(di/dt)_c^{(2)}$ | Without snubber                                                      | $T_j = 125\text{ °C}$ | Min. | 19.5  | A/ms       |
|                   |                                                                      | $T_j = 150\text{ °C}$ |      | 13    |            |

**Notes:**

<sup>(1)</sup>minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

<sup>(2)</sup>for both polarities of A2 referenced to A1.

Table 4: Static electrical characteristics

| Symbol              | Test conditions                                         |                                   |      | Value | Unit          |
|---------------------|---------------------------------------------------------|-----------------------------------|------|-------|---------------|
| $V_{TM}^{(1)}$      | $I_{TM} = 17\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$ | $T_j = 25\text{ }^\circ\text{C}$  | Max. | 1.55  | V             |
| $V_{TO}^{(1)}$      | Threshold voltage                                       | $T_j = 150\text{ }^\circ\text{C}$ | Max. | 0.85  | V             |
| $R_D^{(1)}$         | Dynamic resistance                                      | $T_j = 150\text{ }^\circ\text{C}$ | Max. | 40    | m $\Omega$    |
| $I_{DRM} / I_{RRM}$ | $V_D = V_{DRM} = V_R = V_{RRM} = 600\text{ V}$          | $T_j = 25\text{ }^\circ\text{C}$  | Max. | 5     | $\mu\text{A}$ |
|                     |                                                         | $T_j = 150\text{ }^\circ\text{C}$ | Max. | 3.6   | mA            |
|                     | $V_D = V_{DRM} = V_R = V_{RRM} = 800\text{ V}$          | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 1.2   | mA            |

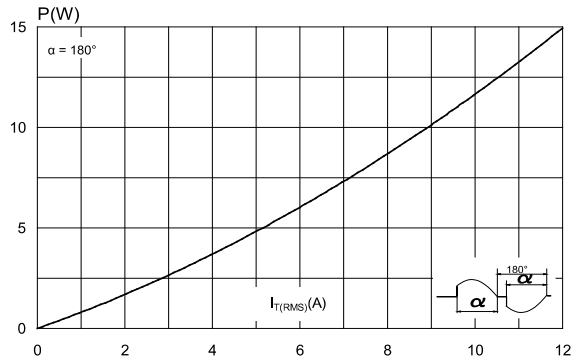
**Notes:**<sup>(1)</sup>for both polarities of A2 referenced to A1

Table 5: Thermal parameters

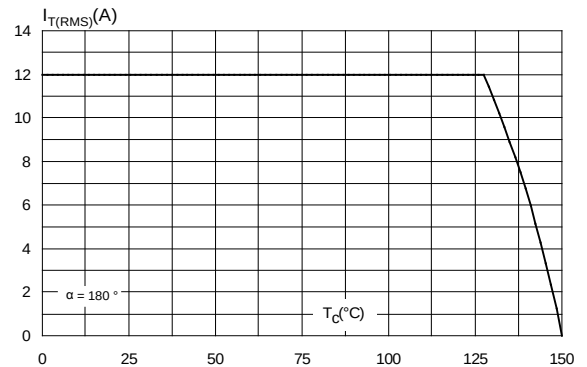
| Symbol        | Parameter             |      | Value | Unit               |
|---------------|-----------------------|------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case (AC) | Max. | 1.5   | $^\circ\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient   | Typ. | 65    |                    |

## 1.1 Characteristics (curves)

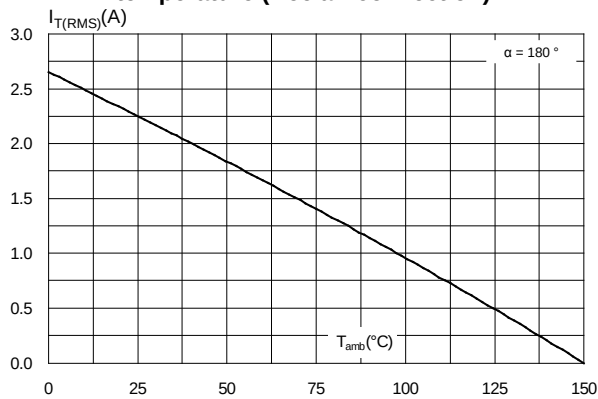
**Figure 1: Maximum power dissipation versus on-state RMS current (full cycle)**



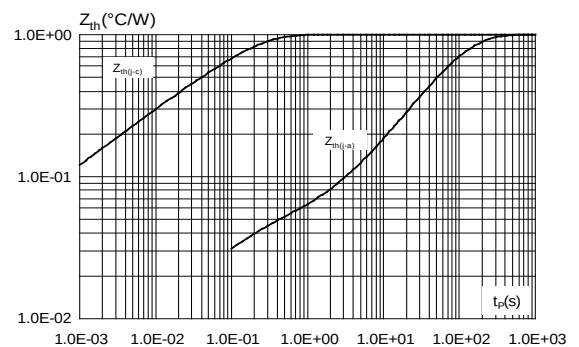
**Figure 2: On-state RMS current versus case temperature (full cycle)**



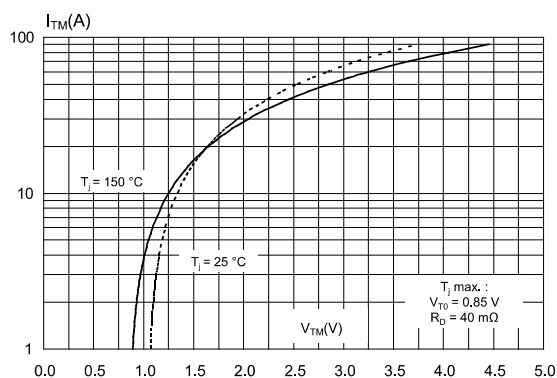
**Figure 3: On-state RMS current versus ambient temperature (free air convection)**



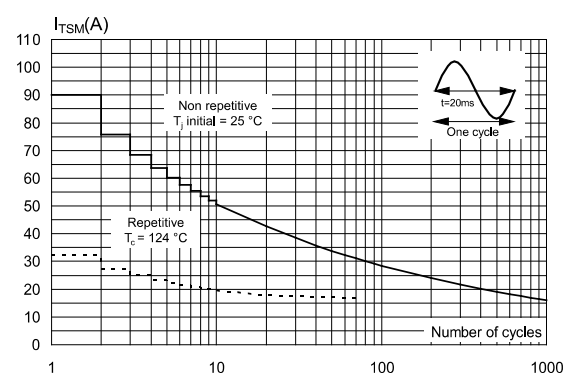
**Figure 4: Variation of thermal impedance versus pulse duration**



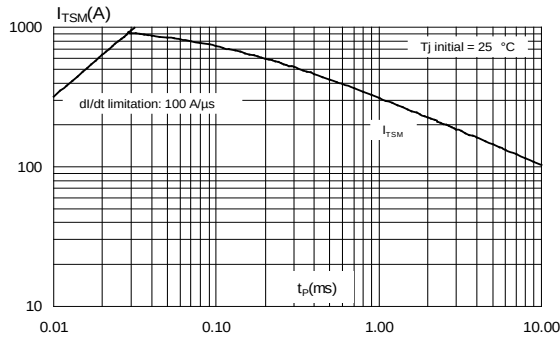
**Figure 5: On-state characteristics (maximum values)**



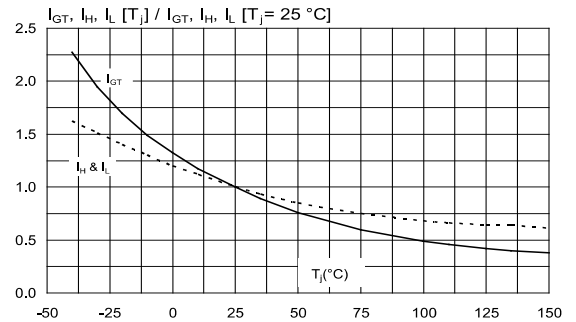
**Figure 6: Surge peak on-state current versus number of cycles**



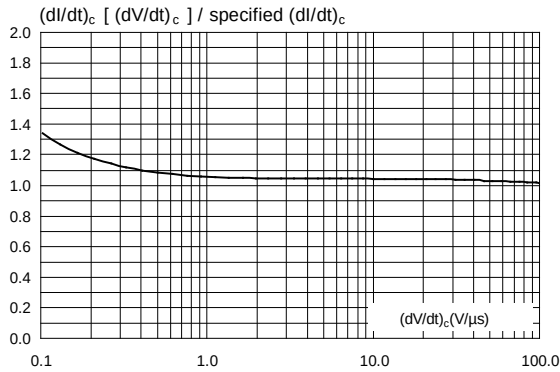
**Figure 7: Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms**



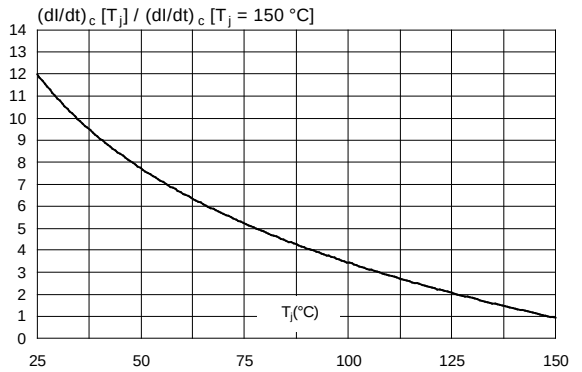
**Figure 8: Relative variation of gate current, holding current and latching current versus junction temperature (typical values)**



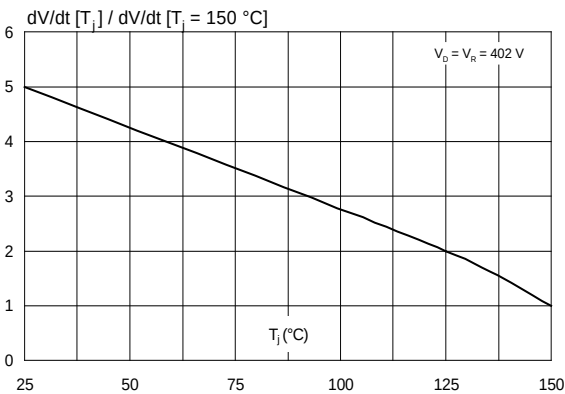
**Figure 9: Relative variation of critical rate of decrease of main current versus reapplied dV/dt (typical values)**



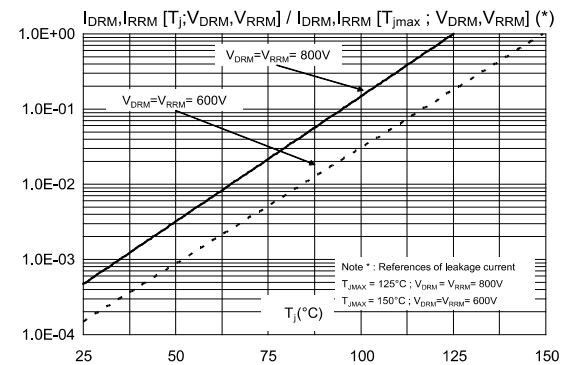
**Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature**



**Figure 11: Relative variation of static dV/dt immunity versus junction temperature**



**Figure 12: Relative variation of leakage current versus junction temperature for different blocking voltages (typical values)**



## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

- ECOPACK®2 compliant
- Lead-free package leads finishing
- Molding compound resin is halogen-free and meets UL94 standard level V0

### 2.1 I<sup>2</sup>PAK package information

Figure 13: I<sup>2</sup>PAK package outline

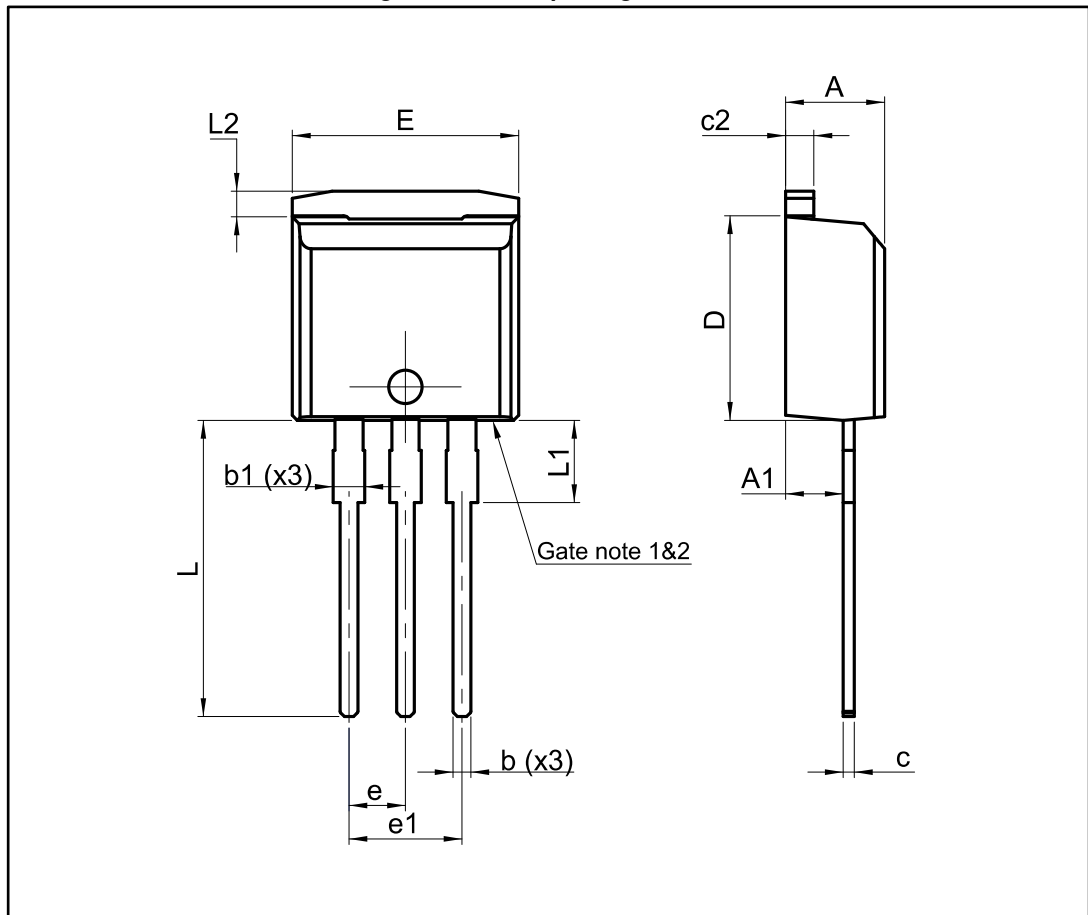


Table 6: I<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |       |                       |        |
|------|-------------|-------|-----------------------|--------|
|      | Millimeters |       | Inches <sup>(1)</sup> |        |
|      | Min.        | Max.  | Min.                  | Max.   |
| A    | 4.40        | 4.60  | 0.1732                | 0.1811 |
| A1   | 2.40        | 2.72  | 0.0945                | 0.1071 |
| b    | 0.61        | 0.88  | 0.0240                | 0.0346 |
| b1   | 1.14        | 1.70  | 0.0449                | 0.0669 |
| c    | 0.49        | 0.70  | 0.0193                | 0.0276 |
| c2   | 1.23        | 1.32  | 0.0484                | 0.0520 |
| D    | 8.95        | 9.35  | 0.3524                | 0.3681 |
| e    | 2.40        | 2.70  | 0.0945                | 0.1063 |
| e1   | 4.95        | 5.15  | 0.1949                | 0.2028 |
| E    | 10.00       | 10.40 | 0.3937                | 0.4094 |
| L    | 13.00       | 14.00 | 0.5118                | 0.5512 |
| L1   | 3.50        | 3.93  | 0.1378                | 0.1547 |
| L2   | 1.27        | 1.40  | 0.0500                | 0.0551 |

**Notes:**<sup>(1)</sup>Inches dimensions given for reference only

### 3 Ordering information

Figure 14: Ordering information scheme

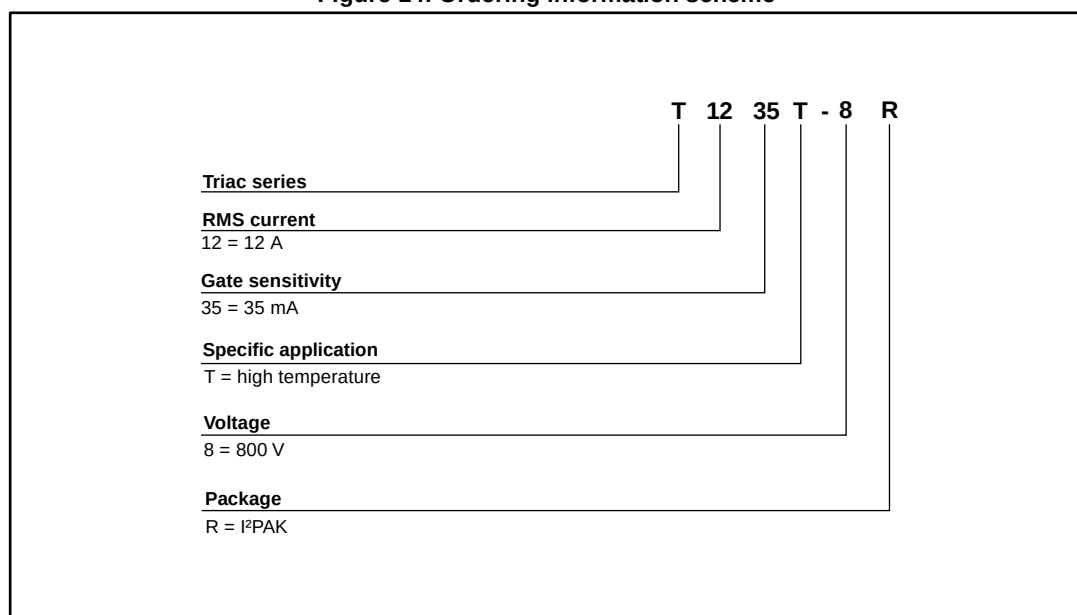


Table 7: Ordering information

| Order code | Marking   | Package            | Weight | Base qty. | Delivery mode |
|------------|-----------|--------------------|--------|-----------|---------------|
| T1235T-8R  | T1235T-8R | I <sup>2</sup> PAK | 1.7 g  | 50        | Tube          |

### 4 Revision history

Table 8: Document revision history

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 14-Nov-2017 | 1        | Initial release. |



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