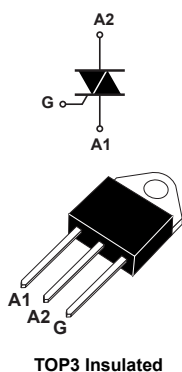


## 25 A standard Triacs in TOP3 package



### Features

- On-state current ( $I_{T(RMS)}$ ): 25 A
- Max. blocking voltage ( $V_{DRM}/V_{RRM}$ ): 1200 V
- Gate current ( $I_{GT}$ ): 150 mA
- Commutation at 10 V/ $\mu$ s: up to 88 A/ms
- Noise immunity: 2 kV/ $\mu$ s
- Insulated package:
  - 2500 V rms (UL recognized: E81734)

### Application

- Heating system
- Motor starter
- Induction motor speed control

### Description

The TPDVxx25 series use high performance alternistor technology.

Featuring very high commutation levels and high surge current capability, these devices are well adapted to power control for inductive and resistive loads (motor, transformer...) especially on three-phase power grid. Targeted three-phase applications include heating systems, motor starters, and induction motor speed control (especially for fans).

#### Product status link

[TPDV825RG](#)

[TPDV1025RG](#)

[TPDV1225RG](#)

#### Product summary

|                   |                    |
|-------------------|--------------------|
| $I_{T(RMS)}$      | 25 A               |
| $V_{DRM}/V_{RRM}$ | TPDV825RG: 825 V   |
|                   | TPDV1025RG: 1025 V |
|                   | TPDV1225RG: 1225 V |
| $I_{GT}$          | 150 mA             |

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values)**

| Symbol                              | Parameters                                                                                         |                         |                         | Value       | Unit             |
|-------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------|------------------|
| I <sub>T(RMS)</sub>                 | RMS on-state current (180° conduction angle)                                                       |                         | T <sub>c</sub> = 85 °C  | 25          | A                |
| I <sub>TSM</sub>                    | Non repetitive surge peak on-state current                                                         | t <sub>p</sub> = 2.5 ms | T <sub>j</sub> = 25 °C  | 390         | A                |
|                                     |                                                                                                    | t <sub>p</sub> = 8.3 ms |                         | 250         |                  |
|                                     |                                                                                                    | t <sub>p</sub> = 10 ms  |                         | 230         |                  |
| I <sup>2</sup> t                    | I <sup>2</sup> t value for fusing                                                                  | t <sub>p</sub> = 10 ms  | T <sub>j</sub> = 25 °C  | 265         | A <sup>2</sup> s |
| di/dt                               | Critical rate of rise of on-state current<br>I <sub>G</sub> = 500 mA, di <sub>G</sub> /dt = 1 A/μs | f = 50 Hz               |                         | 100         | A/μs             |
| V <sub>DRM</sub> , V <sub>RRM</sub> | Repetitive surge peak off-state voltage                                                            | TPDV825                 | T <sub>j</sub> = 125 °C | 800         | V                |
|                                     |                                                                                                    | TPDV1025                |                         | 1000        |                  |
|                                     |                                                                                                    | TPDV1225                |                         | 1200        |                  |
| I <sub>GM</sub>                     | Peak gate current                                                                                  | t <sub>p</sub> = 20 μs  |                         | 8           | A                |
| P <sub>GM</sub>                     | Peak gate power dissipation                                                                        |                         |                         | 40          | W                |
| V <sub>GM</sub>                     | Peak positive gate voltage                                                                         |                         |                         | 16          | V                |
| P <sub>G(AV)</sub>                  | Average gate power dissipation                                                                     |                         |                         | 1           | W                |
| T <sub>stg</sub>                    | Storage junction temperature range                                                                 |                         |                         | -40 to +150 | °C               |
| T <sub>j</sub>                      | Operating junction temperature range                                                               |                         |                         | -40 to +125 | °C               |
| V <sub>INS</sub> <sup>(1)</sup>     | Insulation RMS voltage, 1 minute                                                                   |                         |                         | 2500        | V                |

1. A1, A2, gate terminals to case for 1 minute.

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol            | Parameters                                                                 | Quadrant     |      | Value | Unit             |
|-------------------|----------------------------------------------------------------------------|--------------|------|-------|------------------|
| $I_{GT}^{(1)}$    | $V_D = 12\text{ V}, R_L = 33\ \Omega$                                      | I - II - III | Max. | 150   | mA               |
| $V_{GT}$          |                                                                            | I - II - III | Max. | 1.5   | V                |
| $V_{GD}$          | $V_D = V_{DRM}, R_L = 3.3\text{ k}\Omega, T_j = 125\text{ }^\circ\text{C}$ | I - II - III | Min. | 0.2   | V                |
| $t_{GT}$          | $V_D = V_{DRM}, I_G = 500\text{ mA}, dI_G/dt = 3\text{ A}/\mu\text{s}$     | I - II - III | Typ. | 2.5   | $\mu\text{s}$    |
| $I_H^{(2)}$       | $I_T = 500\text{ mA}$                                                      |              | Typ. | 50    | mA               |
| $I_L$             | $I_G = 1.2\ I_{GT}$                                                        | I - III      | Typ. | 100   | mA               |
|                   |                                                                            | II           | Typ. | 200   |                  |
| $dV/dt^{(2)}$     | $V_D = 67\ \% \ V_{DRM}$ gate open, $T_j = 125\text{ }^\circ\text{C}$      |              | Min. | 2000  | V/ $\mu\text{s}$ |
| $(dI/dt)_c^{(2)}$ | $(dV/dt)_c = 200\text{ V}/\mu\text{s}, T_j = 125\text{ }^\circ\text{C}$    |              | Min. | 20    | A/ms             |
|                   | $(dV/dt)_c = 10\text{ V}/\mu\text{s}, T_j = 125\text{ }^\circ\text{C}$     |              |      | 88    |                  |

1. Minimum  $I_{GT}$  is guaranteed at 5 % of  $I_{GT}$  max.

2. For both polarities of A2 referenced to A1

**Table 3. Static electrical characteristics**

| Symbol            | Test conditions                                         |                                   |      | Value | Unit          |
|-------------------|---------------------------------------------------------|-----------------------------------|------|-------|---------------|
| $V_{TM}^{(1)}$    | $I_{TM} = 35\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$ | $T_j = 25\text{ }^\circ\text{C}$  | Max. | 1.8   | V             |
| $V_{TO}^{(1)}$    | threshold on-state voltage                              | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 1.1   | V             |
| $R_D^{(1)}$       | Dynamic resistance                                      | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 19    | m $\Omega$    |
| $I_{DRM}/I_{RRM}$ | $V_{DRM} = V_{RRM}$                                     | $T_j = 25\text{ }^\circ\text{C}$  | Max. | 20    | $\mu\text{A}$ |
|                   |                                                         | $T_j = 125\text{ }^\circ\text{C}$ |      | 8     | mA            |

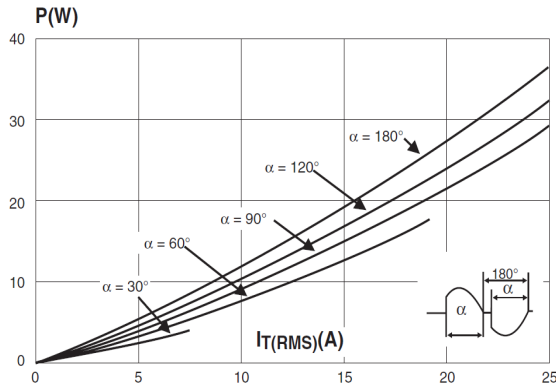
1. For both polarities of A2 referenced to A1

**Table 4. Thermal resistance**

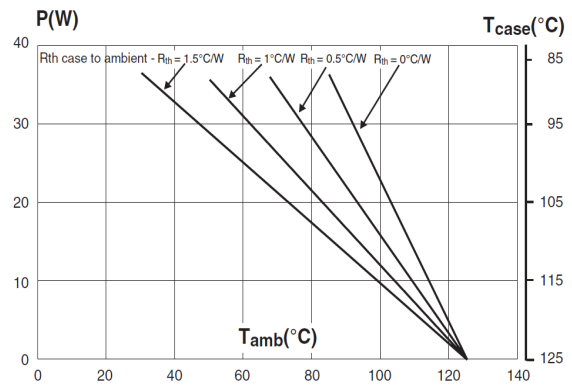
| Symbol        | Parameters                                                   | Value | Unit |
|---------------|--------------------------------------------------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case (DC)                                        | Max.  | 1.5  |
|               | Junction to case (AC) for 360 ° conduction angle (F = 50 Hz) | Max.  | 1.1  |
| $R_{th(j-a)}$ | Junction to ambient                                          | Typ.  | 50   |

## 1.1 Characteristics (curves)

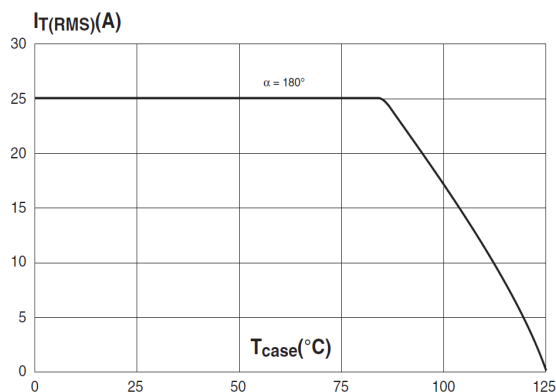
**Figure 1.** Max. rms power dissipation versus on-state rms current ( $F = 50\text{Hz}$ , curves limited by  $(di/dt)_c$ )



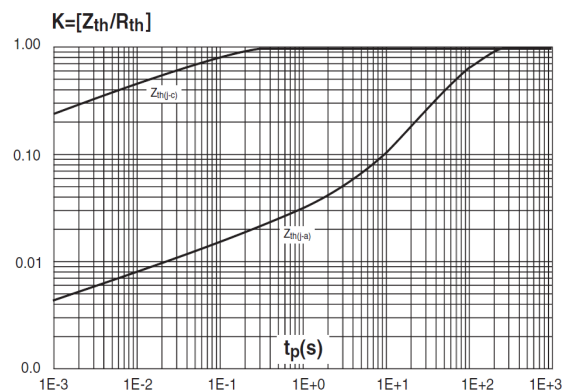
**Figure 2.** Max. rms power dissipation and max. allowable temperatures ( $T_{amb}$  and  $T_{case}$ ) for various  $R_{th}$



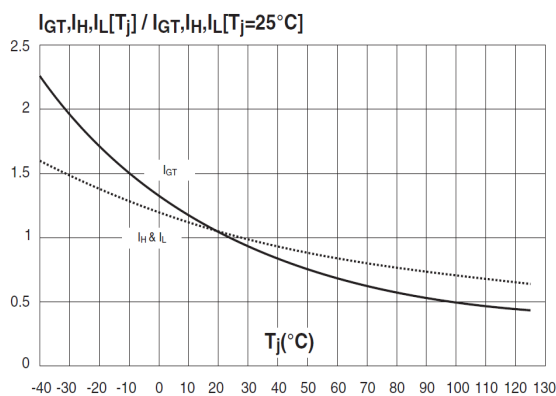
**Figure 3.** On-state rms current versus case temperature



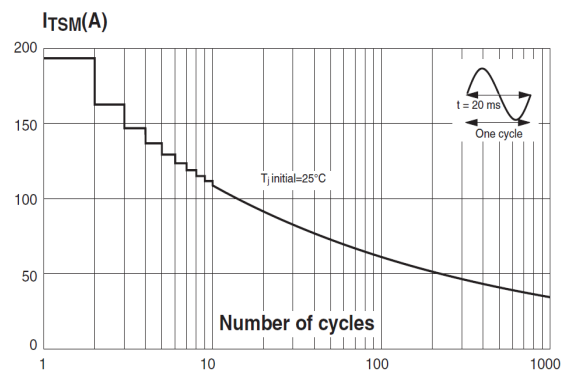
**Figure 4.** Relative variation of thermal impedance versus pulse duration



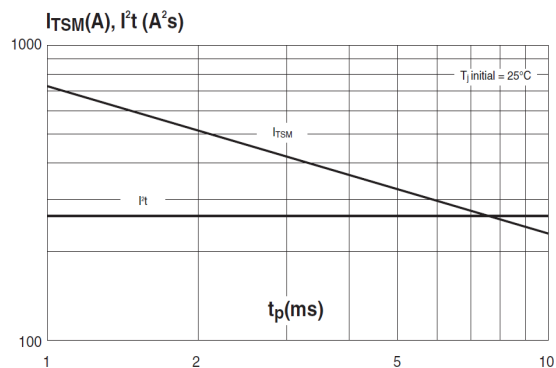
**Figure 5.** Relative variation of gate trigger current and holding current and latching current versus junction temperature



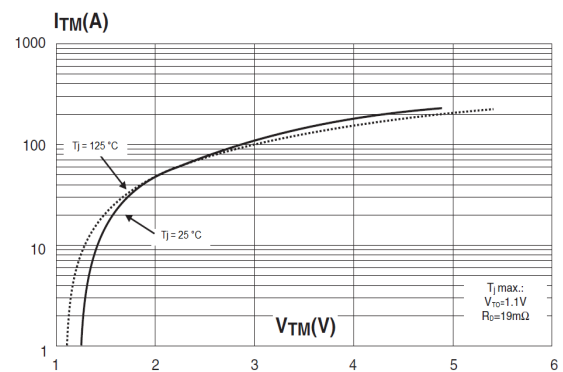
**Figure 6.** Non-repetitive surge peak on-state current versus number of cycles



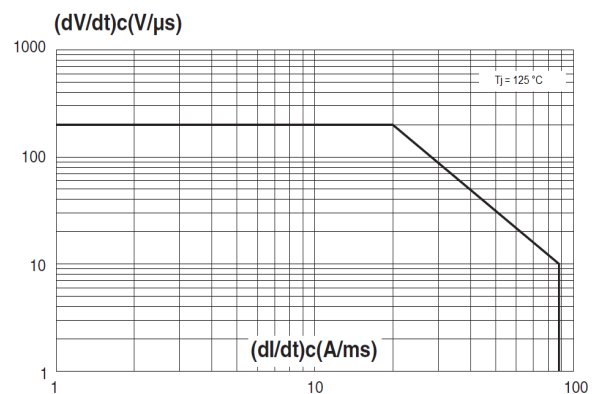
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding values of  $I^2t$**



**Figure 8. On-state characteristics (maximum values)**



**Figure 9. Safe turn-off operating area**



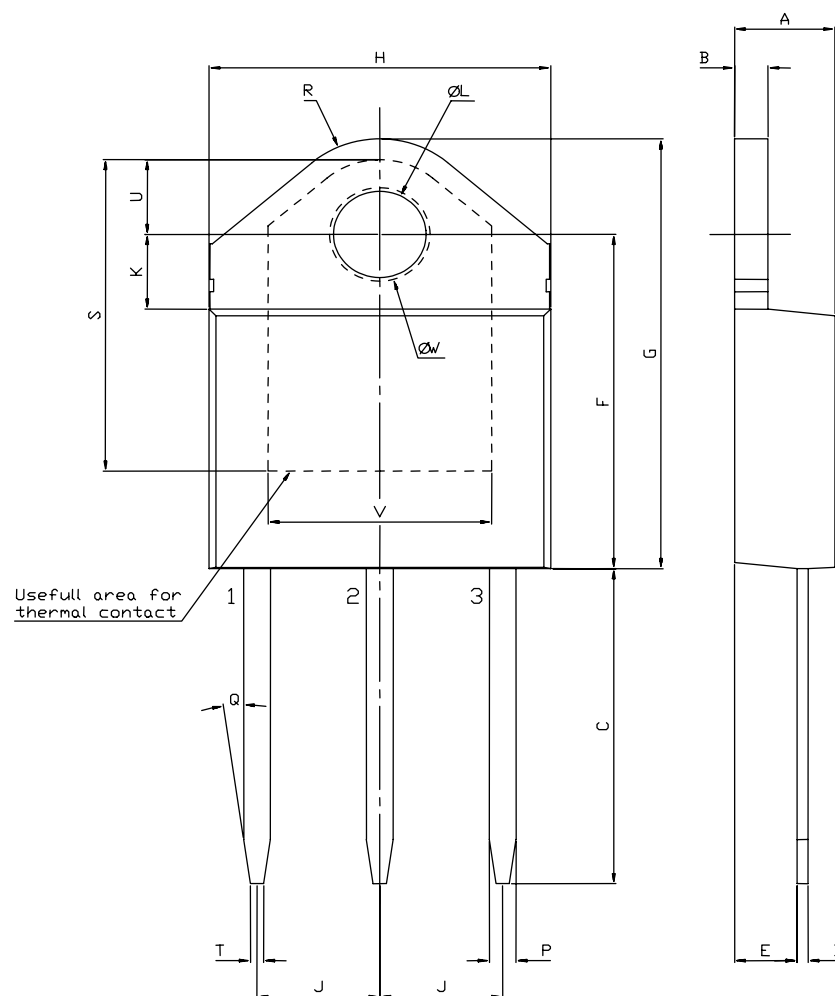
## 2 Package information

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.

### 2.1 Package information

- **ECOPACK** (lead-free plating and halogen free package compliance)
- Lead-free package leads finishing
- Halogen-free molding compound resin meets UL94 standard level V0
- Recommended torque: 1.05 N·m (max. torque: 1.2 N·m)

Figure 10. Package outline



**Table 5. Mechanical data**

| Ref. | Dimensions |      |       |                       |        |        |
|------|------------|------|-------|-----------------------|--------|--------|
|      | mm         |      |       | Inches <sup>(1)</sup> |        |        |
|      | Min.       | Typ. | Max.  | Min.                  | Typ.   | Max.   |
| A    | 4.40       |      | 4.60  | 0.1732                |        | 0.1811 |
| B    | 1.45       |      | 1.55  | 0.0571                |        | 0.0610 |
| C    | 14.35      |      | 15.60 | 0.5650                |        | 0.6142 |
| D    | 0.50       |      | 0.70  | 0.0197                |        | 0.0276 |
| E    | 2.70       |      | 2.90  | 0.1063                |        | 0.1142 |
| F    | 15.80      |      | 16.50 | 0.6220                |        | 0.6496 |
| G    | 20.40      |      | 21.10 | 0.8031                |        | 0.8307 |
| H    | 15.10      |      | 15.50 | 0.5945                |        | 0.6102 |
| J    | 5.40       |      | 5.65  | 0.2126                |        | 0.2224 |
| K    | 3.40       |      | 3.65  | 0.1339                |        | 0.1437 |
| L    | 4.08       |      | 4.17  | 0.1606                |        | 0.1642 |
| P    | 1.10       |      | 1.30  | 0.0430                |        | 0.0510 |
| R    |            | 4.60 |       |                       | 0.1811 |        |

1. Inches given for reference only

### 3 Ordering information

**Table 6. Ordering information**

| Order code | Marking  | Package   | Weight | Base qty. | Delivery mode |
|------------|----------|-----------|--------|-----------|---------------|
| TPDV825RG  | TPDV825  | TOP3 Ins. | 4.5 g  | 30        | Tube          |
| TPDV1025RG | TPDV1025 |           |        |           |               |
| TPDV1225RG | TPDV1225 |           |        |           |               |



## Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes                                                                            |
|-------------|----------|------------------------------------------------------------------------------------|
| 30-Mar-2011 | 1        | First issue.                                                                       |
| 13-Jan-2012 | 2        | Updated $dI/dt$ in <i>Table 2</i> and added $V_{to}$ and $R_d$ to <i>Table 3</i> . |
| 06-Oct-2023 | 3        | Updated <i>Section 2.1 Package information</i> .                                   |
| 23-May-2024 | 4        | Updated <a href="#">Table 2</a> .                                                  |

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