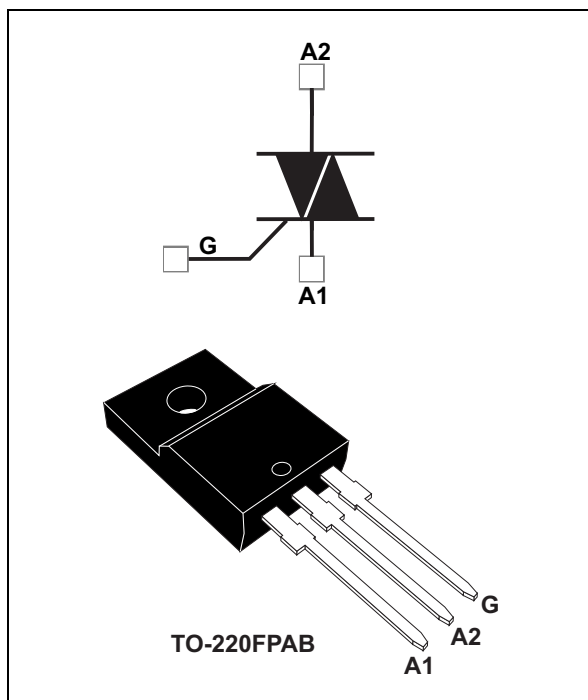


**4 A Snubberless™ Triac**

Datasheet - production data

**Description**

Available in through-hole package, the Triac T435T-600FP is suitable for general purpose AC switching.

Specially designed for power tool applications, it can also be used to drive loads like motor speed controller, and kitchen equipment such as electro valves, light dimmers and similar.

**Features**

- High static and dynamic commutation
- Package is RoHS (2002/95/EC) compliant
- $I_{GT} = 35 \text{ mA}$
- ECOPACK®2 compliant component
- Provides UL certified insulation rate at 2.0 kV rms

**TM:** Snubberless is a trademark of STMicroelectronics

# 1 Characteristics

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

| Symbol             | Parameter                                                                                                        |                               |                                     | Value                      | Unit                   |
|--------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------|----------------------------|------------------------|
| $I_{T(RMS)}$       | On-state rms current (full sine wave)                                                                            |                               | $T_c = 105\text{ }^{\circ}\text{C}$ | 4                          | A                      |
| $I_{TSM}$          | Non repetitive surge peak on-state current (full cycle sine wave, $T_j$ initial = $25\text{ }^{\circ}\text{C}$ ) | $F = 60\text{ Hz}$            | $t = 16.7\text{ ms}$                | 32                         | A                      |
|                    |                                                                                                                  | $F = 50\text{ Hz}$            | $t = 20\text{ ms}$                  | 30                         |                        |
| $I^2t$             | $I^2t$ Value for fusing                                                                                          | $t_p = 10\text{ ms}$          |                                     | 6                          | $\text{A}^2\text{s}$   |
| $di/dt$            | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$                  | $F = 120\text{ Hz}$           | $T_j = 125\text{ }^{\circ}\text{C}$ | 50                         | $\text{A}/\mu\text{s}$ |
| $V_{DSM}/V_{RSM}$  | Non repetitive surge peak off-state voltage                                                                      | $t_p = 10\text{ ms}$          | $T_j = 25\text{ }^{\circ}\text{C}$  | $V_{DRM}/V_{RRM} + 100$    | V                      |
| $I_{GM}$           | Peak gate current                                                                                                | $t_p = 20\text{ }\mu\text{s}$ | $T_j = 125\text{ }^{\circ}\text{C}$ | 4                          | A                      |
| $P_{G(AV)}$        | Average gate power dissipation                                                                                   |                               | $T_j = 125\text{ }^{\circ}\text{C}$ | 1                          | W                      |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                                       |                               |                                     | -40 to +150<br>-40 to +125 | $^{\circ}\text{C}$     |

**Table 2. Electrical characteristics, Snubberless (3 quadrants)  
( $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

| Symbol            | Test conditions                                                       | Quadrant     |     | Value | Unit                   |
|-------------------|-----------------------------------------------------------------------|--------------|-----|-------|------------------------|
| $I_{GT}^{(1)}$    | $V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$                        | I - II - III | MAX | 35    | mA                     |
| $V_{GT}$          | $V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$                        | I - II - III | MAX | 1.3   | V                      |
| $V_{GD}$          | $V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$                          | I - II - III | MIN | 0.2   | V                      |
| $I_H^{(2)}$       | $I_T = 100\text{ mA}$                                                 |              | MAX | 35    | mA                     |
| $I_L$             | $I_G = 1.2 \times I_{GT}$                                             | I - III      | MAX | 50    | mA                     |
|                   |                                                                       | II           | MAX | 80    |                        |
| $dV/dt^{(2)}$     | $V_D = 67\% V_{DRM}$ , gate open, $T_j = 125\text{ }^{\circ}\text{C}$ |              | MIN | 750   | $\text{V}/\mu\text{s}$ |
| $(di/dt)_c^{(2)}$ | Without snubber, $T_j = 125\text{ }^{\circ}\text{C}$                  |              | MIN | 5.3   | $\text{A}/\text{ms}$   |
| $V_{ins}$         | Insulation rms voltage, 1 minute                                      |              |     | 2.0   | kV                     |

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

2. For both polarities of A2 pin referenced to A1 pin

Table 3. Static electrical characteristics

| Symbol                 | Test conditions                                    |                                    |     |  | Value | Unit          |
|------------------------|----------------------------------------------------|------------------------------------|-----|--|-------|---------------|
| $V_{TM}^{(1)}$         | $I_{TM} = 5.7 \text{ A}$ , $t_p = 380 \mu\text{s}$ | $T_j = 25 \text{ }^\circ\text{C}$  | MAX |  | 1.6   | V             |
| $V_{TO}^{(1)}$         | Threshold voltage                                  | $T_j = 125 \text{ }^\circ\text{C}$ | MAX |  | 0.9   | V             |
| $R_D^{(1)}$            | Dynamic resistance                                 | $T_j = 125 \text{ }^\circ\text{C}$ | MAX |  | 100   | m $\Omega$    |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}$                                | $T_j = 25 \text{ }^\circ\text{C}$  | MAX |  | 5     | $\mu\text{A}$ |
|                        |                                                    | $T_j = 125 \text{ }^\circ\text{C}$ |     |  | 1     | mA            |

1. For both polarities of A2 pin referenced to A1 pin

Table 4. Thermal resistances

| Symbol        | Parameter             | Value | Unit               |
|---------------|-----------------------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case (ac) | 4.3   | $^\circ\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient   | 60    |                    |

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

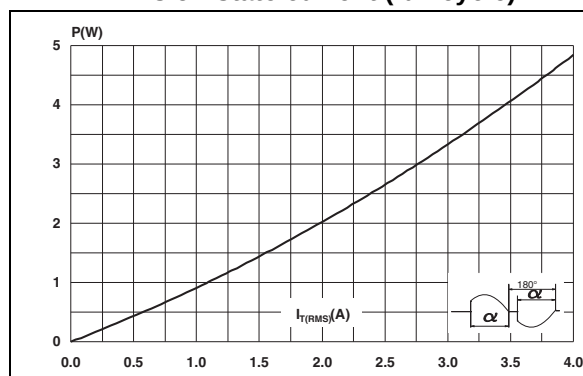


Figure 2. On-state current (rms) versus case temperature (full cycle)

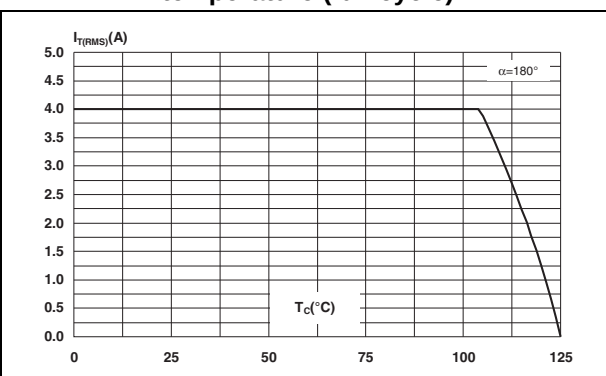


Figure 3. On-state current (rms) versus ambient temperature (free air convection)

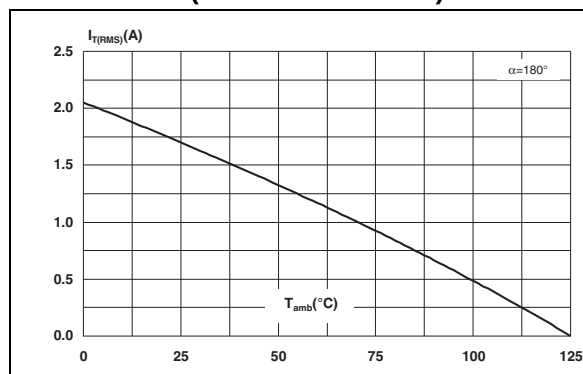
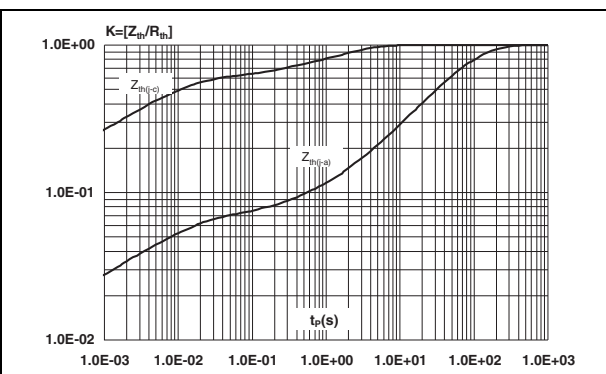
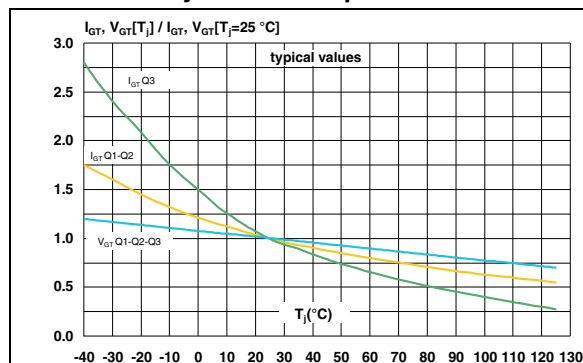


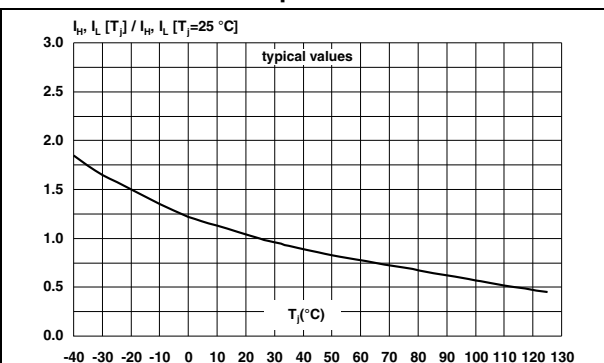
Figure 4. Relative variation of thermal impedance versus pulse duration



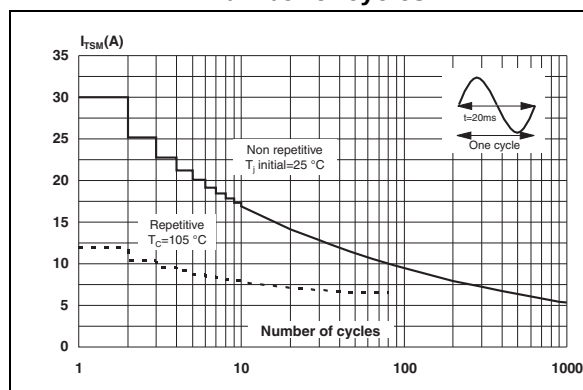
**Figure 5. Relative variation of gate trigger current, and gate trigger voltage versus junction temperature**



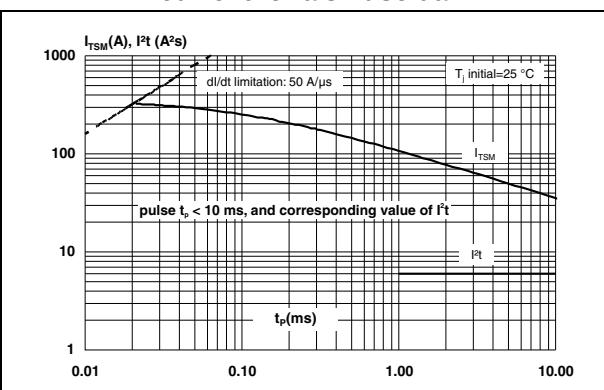
**Figure 6. Relative variation of holding current and latching current versus junction temperature**



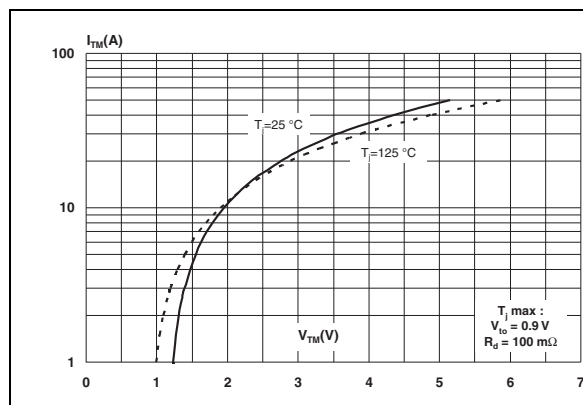
**Figure 7. Surge peak on-state current versus number of cycles**



**Figure 8. Non-repetitive surge peak on-state current for a sinusoidal**



**Figure 9. On-state characteristics (maximum values)**



**Figure 10. Relative variation of critical rate of decrease of main current (di/dt)\_c versus junction temperature**

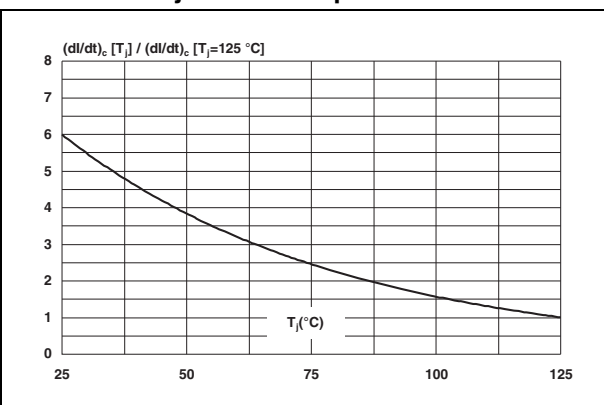


Figure 11. Relative variation of critical rate of decrease of main current  $(di/dt)_c$  versus reappplied  $(dV/dt)_c$

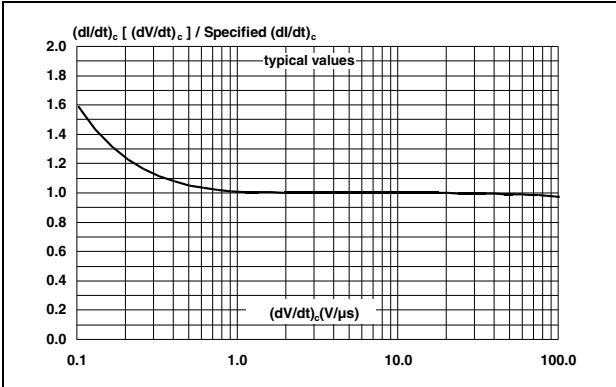
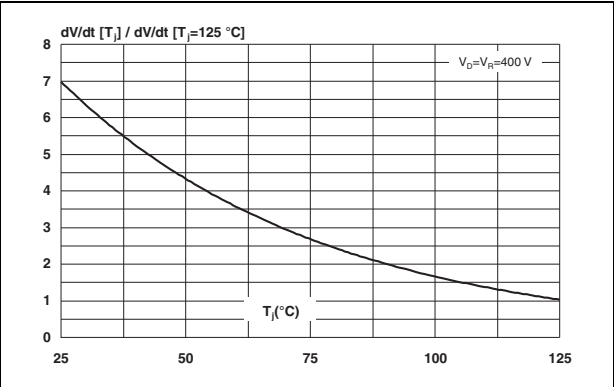


Figure 12. Relative variation of static  $dV/dt$  immunity versus junction temperature



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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

Figure 13. TO-220FPAB dimension definitions

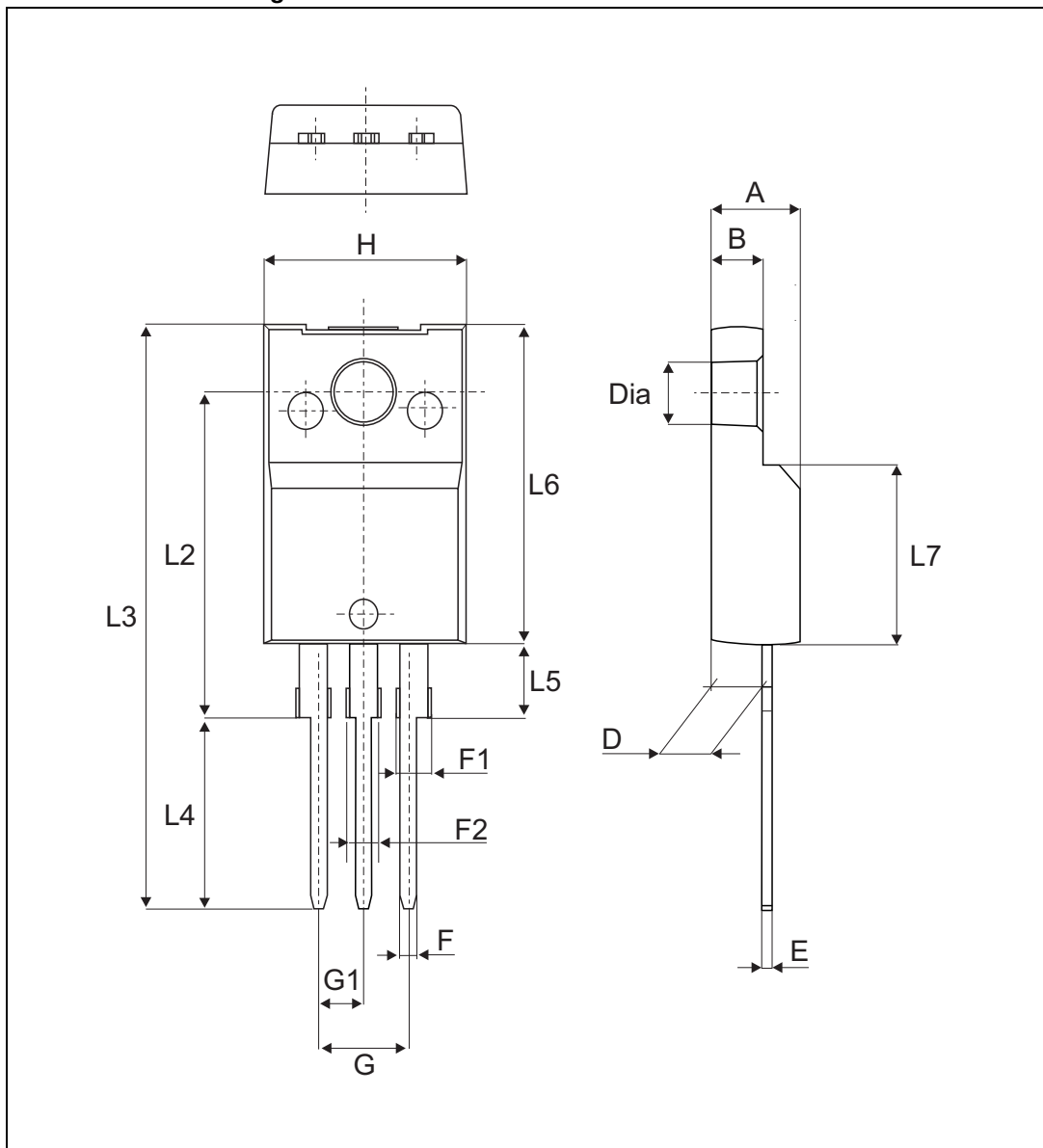


Table 5. TO-220FPAB dimension values

| Ref. | Dimensions  |         |      |        |           |       |
|------|-------------|---------|------|--------|-----------|-------|
|      | Millimeters |         |      | Inches |           |       |
|      | Min.        |         | Max. | Min.   |           | Max.  |
| A    | 4.4         |         | 4.6  | 0.173  |           | 0.181 |
| B    | 2.5         |         | 2.7  | 0.098  |           | 0.106 |
| D    | 2.5         |         | 2.75 | 0.098  |           | 0.108 |
| E    | 0.45        |         | 0.70 | 0.018  |           | 0.027 |
| F    | 0.75        |         | 1    | 0.030  |           | 0.039 |
| F1   | 1.15        |         | 1.70 | 0.045  |           | 0.067 |
| F2   | 1.15        |         | 1.70 | 0.045  |           | 0.067 |
| G    | 4.95        |         | 5.20 | 0.195  |           | 0.205 |
| G1   | 2.4         |         | 2.7  | 0.094  |           | 0.106 |
| H    | 10          |         | 10.4 | 0.393  |           | 0.409 |
| L2   |             | 16 Typ. |      |        | 0.63 Typ. |       |
| L3   | 28.6        |         | 30.6 | 1.126  |           | 1.205 |
| L4   | 9.8         |         | 10.6 | 0.386  |           | 0.417 |
| L5   | 2.9         |         | 3.6  | 0.114  |           | 0.142 |
| L6   | 15.9        |         | 16.4 | 0.626  |           | 0.646 |
| L7   | 9.00        |         | 9.30 | 0.354  |           | 0.366 |
| Dia. | 3.00        |         | 3.20 | 0.118  |           | 0.126 |

### 3 Ordering information

Figure 14. Ordering information scheme

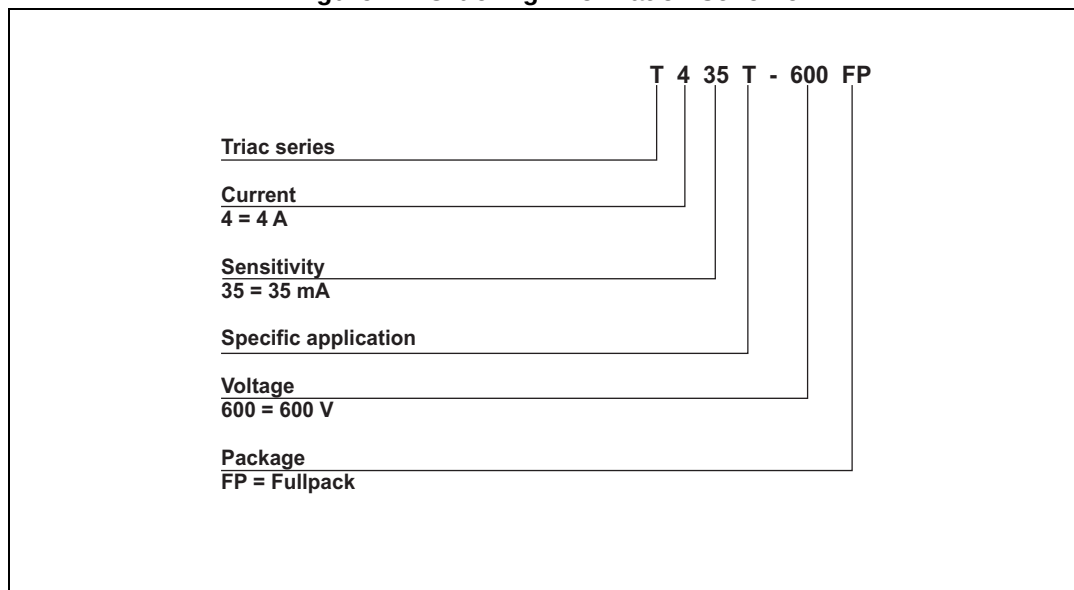


Table 6. Ordering information

| Order code  | Marking   | Package    | Weight | Base qty | Packing mode |
|-------------|-----------|------------|--------|----------|--------------|
| T435T-600FP | T435T-600 | TO-220FPAB | 2.0 g  | 50       | Tube         |

### 4 Revision history

Table 7. Document revision history

| Date        | Revision | Changes                                                                                                                       |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------|
| 09-Nov-2007 | 1        | Initial release.                                                                                                              |
| 14-Jun-2010 | 2        | Updated ECOPACK statement.                                                                                                    |
| 28-Jul-2014 | 3        | Updated <a href="#">Features</a> , <a href="#">Table 2</a> and <a href="#">Figure 14</a> and reformatted to current standard. |

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