

**Table 1. Main features**

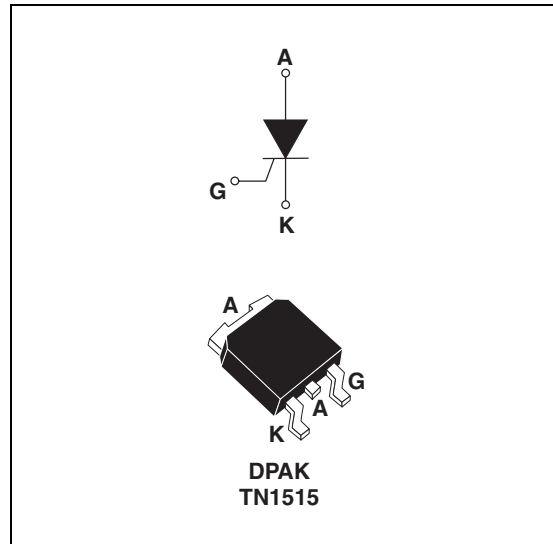
| Symbol            | Value | Unit |
|-------------------|-------|------|
| $I_{T(RMS)}$      | 15    | A    |
| $V_{DRM}/V_{RRM}$ | 600   | V    |
| $I_{GT}(Q_1)$     | 15    | mA   |

### Description

Specifically designed to control motor in hand tools application, the TN15 SCR is available in DPAK package, providing a high robustness against stalled rotor operating conditions in a small SMD package

**Table 2. Order code**

| Part number    | Marking    |
|----------------|------------|
| TN1515-600B-TR | TN15 15600 |
| TN1515-600B    | TN15 15600 |



**Table 3. Absolute maximum ratings**

| Symbol             | Parameter   |                         | Value                            | Unit                   |
|--------------------|---|-------------------------|----------------------------------|------------------------|
| $I_{T(RMS)}$       | RMS on-state current (180° conduction angle)  |                         | $T_c = 109^\circ\text{C}$<br>15  | A                      |
| $I_{T(AV)}$        | Average on-state current (180° conduction angle)  |                         | $T_c = 109^\circ\text{C}$<br>9.5 | A                      |
| $I_{TSM}$          | Non repetitive surge peak on-state current  | $t_p = 8.3\text{ ms}$   | $T_j = 25^\circ\text{C}$<br>165  | A                      |
|                    |   | $t_p = 10\text{ ms}$    |                                  |                        |
| $I^2t$             | $I^2t$ Value for fusing   | $t_p = 10\text{ ms}$    | $T_j = 25^\circ\text{C}$<br>113  | $\text{A}^2\text{s}$   |
| $di/dt$            | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$ | $F = 120\text{ Hz}$     | $T_j = 125^\circ\text{C}$<br>50  | $\text{A}/\mu\text{s}$ |
| $I_{GM}$           | Peak gate current   | $t_p = 20\ \mu\text{s}$ | $T_j = 125^\circ\text{C}$<br>4   | A                      |
| $P_{G(AV)}$        | Average gate power dissipation  |                         | $T_j = 125^\circ\text{C}$<br>1   | W                      |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                      |                         | - 40 to + 150<br>- 40 to + 125   | $^\circ\text{C}$       |
| $V_{RGM}$          | Maximum peak reverse gate voltage   |                         | 5                                | V                      |

# 1 Characteristics

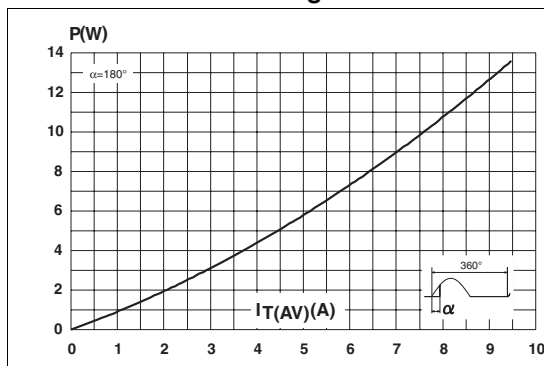
**Table 4. Electrical characteristics** ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol    | Test conditions                                |                           | Values |      | Unit             |
|-----------|--|---------------------------|--------|------|------------------|
| $I_{GT}$  | $V_{out} = 12\text{ V}, R_L = 33\ \Omega$      | $T_j = 25^\circ\text{C}$  | MIN.   | 2    | mA               |
|           |  |                           | MAX.   | 15   |                  |
| $V_{GT}$  | $V_{out} = 12\text{ V}, R_L = 33\ \Omega$      |                           | MAX.   | 1.3  | V                |
| $V_{GD}$  | $V_{out} = V_{DRM}, R_L = 33\ \Omega$          | $T_j = 125^\circ\text{C}$ | MIN.   | 0.2  | V                |
| $I_H$     | $I_T = 500\text{ mA}$                          |                           | MAX.   | 40   | mA               |
| $I_L$     | $I_G = 1.2 I_{GT}$                             |                           | MAX.   | 60   | mA               |
| dV/dt     | $V_D = 67\% V_{DRM}$ , gate open               | $T_j = 125^\circ\text{C}$ | MIN.   | 200  | V/ $\mu\text{s}$ |
| $V_{TM}$  | $I_{TM} = 30\text{ A}, t_p = 380\ \mu\text{s}$ | $T_j = 25^\circ\text{C}$  | MAX.   | 1.6  | V                |
| $V_{TO}$  | Threshold voltage                              | $T_j = 125^\circ\text{C}$ | MAX.   | 0.85 | V                |
| $R_D$     | Dynamic resistance                             | $T_j = 125^\circ\text{C}$ | MAX.   | 25   | m $\Omega$       |
| $I_{DRM}$ | $V_{DRM} = V_{RRM}$                            | $T_j = 25^\circ\text{C}$  | MAX.   | 5    | $\mu\text{A}$    |
| $I_{RRM}$ |  | $T_j = 125^\circ\text{C}$ |        | 2    | mA               |

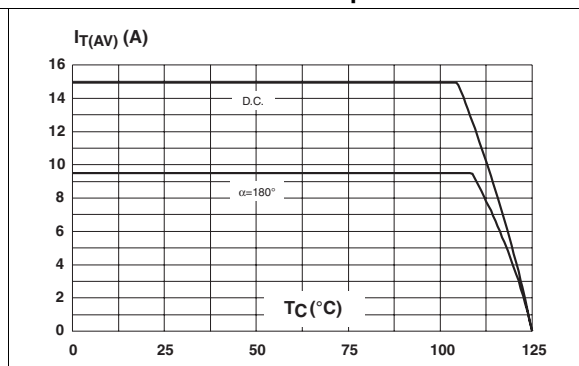
**Table 5. Thermal resistance**

| Symbol        | Parameter             |                       | Value | Unit               |
|---------------|-----------------------|-----------------------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case (DC) |                       | 1.2   | $^\circ\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient   | $S = 0.5\text{ cm}^2$ | 70    | $^\circ\text{C/W}$ |

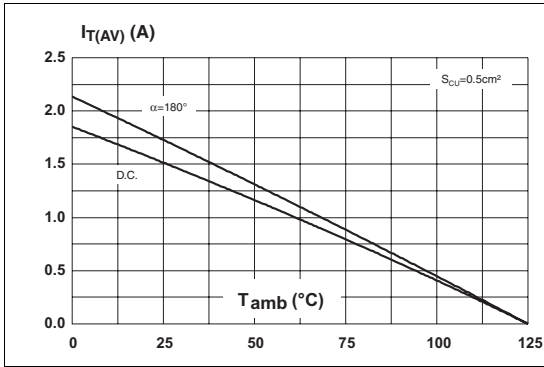
**Figure 1. Maximum power dissipation versus average on-state current**



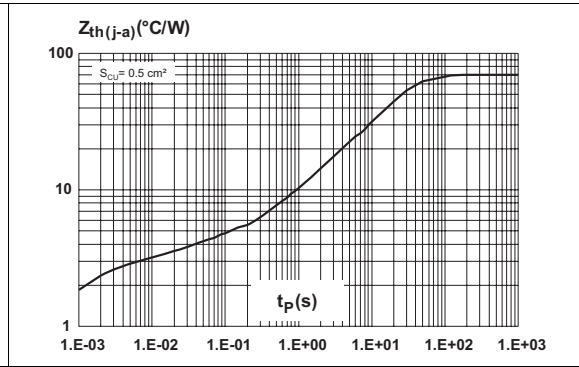
**Figure 2. Average and DC on-state current versus case temperature**



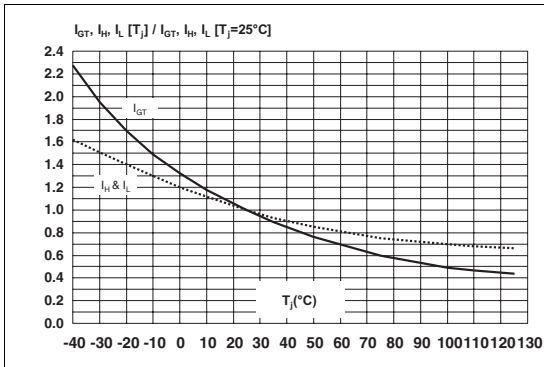
**Figure 3. Average and DC on-state current versus ambient temperature, PCB FR4, copper thickness 35  $\mu\text{m}$**



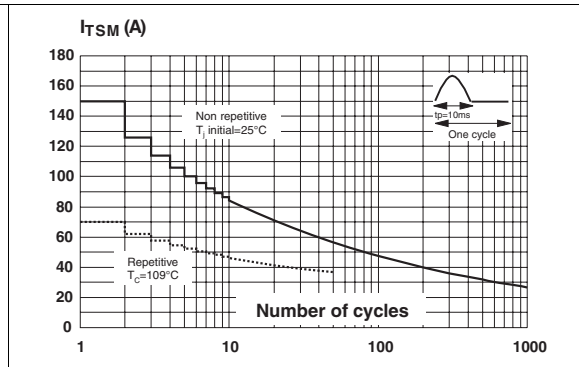
**Figure 4. Thermal impedance, junction to ambient, versus pulse duration, PCB FR4, copper thickness 35  $\mu\text{m}$**



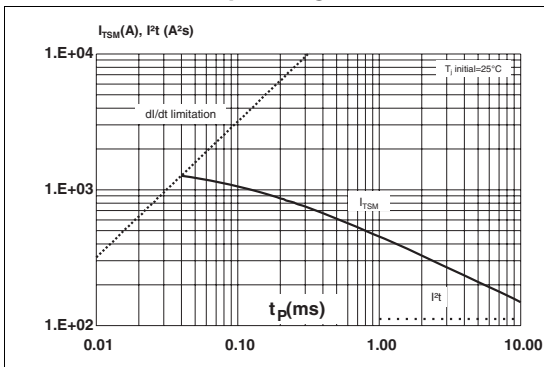
**Figure 5. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)**



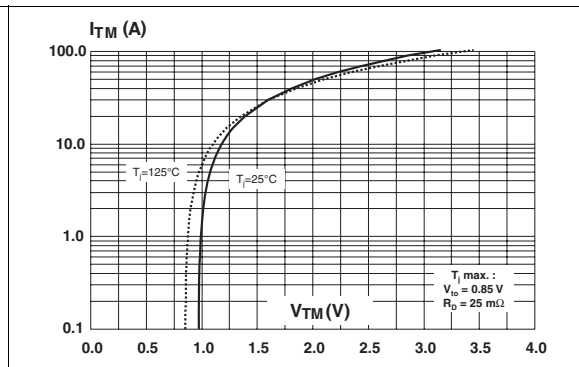
**Figure 6. Surge peak on-state current versus number of cycles**



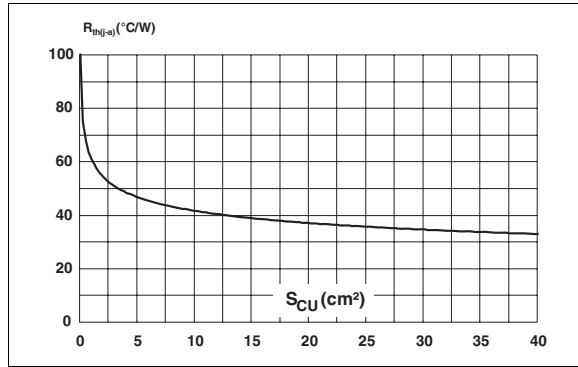
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$  and corresponding value of  $I^2t$**



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

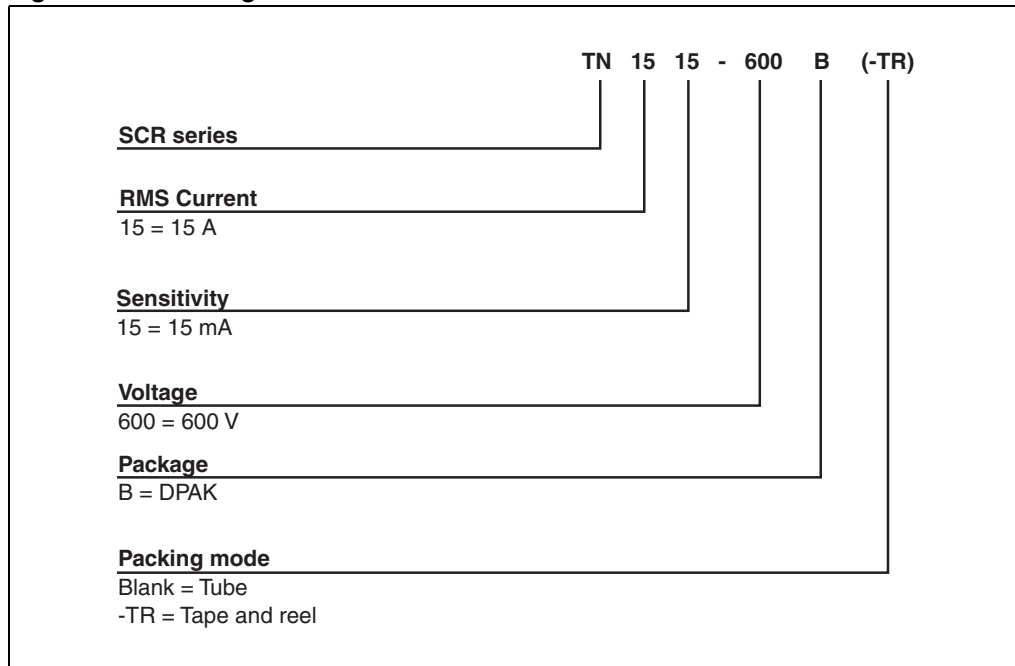


**Figure 9. Junction to ambient thermal resistance versus copper surface under tab, PCB FR4, copper thickness 35µm**



## 2 Ordering information scheme

**Figure 10. Ordering information scheme**



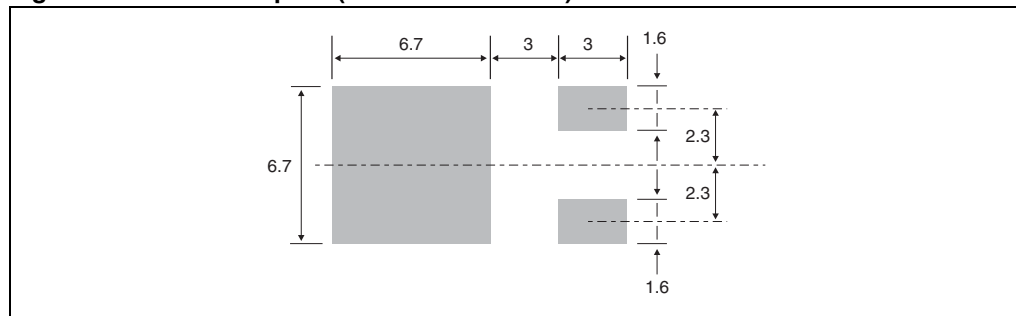
### 3 Package information

- Epoxy meets UL94, V0

Table 6. DPAK dimensions

| REF. | DIMENSIONS  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max   | Min.       | Max.  |
| A    | 2.20        | 2.40  | 0.086      | 0.094 |
| A1   | 0.90        | 1.10  | 0.035      | 0.043 |
| A2   | 0.03        | 0.23  | 0.001      | 0.009 |
| B    | 0.64        | 0.90  | 0.025      | 0.035 |
| B2   | 5.20        | 5.40  | 0.204      | 0.212 |
| C    | 0.45        | 0.60  | 0.017      | 0.023 |
| C2   | 0.48        | 0.60  | 0.018      | 0.023 |
| D    | 6.00        | 6.20  | 0.236      | 0.244 |
| E    | 6.40        | 6.60  | 0.251      | 0.259 |
| G    | 4.40        | 4.60  | 0.173      | 0.181 |
| H    | 9.35        | 10.10 | 0.368      | 0.397 |
| L2   | 0.80 typ.   |       | 0.031 typ. |       |
| L4   | 0.60        | 1.00  | 0.023      | 0.039 |
| V2   | 0°          | 8°    | 0°         | 8°    |

Figure 11. DPAK footprint (dimensions in mm)



In order to meet environmental requirements, ST offers these devices in ECOPACK® 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).

## 4 Ordering information

Table 7. Ordering information

| Part number    | Marking    | Package | Weight | Base qty | Delivery mode |
|----------------|------------|---------|--------|----------|---------------|
| TN1515-600B-TR | TN15 15600 | DPAK    | 0.3 g  | 2500     | Tape and reel |
| TN1515-600B    | TN15 15600 | DPAK    | 0.3 g  | 75       | Tube          |

## 5 Revision history

Table 8. Revision history

| Date        | Revision | Changes   |
|-------------|----------|---|
| 13-Mar-2006 | 1        | Initial release.  |
| 11-Jul-2007 | 2        | Added pin out labels to package illustration on cover page. |

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2007 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)

