

Description

The TN1515-600B is a 15 A thyristor SCR housed in DPAK package. It fits any high voltage application that requires a high power density and compact housing design.

Table 1. Device summary

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

Features

- On-state RMS current, $I_{T(RMS)}$: 15 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} : 600 V
- Triggering gate current, I_{GT} : 15 mA
- DPAK surface mount package

Application

- Universal motor DC phase control
- Power supply crowbar circuit
- Power Supply inrush limiter
- Motor soft start controller
- AC-DC voltage regulator

Benefits

- High AC surge current density
- Compact DPAK foot print

1 Characteristics

Table 2. Absolute ratings (limiting values)

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

Table 3. Standard electrical characteristics ($T_j = 25\text{ °C}$, unless otherwise specified)

| Symbol | Test conditions | | Values | | Unit |
|------------------------|--|-----------------------|--------|------|------------|
| I_{GT} | $V_{out} = 12\text{ V}$, $R_L = 33\text{ }\Omega$ | $T_j = 25\text{ °C}$ | MIN. | 2 | mA |
| | | | MAX. | 15 | |
| V_{GT} | $V_{out} = 12\text{ V}$, $R_L = 33\text{ }\Omega$ | | MAX. | 1.3 | V |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$ | $T_j = 125\text{ °C}$ | 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 | $T_j = 125\text{ °C}$ | MIN. | 200 | V/ μ s |
| V_{TM} | $I_{TM} = 30\text{ A}$ $t_p = 380\text{ }\mu$ s | $T_j = 25\text{ °C}$ | MAX. | 1.6 | V |
| V_{TO} | Threshold voltage | | MAX. | 0.85 | V |
| R_D | Dynamic resistance | | MAX. | 25 | m Ω |
| I_{DRM} I_{RRM} | $V_D/V_R = V_{DRM} = V_{RRM}$ | $T_j = 25\text{ °C}$ | MAX. | 5 | μ A |
| | | $T_j = 125\text{ °C}$ | | 2 | mA |

Table 4. Thermal resistance

| Symbol | Parameter | Value | Unit |
|---------------|-----------------------|------------------------------|------|
| $R_{th(j-c)}$ | Junction to case (DC) | 1.2 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient | $S^{(1)} = 0.5 \text{ cm}^2$ | °C/W |

1. S = Copper surface under tab

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

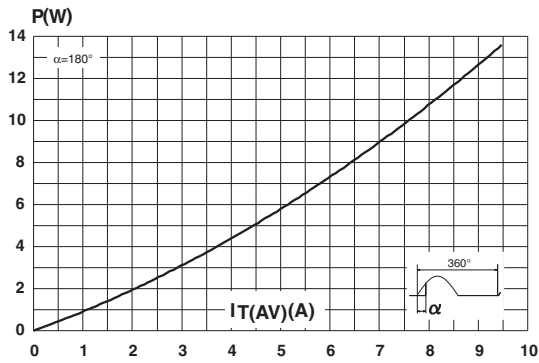


Figure 2. Average and DC on-state current versus case temperature

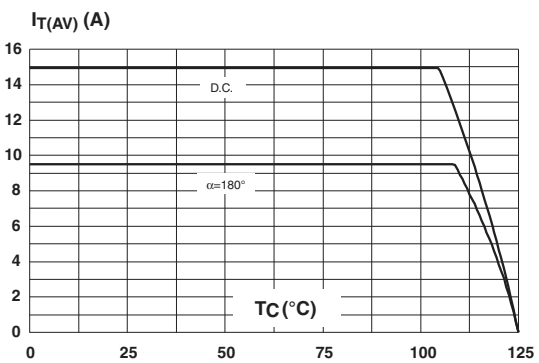


Figure 3. Average and DC on-state current versus ambient temperature, PCB FR4, copper thickness 35 µm

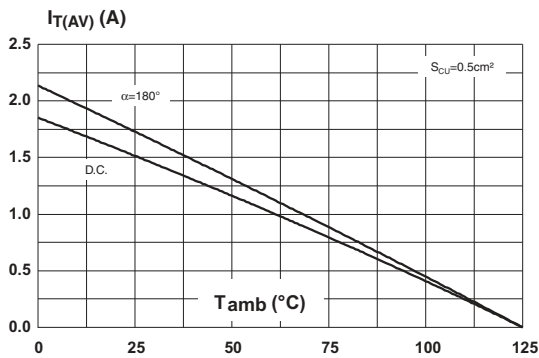


Figure 4. Thermal impedance junction to ambient versus pulse duration, PCB FR4, copper thickness 35 µm

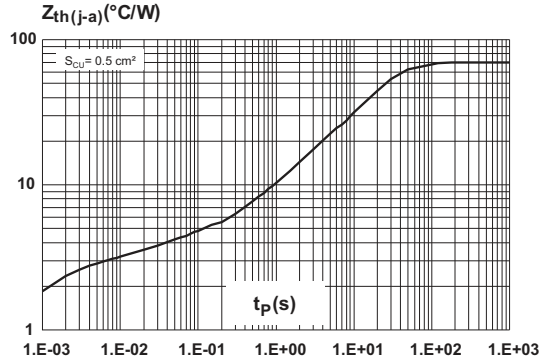


Figure 5. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

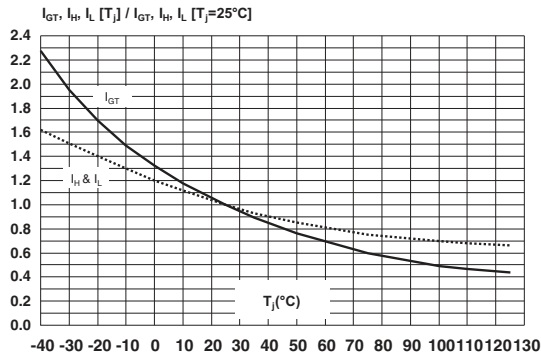


Figure 6. Surge peak on-state current versus number of cycles

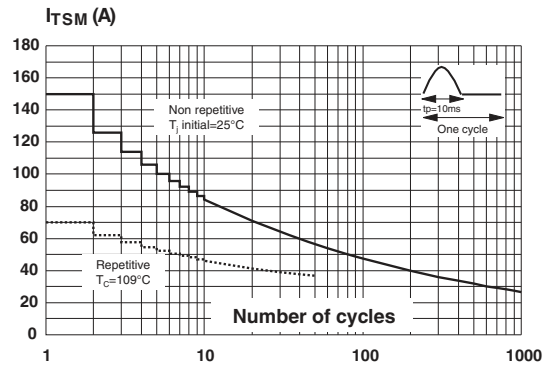


Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms

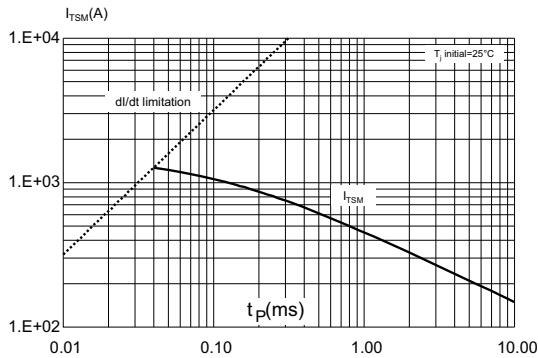


Figure 8. On-state characteristics (maximum values)

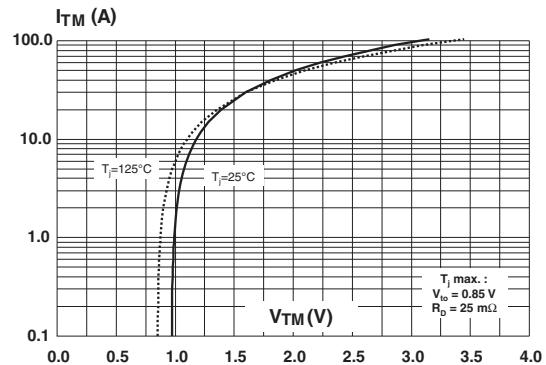
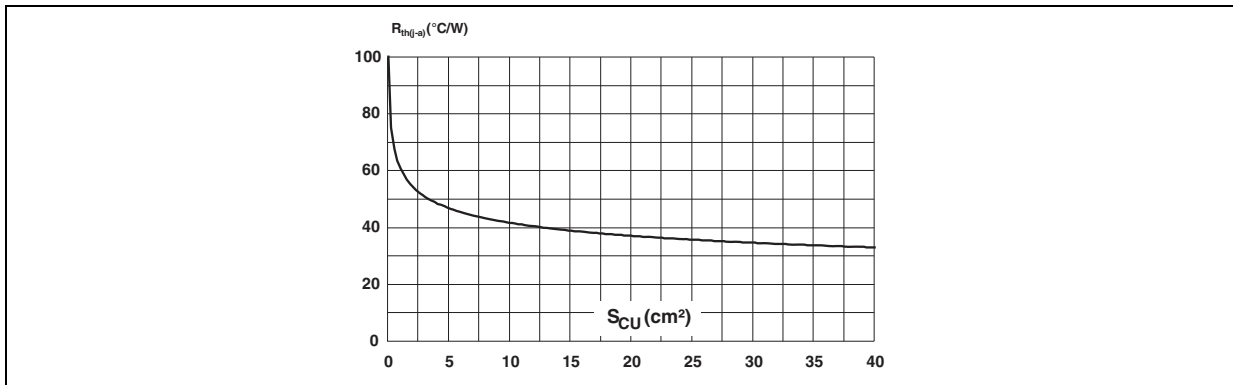


Figure 9. Junction to ambient thermal resistance versus copper surface under tab, PCB FR4, copper thickness 35µm



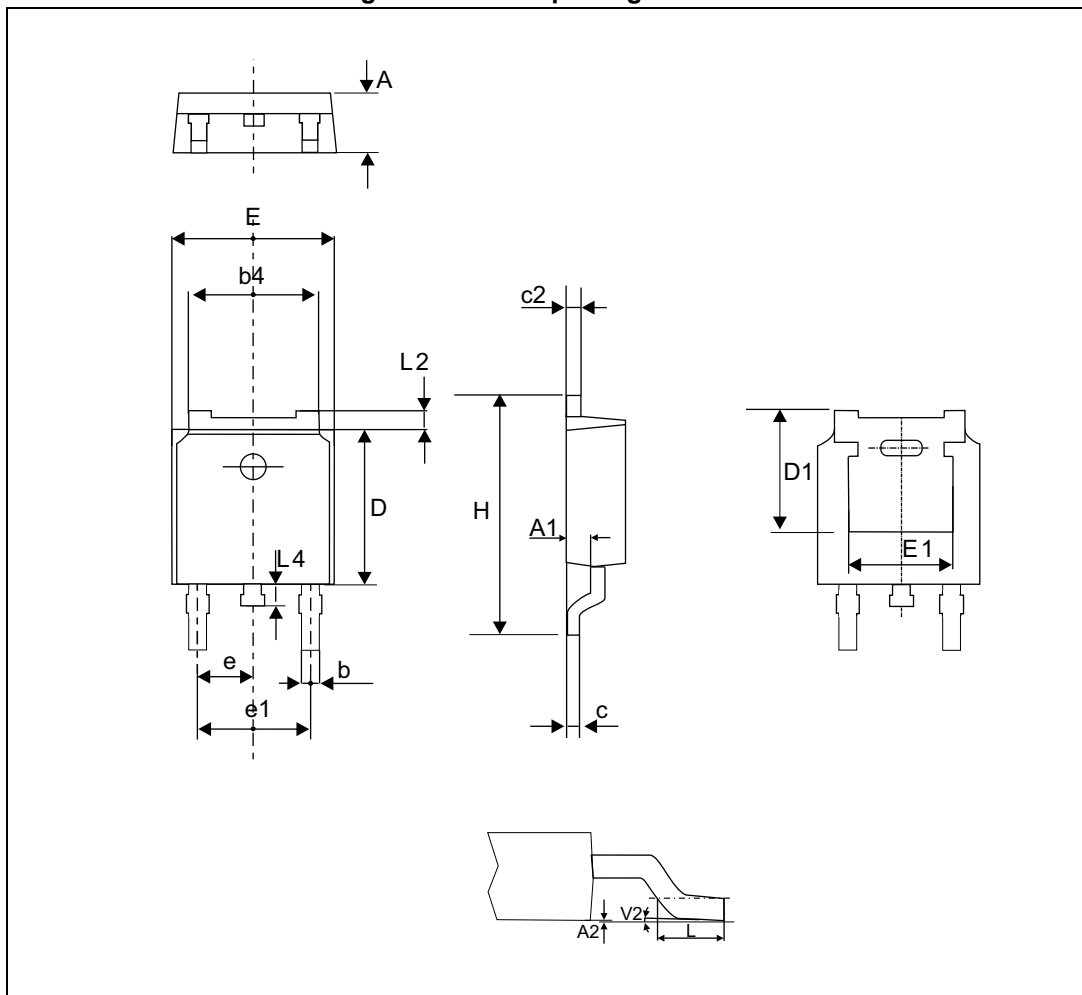
2 Package information

- Epoxy meets UL94, V0
- Lead-free packages
- Halogen-free molding resin
- Recommended torque: 0.4 to 0.6 N·m

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. ECOPACK® is an ST trademark.

2.1 DPAK package information

Figure 10. DPAK package outline

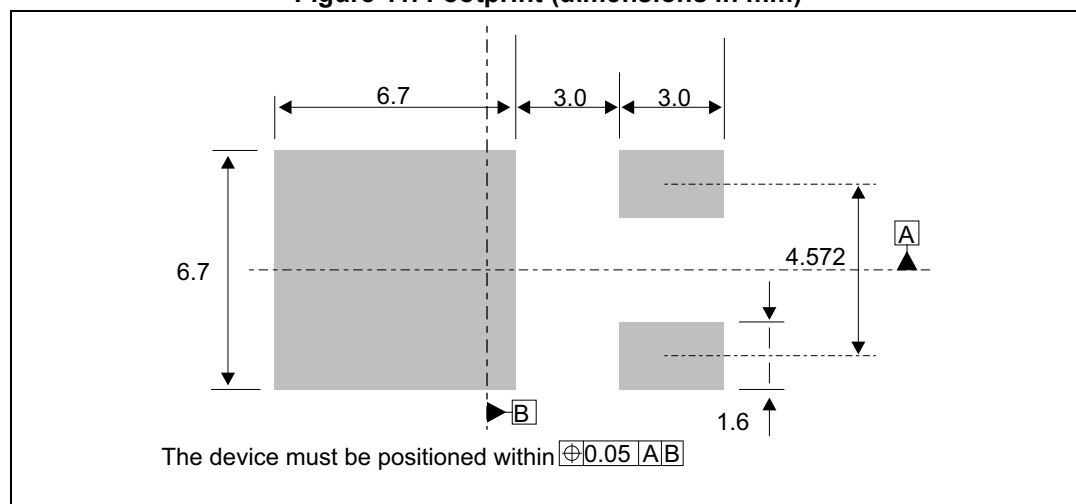


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|------|--------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.18 | | 2.40 | 0.086 | | 0.0944 |
| A1 | 0.9 | | 1.10 | 0.035 | | 0.0433 |
| A2 | 0.03 | | 0.23 | 0.0011 | | 0.0090 |
| b | 0.64 | | 0.90 | 0.0251 | | 0.0354 |
| b4 | 4.95 | | 5.46 | 0.1948 | | 0.2149 |
| c | 0.46 | | 0.61 | 0.0181 | | 0.0240 |
| c2 | 0.46 | | 0.60 | 0.0181 | | 0.0236 |
| D | 5.97 | | 6.22 | 0.2350 | | 0.2448 |
| D1 | 4.95 | | | 0.1948 | | |
| E | 6.35 | | 6.73 | 0.2500 | | 0.2649 |
| E1 | 4.32 | | | 0.1700 | | |
| e | | 2.286 | | | 0.09 | |
| e1 | | 4.572 | | | 0.18 | |
| H | 9.35 | | 10.40 | 0.3681 | | 0.4094 |
| L | 1.0 | | 1.78 | 0.039 | | 0.0700 |
| L2 | | | 1.27 | | | 0.0500 |
| L4 | 0.6 | | 1.02 | 0.023 | | 0.0401 |
| V2 | -8° | | +8° | -8° | | +8° |

Figure 11. Footprint (dimensions in mm)



Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

3 Ordering information

Figure 12. Ordering information schema

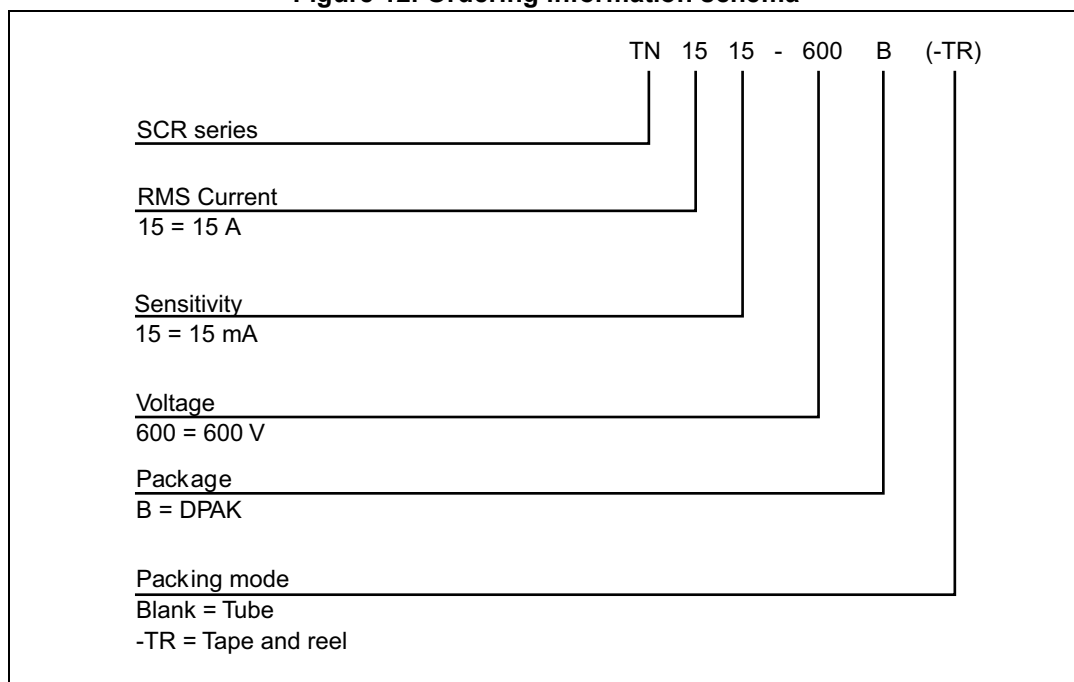


Table 6. Ordering information

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

4 Revision history

Table 7. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 13-Mar-2006 | 1 | Last update. |
| 11-Jul-2007 | 2 | TO-220AB delivery mode changed from bulk to tube. |
| 21-Sep-2015 | 3 | Updated Features , Application , Description and Benefits on cover page. Updated Figure 7 , package information and reformatted to current standard. |

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