# TN8, TS8 and TYNx08 Series

**SENSITIVE & STANDARD**

## 8A SCRs

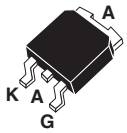
**Table 1: Main Features**

| Symbol | Value | Unit |
|---|---|---|
| $I_{T(RMS)}$ | 8 | A |
| $V_{DRM}/V_{RRM}$ | 600 to 1000 | V |
| $I_{GT}$ | 0.2 to 15 | mA |

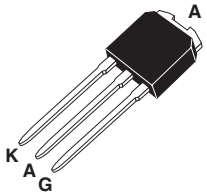
### DESCRIPTION

Available either in sensitive **(TS8)** or standard **(TN8 / TYN)** gate triggering levels, the 8A SCR series is suitable to fit all modes of control, found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits...

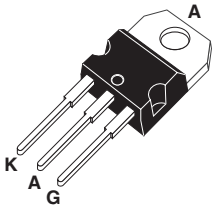
Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space area.

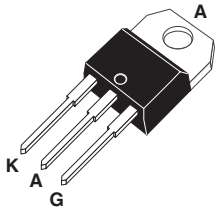

**DPAK**
**(TN8-B / TS8-B)**




**IPAK**
**(TN8-H / TS8-H)**




**TO-220AB**
**(TS8-T)**




**TO-220AB**
**(TYNx08RG)**

**Table 2: Order Codes**

| Part Numbers | Marking |
|---|---|
| TN805-x00B | TN805x00 |
| TN805-x00B-TR | TN805x00 |
| TN805-x00H | TN805x00 |
| TN815-x00B | TN815x00 |
| TN815-x00B-TR | TN815x00 |
| TN815-x00H | TN815x00 |
| TS820-x00B | TS820x00 |
| TS820-x00B-TR | TS820x00 |
| TS820-x00H | TS820x00 |
| TS820-x00T | TS820x00T |
| TYNx08RG | TYNx08 |

**Table 3: Absolute Ratings** (limiting values)

| Symbol | Parameter | | | Value | | Unit |
|---|---|---|---|---|---|---|
| | | | | TS8/TN8 | TYN08 | |
| $I_{T(RMS)}$ | RMS on-state current (180° conduction angle) | | $T_c$ = 110°C | 8 | | A |
| $IT_{(AV)}$ | Average on-state current (180° conduction angle) | | $T_c$ = 110°C | 5 | | A |
| $I_{TSM}$ | Non repetitive surge peak on-state current | $t_p$ = 8.3 ms | $T_j$ = 25°C | 73 | 100 | A |
| | | $t_p$ = 10 ms | | 70 | 95 | |
| $I^2t$ | $I^2t$ Value for fusing | $t_p$ = 10 ms | $T_j$ = 25°C | 24.5 | 45 | $A^2S$ |
| dI/dt | Critical rate of rise of on-state current $I_G$ = 2 x $I_{GT}$ , $t_r \leq$ 100 ns | F = 60 Hz | $T_j$ = 125°C | 50 | | A/µs |
| $I_{GM}$ | Peak gate current | $t_p$ = 20 µs | $T_j$ = 125°C | 4 | | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j$ = 125°C | 1 | | W |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range | | | - 40 to + 150<br>- 40 to + 125 | | °C |
| $V_{RGM}$ | Maximum peak reverse gate voltage (for **TN8** & **TYN08** only) | | | 5 | | V |

**Tables 4: Electrical Characteristics** ($T_j$ = 25°C, unless otherwise specified)

■ **SENSITIVE**

| Symbol | Test Conditions | | | TS820 | Unit |
|---|---|---|---|---|---|
| $I_{GT}$ | $V_D$ = 12 V $R_L$ = 140 Ω | | MAX. | 200 | µA |
| $V_{GT}$ | | | MAX. | 0.8 | V |
| $V_{GD}$ | $V_D = V_{DRM}$ $R_L$ = 3.3 kΩ $R_{GK}$ = 220 Ω | $T_j$ = 125°C | MIN. | 0.1 | V |
| $V_{RG}$ | $I_{RG}$ = 10 µA | | MIN. | 8 | V |
| $I_H$ | $I_T$ = 50 mA $R_{GK}$ = 1 kΩ | | MAX. | 5 | mA |
| $I_L$ | $I_G$ = 1 mA $R_{GK}$ = 1 kΩ | | MAX. | 6 | mA |
| dV/dt | $V_D$ = 65 % $V_{DRM}$ $R_{GK}$ = 220 Ω | $T_j$ = 125°C | MIN. | 5 | V/µs |
| $V_{TM}$ | $I_{TM}$ = 16 A tp = 380 µs | $T_j$ = 25°C | MAX. | 1.6 | V |
| $V_{t0}$ | Threshold voltage | $T_j$ = 125°C | MAX. | 0.85 | V |
| $R_d$ | Dynamic resistance | $T_j$ = 125°C | MAX. | 46 | mΩ |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}$ $R_{GK}$ = 220 Ω | $T_j$ = 25°C | MAX. | 5 | µA |
| | | $T_j$ = 125°C | | 1 | mA |

## ■ STANDARD

| Symbol | Test Conditions | | | TN805 | TN815 | TYNx08 | Unit |
|---|---|---|---|---|---|---|---|
| $I_{GT}$ | $V_D$ = 12 V $R_L$ = 33 Ω | | MIN. | 0.5 | 2 | 2 | mA |
| | | | MAX. | 5 | 15 | 15 | |
| $V_{GT}$ | | | MAX. | 1.3 | | | V |
| $V_{GD}$ | $V_D = V_{DRM}$ $R_L$ = 3.3 kΩ | $T_j$ = 125°C | MIN. | 0.2 | | | V |
| $I_H$ | $I_T$ = 100 mA Gate open | | MAX. | 25 | 40 | 30 | mA |
| $I_L$ | $I_G = 1.2\ I_{GT}$ | | MAX. | 30 | 50 | 70 | mA |
| dV/dt | $V_D$ = 67 % $V_{DRM}$ Gate open | $T_j$ =125°C | MIN. | 50 | 150 | 150 | V/µs |
| $V_{TM}$ | $I_{TM}$ = 16 A $t_p$ = 380 µs | $T_j$ = 25°C | MAX. | 1.6 | | | V |
| $V_{t0}$ | Threshold voltage | $T_j$ = 125°C | MAX. | 0.85 | | | V |
| $R_d$ | Dynamic resistance | $T_j$ = 125°C | MAX. | 46 | | | mΩ |
| $I_{DRM}$ $I_{RRM}$ | $V_{DRM} = V_{RRM}$ | $T_j$ = 25°C | MAX. | 5 | | | µA |
| | | $T_j$ = 125°C | | 2 | | | mA |

**Table 6: Thermal resistance**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case (D.C.) | | | 20 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient (D.C.) | S = 0.5 cm² | DPAK | 70 | °C/W |
| | | | IPAK | 100 | |
| | | | TO-220AB | 60 | |

S = Copper surface under tab.

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

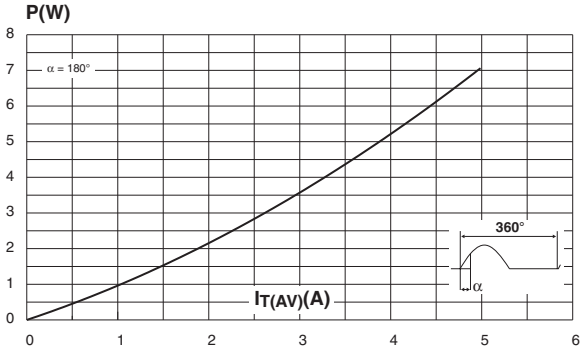



**Figure 2: Average and D.C. on-state current versus case temperature**

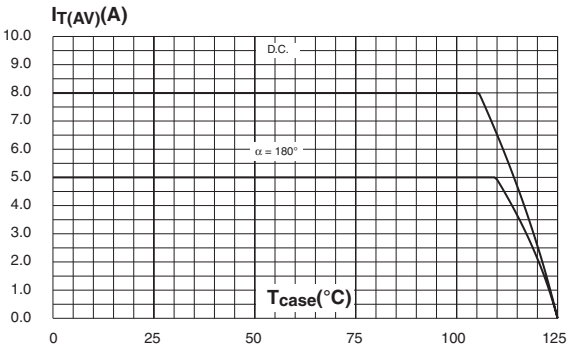


**Figure 3: Average and D.C. on-state current versus ambient temperature (device mounted on FR4 with recommended pad layout) (DPAK)**

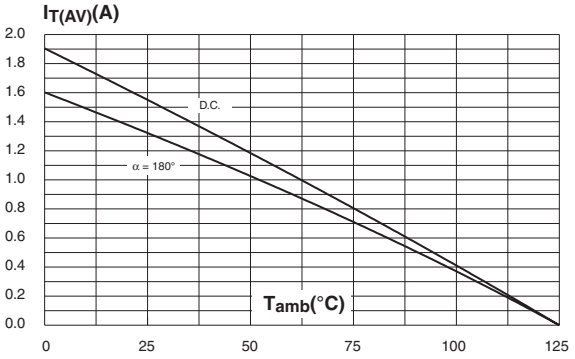



**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration**

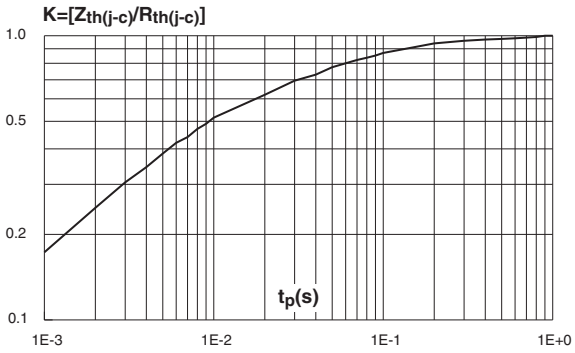



**Figure 5: Relative variation of thermal impedance junction to ambient versus pulse duration (recommended pad layout, FR4 PC board for DPAK)**

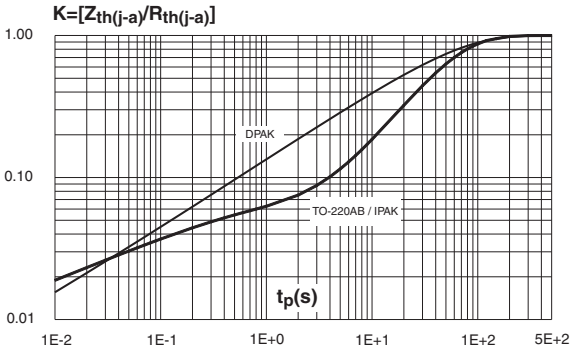



**Figure 6: Relative variation of gate trigger current and holding current versus junction temperature for TS8 series**

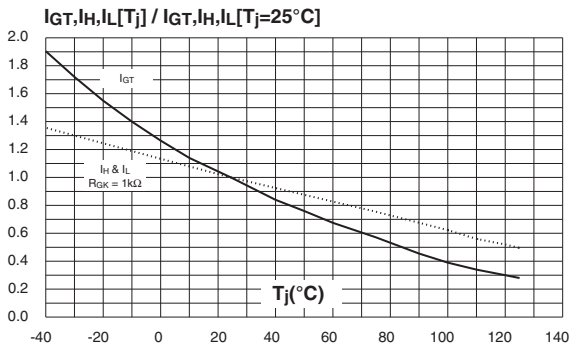



**Figure 7: Relative variation of gate trigger current and holding current versus junction temperature for TN8 & TYN08 series**

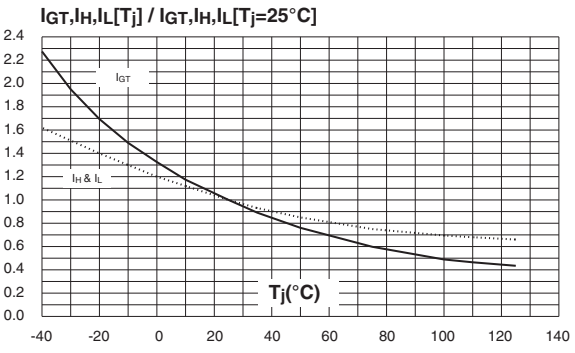



**Figure 8: Relative variation of holding current versus gate-cathode resistance (typical values) for TS8 series**

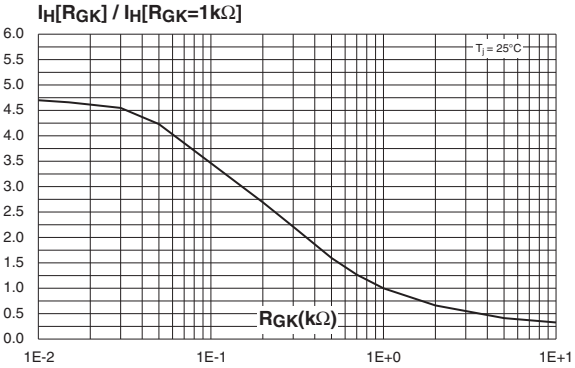


**Figure 9: Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS8 series**

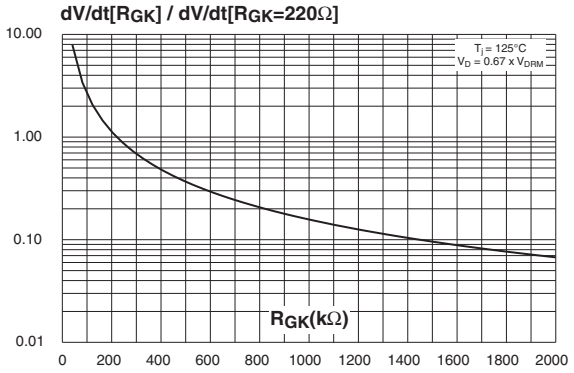



**Figure 10: Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS8 series**

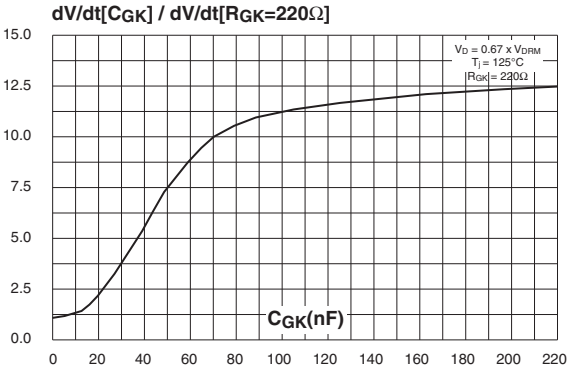



**Figure 11: Surge peak on-state current versus number of cycles**

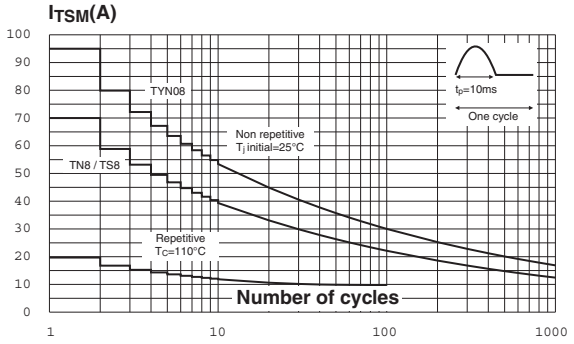



**Figure 12: Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms, and corresponding values of I²t**

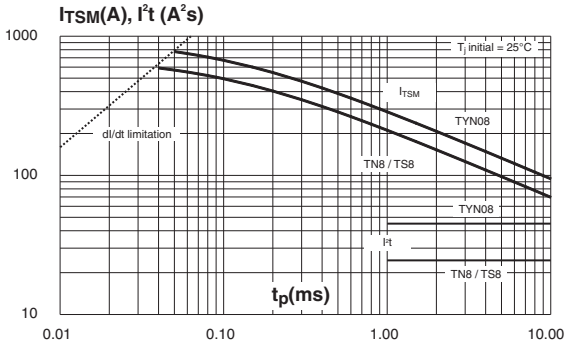



**Figure 13: On-state characteristics (maximum values)**

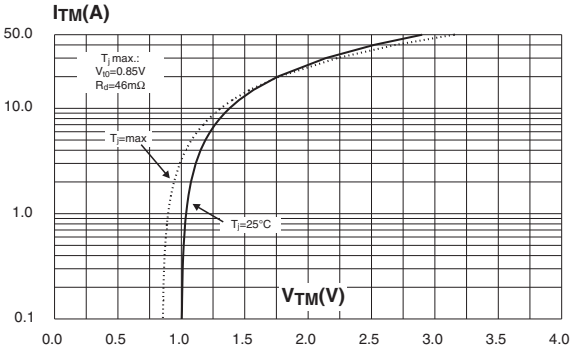



**Figure 14: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed circuit board FR4, copper thickness: 35µm) (DPAK)**

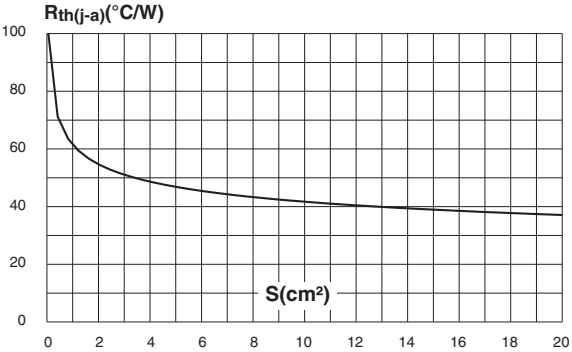


**Figure 17: Ordering Information Scheme (TN8 series)**

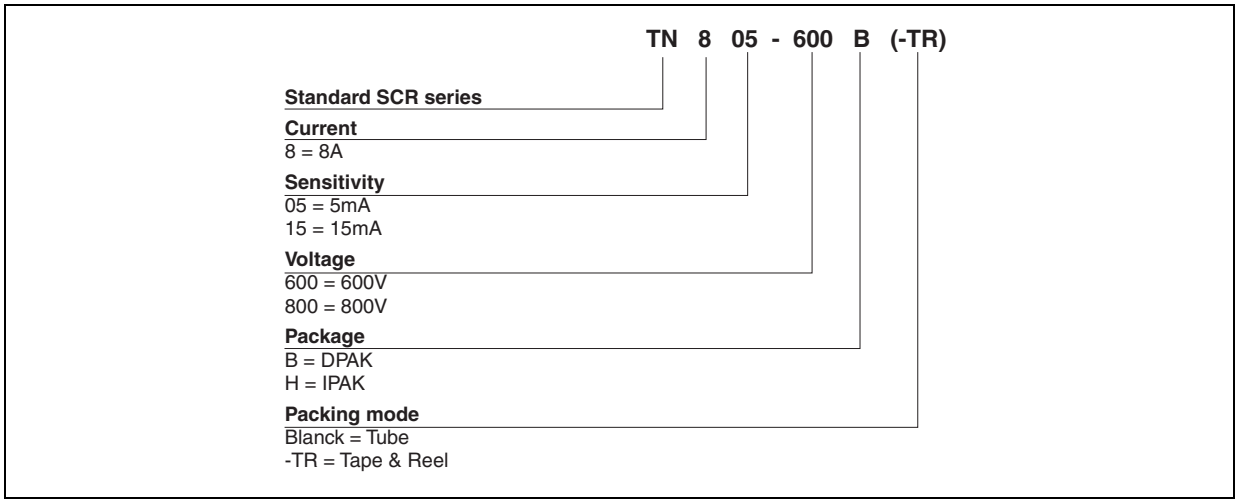



**Figure 18: Ordering Information Scheme (TS8 series)**

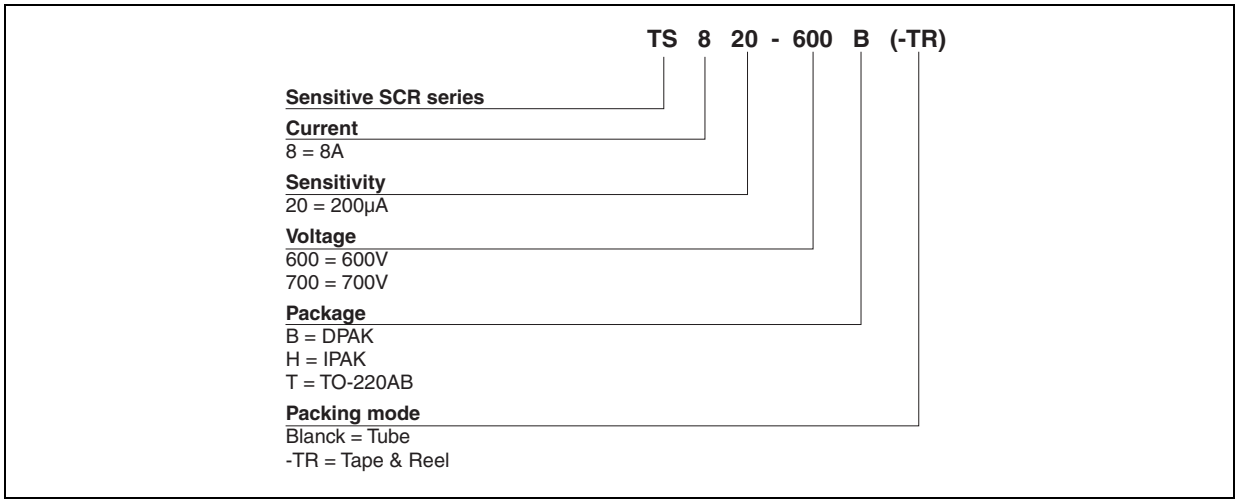



**Figure 19: Ordering Information Scheme (TYN08 series)**

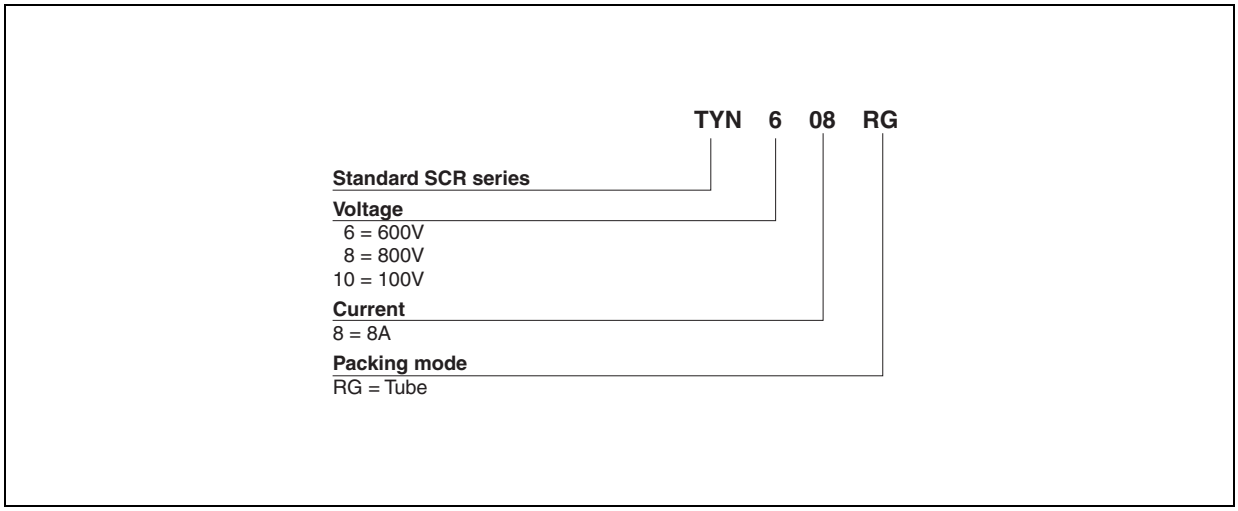
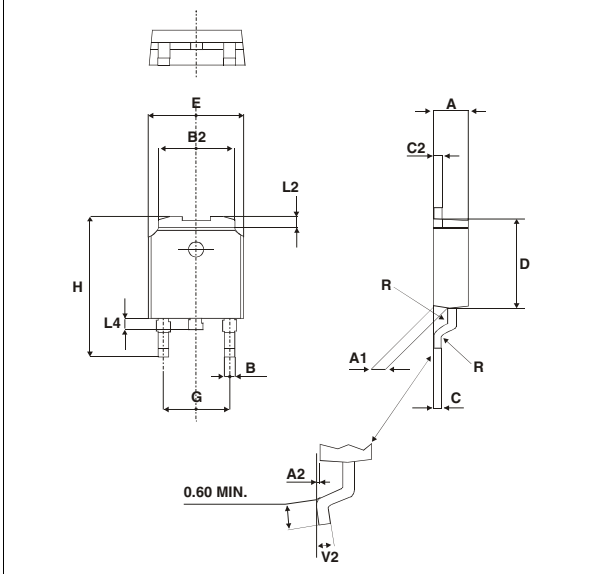


**Table 7: Product Selector**

| Part Numbers | Voltage (xxx) | | | | Sensitivity | Package |
|---|---|---|---|---|---|---|
| | 600 V | 700 V | 800 V | 1000 V | | |
| TN805-xxxB | X | | X | | 5 mA | DPAK |
| TN805-xxxH | X | | X | | 5 mA | IPAK |
| TN815-xxxB | X | | X | | 15 mA | DPAK |
| TN815-xxxH | X | | X | | 15 mA | IPAK |
| TS820-xxxB | X | X | | | 0.2 mA | DPAK |
| TS820-xxxH | X | X | | | 0.2 mA | IPAK |
| TS820-xxxT | X | X | | | 0.2 mA | TO-220AB |
| TYNx08RG | X | | X | X | 15 mA | TO-220AB |

**Figure 20: DPAK Package Mechanical Data**




| 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 21: DPAK Foot Print Dimensions**
(in millimeters)

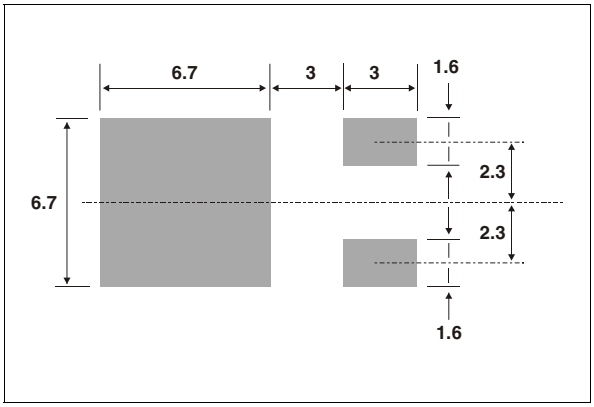
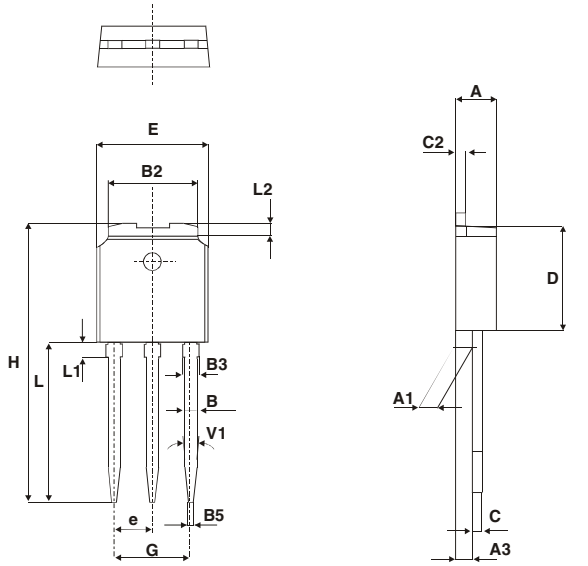
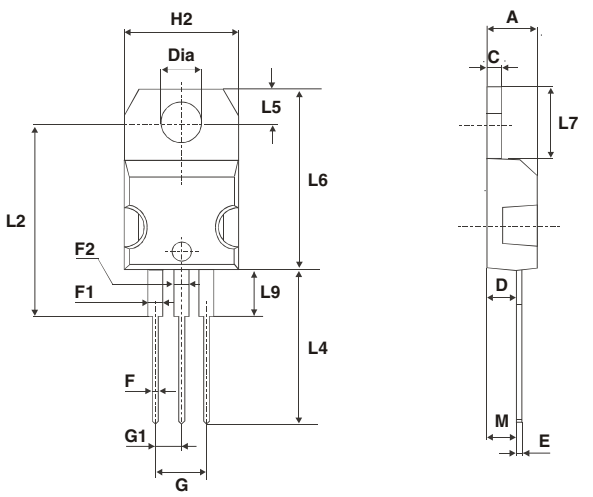


**Figure 22: IPAK Package Mechanical Data**



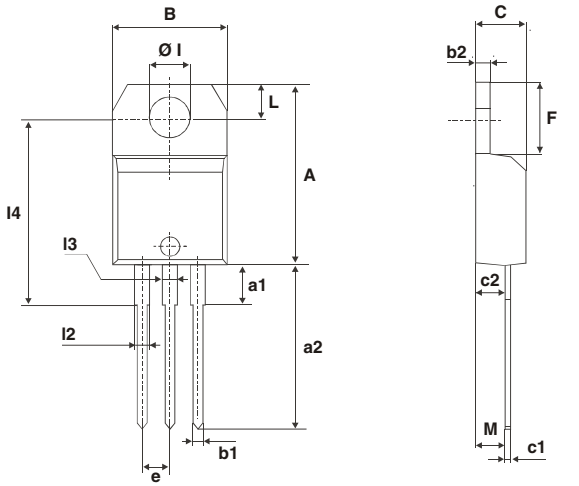

| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.20 | | 2.40 | 0.086 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A3 | 0.70 | | 1.30 | 0.027 | | 0.051 |
| B | 0.64 | | 0.90 | 0.025 | | 0.035 |
| B2 | 5.20 | | 5.40 | 0.204 | | 0.212 |
| B3 | | | 0.95 | | | 0.037 |
| B5 | | 0.30 | | | 0.035 | |
| C | 0.45 | | 0.60 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.60 | 0.019 | | 0.023 |
| D | 6 | | 6.20 | 0.236 | | 0.244 |
| E | 6.40 | | 6.60 | 0.252 | | 0.260 |
| e | | 2.28 | | | 0.090 | |
| G | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | | 16.10 | | | 0.634 | |
| L | 9 | | 9.40 | 0.354 | | 0.370 |
| L1 | 0.8 | | 1.20 | 0.031 | | 0.047 |
| L2 | | 0.80 | 1 | | 0.031 | 0.039 |
| V1 | | 10° | | | 10° | |

**Figure 23: TO-220AB Package Mechanical Data**




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| F2 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| G1 | 2.40 | 2.70 | 0.094 | 0.106 |
| H2 | 10 | 10.40 | 0.393 | 0.409 |
| L2 | 16.4 typ. | | 0.645 typ. | |
| L4 | 13 | 14 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Diam. | 3.75 | 3.85 | 0.147 | 0.151 |

**Figure 24: TO-220AB Package Mechanical Data**




| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 15.20 | | 15.90 | 0.598 | | 0.625 |
| a1 | | 3.75 | | | 0.147 | |
| a2 | 13.00 | | 14.00 | 0.511 | | 0.551 |
| B | 10.00 | | 10.40 | 0.393 | | 0.409 |
| b1 | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b2 | 1.23 | | 1.32 | 0.048 | | 0.051 |
| C | 4.40 | | 4.60 | 0.173 | | 0.181 |
| c1 | 0.49 | | 0.70 | 0.019 | | 0.027 |
| c2 | 2.40 | | 2.72 | 0.094 | | 0.107 |
| e | 2.40 | | 2.70 | 0.094 | | 0.106 |
| F | 6.20 | | 6.60 | 0.244 | | 0.259 |
| ØI | 3.75 | | 3.85 | 0.147 | | 0.151 |
| l4 | 15.80 | 16.40 | 16.80 | 0.622 | 0.646 | 0.661 |
| L | 2.65 | | 2.95 | 0.104 | | 0.116 |
| l2 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| l3 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| M | | 2.60 | | | 0.102 | |

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.

**Table 8: Ordering Information**

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| TN805-x00B | TN805x00 | DPAK | 0.3 g | 75 | Tube |
| TN805-x00B-TR | TN805x00 | DPAK | 0.3 g | 2500 | Tape & reel |
| TN805-x00H | TN805x00 | IPAK | 0.4 g | 75 | Tube |
| TN815-x00B | TN815x00 | DPAK | 0.3 g | 75 | Tube |
| TN815-x00B-TR | TN815x00 | DPAK | 0.3 g | 2500 | Tape & reel |
| TN815-x00H | TN815x00 | IPAK | 0.4 g | 75 | Tube |
| TS820-x00B | TS820x00 | DPAK | 0.3 g | 75 | Tube |
| TS820-x00B-TR | TS820x00 | DPAK | 0.3 g | 2500 | Tape & reel |
| TS820-x00H | TS820x00 | IPAK | 0.4 g | 75 | Tube |
| TS820-x00T | TS820x00T | TO-220AB | 2.3 g | 50 | Tube |
| TYNx08RG | TYNx08 | TO-220AB | 2.3 g | 50 | Tube |

**Note:** x = voltage

**Table 9: Revision History**

| Date | Revision | Description of Changes |
|---|---|---|
| Apr-2002 | 4A | Last update. |
| 13-Feb-2006 | 5 | TO-220AB delivery mode changed from bulk to tube.<br>ECOPACK statement added. |