

Description

Available either in sensitive (TS8) or standard (TN8 / TYN) gate triggering levels, the 8 A 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.

Table 1. Device summary

| Order code | Voltage (x00) V_{DRM}/V_{RRM} | | Sensitivity I_{GT} | Package |
|-------------|------------------------------------|-------|-------------------------|------------|
| | 600 V | 800 V | | |
| TS820-600B | X | | 0.2 mA | DPAK |
| TS820-600H | X | | 0.2 mA | IPAK |
| TS820-600T | X | | 0.2 mA | TO-220AB |
| TS820-600FP | X | | 0.2 mA | TO-220FPAB |
| TN805-600B | X | | 5 mA | DPAK |
| TN815-x00B | X | X | 15 mA | DPAK |
| TYN608RG | X | | 15 mA | TO-220AB |

Features

- On-state rms current, $I_{T(RMS)}$ 8 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 and 800 V
- Triggering gate current, I_{GT} 0.2 to 15 mA

1 Characteristics

Table 2. Absolute ratings (limiting values)

| Symbol | Parameter | | Value | | Unit | |
|--------------------|--|-------------------------|----------------------------------|--------------------------------|------|------------------|
| | | | TN805 TN815 TS820 | TYN608 | | |
| $I_{T(RMS)}$ | On-state rms current (180° conduction angle) | | $T_c = 110\text{ °C}$ | 8 | A | |
| | | | T0-220FPAB, $T_c = 91\text{ °C}$ | | | |
| $I_{T(AV)}$ | Average on-state current (180° conduction angle) | | $T_c = 110\text{ °C}$ | 5 | A | |
| | | | T0-220FPAB, $T_c = 91\text{ °C}$ | | | |
| I_{TSM} | Non repetitive surge peak on-state current | $t_p = 8.3\text{ ms}$ | $T_j = 25\text{ °C}$ | 73 | 100 | A |
| | | $t_p = 10\text{ ms}$ | | 70 | 95 | |
| I^2t | I^2t value for fusing | $t_p = 10\text{ ms}$ | $T_j = 25\text{ °C}$ | 24.5 | 45 | A ² S |
| di/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$ | $F = 60\text{ Hz}$ | $T_j = 125\text{ °C}$ | 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 (for TN8x5 and TYN608 only) | | | 5 | | V |

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

| Symbol | Test conditions | | | TS820 | Unit | |
|------------------------|---|-----------------------|-----------------------|-------|------------|------------|
| I_{GT} | $V_D = 12\text{ V}$, $R_L = 140\text{ }\Omega$ | | MAX. | 200 | μ A | |
| V_{GT} | | | MAX. | 0.8 | V | |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$, $R_{GK} = 220\text{ }\Omega$ | $T_j = 125\text{ °C}$ | MIN. | 0.1 | V | |
| V_{RG} | $I_{RG} = 10\text{ }\mu$ A | | MIN. | 8 | V | |
| I_H | $I_T = 50\text{ mA}$, $R_{GK} = 1\text{ k}\Omega$ | | MAX. | 5 | mA | |
| I_L | $I_G = 1\text{ mA}$, $R_{GK} = 1\text{ k}\Omega$ | | MAX. | 6 | mA | |
| dV/dt | $V_D = 65\% V_{DRM}$, $R_{GK} = 220\text{ }\Omega$ | $T_j = 125\text{ °C}$ | MIN. | 5 | V/ μ s | |
| V_{TM} | $I_{TM} = 16\text{ A}$, $t_p = 380\text{ }\mu$ s | | $T_j = 25\text{ °C}$ | MAX. | 1.6 | V |
| V_{t0} | Threshold voltage | | $T_j = 125\text{ °C}$ | MAX. | 0.85 | V |
| R_d | Dynamic resistance | | $T_j = 125\text{ °C}$ | MAX. | 46 | m Ω |
| I_{DRM} I_{RRM} | $V_{DRM} = V_{RRM}$, $R_{GK} = 220\text{ }\Omega$ | | $T_j = 25\text{ °C}$ | MAX. | 5 | μ A |
| | | | $T_j = 125\text{ °C}$ | | 1 | mA |

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

| Symbol | Test conditions | | TN805 | TN815 | TYN608 | Unit | |
|------------------------|---|-----------------------------------|-------|-------|--------|---------------|------------------|
| I_{GT} | $V_D = 12\text{ V}$, $R_L = 33\ \Omega$ | MIN. | 0.5 | 2 | 2 | mA | |
| | | MAX. | 5 | 15 | 15 | | |
| V_{GT} | | MAX. | 1.3 | | | V | |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$ | $T_j = 125\text{ }^\circ\text{C}$ | MIN. | 0.2 | | V | |
| I_H | $I_T = 100\text{ mA}$, 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 | $T_j = 125\text{ }^\circ\text{C}$ | MIN. | 50 | 150 | 150 | V/ μs |
| V_{TM} | $I_{TM} = 16\text{ A}$, $t_p = 380\ \mu\text{s}$ | $T_j = 25\text{ }^\circ\text{C}$ | MAX. | 1.6 | | V | |
| V_{t0} | Threshold voltage | $T_j = 125\text{ }^\circ\text{C}$ | MAX. | 0.85 | | V | |
| R_d | Dynamic resistance | $T_j = 125\text{ }^\circ\text{C}$ | MAX. | 46 | | m Ω | |
| I_{DRM} I_{RRM} | $V_{DRM} = V_{RRM}$ | $T_j = 25\text{ }^\circ\text{C}$ | MAX. | 5 | | μA | |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | 2 | | mA | |

Table 5. Thermal resistance

| Symbol | Parameter | | Value | Unit | |
|---------------|--------------------------|-----------------------------|----------------------|--------------------|--------------------|
| $R_{th(j-c)}$ | Junction to case (DC) | DPAK, IPAK, TO-220AB | 1.3 | $^\circ\text{C/W}$ | |
| | | TO-220FPAB | 4.6 | | |
| $R_{th(j-a)}$ | Junction to ambient (DC) | $S^{(1)} = 0.5\text{ cm}^2$ | DPAK | 70 | $^\circ\text{C/W}$ |
| | | | IPAK | 100 | |
| | | | TO-220AB, TO-220FPAB | 60 | |

1. S = Copper surface under tab

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

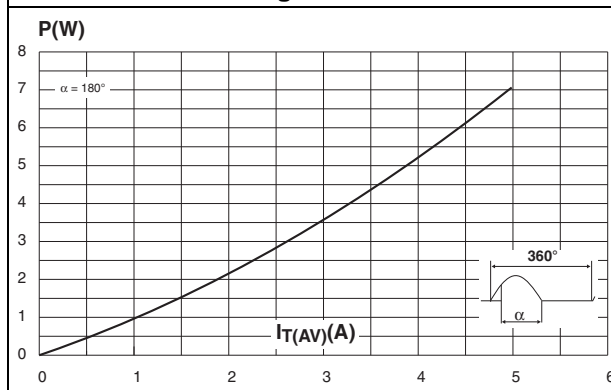


Figure 2. Average and DC on-state current versus case temperature

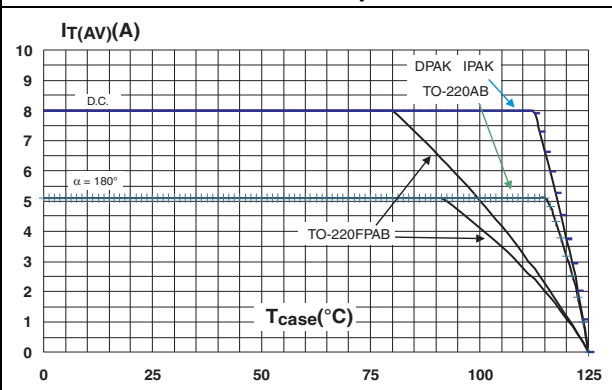


Figure 3. Average and DC on-state current versus ambient temperature

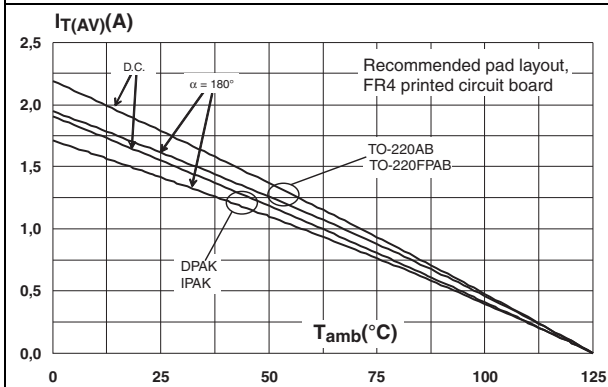


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

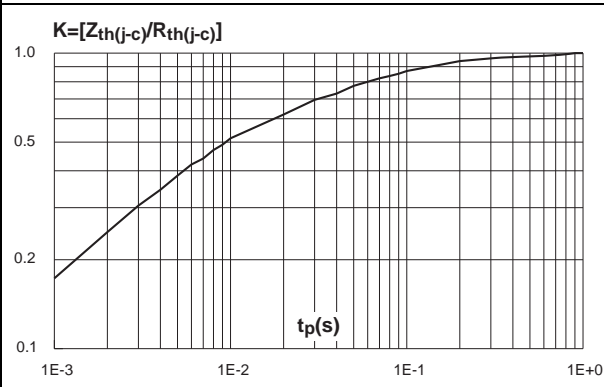


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration

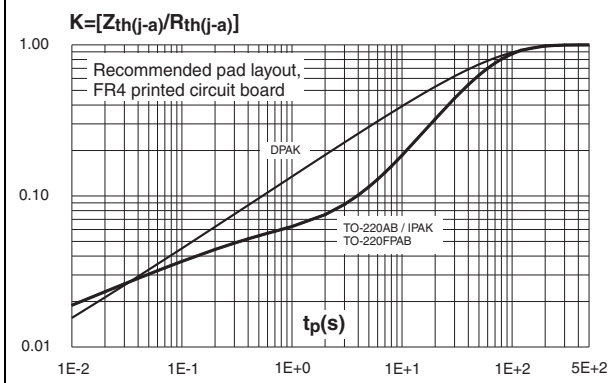


Figure 6. Relative variation of gate trigger current and holding current versus junction temperature for TS820

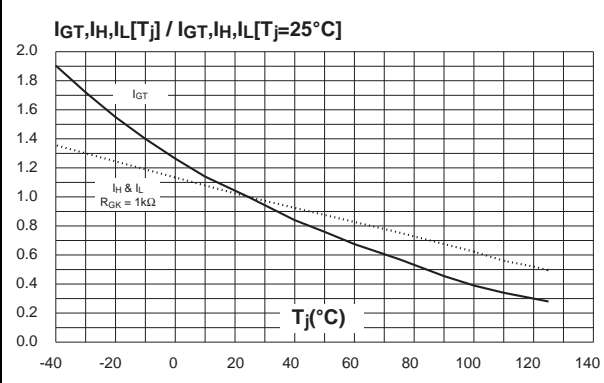


Figure 7. Relative variation of gate trigger and holding current versus junction temperature

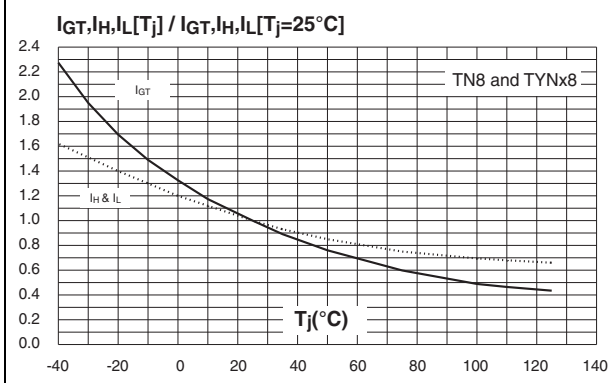


Figure 8. Relative variation of holding current versus gate-cathode resistance (typical values)

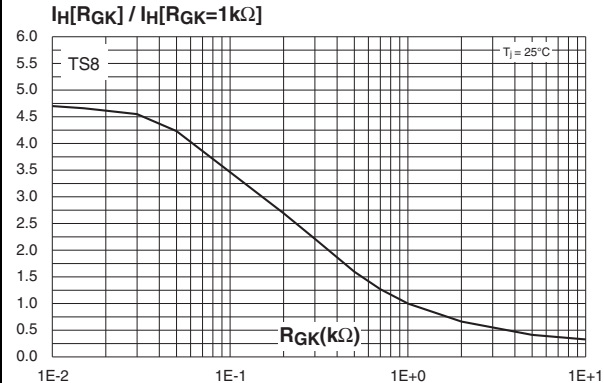


Figure 9. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS820

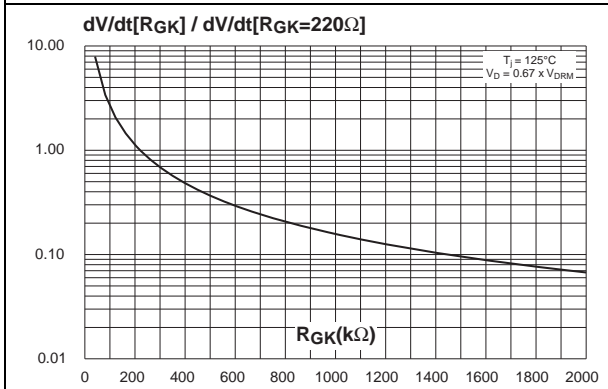


Figure 10. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS820

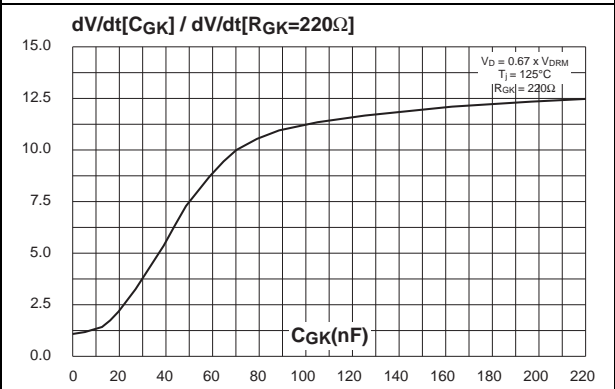


Figure 11. Surge peak on-state current versus number of cycles

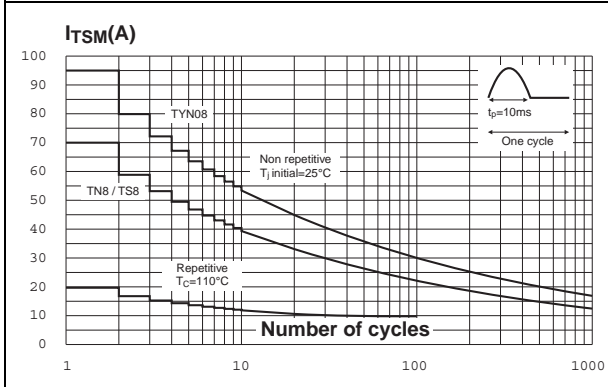


Figure 12. Non-repetitive surge peak on-state current and corresponding values of I²t

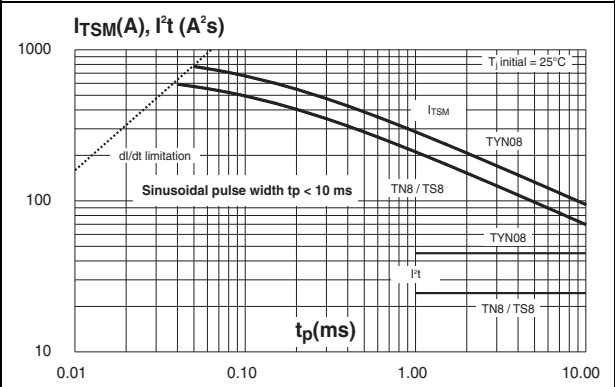


Figure 13. On-state characteristics (maximum values)

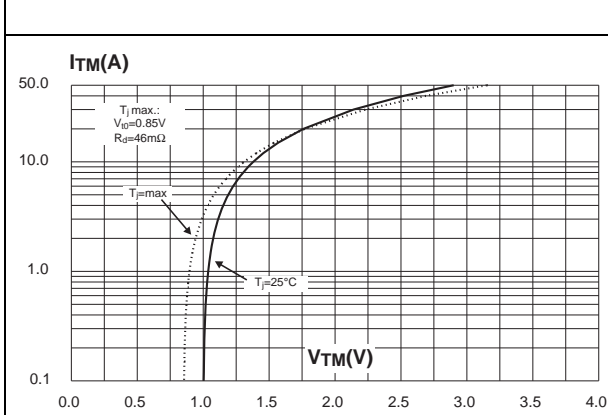
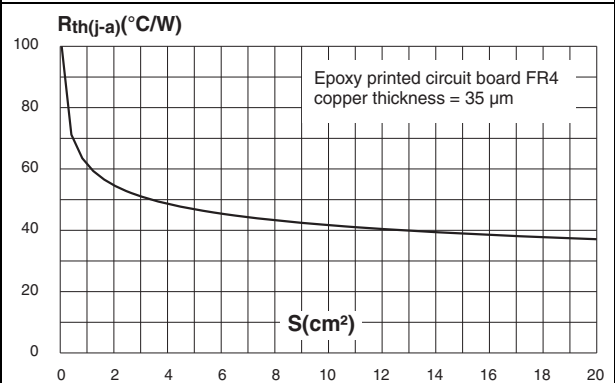


Figure 14. Thermal resistance junction to ambient versus copper surface under tab (DPAK)

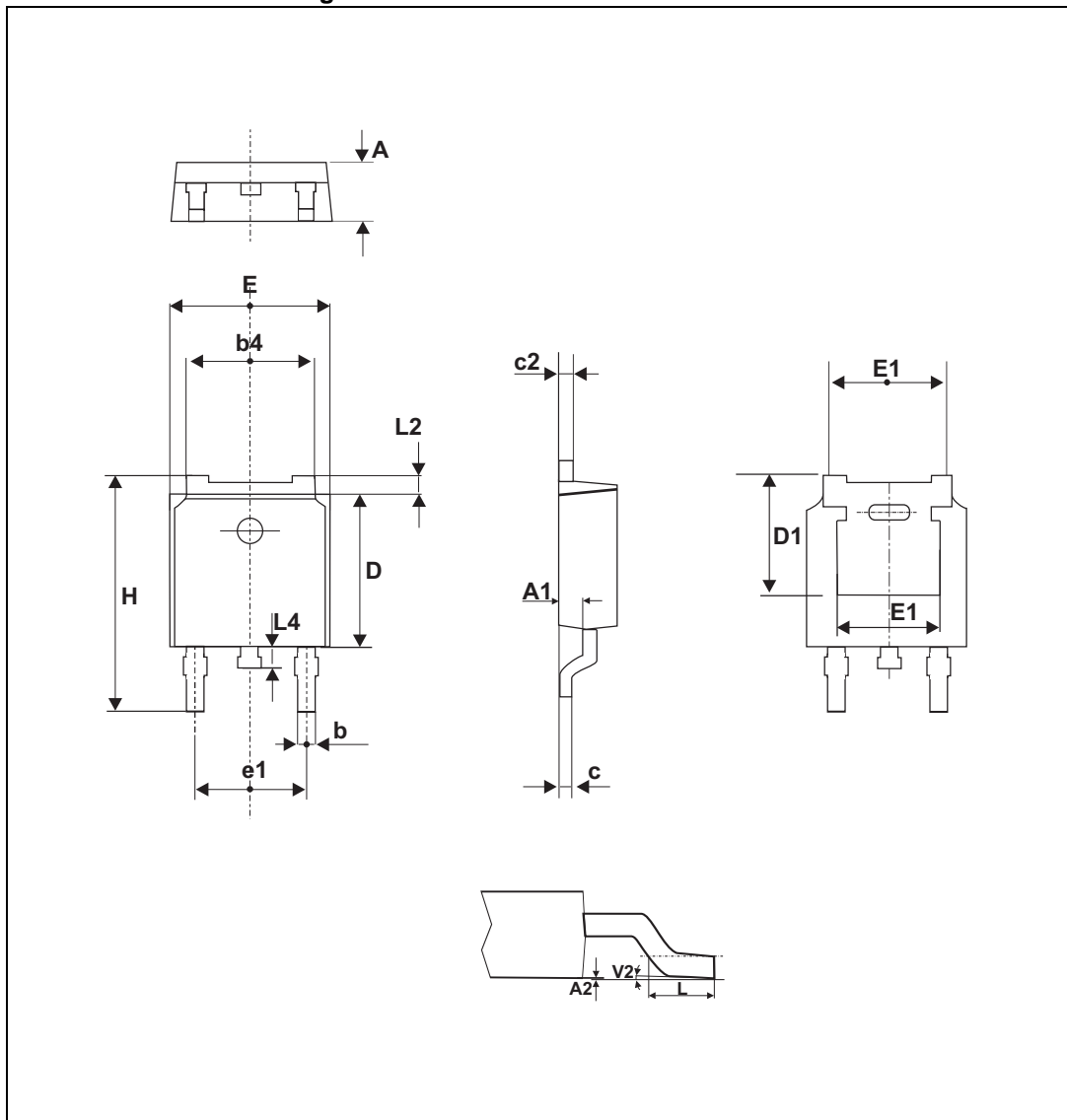


2 Package information

- Epoxy meets UL94, V0
- Lead-free packages
- 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.

Figure 15. DPAK dimension definitions



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

Table 6. DPAK dimension values

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.18 | | 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 |
| b4 | 4.95 | | 5.46 | 0.195 | | 0.215 |
| c | 0.46 | | 0.61 | 0.018 | | 0.024 |
| c2 | 0.46 | | 0.60 | 0.018 | | 0.023 |
| D | 5.97 | | 6.22 | 0.235 | | 0.244 |
| D1 | 5.10 | | | 0.201 | | |
| E | 6.35 | | 6.73 | 0.250 | | 0.264 |
| E1 | | 4.32 | | | 0.170 | |
| e1 | 4.40 | | 4.70 | 0.173 | | 0.185 |
| H | 9.35 | | 10.40 | 0.368 | | 0.409 |
| L | 1.00 | | 1.78 | 0.039 | | 0.070 |
| L2 | | | 1.27 | | | 0.05 |
| L4 | 0.60 | | 1.02 | 0.023 | | 0.040 |
| V2 | 0° | | 8° | 0° | | 8° |

Figure 16. Footprint (dimensions in mm)

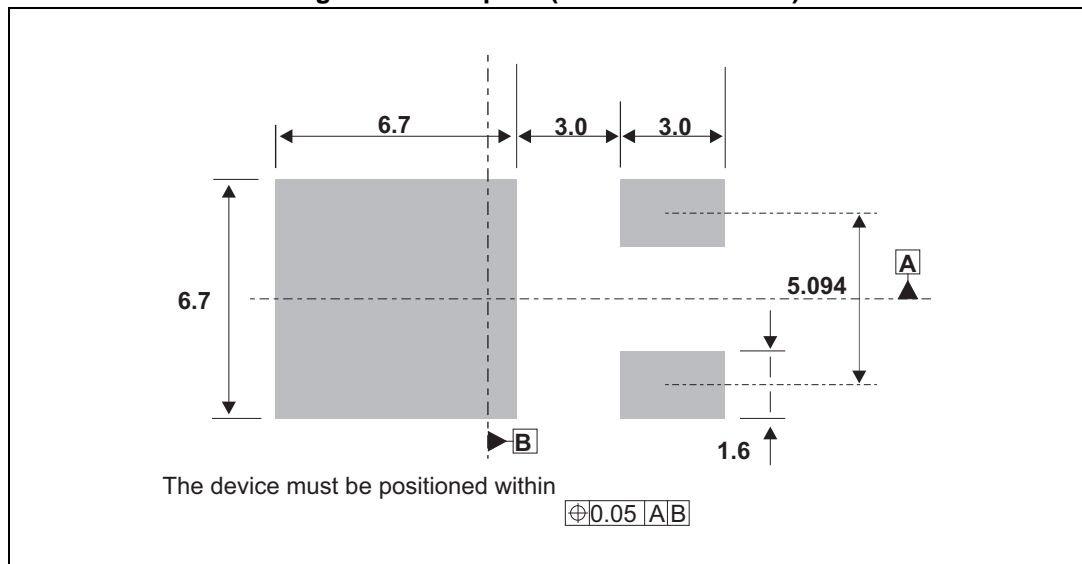
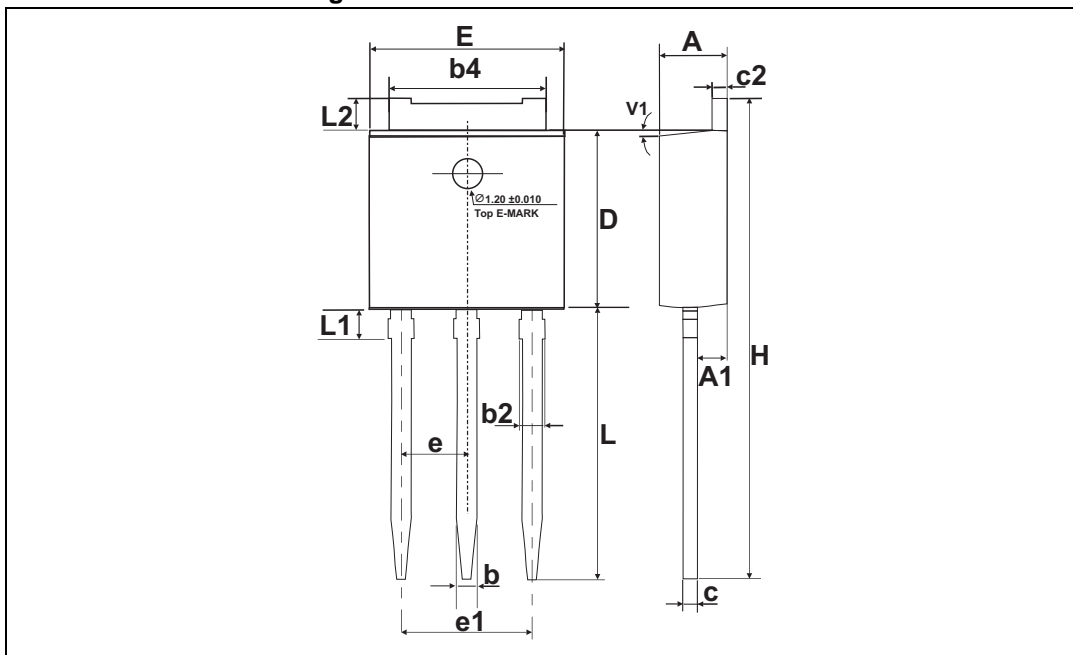


Figure 17. IPAK dimension definitions



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

Table 7. IPAK dimension values

| 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 |
| b | 0.64 | | 0.90 | 0.025 | | 0.035 |
| b2 | | | 0.95 | | | 0.037 |
| b4 | 5.20 | | 5.43 | 0.204 | | 0.213 |
| c | 0.45 | | 0.60 | 0.017 | | 0.023 |
| c2 | 0.46 | | 0.60 | 0.018 | | 0.023 |
| D | 6 | | 6.20 | 0.236 | | 0.244 |
| E | 6.40 | | 6.70 | 0.252 | | 0.263 |
| e | | 2.28 | | | 0.090 | |
| e1 | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | | 16.10 | | | 0.634 | |
| L | 9 | | 9.60 | 0.354 | | 0.377 |
| L1 | 0.8 | | 1.20 | 0.031 | | 0.047 |

Table 7. IPAK dimension values

| | | | | | | |
|----|--|------|------|--|-------|-------|
| L2 | | 0.80 | 1.25 | | 0.031 | 0.049 |
| V1 | | 10° | | | 10° | |

Figure 18. TO-220AB dimension definitions

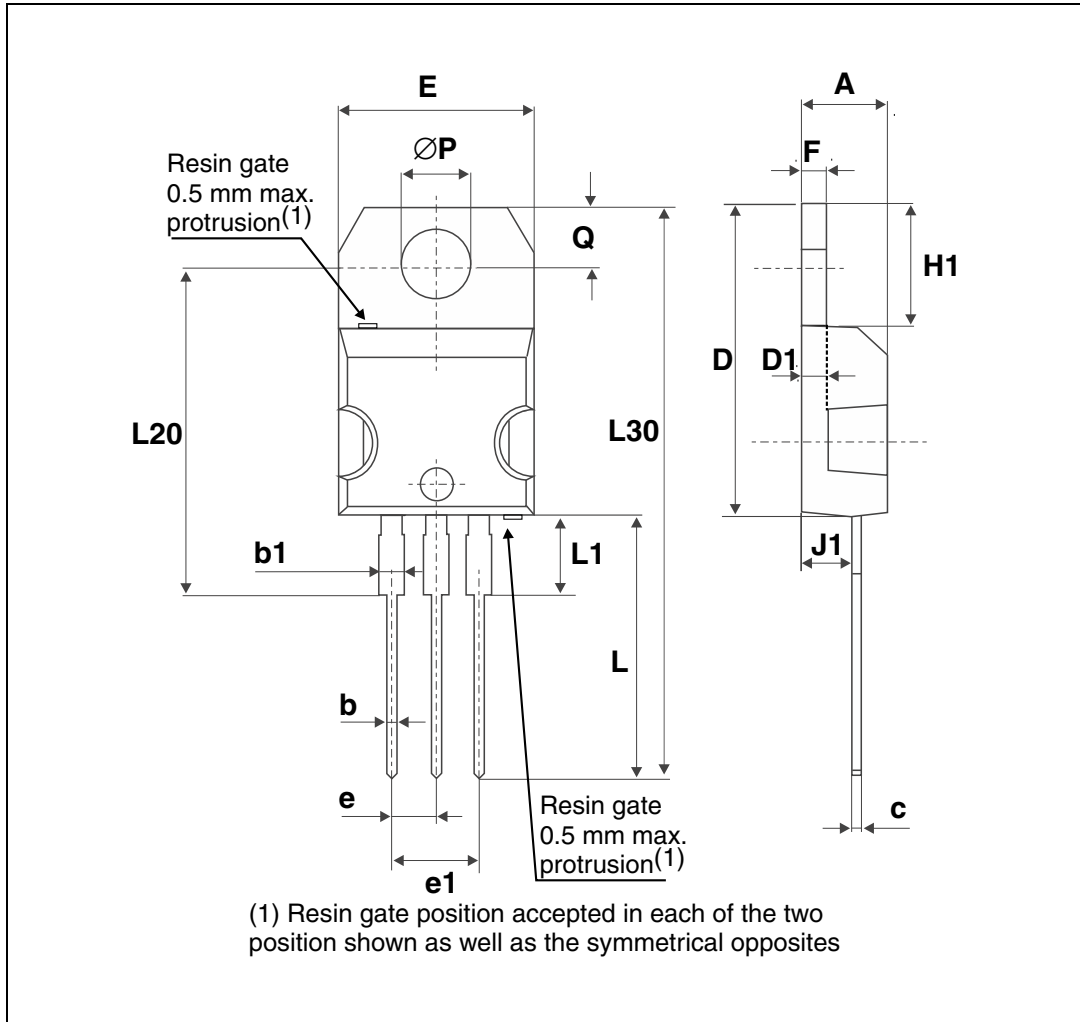


Table 8. TO-220AB dimension values

| Ref. | Dimensions | | | |
|------|-------------|-------|-----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.17 | 0.18 |
| b | 0.61 | 0.88 | 0.024 | 0.035 |
| b1 | 1.14 | 1.70 | 0.045 | 0.067 |
| c | 0.48 | 0.70 | 0.019 | 0.027 |
| D | 15.25 | 15.75 | 0.60 | 0.62 |
| D1 | 1.27 typ. | | 0.05 typ. | |
| E | 10 | 10.40 | 0.39 | 0.41 |
| e | 2.40 | 2.70 | 0.094 | 0.106 |
| e1 | 4.95 | 5.15 | 0.19 | 0.20 |
| F | 1.23 | 1.32 | 0.048 | 0.052 |
| H1 | 6.20 | 6.60 | 0.24 | 0.26 |
| J1 | 2.40 | 2.72 | 0.094 | 0.107 |
| L | 13 | 14 | 0.51 | 0.55 |
| L1 | 3.50 | 3.93 | 0.137 | 0.154 |
| L20 | 16.40 typ. | | 0.64 typ. | |
| L30 | 28.90 typ. | | 1.13 typ. | |
| ∅P | 3.75 | 3.85 | 0.147 | 0.151 |
| Q | 2.65 | 2.95 | 0.104 | 0.116 |

Figure 19. TO-220AB (Nlns. & Ins. 20-up) dimension definitions

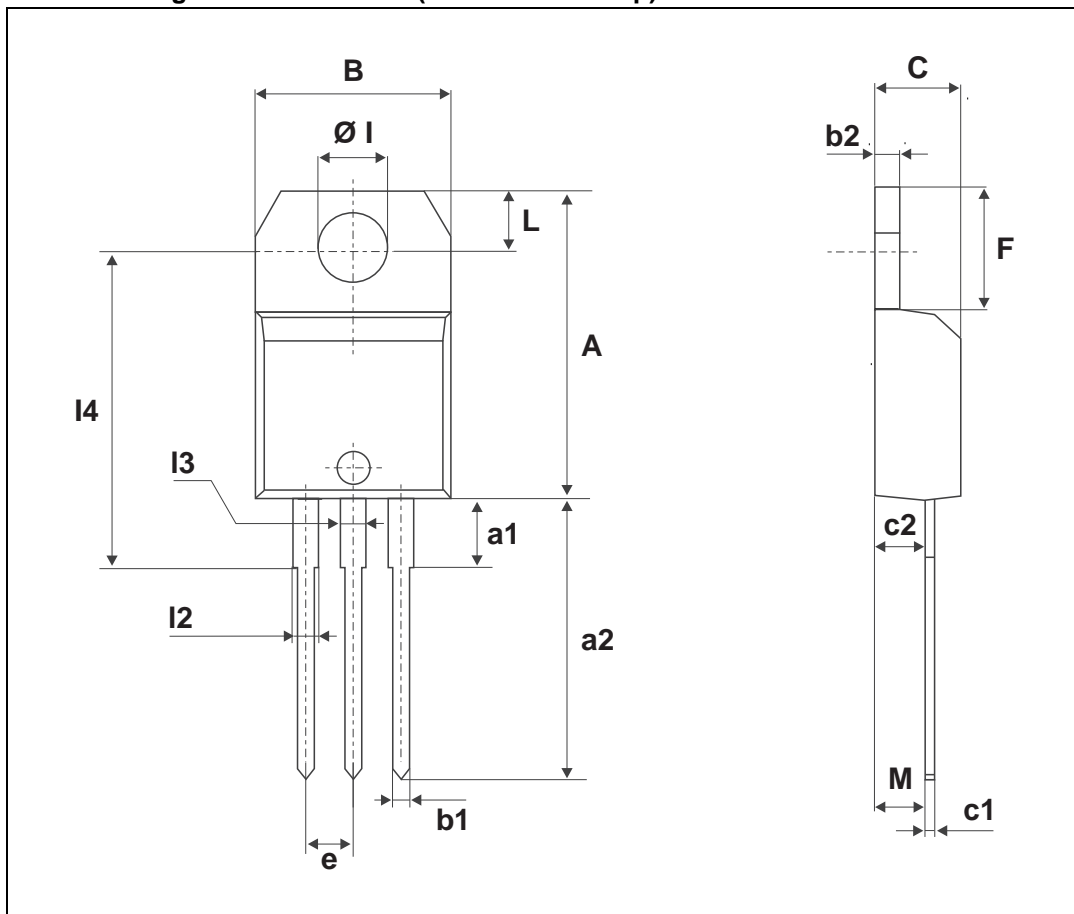


Table 9. TO-220AB (Nlns. & Ins. 20-up) dimension values

| 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 |
| Øl | 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 | |

Figure 20. TO-220FPAB dimension definitions

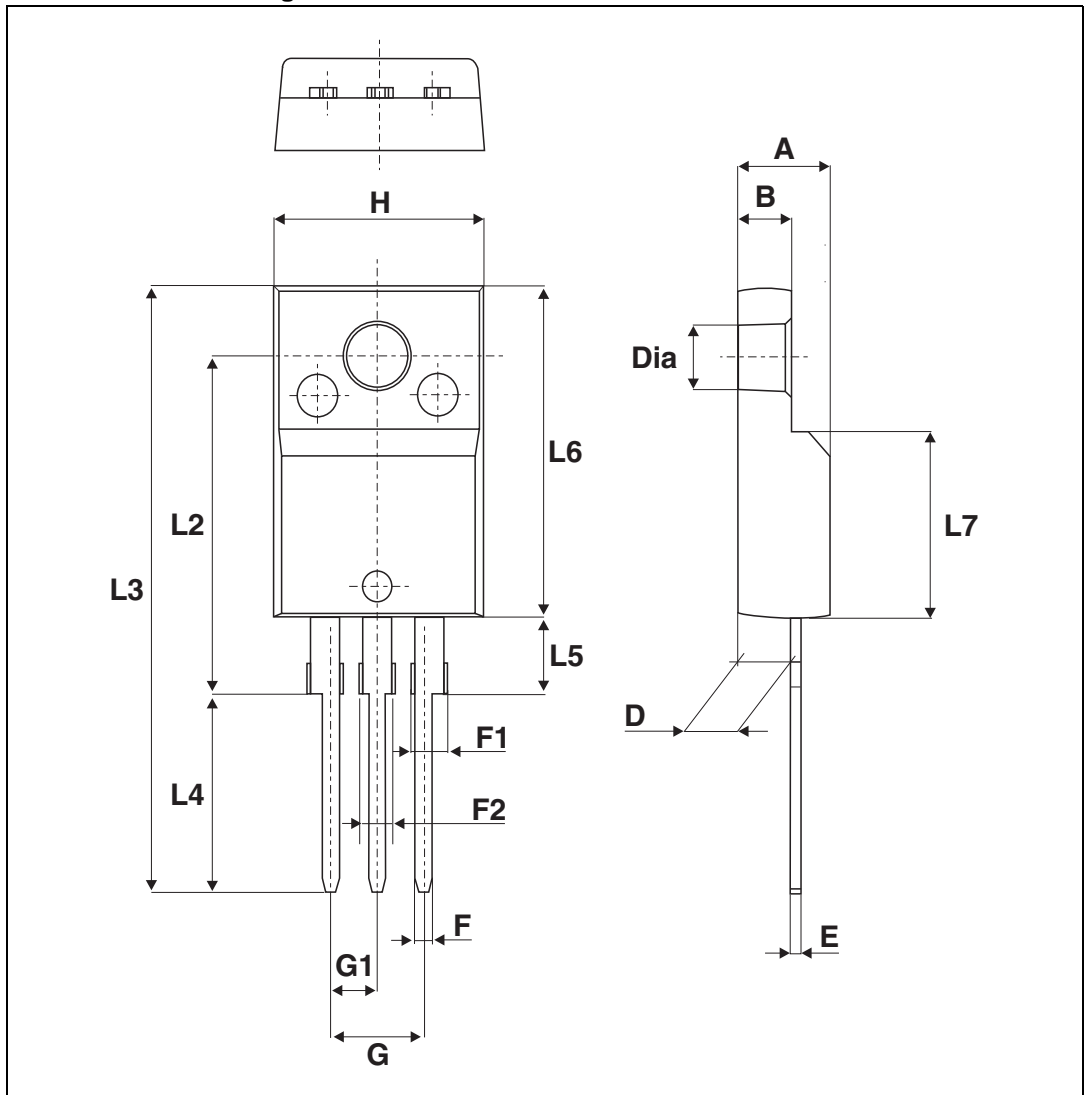


Table 10. TO-220FPAB dimension values

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | 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 | | | 0.63 | |
| 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 21. TN8 series

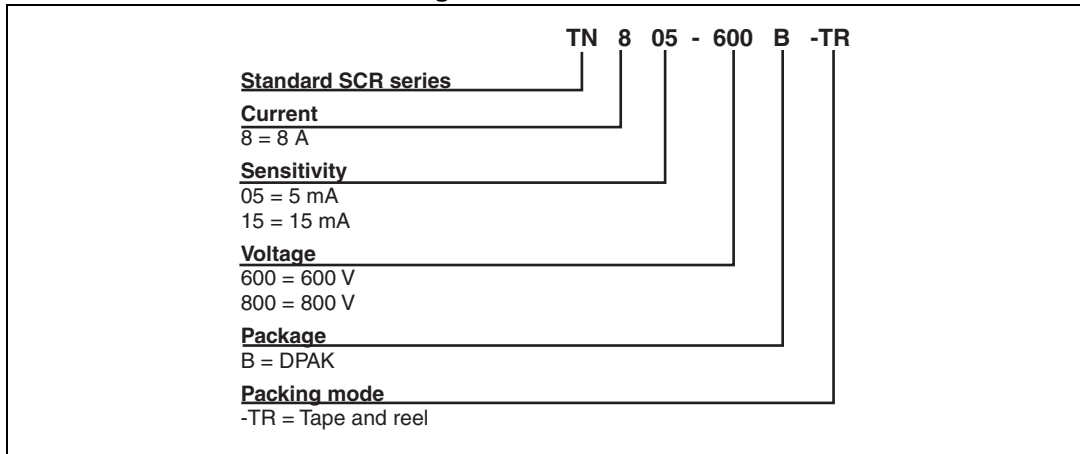


Figure 22. TS8 series

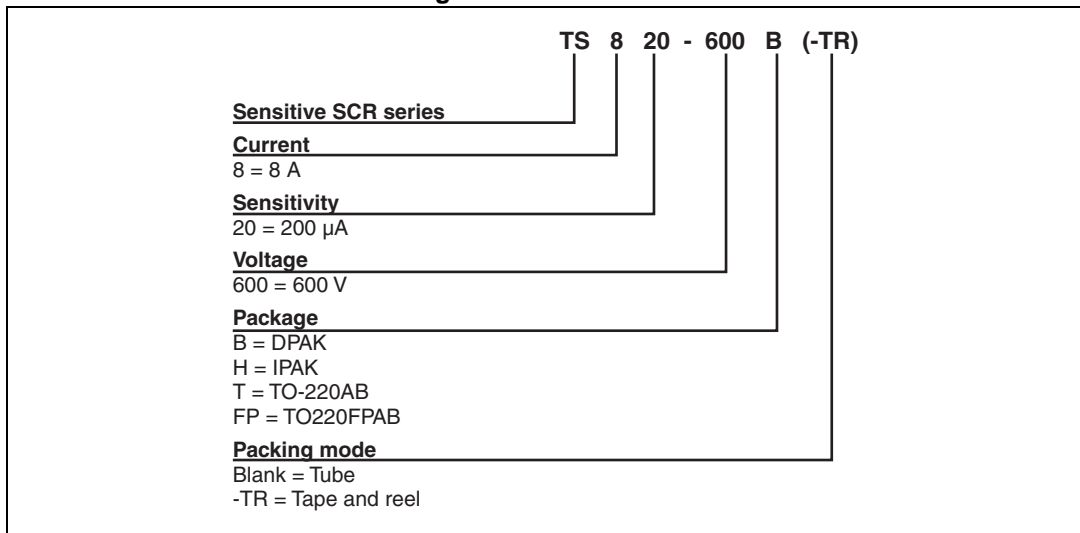


Figure 23. TYNx08 series

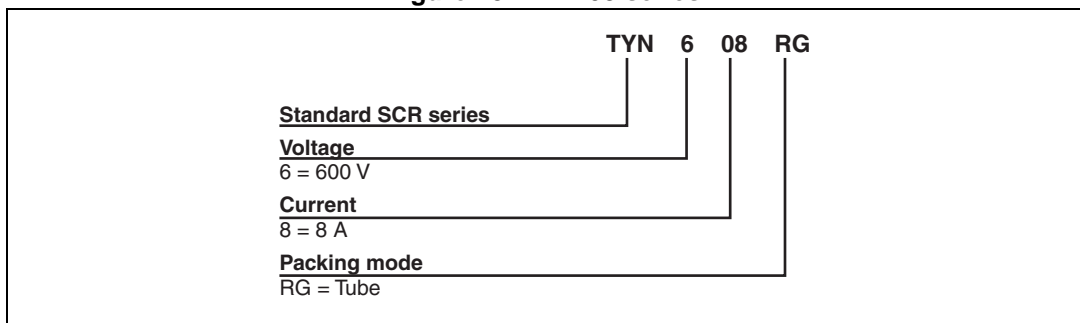


Table 11. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|-----------|------------|--------|----------|---------------|
| TN805-600B-TR | TN805600 | DPAK | 0.3 g | 2500 | Tape and reel |
| TN815-600B-TR | TN815600 | DPAK | 0.3 g | 2500 | Tape and reel |
| TN815-800B-TR | TN815800 | DPAK | 0.3 g | 2500 | Tape and reel |
| TS820-600B | TS820600 | DPAK | 0.3 g | 75 | Tube |
| TS820-600B-TR | TS820600 | DPAK | 0.3 g | 2500 | Tape and reel |
| TS820-600H | TS820600 | IPAK | 0.4 g | 75 | Tube |
| TS820-600T | TS820600T | TO-220AB | 2.3 g | 50 | Tube |
| TS820-600FP | TS820600 | TO-220FPAB | 2.0 g | 50 | Tube |
| TYN608RG | TYN608 | TO-220AB | 2.3 g | 50 | Tube |

4 Revision history

Table 12. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| Apr-2002 | 4A | Last update. |
| 13-Feb-2006 | 5 | TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added. |
| 22-Jan-2010 | 6 | Alpha definition updated in Figure 1 . Thermal resistance, junction to case, updated in Table 5 . |
| 10-Oct-2011 | 7 | Added TO-220FPAB package. Removed 700 V and 1000 V products. |
| 14-May-2014 | 8 | Updated DPAK and IPAK package information and reformatted to current standard. |

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.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

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.

© 2014 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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

