

1 Characteristics

Table 2: Absolute ratings (limiting values)

| Symbol | Parameter | | | Value | Unit |
|---------------------|--|---------------------------------|------------------------|-------------------------|------------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | D ² PAK, TO-220AB | $T_C = 136\text{ °C}$ | 8 | A |
| | | TO-220AB Ins. | $T_C = 123\text{ °C}$ | | |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C) | $f = 50\text{ Hz}$ | $t_p = 20\text{ ms}$ | 80 | A |
| | | $f = 60\text{ Hz}$ | $t_p = 16.7\text{ ms}$ | 84 | |
| I^2t | I^2t value for fusing | | $t_p = 10\text{ ms}$ | 42 | A ² s |
| di/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$ | $f = 50\text{ Hz}$ | $T_j = 150\text{ °C}$ | 50 | A/ μ s |
| V_{DSM} / V_{RSM} | Non repetitive surge peak off- state voltage | $t_p = 10\text{ ms}$ | $T_j = 25\text{ °C}$ | $V_{DRM}/V_{RRM} + 100$ | V |
| I_{GM} | Peak forward gate current | $t_p = 20\text{ }\mu$ s | $T_j = 150\text{ °C}$ | 4 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j = 150\text{ °C}$ | 1 | W |
| T_{stg} | Storage junction temperature range | | | -40 to +150 | °C |
| T_j | Operating junction temperature range | | | -40 to +150 | °C |

Table 3: Electrical characteristics ($T_j = 25\text{ °C}$ unless otherwise specified)

| Symbol | Test conditions | Quadrant | | Value | | Unit |
|-------------------|--|-----------------------|------|-------|-------|------------|
| | | | | T835H | T850H | |
| $I_{GT}^{(1)}$ | $V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$ | I - II - III | Max. | 35 | 50 | mA |
| V_{GT} | | | Max. | 1.0 | | V |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$ | I - II - III | Min. | 0.15 | | V |
| $I_H^{(2)}$ | $I_T = 500\text{ mA}$ | | Max. | 35 | 75 | mA |
| I_L | $I_G = 1.2 \times I_{GT}$ | I - III | Max. | 50 | 60 | mA |
| | | II | | 80 | 110 | |
| $dV/dt^{(2)}$ | $V_D = 2/3 \times V_{DRM}$, gate open | $T_j = 150\text{ °C}$ | Min. | 1000 | 1500 | V/ μ s |
| $(di/dt)_c^{(2)}$ | Without snubber | $T_j = 150\text{ °C}$ | Min. | 11 | 14 | A/ms |

Notes:

⁽¹⁾minimum I_{GT} is guaranteed at 20% of I_{GT} max.

⁽²⁾for both polarities of A2 referenced to A1.

Table 4: Static characteristics

| Symbol | Test conditions | | | Value | Unit |
|---------------------------|--|------------------------------------|------|-------|---------------|
| $V_T^{(1)}$ | $I_{TM} = 11 \text{ A}$, $t_p = 380 \text{ } \mu\text{s}$ | $T_j = 25 \text{ }^\circ\text{C}$ | Max. | 1.5 | V |
| $V_{T0}^{(1)}$ | Threshold voltage | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 0.80 | V |
| $R_d^{(1)}$ | Dynamic resistance | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 52 | m Ω |
| $I_{DRM} / I_{RRM}^{(2)}$ | $V_{DRM} = V_{RRM}$ | $T_j = 25 \text{ }^\circ\text{C}$ | Max. | 5 | μA |
| | | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 3.1 | mA |
| | $V_D/V_R = 400 \text{ V}$ (at peak mains voltage) | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 2.5 | |
| | $V_D/V_R = 200 \text{ V}$ (at peak mains voltage) | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 2.0 | |

Notes:⁽¹⁾for both polarities of A2 referenced to A1⁽²⁾ $t_p = 380 \text{ } \mu\text{s}$

Table 5: Thermal parameters

| Symbol | Parameter | | Value | Unit |
|---------------|---|------------------------------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case (AC) | D ² PAK, TO-220AB | 1.85 | $^\circ\text{C/W}$ |
| | | TO-220AB Ins. | 3.7 | |
| $R_{th(j-a)}$ | Junction to ambient ($S_{cu} = 1 \text{ cm}^2$) | D ² PAK | 45 | |
| | Junction to ambient | TO-220AB, TO-220AB Ins. | 60 | |

1.1 Characteristics (curves)

Figure 1: Maximum power dissipation versus on-state RMS current (full cycle)

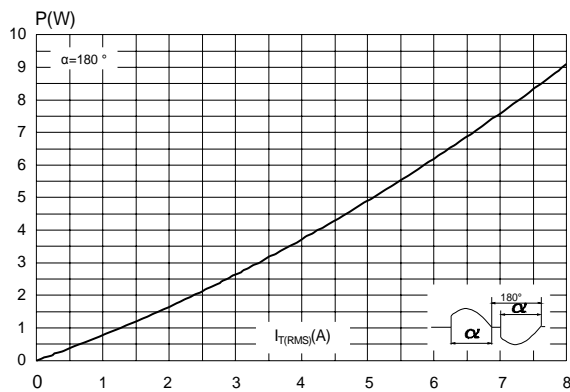


Figure 2: On-state RMS current versus case temperature (full cycle)

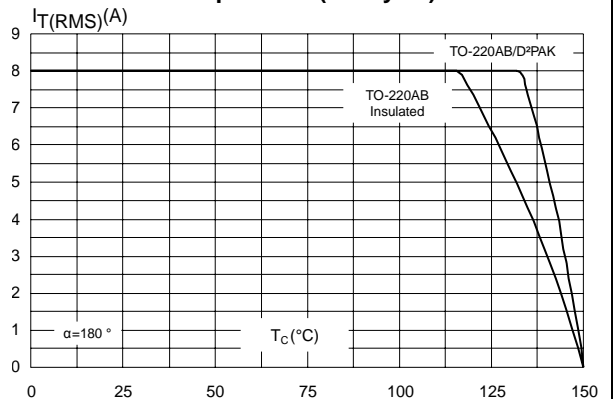


Figure 3: On-state RMS current versus ambient temperature

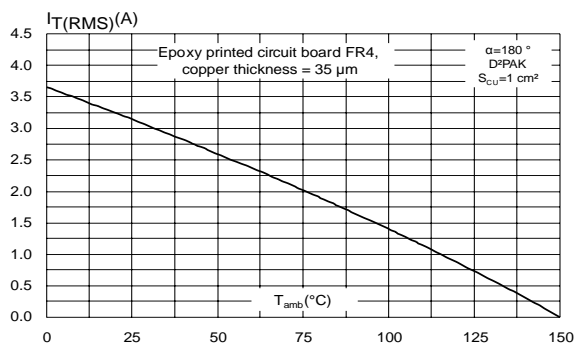


Figure 4: Variation of thermal impedance versus pulse duration

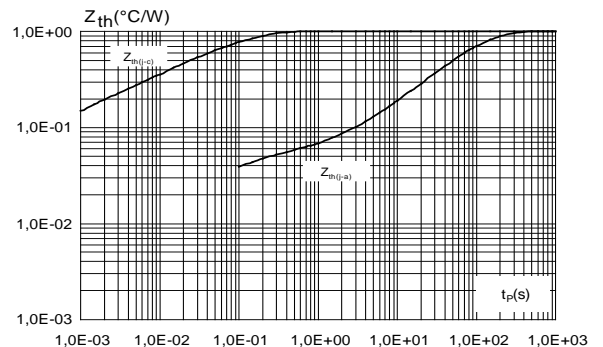


Figure 5: On-state characteristics (maximum values)

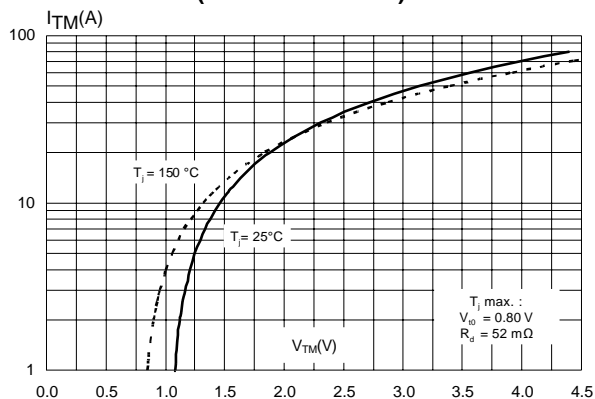


Figure 6: Surge peak on-state current versus number of cycles

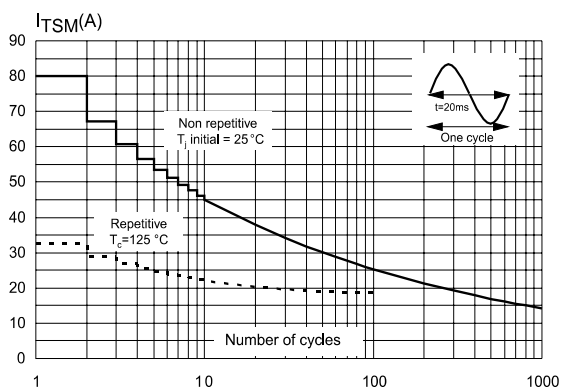
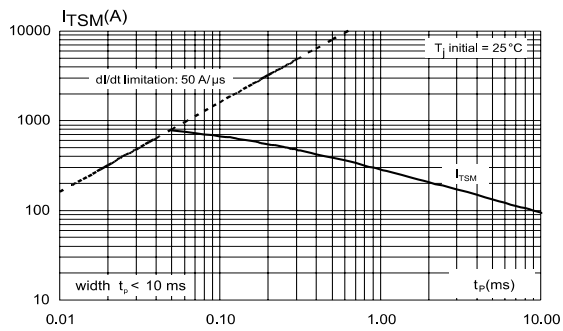
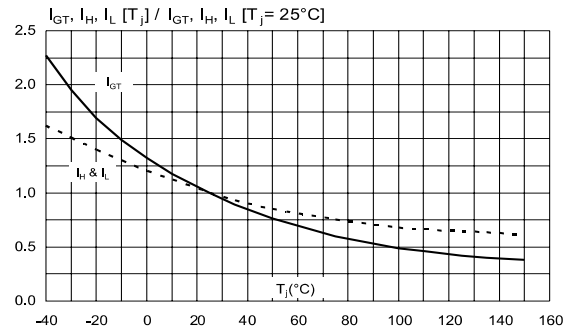
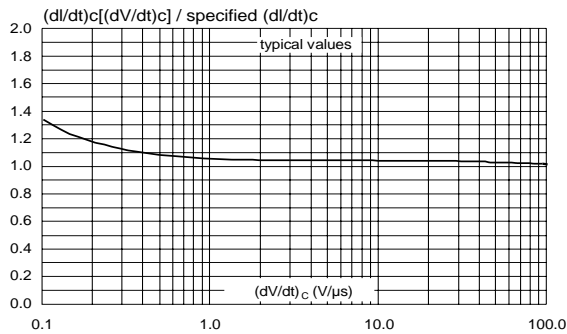
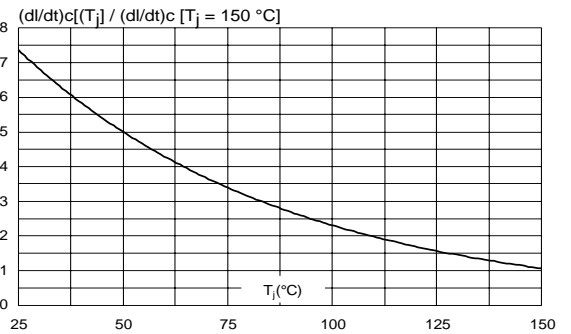
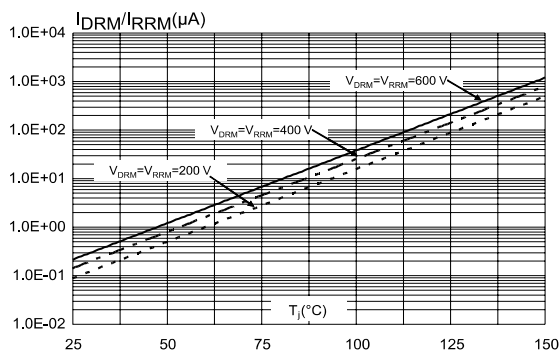
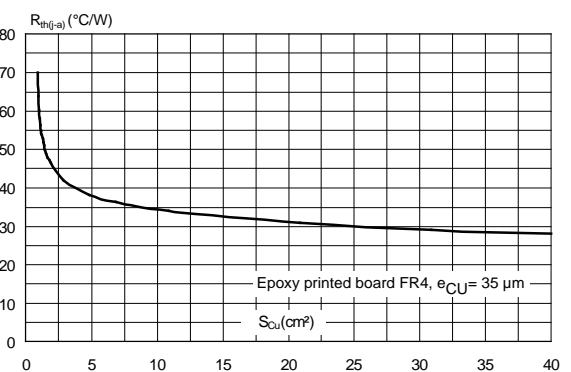


Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse**Figure 8: Relative variation of I_{GT} , I_H , I_L versus junction temperature (typical values)****Figure 9: Relative variation of critical rate of decrease of main current $(dI/dt)_c$ versus reapplied $(dV/dt)_c$** **Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature****Figure 11: Leakage current versus junction temperature for different values of blocking voltage (typical values)****Figure 12: Variation of thermal resistance junction to ambient versus copper surface under tab**

2 Package information

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.

- Epoxy meets UL94, V0
- Lead-free package leads
- Cooling method: by conduction (C)

2.1 D²PAK package information

Figure 13: D²PAK package outline

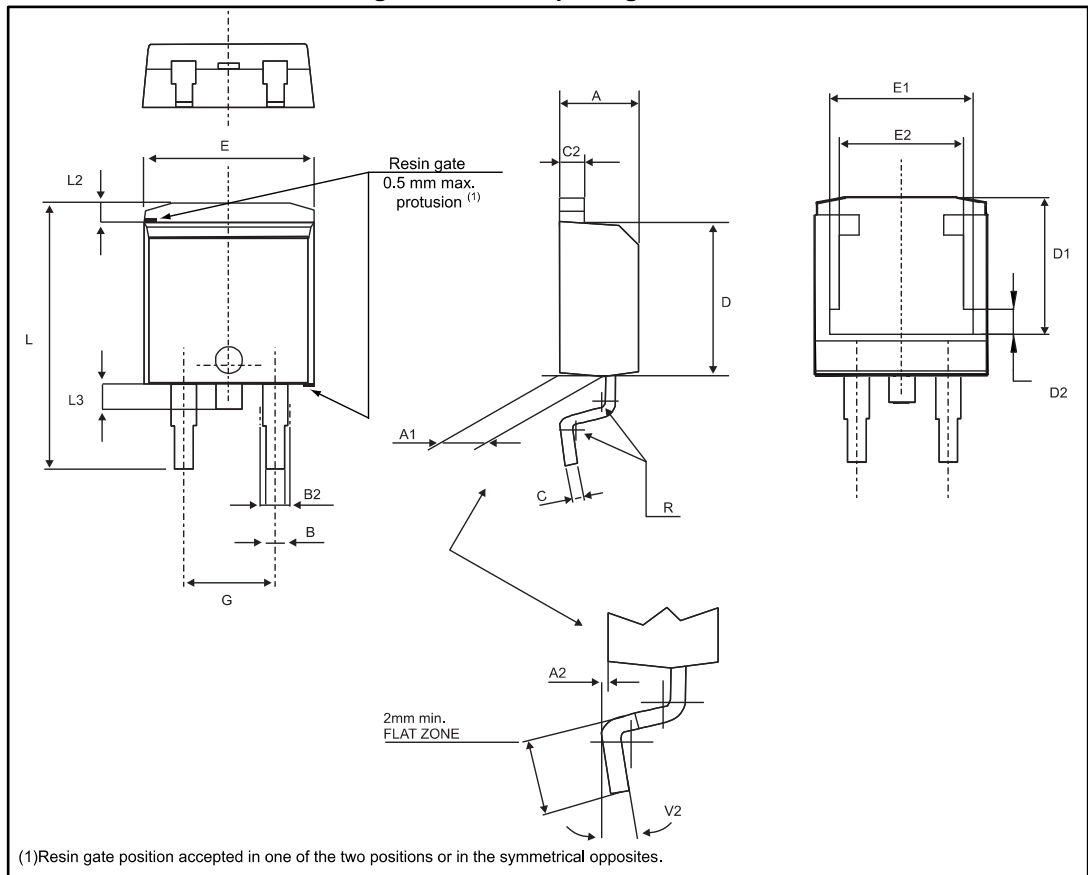
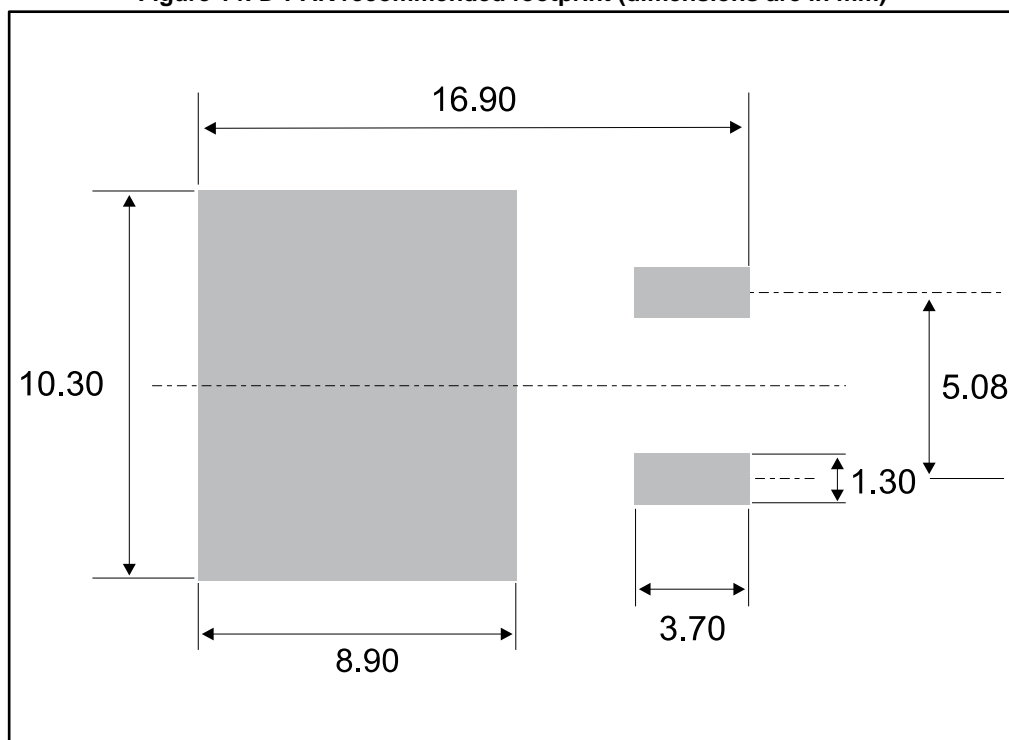


Table 6: D²PAK package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|-----------------------|--------|--------|
| | Millimeters | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.30 | | 4.60 | 0.1693 | | 0.1811 |
| A1 | 2.49 | | 2.69 | 0.0980 | | 0.1059 |
| A2 | 0.03 | | 0.23 | 0.0012 | | 0.0091 |
| B | 0.70 | | 0.93 | 0.0276 | | 0.0366 |
| B2 | 1.25 | 1.40 | | 0.0492 | 0.0551 | |
| C | 0.45 | | 0.60 | 0.0177 | | 0.0236 |
| C2 | 1.21 | | 1.36 | 0.0476 | | 0.0535 |
| D | 8.95 | | 9.35 | 0.3524 | | 0.3681 |
| D1 | 7.50 | | 8.00 | 0.2953 | | 0.3150 |
| D2 | 1.30 | | 1.70 | 0.0512 | | 0.0669 |
| E | 10.00 | | 10.28 | 0.3937 | | 0.4047 |
| E1 | 8.30 | | 8.70 | 0.3268 | | 0.3425 |
| E2 | 6.85 | | 7.25 | 0.2697 | | 0.2854 |
| G | 4.88 | | 5.28 | 0.1921 | | 0.2079 |
| L | 15 | | 15.85 | 0.5906 | | 0.6240 |
| L2 | 1.27 | | 1.40 | 0.0500 | | 0.0551 |
| L3 | 1.40 | | 1.75 | 0.0551 | | 0.0689 |
| R | | 0.40 | | | 0.0157 | |
| V2 | 0° | | 8° | 0° | | 8° |

Notes:

⁽¹⁾Dimensions in inches are given for reference only

Figure 14: D²PAK recommended footprint (dimensions are in mm)

2.2 TO-220AB (NIns. and Ins.) package information

Figure 15: TO-220AB (NIns. and Ins.) package outline

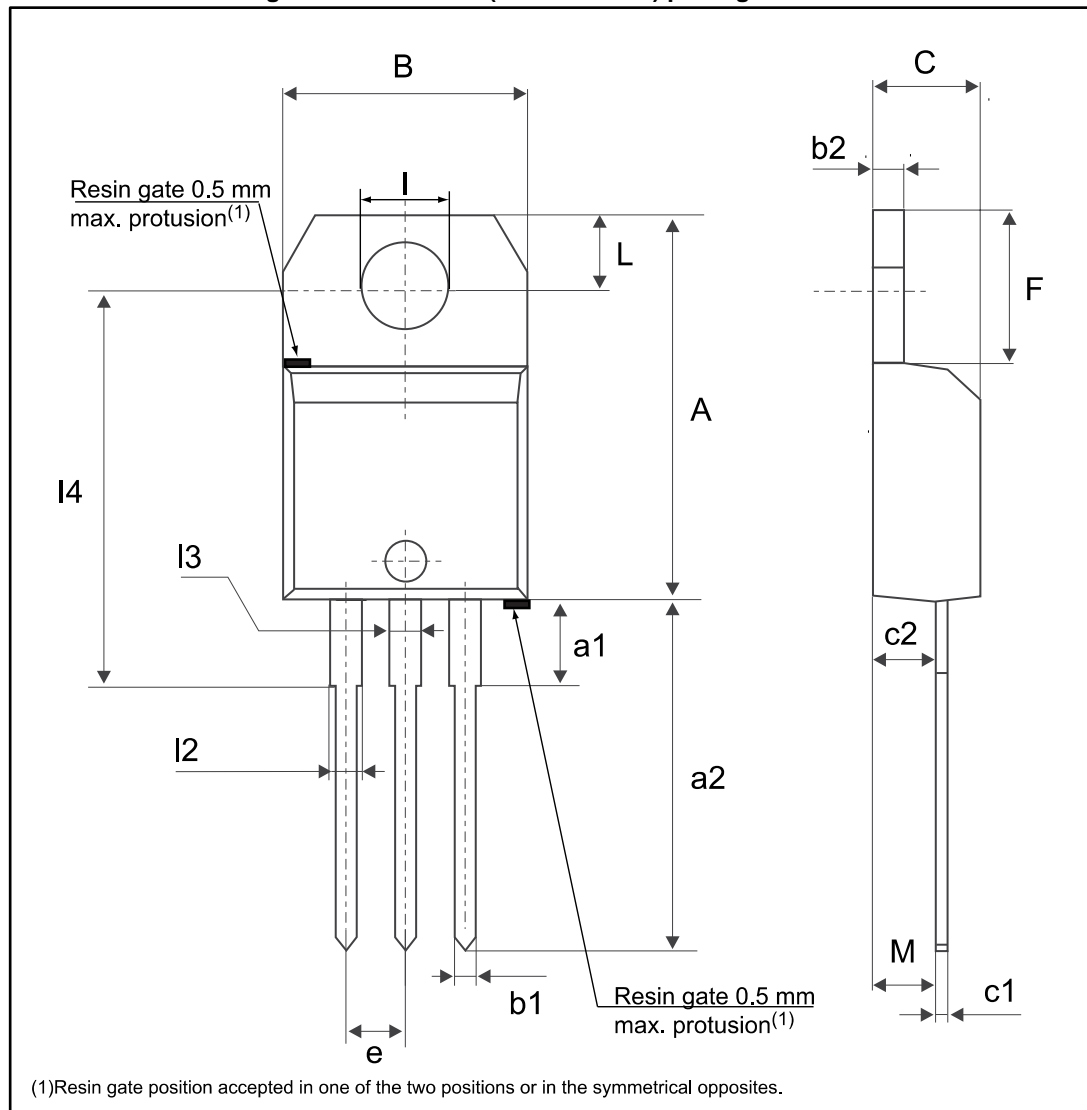


Table 7: TO-220AB (Nlns. and Ins.) package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|-----------------------|--------|--------|
| | Millimeters | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 15.20 | | 15.90 | 0.5984 | | 0.6260 |
| a1 | | 3.75 | | | 0.1476 | |
| a2 | 13.00 | | 14.00 | 0.5118 | | 0.5512 |
| B | 10.00 | | 10.40 | 0.3937 | | 0.4094 |
| b1 | 0.61 | | 0.88 | 0.0240 | | 0.0346 |
| b2 | 1.23 | | 1.32 | 0.0484 | | 0.0520 |
| C | 4.40 | | 4.60 | 0.1732 | | 0.1811 |
| c1 | 0.49 | | 0.70 | 0.0193 | | 0.0276 |
| c2 | 2.40 | | 2.72 | 0.0945 | | 0.1071 |
| e | 2.40 | | 2.70 | 0.0945 | | 0.1063 |
| F | 6.20 | | 6.60 | 0.2441 | | 0.2598 |
| I | 3.73 | | 3.88 | 0.1469 | | 0.1528 |
| L | 2.65 | | 2.95 | 0.1043 | | 0.1161 |
| l2 | 1.14 | | 1.70 | 0.0449 | | 0.0669 |
| l3 | 1.14 | | 1.70 | 0.0449 | | 0.0669 |
| l4 | 15.80 | 16.40 | 16.80 | 0.6220 | 0.6457 | 0.6614 |
| M | | 2.6 | | | 0.1024 | |

Notes:⁽¹⁾Inch dimensions are for reference only.

3 Ordering information

Figure 16: Ordering information scheme

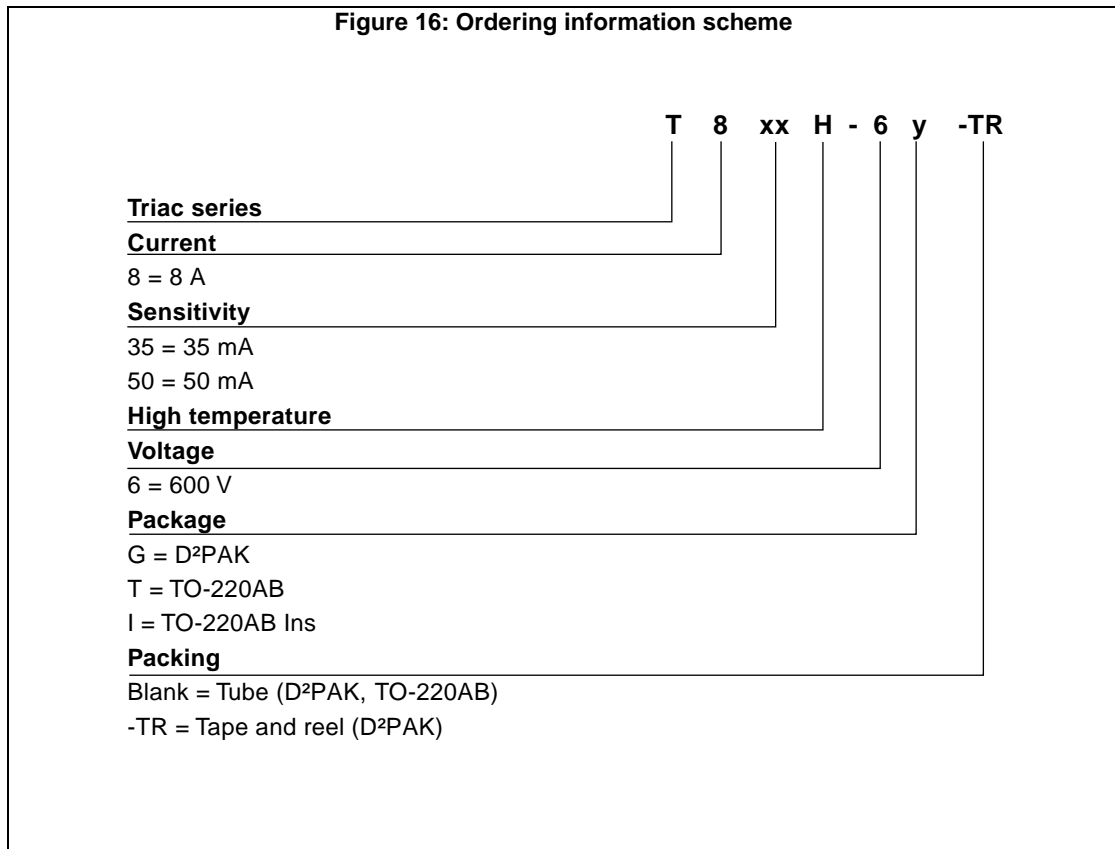


Table 8: Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|-------------|----------|--------------------|--------|-----------|---------------|
| T8xxH-6G | T8xxH 6G | D ² PAK | 1.5 g | 50 | Tube |
| T8xxH-6G-TR | T8xxH 6G | D ² PAK | 1.5 g | 1000 | Tape and reel |
| T8xxH-6T | T8xxH 6T | TO-220AB | 2.3 g | 50 | Tube |
| T8xxH-6I | T8xxH 6I | TO-220AB Ins. | 2.3 g | 50 | Tube |

4 Revision history

Table 9: Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| 17-Apr-2007 | 1 | First issue. |
| 19-Sep-2011 | 2 | Updated: <i>Features, Description, Figure 2, Table 2 and 4.</i> |
| 30-Mar-2017 | 3 | Minor text changes. Updated Table 4: "Static characteristics" and Figure 7: "Non-repetitive surge peak on-state current for a sinusoidal pulse" . |

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