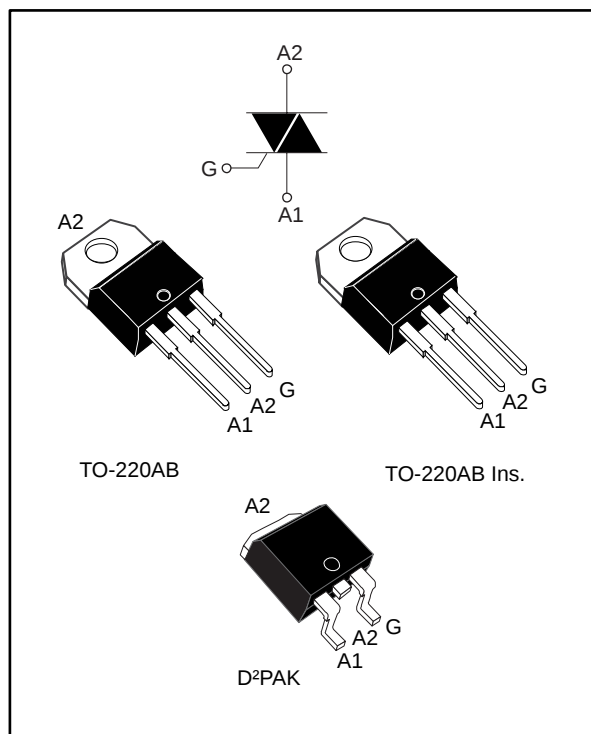


## High temperature 8 A Snubberless™ Triacs

Datasheet - production data



### Applications

Especially designed to operate in high power density or universal motor applications such as vacuum cleaner and washing machine drum motor, these 8 A Triacs provide a very high switching capability up to 150 °C junction temperatures.

The heatsink can be reduced, compared to traditional Triac, according to the high performance at given junction temperatures.

### Description

Available in through-hole or surface mount packages, these Triacs series are suitable for general purpose mains power ac switching.

By using an internal ceramic pad, they provide voltage insulation (rated at 2500 V<sub>RMS</sub>).

Table 1: Device summary

| Symbol            | Value    | Unit |
|-------------------|----------|------|
| $I_{T(RMS)}$      | 8        | A    |
| $V_{DRM}/V_{RRM}$ | 600      | V    |
| $I_{GT}$          | 35 or 50 | mA   |

### Features

- Medium current Triac
- 150 °C max. T<sub>j</sub> turn-off commutation
- Low thermal resistance with clip bonding
- Very high 3 quadrant commutation capability
- Packages are RoHS (2002/95/EC) compliant
- UL certified (ref. file E81734)

# 1 Characteristics

Table 2: Absolute ratings (limiting values)

| Symbol              | Parameter                                                                                                    |                                 |                                     | Value                   | Unit               |
|---------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------|-------------------------|--------------------|
| $I_{T(RMS)}$        | RMS on-state current<br>(full sine wave)                                                                     | D <sup>2</sup> PAK,<br>TO-220AB | $T_C = 133\text{ }^{\circ}\text{C}$ | 8                       | A                  |
|                     |                                                                                                              | TO-220A Ins.                    | $T_C = 116\text{ }^{\circ}\text{C}$ |                         |                    |
| $I_{TSM}$           | Non repetitive surge peak<br>on-state current<br>(full cycle, $T_j$ initial = $25\text{ }^{\circ}\text{C}$ ) | f = 50 Hz                       | $t_p = 20\text{ ms}$                | 80                      | A                  |
|                     |                                                                                                              | f = 60 Hz                       | $t_p = 16.7\text{ ms}$              | 84                      |                    |
| $I^2t$              | $I^2t$ value for fusing                                                                                      |                                 | $t_p = 10\text{ ms}$                | 42                      | A <sup>2</sup> s   |
| $di/dt$             | Critical rate of rise of<br>on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$           | f = 50 Hz                       | $T_j = 150\text{ }^{\circ}\text{C}$ | 50                      | A/ $\mu$ s         |
| $V_{DSM} / V_{RSM}$ | Non repetitive surge peak<br>off-state voltage                                                               | $t_p = 10\text{ ms}$            | $T_j = 25\text{ }^{\circ}\text{C}$  | $V_{DRM}/V_{RRM} + 100$ | V                  |
| $I_{GM}$            | Peak forward gate current                                                                                    | $t_p = 20\text{ }\mu\text{s}$   | $T_j = 150\text{ }^{\circ}\text{C}$ | 4                       | A                  |
| $P_{G(AV)}$         | Average gate power dissipation                                                                               |                                 | $T_j = 150\text{ }^{\circ}\text{C}$ | 1                       | W                  |
| $T_{stg}$           | Storage junction temperature range                                                                           |                                 |                                     | -40 to +150             | $^{\circ}\text{C}$ |
| $T_j$               | Operating junction temperature range                                                                         |                                 |                                     | -40 to +150             | $^{\circ}\text{C}$ |

Table 3: Electrical characteristics ( $T_j = 25\text{ }^{\circ}\text{C}$  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         |
| $V_{GT}$          |                                                |                                     |      | 1.0   |       | mA         |
| $V_{GD}$          | $V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$   | 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         | $T_j = 150\text{ }^{\circ}\text{C}$ | Min. | 1000  | 1500  | V/ $\mu$ s |
| $(di/dt)_c^{(2)}$ | Without snubber                                | $T_j = 150\text{ }^{\circ}\text{C}$ | 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          |
|---------------------|---------------------------------------------------|------------------------------------|------|-------|---------------|
| $V_T^{(1)}$         | $I_{TM} = 11 \text{ A}$ , $t_p = 380 \mu\text{s}$ | $T_j = 25 \text{ }^\circ\text{C}$  | 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 $\Omega$    |
| $I_{DRM} / I_{RRM}$ | $V_{DRM} = V_{RRM}$                               | $T_j = 25 \text{ }^\circ\text{C}$  | Max. | 5     | $\mu\text{A}$ |
|                     |                                                   | $T_j = 150 \text{ }^\circ\text{C}$ | 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   |               |

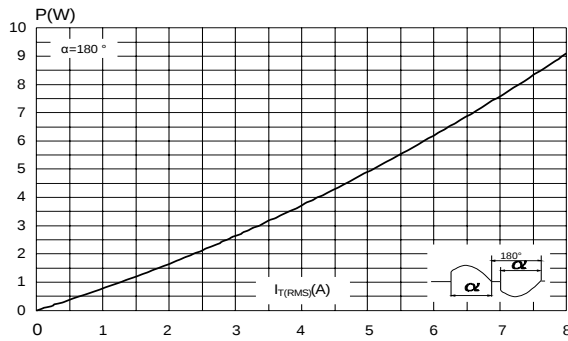
**Notes:**<sup>(1)</sup>for both polarities of A2 referenced to A1

Table 5: Thermal parameters

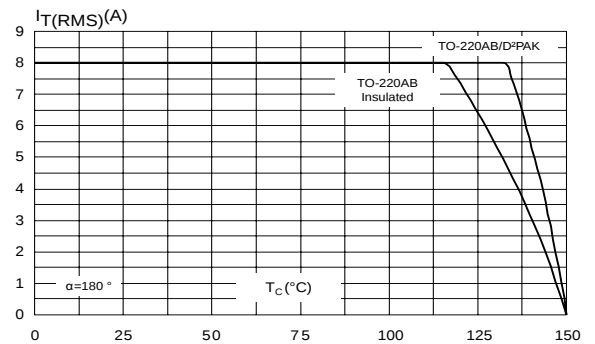
| Symbol        | Parameter                                                             |                              | Value | Unit               |
|---------------|-----------------------------------------------------------------------|------------------------------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case (AC)                                                 | D <sup>2</sup> 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 <sup>2</sup> PAK) | D <sup>2</sup> PAK           | 45    |                    |
|               | Junction to ambient                                                   | TO-220AB, TO-220AB Ins.      | 60    |                    |

## 1.1 Characteristics (curves)

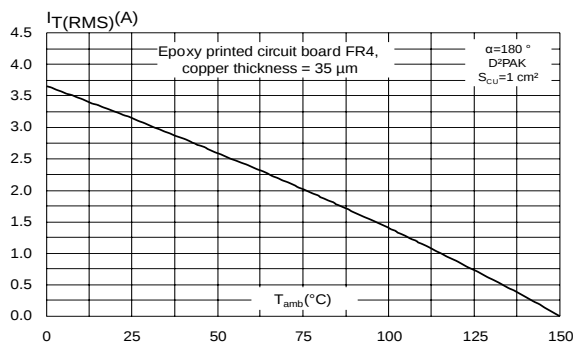
**Figure 1: Maximum power dissipation versus on-state RMS current (full cycle)**



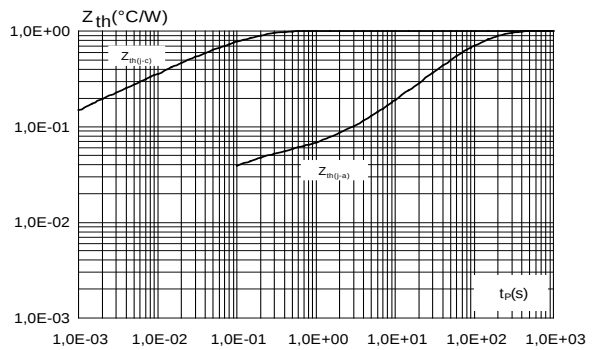
**Figure 2: On-state RMS current versus case temperature (full cycle)**



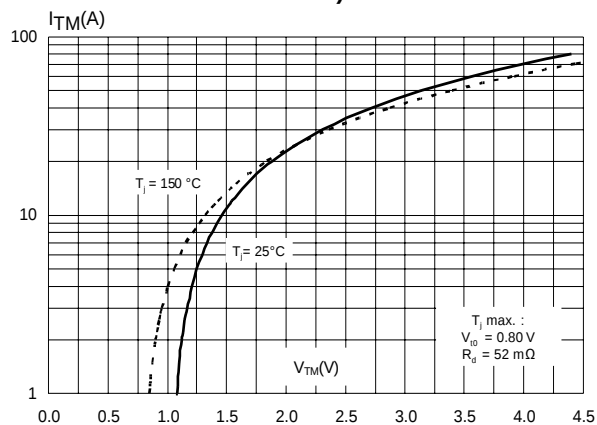
**Figure 3: On-state RMS current versus ambient temperature**



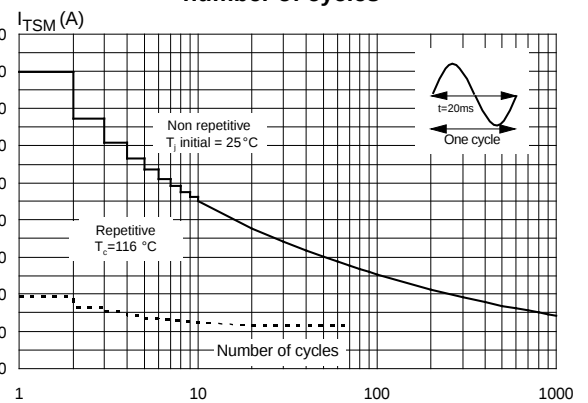
**Figure 4: Variation of thermal impedance versus pulse duration**



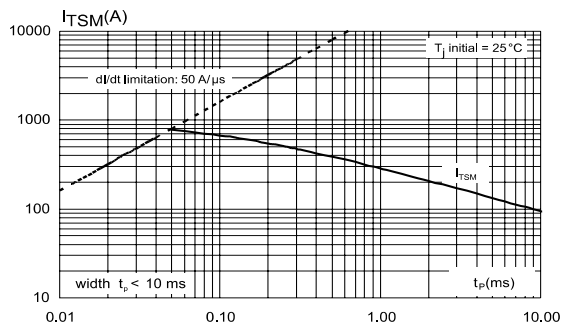
**Figure 5: On-state characteristics (maximum values)**



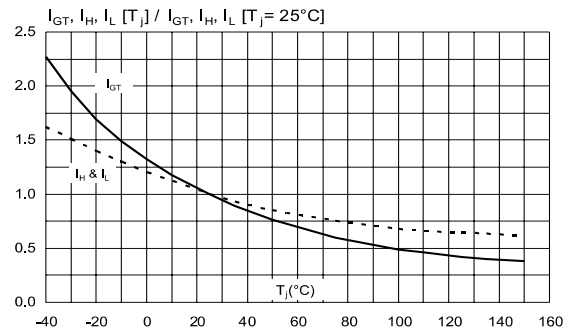
**Figure 6: Surge peak on-state current versus number of cycles**



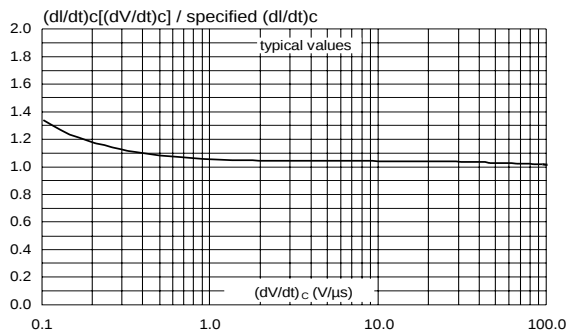
**Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse**



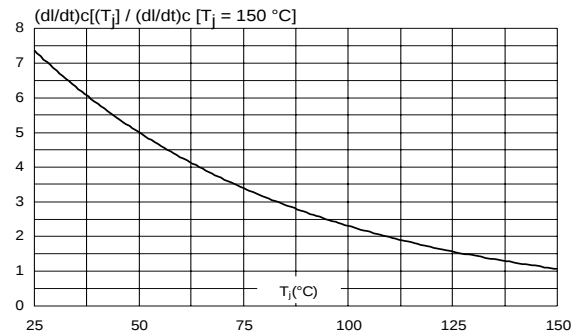
**Figure 8: Relative variation of  $I_{GT}, I_H, I_L$  vs junction temperature (typical values)**



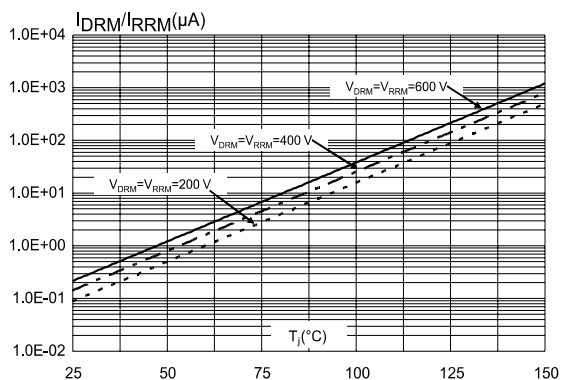
**Figure 9: Relative variation of critical rate of decrease of main current  $(dI/dt)_c$  versus reapplied  $(dV/dt)_c$**



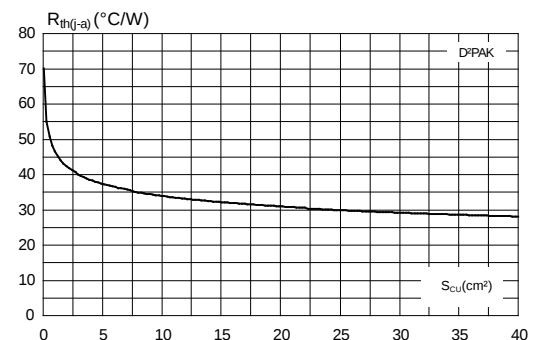
**Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature**



**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](http://www.st.com). ECOPACK® is an ST trademark.

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

### 2.1 D<sup>2</sup>PAK package information

Figure 13: D<sup>2</sup>PAK package outline

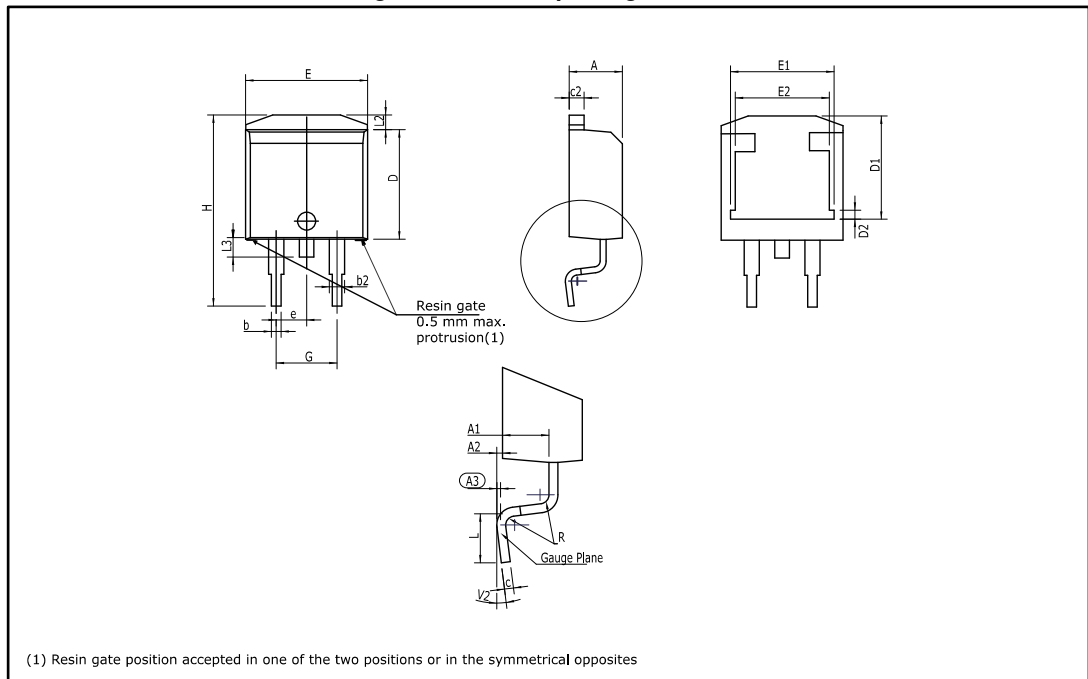
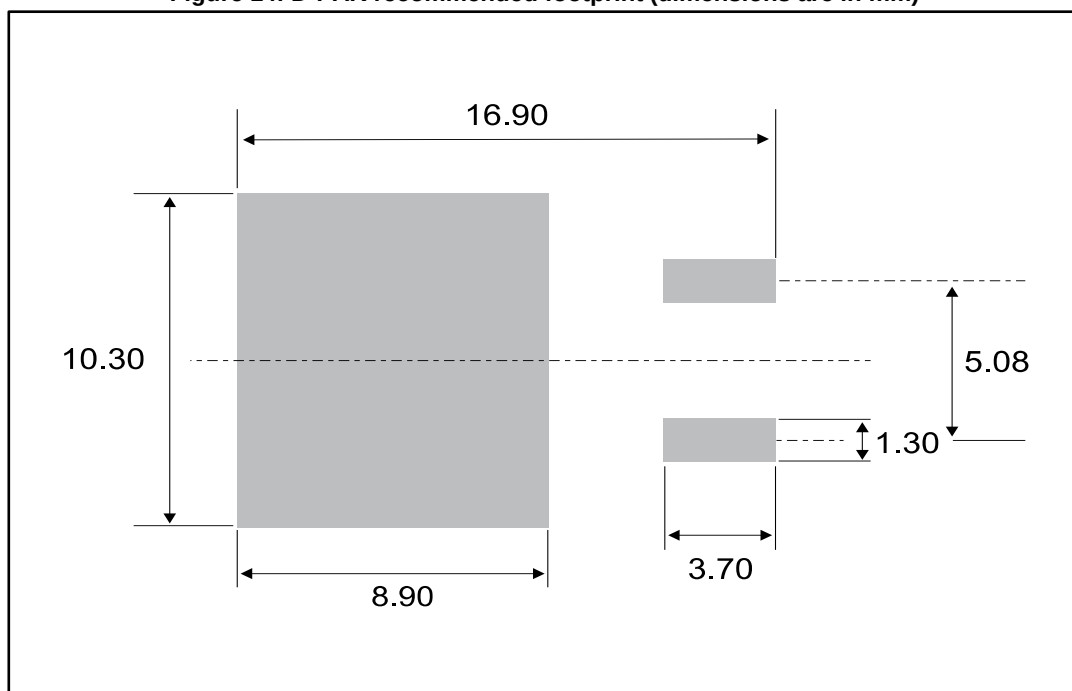


Table 6: D<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |      |       |                       |        |        |
|------|-------------|------|-------|-----------------------|--------|--------|
|      | Millimeters |      |       | Inches <sup>(1)</sup> |        |        |
|      | 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 |
| A3   |             | 0.25 |       |                       | 0.0098 |        |
| b    | 0.70        |      | 0.93  | 0.0276                |        | 0.0366 |
| b2   | 1.25        |      | 1.7   | 0.0492                |        | 0.0669 |
| 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    | 2.54        |      |       | 0.1                   |        |        |
| 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 |
| H    | 15          |      | 15.85 | 0.5906                |        | 0.6240 |
| L    | 1.78        |      | 2.28  | 0.0701                |        | 0.0898 |
| 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:**<sup>(1)</sup>Dimensions in inches are given for reference only

Figure 14: D<sup>2</sup>PAK recommended footprint (dimensions are in mm)

## 2.2 TO-220AB Insulated package information

Figure 15: TO-220AB Insulated package outline

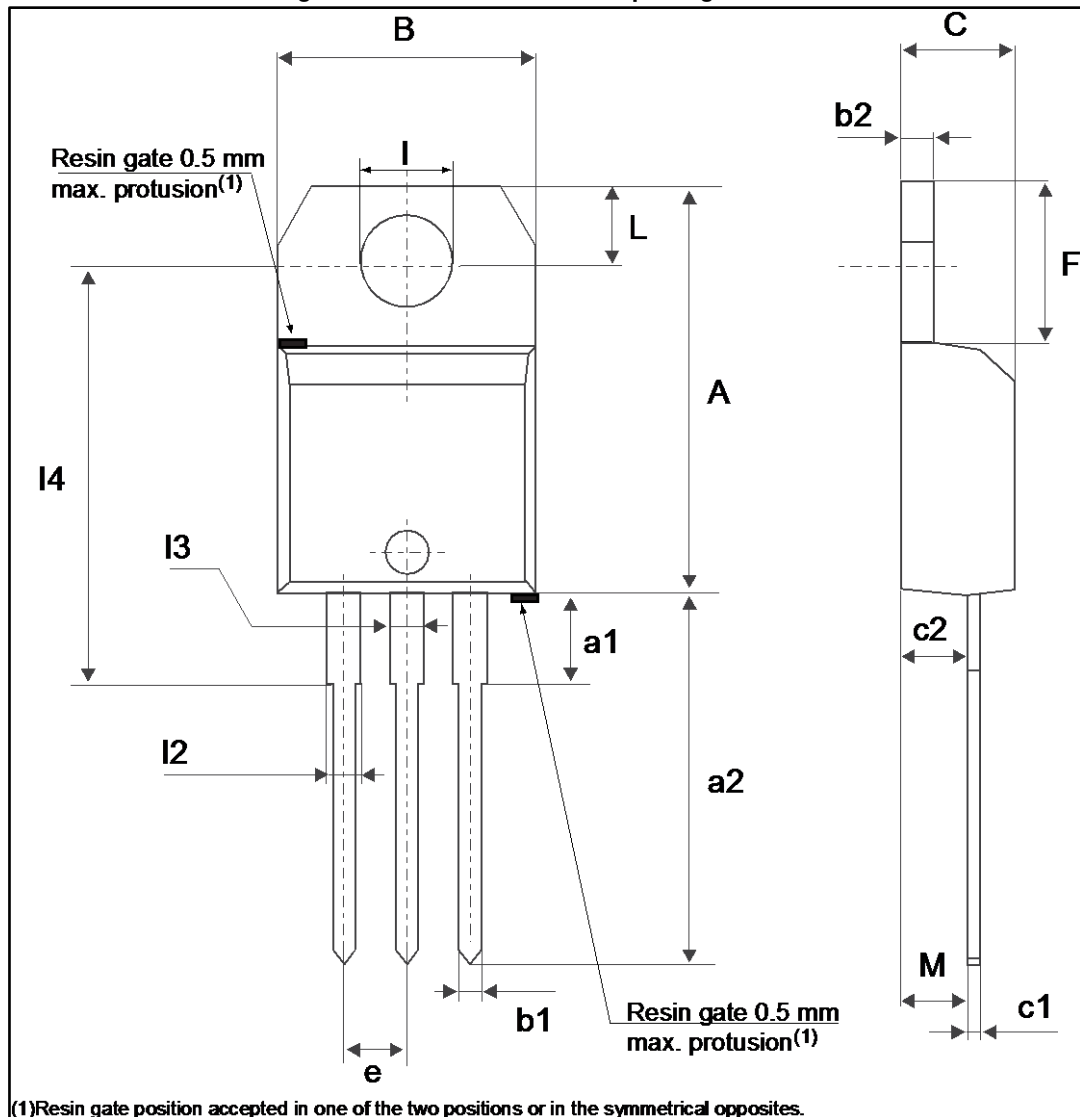


Table 7: TO-220AB Insulated package mechanical data

| Ref. | Dimensions  |       |       |                       |        |        |
|------|-------------|-------|-------|-----------------------|--------|--------|
|      | Millimeters |       |       | Inches <sup>(1)</sup> |        |        |
|      | 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 |
| I2   | 1.14        |       | 1.70  | 0.0449                |        | 0.0669 |
| I3   | 1.14        |       | 1.70  | 0.0449                |        | 0.0669 |
| I4   | 15.80       | 16.40 | 16.80 | 0.6220                | 0.6457 | 0.6614 |
| M    |             | 2.6   |       |                       | 0.1024 |        |

**Notes:**<sup>(1)</sup>Inch dimensions are for reference only.

### 3 Ordering information

Figure 16: Ordering information scheme

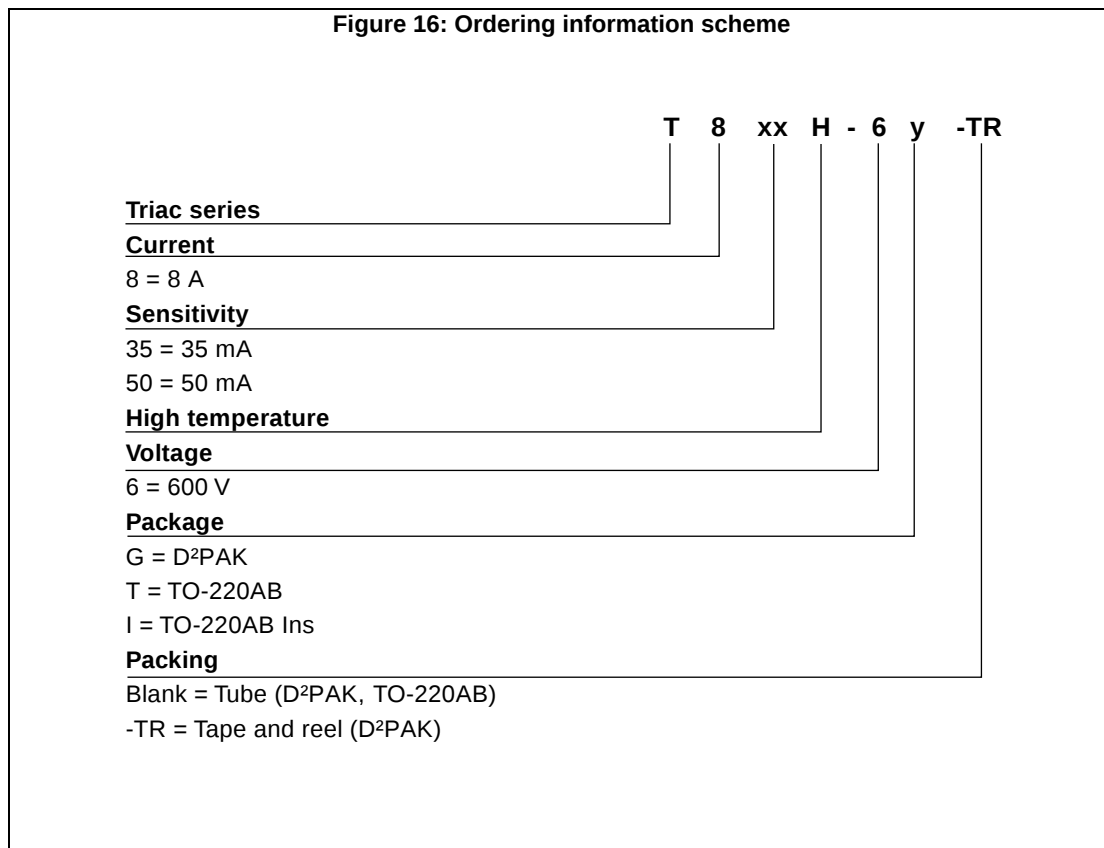


Table 8: Ordering information

| Order code  | Marking  | Package            | Weight | Base qty. | Delivery mode |
|-------------|----------|--------------------|--------|-----------|---------------|
| T8xxH-6G    | T8xxH 6G | D <sup>2</sup> PAK | 1.5 g  | 50        | Tube          |
| T8xxH-6G-TR | T8xxH 6G | D <sup>2</sup> 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</i> , <i>Description</i> , <i>Figure 2</i> , <i>Table 2</i> and <i>4</i> .                                                                                                                                 |
| 30-Mar-2017 | 3        | Minor text changes.<br>Updated <i>Table 4</i> : "Static characteristics" and<br><i>Figure 7</i> : "Non-repetitive surge peak on-state current for a sinusoidal pulse".                                                          |
| 07-Feb-2018 | 4        | Updated <i>Table 2</i> : "Absolute ratings (limiting values)",<br><i>Figure 2</i> : "On-state RMS current versus case temperature (full cycle)" and<br><i>Figure 6</i> : "Surge peak on-state current versus number of cycles". |

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