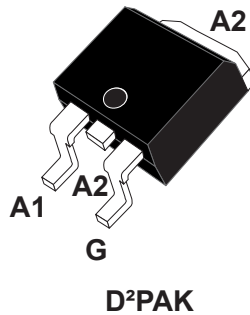
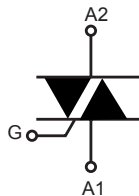


16 A - 800 V - D<sup>2</sup>PAK Snubberless™ Triac


A2: Anode2  
A1: Anode1  
G: Gate



## Features

- High static dV/dt
- High dynamic turn-off commutation (di/dt)<sub>c</sub>
- 150 °C maximum junction temperature
- Three quadrants
- Surge capability  $V_{DSM}, V_{RSM} = 900\text{ V}$
- Benefits:
  - High immunity to false turn-on thanks to high static dV/dt
  - Improved turn-off in high temperature environments thanks higher (di/dt)<sub>c</sub>
  - Increase of thermal margin due to extended working  $T_j$  up to 150 °C
  - Good thermal resistance due to non-insulated tab.

## Applications

- General purpose AC line load switching
- Motor control circuits
- Home appliances
- Heating
- Lighting
- Inrush current limiting circuits
- Overvoltage crowbar protection

## Description

Available in SMD, the T1635T-8G Triac can be used for the on/off or phase angle control function in general purpose AC switching where high commutation capability is required. The T1635T-8G can be used without a snubber RC circuit when the limits defined are respected.

D<sup>2</sup>PAK package is UL-94,V0 flammability resin compliance.

Package environmentally friendly Ecopack<sup>®</sup>2 graded (RoHS and Halogen Free compliance).

Snubberless™ is a trademark of STMicroelectronics.

## Product status link

[T1635T-8G](#)

## Product summary

|                   |       |
|-------------------|-------|
| $I_{T(RMS)}$      | 16 A  |
| $V_{DRM}/V_{RRM}$ | 800 V |
| $V_{DSM}/V_{RSM}$ | 900 V |
| $I_{GT}$          | 35 mA |

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values)**

| Symbol            | Parameter  | Value   | Unit                         |
|-------------------|--|---|------------------------------|
| $I_{T(RMS)}$      | RMS on-state current (full sine wave)  | $T_c = 125.9\text{ }^\circ\text{C}$                               | 16 A                         |
| $I_{TSM}$         | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ }^\circ\text{C}$ ) | $t_p = 20\text{ ms}$  | 120 A                        |
|                   |  | $t_p = 16.7\text{ ms}$  | 126 A                        |
| $I^2t$            | $I^2t$ value for fusing  | $t_p = 10\text{ ms}$  | 95 A <sup>2</sup> s          |
| $di/dt$           | Critical rate of rise of on-state current, $I_G = 2 \times I_{GT}$ , $tr \leq 100\text{ ns}$         | $T_j$ initial = $150\text{ }^\circ\text{C}$ , $f = 100\text{ Hz}$ | 100 A/ $\mu$ s               |
| $V_{DRM}/V_{RRM}$ | Repetitive peak off-state voltage (50-60 Hz)   | $T_j = 125\text{ }^\circ\text{C}$                                 | 800 V                        |
|                   |  | $T_j = 150\text{ }^\circ\text{C}$                                 | 600 V                        |
| $V_{DSM}/V_{RSM}$ | Non Repetitive peak off-state voltage  | $t_p = 10\text{ ms}$ , $T_j = 25\text{ }^\circ\text{C}$           | 900 V                        |
| $I_{GM}$          | Peak gate current  | $t_p = 20\text{ }\mu\text{s}$ , $T_j = 150\text{ }^\circ\text{C}$ | 4 A                          |
| $V_{GM}$          | Peak Gate Voltage  |   | 5 V                          |
| $P_{G(AV)}$       | 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 2. Electrical characteristics ( $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified)**

| Symbol            | Test conditions   | Quadrants; $T_j$                  | Value     | Unit       |
|-------------------|---|-----------------------------------|-----------|------------|
| $I_{GT}^{(1)}$    | $V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$  | I - II - III                      | Max. 35   | mA         |
| $V_{GT}$          | $V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$  | I - II - III                      | Max. 1.3  | V          |
| $V_{GD}$          | $V_D = 600\text{ V}$ , $R_L = 3.3\text{ k}\Omega$ , $T_j = 150\text{ }^\circ\text{C}$ | I - II - III                      | Max. 0.2  | V          |
| $I_L$             | $I_G = 1.2 \times I_{GT}$   | I - III                           | Max. 55   | mA         |
|                   |   | II                                | Max. 65   | mA         |
| $I_H^{(2)}$       | $I_T = 500\text{ mA}$ , gate open   |                                   | Max. 45   | mA         |
| $dV/dt^{(2)}$     | $V_D = 536\text{ V}$ , gate open  | $T_j = 125\text{ }^\circ\text{C}$ | Min. 2000 | V/ $\mu$ s |
|                   | $V_D = 402\text{ V}$ , gate open  | $T_j = 150\text{ }^\circ\text{C}$ | Min. 1000 | V/ $\mu$ s |
| $(di/dt)_c^{(2)}$ | Without snubber   | $T_j = 125\text{ }^\circ\text{C}$ | Min. 16   | A/ms       |
|                   |   | $T_j = 150\text{ }^\circ\text{C}$ | Min. 12   | A/ms       |

1. Minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT\text{ max}}$

2. For both polarities of A2 referenced to A1.

**Table 3. Static characteristics**

| Symbol            | Test conditions   | $T_j$  |      | Value | Unit          |
|-------------------|---|--------|------|-------|---------------|
| $V_{TM}^{(1)}$    | $I_{TM} = 22.6 \text{ A}$ , $t_p = 380 \text{ }\mu\text{s}$ | 25 °C  | Max. | 1.6   | V             |
| $V_{TO}^{(1)}$    | Threshold on-state voltage                                  | 150 °C | Max. | 0.85  | V             |
| $R_D^{(1)}$       | Dynamic resistance  | 150 °C | Max. | 34    | m $\Omega$    |
| $I_{DRM}/I_{RRM}$ | $V_{DRM} = V_{RRM} = 800 \text{ V}$                         | 25 °C  | Max. | 5     | $\mu\text{A}$ |
|                   |   | 125 °C |      | 1.0   | mA            |
|                   | $V_{DRM} = V_{RRM} = 600 \text{ V}$                         | 150 °C | Max. | 3.6   | mA            |

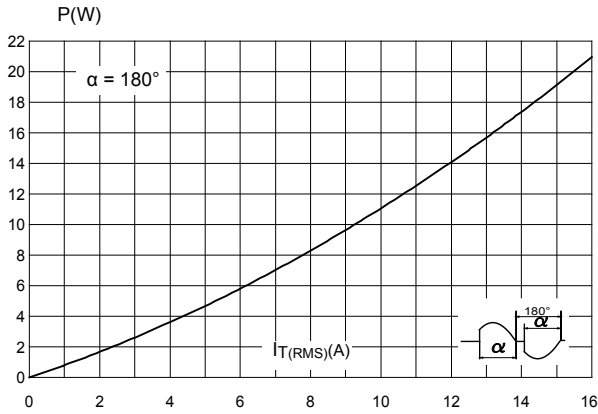
1. For both polarities of A2 referenced to A1.

**Table 4. Thermal resistance**

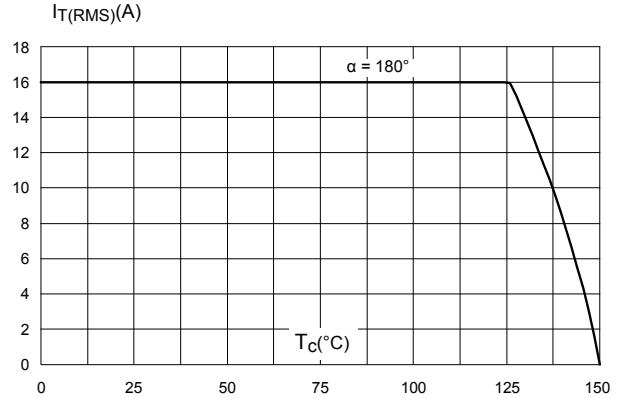
| Symbol        | Parameter             |                    | Value | Unit      |
|---------------|-----------------------|--------------------|-------|-----------|
| $R_{th(j-c)}$ | Junction to case (AC) | D <sup>2</sup> PAK | Max.  | 1.15 °C/W |

## 1.2 Characteristics curves

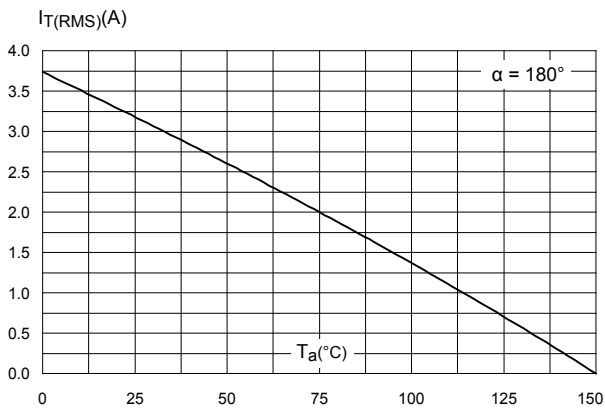
**Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)**



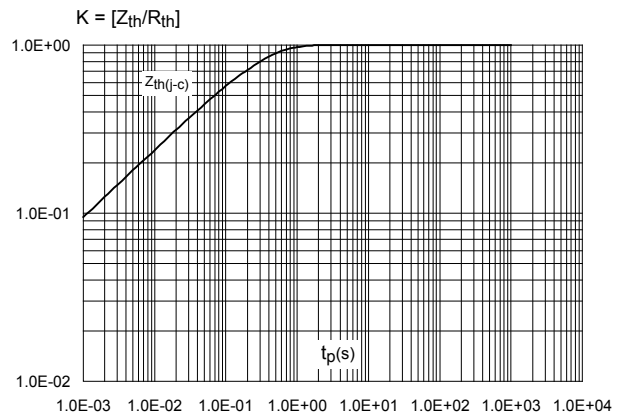
**Figure 2. On-state RMS current cycle versus case temperature (full cycle)**



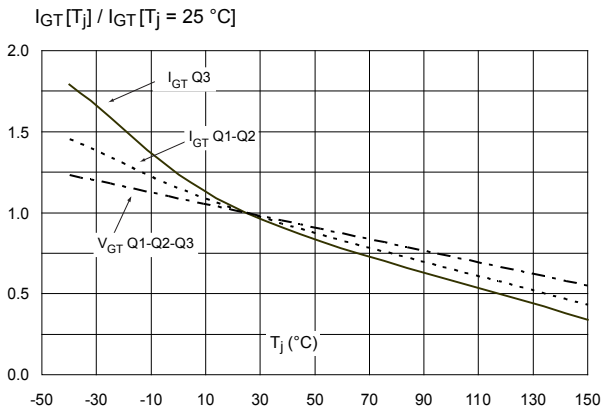
**Figure 3. On-state RMS current versus ambient temperature (free air convection)**



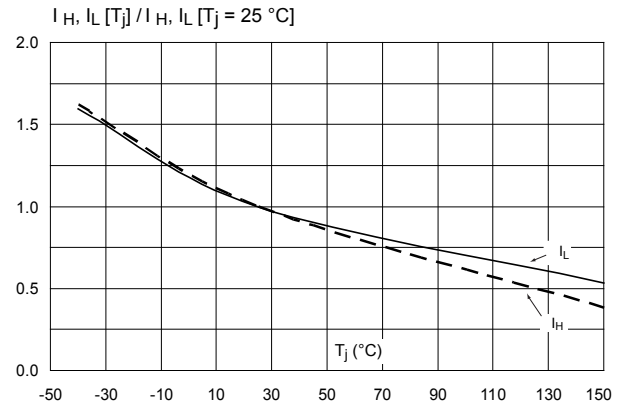
**Figure 4. Relative variation of thermal impedance versus pulse duration**



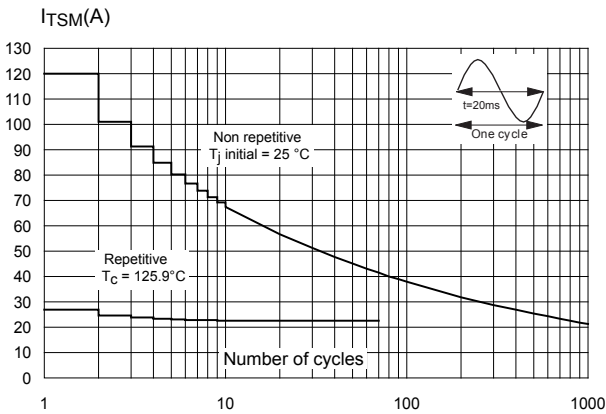
**Figure 5. Relative variation of gate trigger voltage and current versus junction temperature (typical values)**



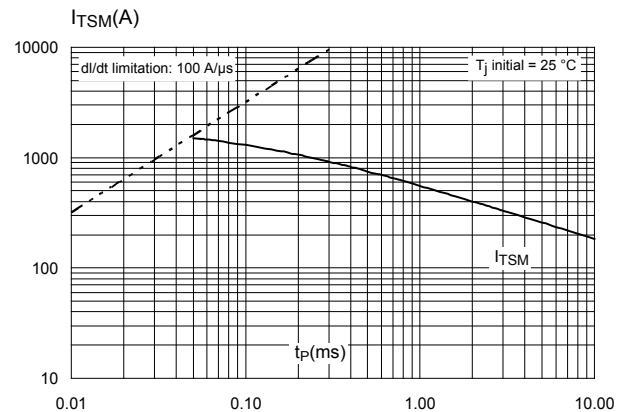
**Figure 6. Relative variation of holding current and latching current versus junction temperature (typical values)**



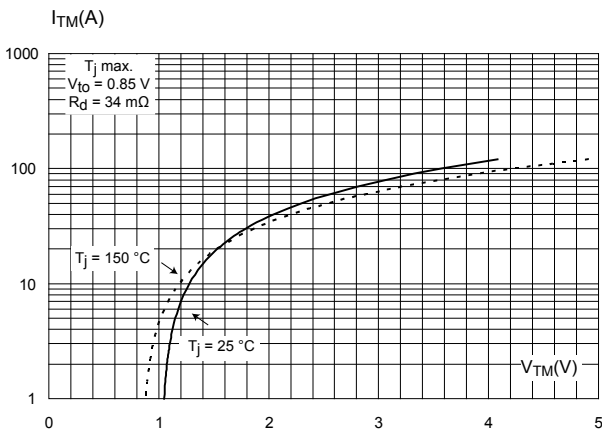
**Figure 7. Surge peak on-state current versus number of cycles**



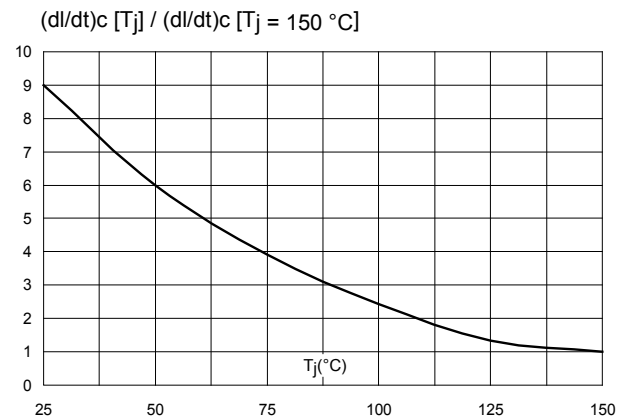
**Figure 8. Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ ms}$**



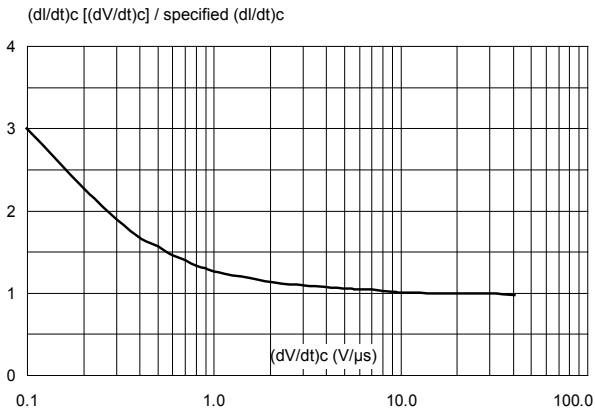
**Figure 9. On-state characteristics (maximum values)**



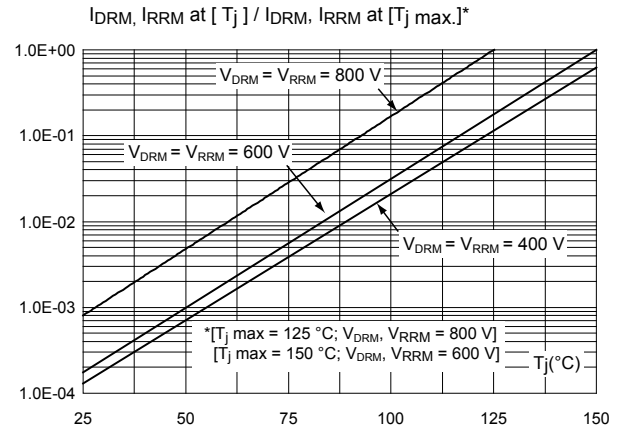
**Figure 10. Relative variation of critical rate of decrease of main current versus junction temperature (typical values)**



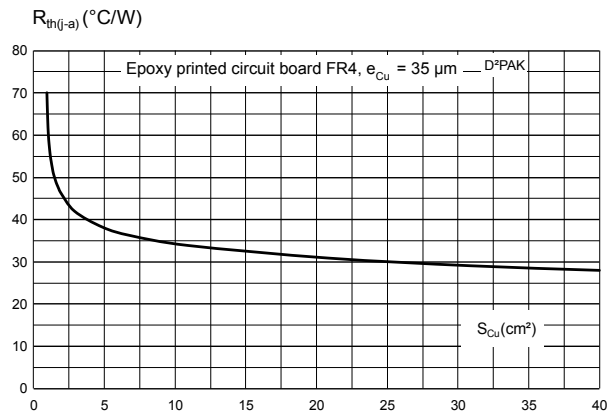
**Figure 11. Relative variation of critical rate of decrease of main current versus reapplied (dV/dt)<sub>c</sub> (typical values)**



**Figure 12. Relative variation of leakage current versus junction temperature for different values of blocking voltage (typical values)**



**Figure 13. 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<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

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

- ECOPACK<sup>®</sup>2 compliant
- Lead-free package leads finishing
- Molding compound resin is halogen-free and meets UL94 standard level V0

Figure 14. D<sup>2</sup>PAK package outline

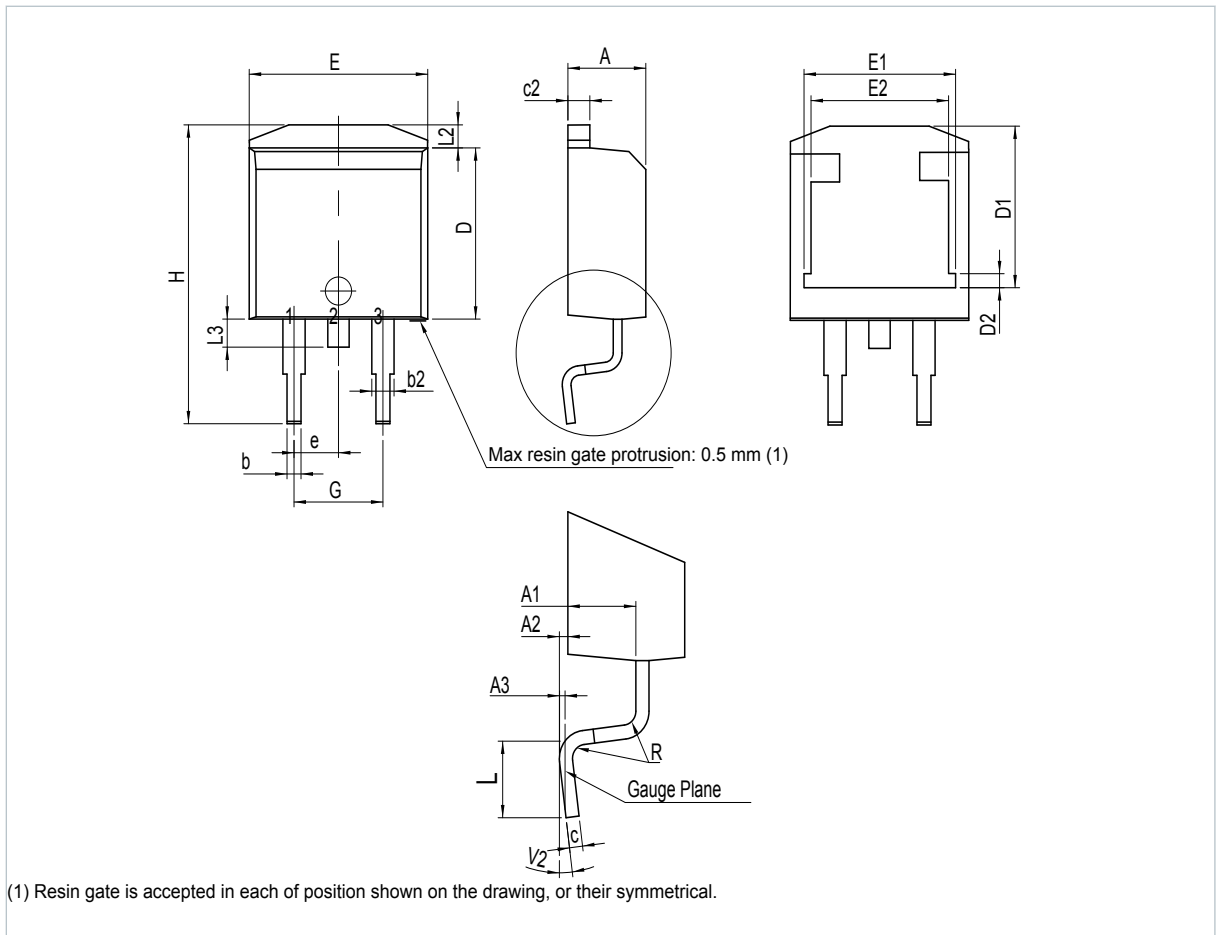


Table 5. D<sup>2</sup>PAK package mechanical data

| 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 <sup>(2)</sup> | 0°          |      | 8°    | 0°                    |        | 8°     |

1. Dimensions in inches are given for reference only

2. Degree



Figure 15. D<sup>2</sup>PAK recommended footprint (dimensions are in mm)

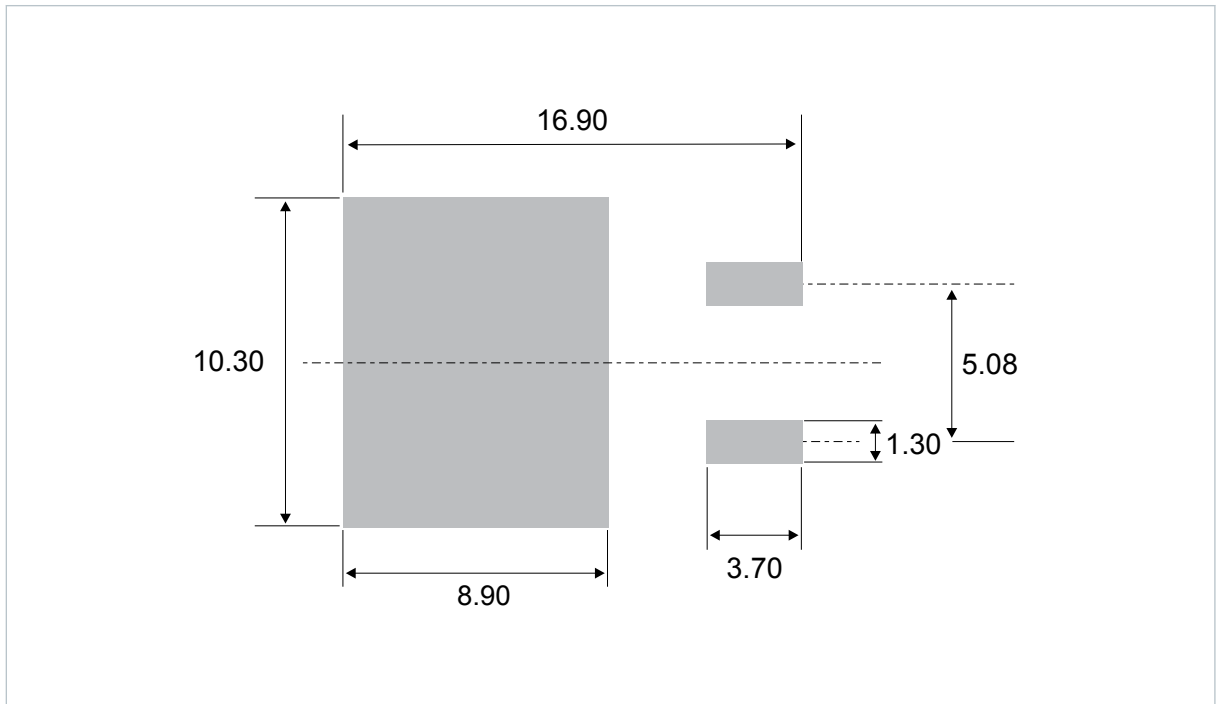
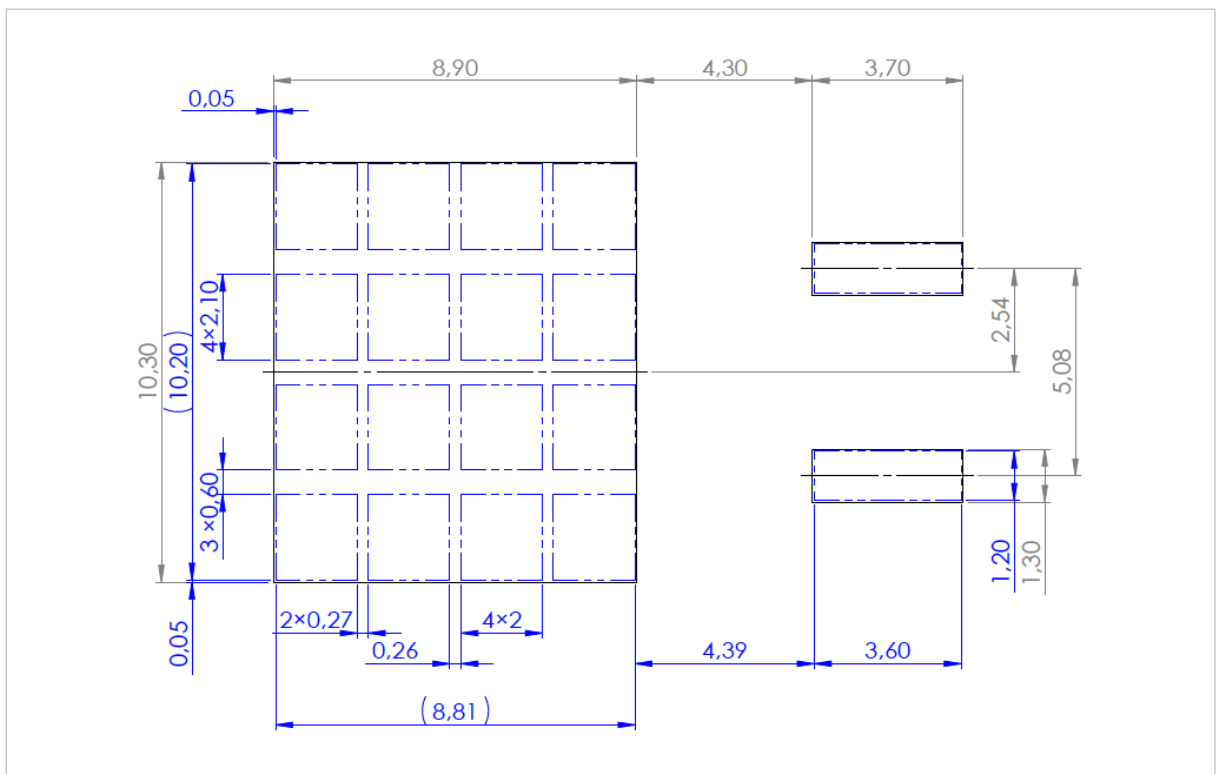


Figure 16. D<sup>2</sup>PAK stencil definitions (dimensions are in mm)



### 3 Ordering information

Figure 17. Ordering information scheme

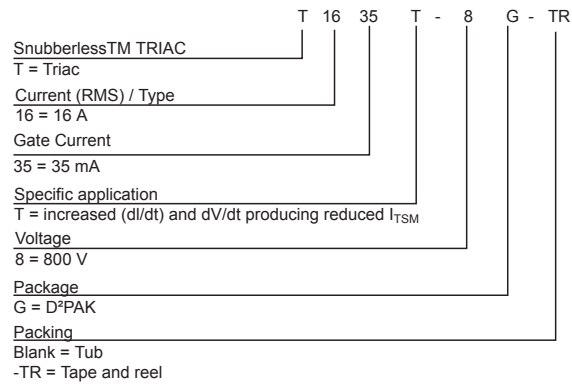


Table 6. Ordering information

| Order code   | Marking   | Package            | Weight | Base qty. | Delivery mode |
|--------------|-----------|--------------------|--------|-----------|---------------|
| T1635T-8G-TR | T1635T-8G | D <sup>2</sup> PAK | 1.6 g  | 1000      | Tape and reel |
| T1635T-8G    |           |                    |        | 50        | Tube          |

## Revision history

**Table 7. Document revision history**

| Date        | Version | Changes          |
|-------------|---------|------------------|
| 12-Sep-2018 | 1       | Initial release. |