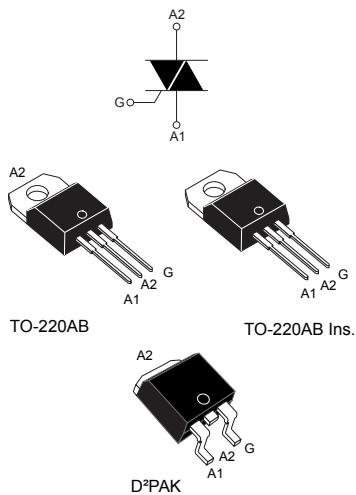


25 A, 1200 V Snubberless Triacs



Features

- On-state RMS current: 25 A
- Blocking voltage: 1200 V
- High static community and dynamic commutation
- $I_{GT} = 50 \text{ mA}$
- High endurance reliability
- Compact high voltage device
- UL recognized component : UL1557 standard, reference file E81734

Applications

- Motor control circuits
- Heating control circuits

Description

The T2550-12x is a 25 A 1200 V Snubberless Triac available in three packages: D²PAK, TO-220AB and TO-220AB insulated.

Its 1200 V blocking voltage enables use in 3-phase industrial application. Its noise immunity and dynamic commutation makes it suitable for either inductive, capacitive or resistive load control.

Product status link

T2550-12G, T2550-12T, T2550-12I

Product summary

| | |
|-------------------|--------|
| $I_{T(RMS)}$ | 25 A |
| V_{DRM}/V_{RRM} | 1200 V |
| I_{GT} | 50 mA |

1 Characteristics

Table 1. Absolute maximum ratings (limiting values, $T_j = 25\text{ °C}$, unless otherwise stated)

| Symbol | Parameters | | Value | Unit | |
|-------------------|---|------------------------------|-----------------------|-------------|------------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | D ² PAK, TO-220AB | $T_c = 100\text{ °C}$ | 25 | A |
| | | TO-220AB Ins. | $T_c = 71\text{ °C}$ | | |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C) | $t_p = 20\text{ ms}$ | | 240 | A |
| | | $t_p = 16.7\text{ ms}$ | | 252 | |
| I^2t | I^2t value for fusing | $t_p = 10\text{ ms}$ | | 380 | A ² s |
| di/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$ | $f = 60\text{ Hz}$ | $T_j = 125\text{ °C}$ | 100 | A/ μ s |
| V_{DRM}/V_{RRM} | Repetitive peak off-state voltage | | | 1200 | V |
| V_{DSM}/V_{RSM} | Non repetitive surge peak off-state voltage | $t_p = 10\text{ ms}$ | | 1300 | V |
| I_{GM} | Peak gate current | $t_p = 20\text{ }\mu$ s | | 4 | A |
| V_{GM} | Peak positive gate voltage | $t_p = 20\text{ }\mu$ s | | 16 | V |
| $P_{G(AV)}$ | Average gate power dissipation | | | 1 | W |
| T_{stg} | Storage junction temperature range | | | -40 to +150 | °C |
| T_j | Operating junction temperature range | | | -40 to +125 | °C |
| $V_{ins.}$ | Insulation RMS voltage, 1 minute | TO-220AB Ins. | | 2500 | V |

Table 2. Electrical characteristics ($T_j = 25\text{ °C}$, unless otherwise specified) - Snubberless™ (3 quadrants)

| Symbol | Parameters | Quadrant | | Value | Unit |
|-------------------|---|--------------|------|-------|------------|
| I_{GT} | $V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$ | I - II - III | Min. | 2.5 | mA |
| | | | Max. | 50 | |
| V_{GT} | | I - II - III | Max. | 1.3 | V |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3,3\text{ k}\Omega$, $T_j = 125\text{ °C}$ | I - II - III | Min. | 0.2 | V |
| $I_H^{(1)}$ | $I_T = 500\text{ mA}$, gate open | | Max. | 60 | mA |
| I_L | $I_G = 1.2 I_{GT}$ | I - II - III | Max. | 80 | mA |
| $dV/dt^{(1)}$ | $V_D = 67\%$ V_{DRM} gate open, $T_j = 125\text{ °C}$ | | Min. | 2500 | V/ μ s |
| $(di/dt)_c^{(1)}$ | Without snubber, $T_j = 125\text{ °C}$ | | Min. | 20 | A/ms |
| t_{gt} | $I_{TM} = 13\text{ A}$, $V_D = 400\text{ V}$, $I_G = 100\text{ mA}$, $di_G/dt = 100\text{ mA}/\mu$ s, $R_L = 30\text{ }\Omega$ | I - II - III | Typ. | 2 | μ s |

1. For both polarities of A2 referenced to A1

Table 3. Static electrical characteristics

| Symbol | Test conditions | T _j | | Value | Unit |
|--------------------------------------|---|----------------|------|-------|------|
| V _{TM} ⁽¹⁾ | I _{TM} = 35 A, t _p = 380 μs | 25 °C | Max. | 1.55 | V |
| V _{TO} ⁽¹⁾ | threshold on-state voltage | 125 °C | Max. | 0.85 | V |
| R _D ⁽¹⁾ | Dynamic resistance | 125 °C | Max. | 20 | mΩ |
| I _{DRM} I _{RRM} | V _D = V _R = 1200 V | 25 °C | Max. | 10 | μA |
| | | 125 °C | | 6 | mA |

1. For both polarities of A2 referenced to A1

Table 4. Thermal resistance

| Symbol | Parameters | | | Value | Unit |
|----------------------|---|-------------------------------|------|-------|------|
| R _{th(j-c)} | Junction to case (AC) | TO-220AB / D ² PAK | Max. | 0.8 | °C/W |
| | | TO-220AB insulated | | 1.7 | |
| R _{th(j-a)} | Junction to ambient (S = 2 cm ²) ⁽¹⁾ | D ² PAK | Typ. | 45 | |
| | Junction to ambient | TO-220AB / TO-220AB ins | | 60 | |

1. Copper surface under tab.

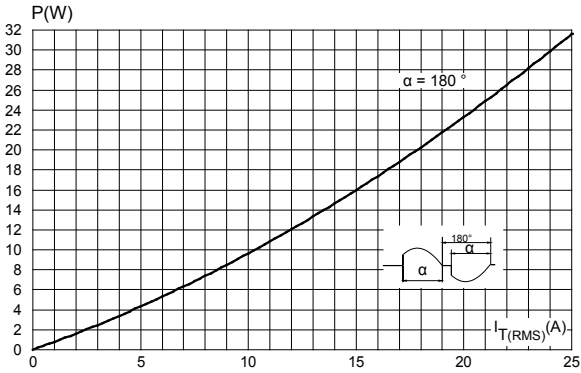
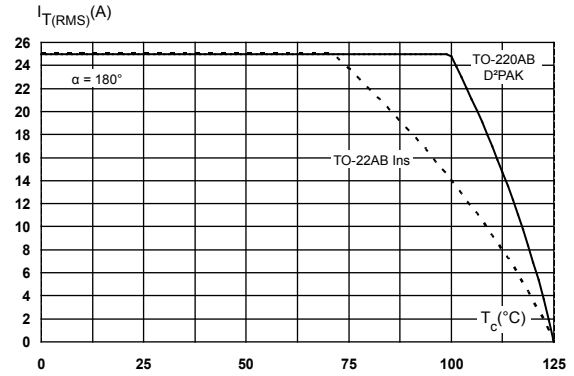
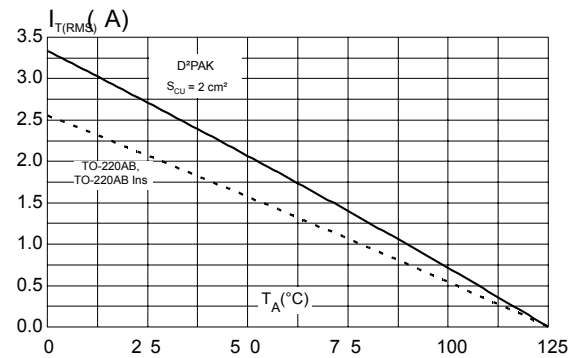
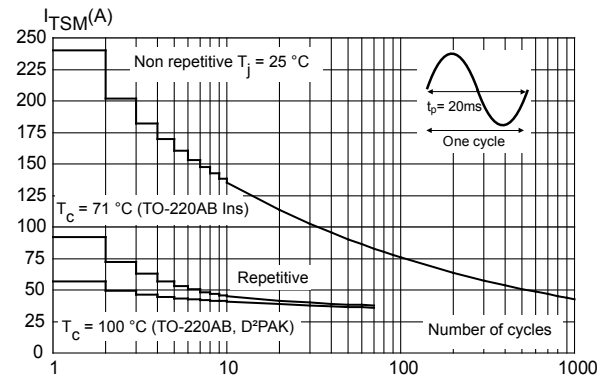
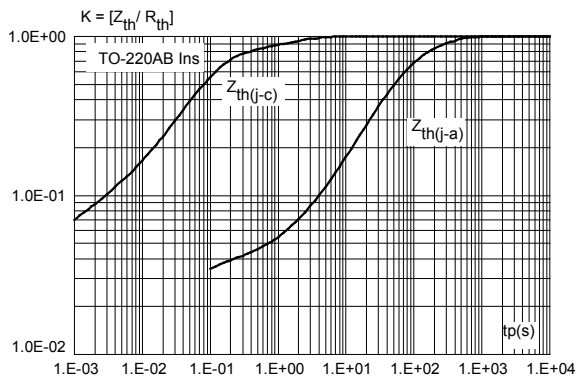
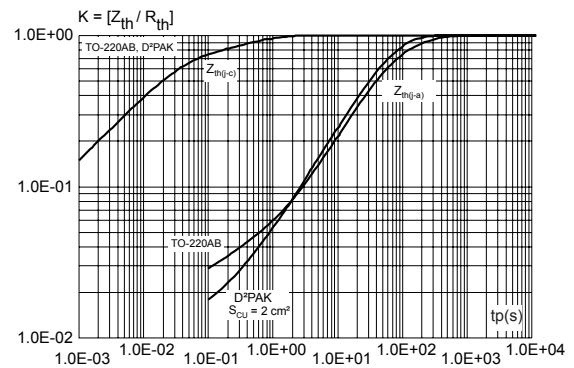
1.1 Characteristics (curves)
Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)

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

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

Figure 4. Surge peak on-state current versus number of cycles

Figure 5. Relative variation of thermal impedance versus pulse duration (T2550-12I)

Figure 6. Relative variation of thermal impedance versus pulse duration


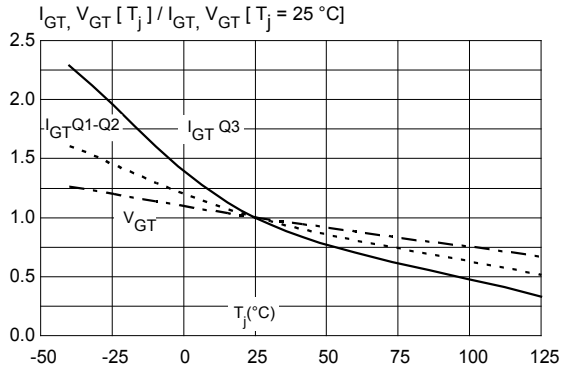
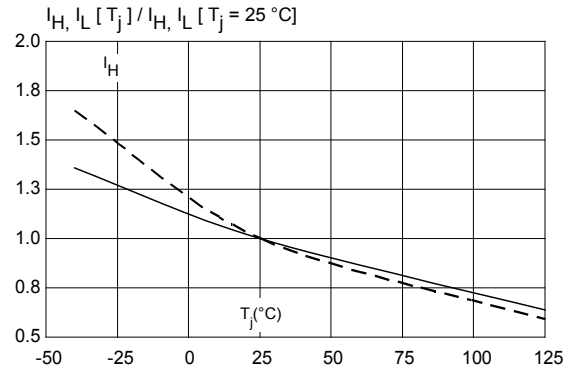
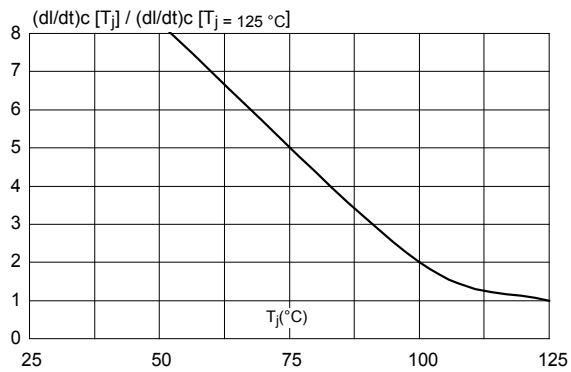
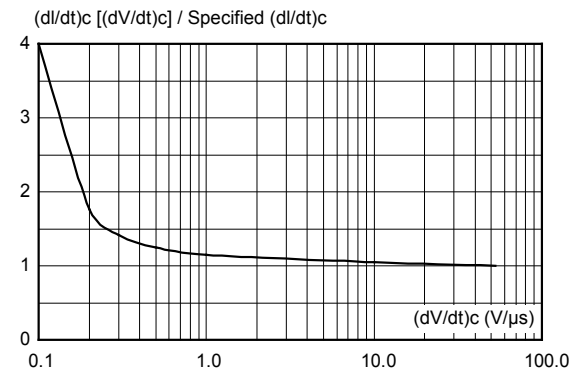
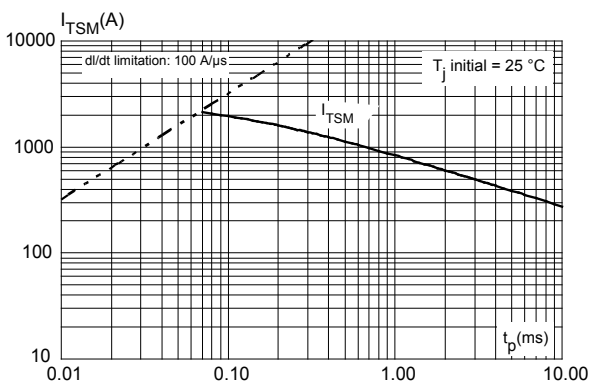
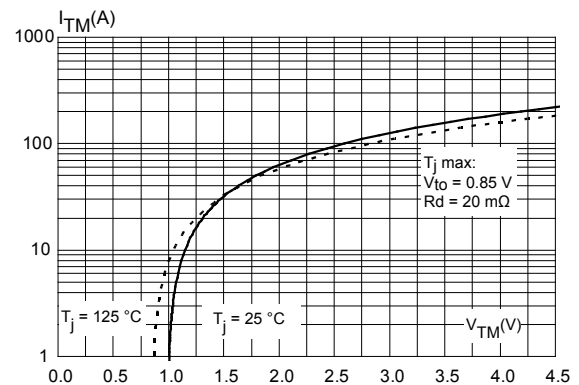
Figure 7. Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

Figure 8. Relative variation of holding current and latching current versus junction temperature (typical values)

Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature (typical values)

Figure 10. Relative variation of critical rate of decrease of main current versus reapplied dV/dt

Figure 11. Non repetitive surge peak on-state current versus sinusoidal pulse width (t_p < 10 ms)

Figure 12. On-state characteristics (maximum values)


Figure 13. Relative variation of leakage current versus junction temperature for different values of blocking voltage (typical values)

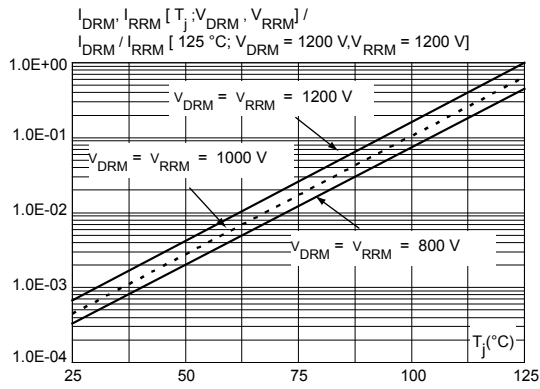
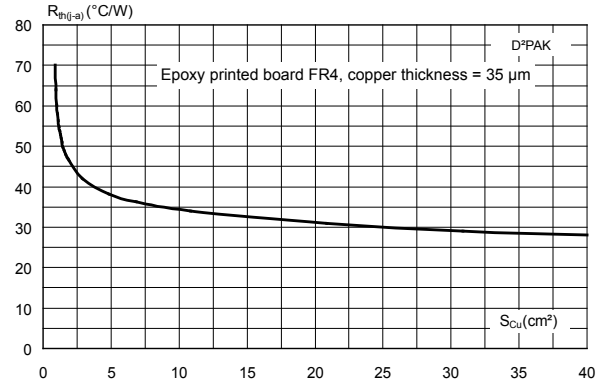


Figure 14. D²PAK thermal resistance junction to ambient versus copper surface under tab



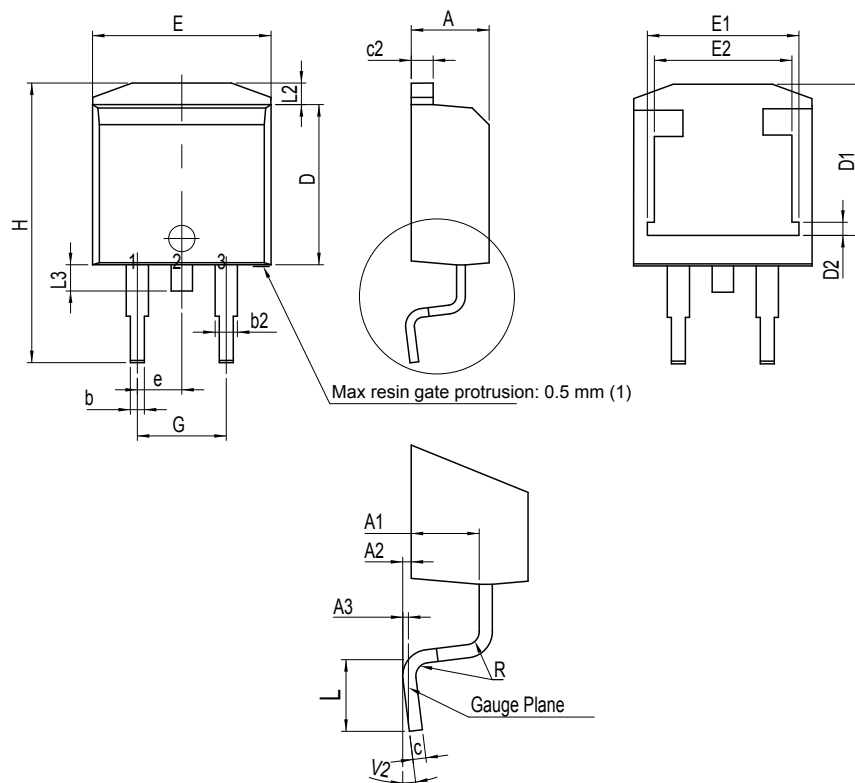
2 Package information

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.

2.1 D²PAK package information

- Molding epoxy meets UL94 level V0
- lead-free plating of package leads

Figure 15. D²PAK package outline



(1) Resin gate is accepted in each of position shown on the drawing, or their symmetrical.

Table 5. 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 |
| 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 | 1.19 | | 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° |

1. Dimensions in inches are given for reference only

Figure 16. D²PAK recommended footprint (dimensions are in mm)

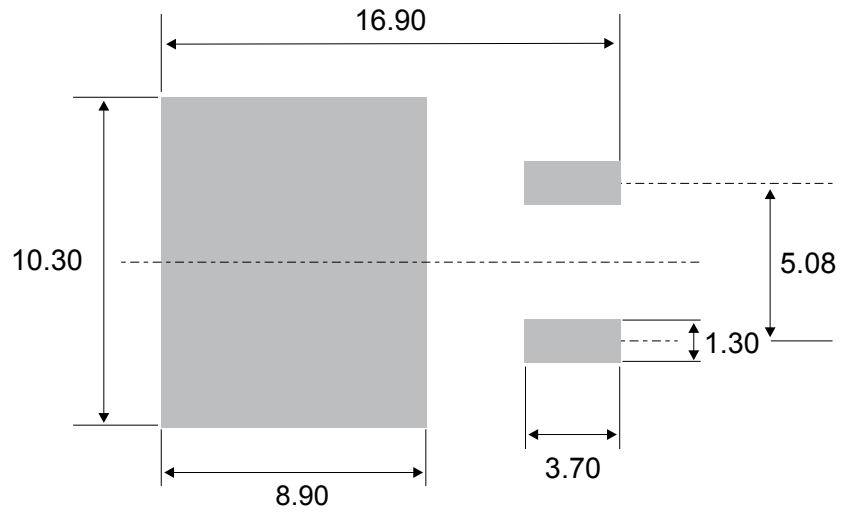
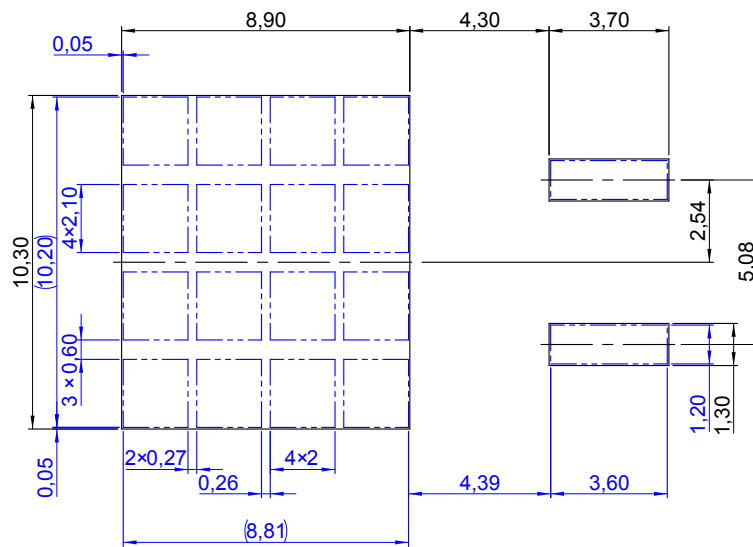


Figure 17. D²PAK footprint and stencil dimensions' definitions (dimensions in mm)

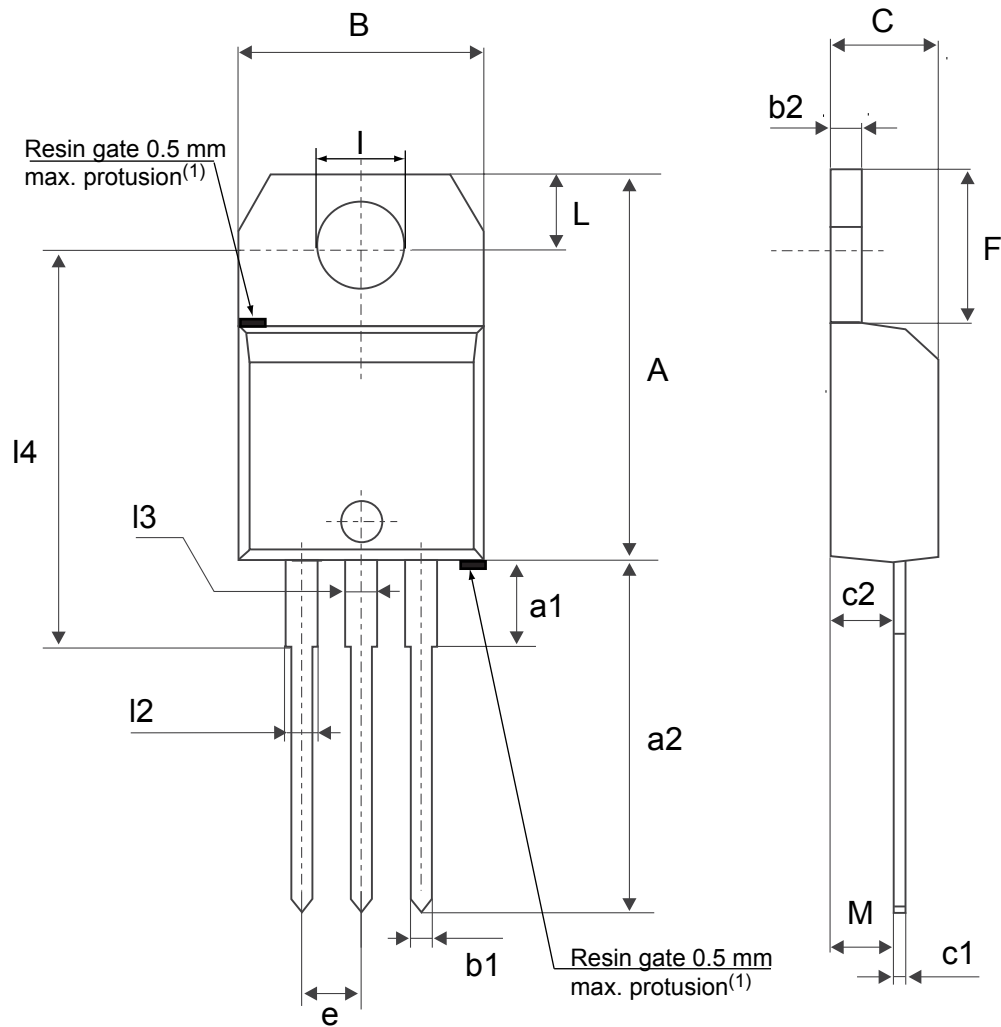


Note: Blue = Stencil, Black = Footprint

2.2 TO-220AB non ins. and insulated package information

- Molding compound resin is halogen-free and meets flammability standard UL94 level 0
- Lead-free package leads finishing
- Recommended torque: 0.4 to 0.6 N.m

Figure 18. TO-220AB non ins. and insulated package outline



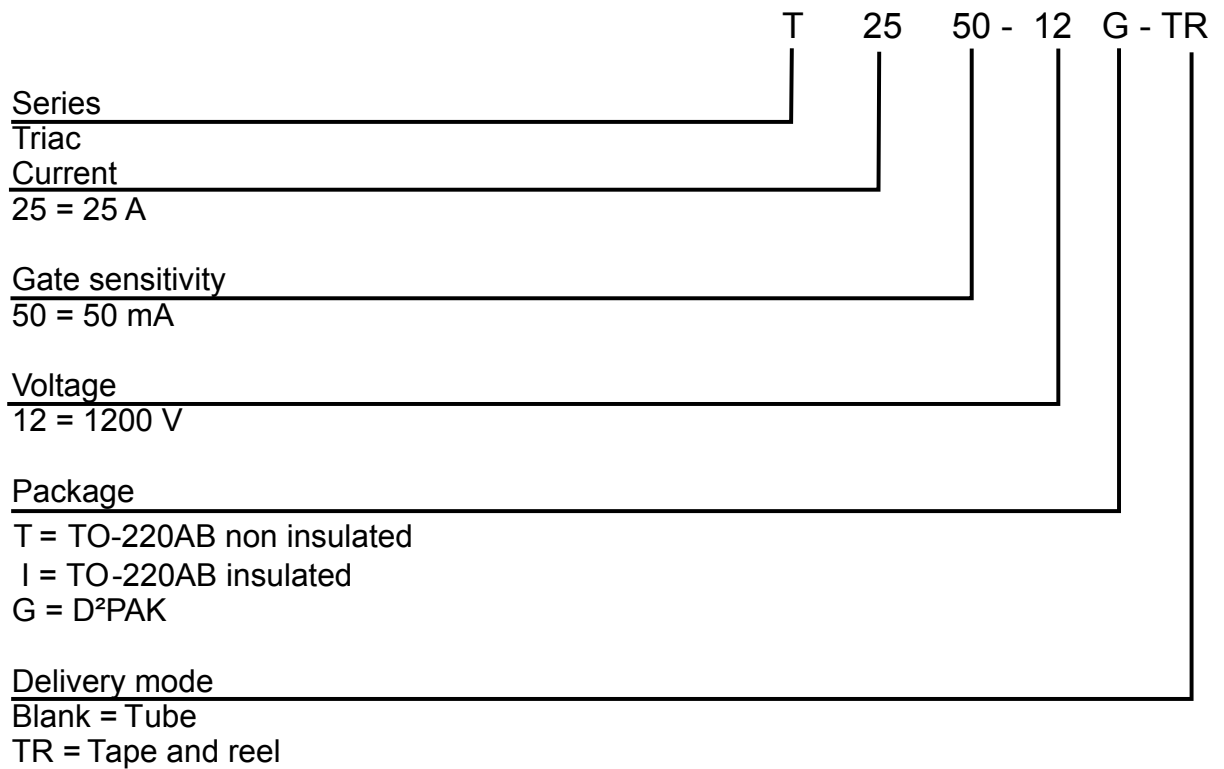
(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites.

Table 6. TO-220AB non ins. and insulated 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 |
| 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 | |

1. Inch dimensions are for reference only.

3 Ordering information

Figure 19. Ordering information scheme

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|--------------|-----------|--------------------|--------|-----------|-------------------|
| T2550-12G | T2550-12G | D ² PAK | 1.50 g | 50 | Tube |
| T2550-12G-TR | | | | 1000 | Tape and reel 13" |
| T2550-12T | T2550-12T | TO-220AB | 2.3 g | 50 | Tube |
| T2550-12I | T2550-12I | TO-220AB Ins. | 2.3 g | 50 | Tube |

Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 9-Jan-2014 | 1 | Initial release. |
| 30-Jan-2014 | 2 | Updated table 4. |
| 10-Dec-2015 | 3 | Inserted TO-220AB insulated package information and reformatted to current standard. |
| 17-May-2019 | 4 | Updated Table 1, Table 4 and Figure 15. Added Figure 18. Minor text changed. |
| 23-Sep-2020 | 5 | Updated Section Features and Table 5 . D ² PAK package mechanical data. |