

### Features

- On-state rms current,  $I_{T(RMS)}$  25 A
- Repetitive peak off-state voltage,  $V_{DRM}/V_{RRM}$  600 to 1200 V
- Triggering gate current,  $I_{GT}$  40 mA
- Insulated package TO-220AB ins
  - Insulating voltage 2500 V rms
  - UL1557 certified (file ref. E81734)

### Description

These standard 25 A SCRs are suitable for general purpose applications.

Using clip assembly technology, they provide a superior performance in surge current capabilities.

TXN625RG is packaged in TO-220AB ins.

Table 1. Device summary

| Order code     | Voltage $V_{DRM}/V_{RRM}$ |       |        | Sensitivity<br>$I_{GT}$ | Package            |
|----------------|---------------------------|-------|--------|-------------------------|--------------------|
|                | 600 V                     | 800 V | 1200 V |                         |                    |
| TN2540-600G-TR | Y                         |       |        | 40 mA                   | D <sup>2</sup> PAK |
| TN2540-800G-TR |                           | Y     |        | 40 mA                   | D <sup>2</sup> PAK |
| TXN625RG       | Y                         |       |        | 40 mA                   | TO-220AB ins       |
| TYN625RG       | Y                         |       |        | 40 mA                   | TO-220AB           |
| TYN825RG       |                           | Y     |        | 40 mA                   | TO-220AB           |
| TYN1225RG      |                           |       | Y      | 40 mA                   | TO-220AB           |

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

| Symbol             | Parameter   |                              | Value                 | Unit                           |                  |
|--------------------|---|------------------------------|-----------------------|--------------------------------|------------------|
| $I_{T(RMS)}$       | On-state rms current (180 °Conduction angle)  | TO-220AB, D <sup>2</sup> PAK | $T_c = 100\text{ °C}$ | 25                             | A                |
|                    |   | TO-220AB ins                 | $T_c = 83\text{ °C}$  |                                |                  |
| $I_{T(AV)}$        | Average on-state current (180 °Conduction angle)  |                              | $T_c = 100\text{ °C}$ | 16                             | A                |
| $I_{TSM}$          | Non repetitive surge peak on-state current  | $t_p = 8.3\text{ ms}$        | $T_j = 25\text{ °C}$  | 314                            | A                |
|                    |   | $t_p = 10\text{ ms}$         |                       | 300                            |                  |
| $I^2t$             | $I^2t$ Value for fusing   | $t_p = 10\text{ ms}$         | $T_j = 25\text{ °C}$  | 450                            | A <sup>2</sup> s |
| dI/dt              | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$ | F = 60 Hz                    | $T_j = 125\text{ °C}$ | 50                             | A/ $\mu$ 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                |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                      |                              |                       | - 40 to + 150<br>- 40 to + 125 | °C               |
| $V_{RGM}$          | Maximum peak reverse gate voltage   |                              |                       | 5                              | V                |

**Table 3. Electrical Characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol                 | Test conditions                                 |                       | Value | Unit |            |
|------------------------|---|-----------------------|-------|------|------------|
| $I_{GT}$               | $V_D = 12\text{ V}$ $R_L = 33\text{ }\Omega$    | MIN.                  | 4     | mA   |            |
|                        |   | MAX.                  | 40    |      |            |
| $V_{GT}$               |   | MAX.                  | 1.3   | V    |            |
| $V_{GD}$               | $V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$      | $T_j = 125\text{ °C}$ | MIN.  | 0.2  | V          |
| $I_H$                  | $I_T = 500\text{ mA}$ Gate open                 |                       | MAX.  | 50   | mA         |
| $I_L$                  | $I_G = 1.2 \times I_{GT}$                       |                       | MAX.  | 90   | mA         |
| dV/dt                  | $V_D = 67\% V_{DRM}$ Gate open                  | $T_j = 125\text{ °C}$ | MIN.  | 1500 | V/ $\mu$ s |
| $V_{TM}$               | $I_{TM} = 50\text{ A}$ $t_p = 380\text{ }\mu$ s | $T_j = 25\text{ °C}$  | MAX.  | 1.6  | V          |
| $V_{t0}$               | Threshold voltage                               | $T_j = 125\text{ °C}$ | MAX.  | 0.77 | V          |
| $R_d$                  | Dynamic resistance                              | $T_j = 125\text{ °C}$ | MAX.  | 14   | m $\Omega$ |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}$                             | $T_j = 25\text{ °C}$  | MAX.  | 5    | $\mu$ A    |
|                        |   | $T_j = 125\text{ °C}$ |       | 4    | mA         |

Table 4. Thermal resistances

| Symbol        | Parameter                |                              | Value                  | Unit |      |
|---------------|--------------------------|------------------------------|------------------------|------|------|
| $R_{th(j-c)}$ | Junction to case (DC)    | D <sup>2</sup> PAK, TO-220AB | 1.0                    | °C/W |      |
|               |                          | TO-220AB ins                 | 2.0                    |      |      |
| $R_{th(j-a)}$ | Junction to ambient (DC) | $S^{(1)} = 1 \text{ cm}^2$   | D <sup>2</sup> PAK     | 45   | °C/W |
|               |                          |                              | TO-220AB, TO-220AB ins | 60   |      |

1. S = Copper surface under tab.

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

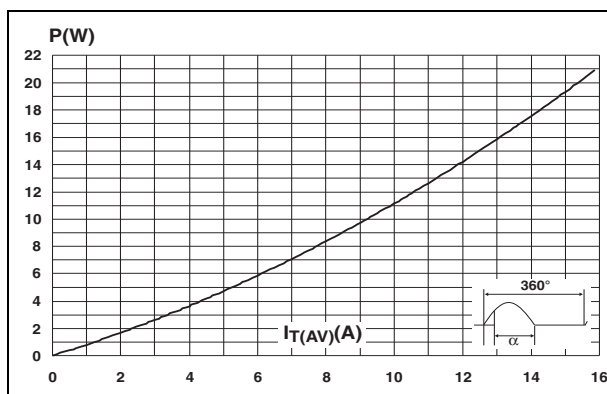


Figure 2. Average and DC on-state current versus case temperature

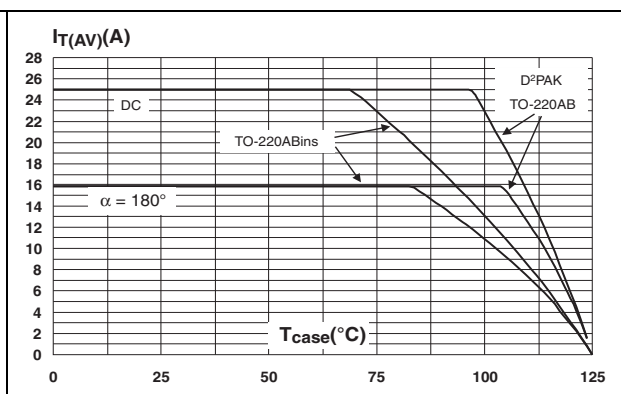


Figure 3. Average and DC on-state current versus ambient temperature

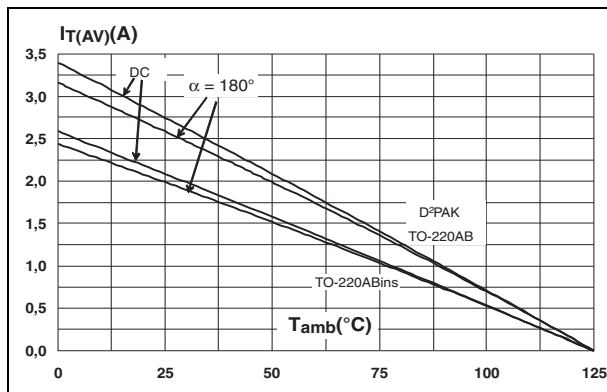


Figure 4. Relative variation of thermal impedance versus pulse duration (D<sup>2</sup>PAK, and TO-220AB)

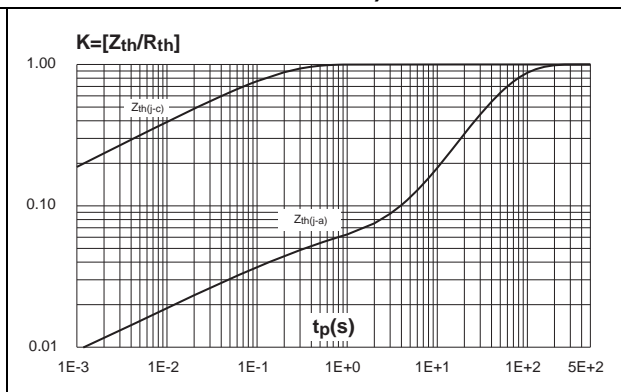


Figure 5. Relative variation of thermal impedance versus pulse duration (TO-220AB ins)

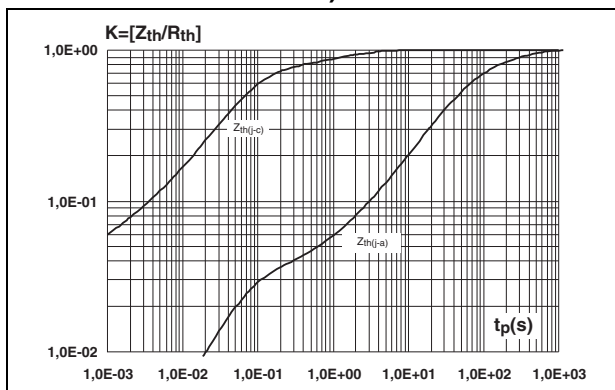


Figure 6. Relative variation of gate trigger, holding, and latching currents versus junction temperature

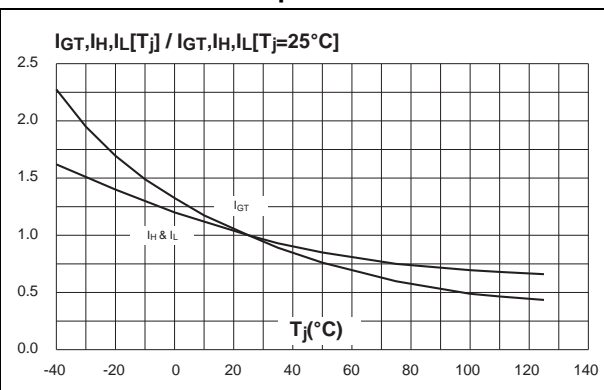


Figure 7. Surge peak on-state current versus number of cycles

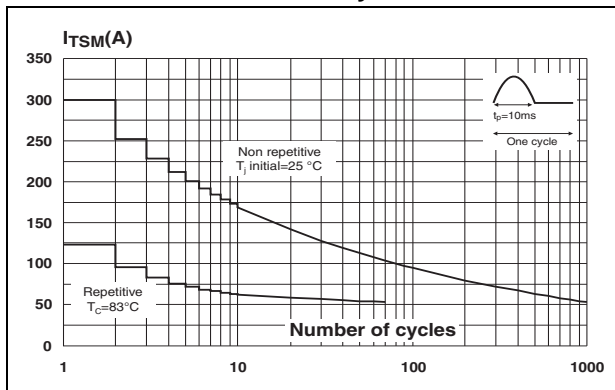


Figure 8. Non-repetitive surge peak on-state current, and corresponding values of I²t

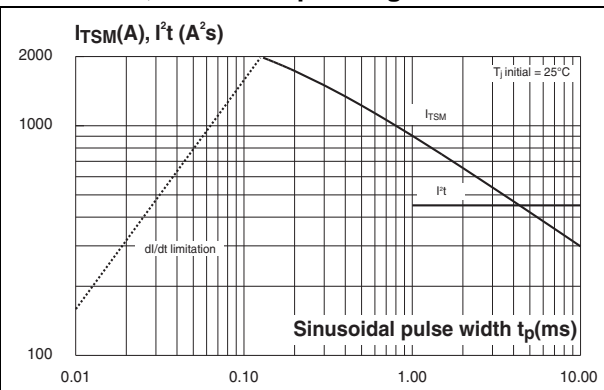


Figure 9. On-state characteristics (maximum values)

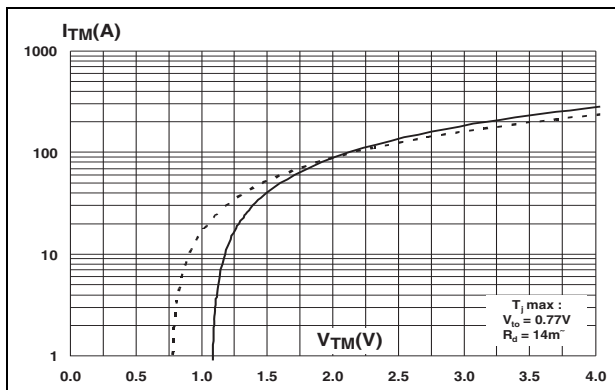
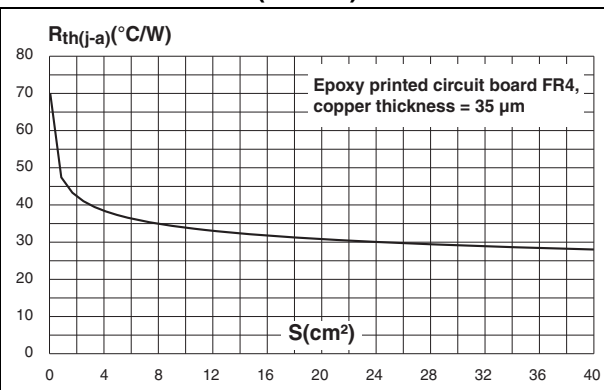


Figure 10. Thermal resistance junction to ambient versus copper surface under tab (D²PAK)



## 2 Ordering information schemes

Figure 11. TN2540-x00G ordering information scheme

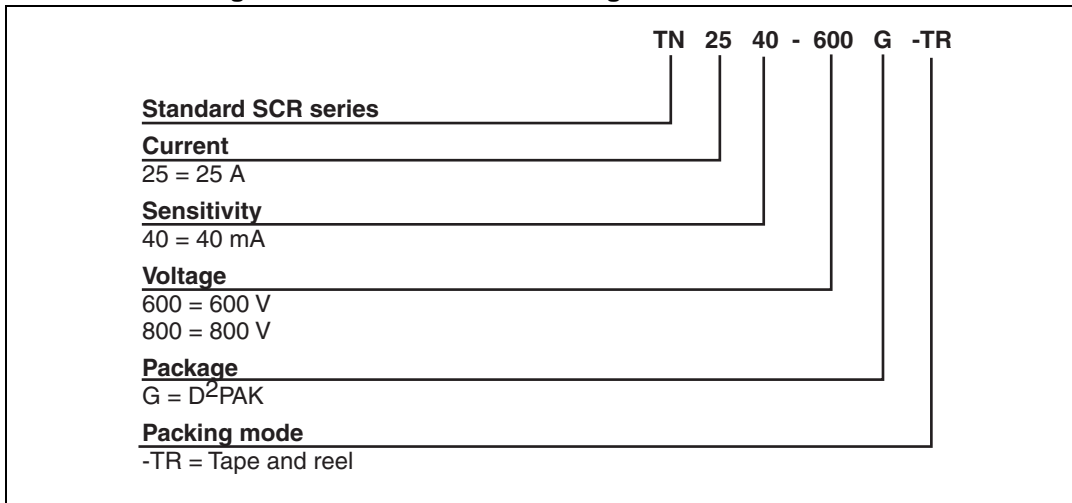


Figure 12. TXN625RG ordering information scheme

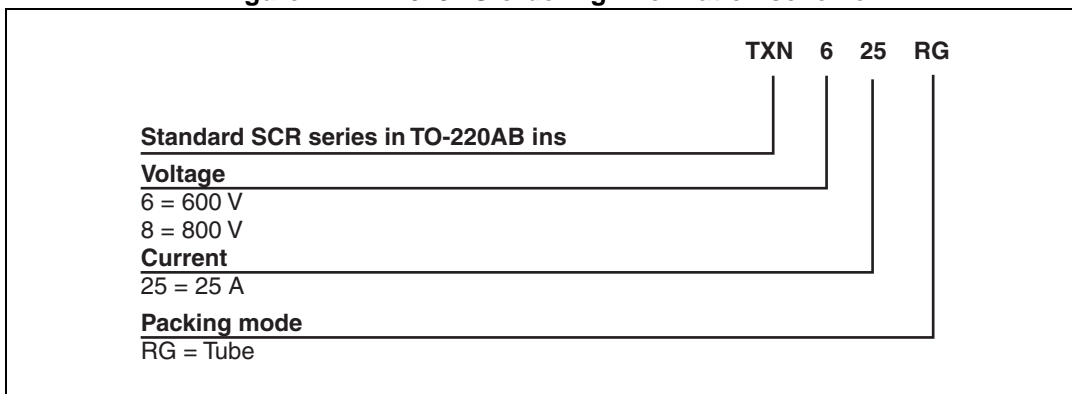
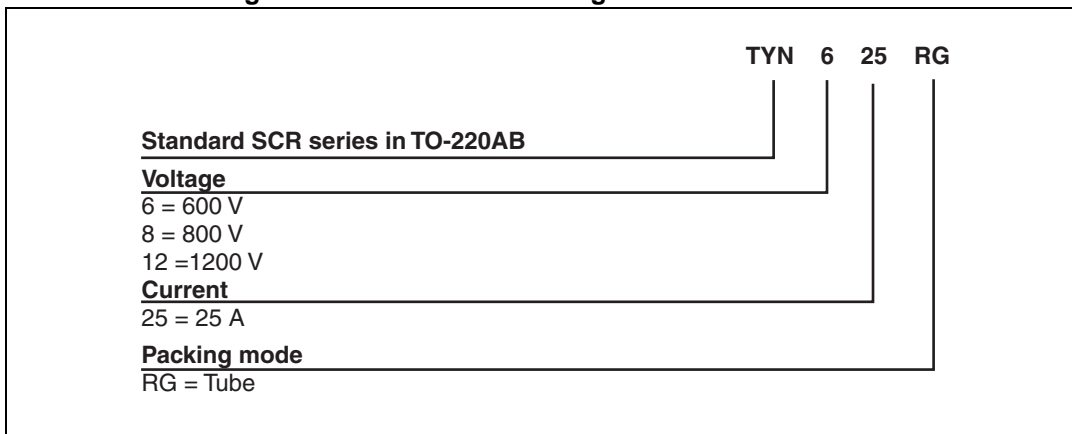


Figure 13. TYNx25RG ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Recommended torque values (TO-220AB, and TO220AB ins): 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](http://www.st.com). ECOPACK® is an ST trademark.

Figure 14. TO-220AB (Nlns. & Ins. 20-up) dimension definitions

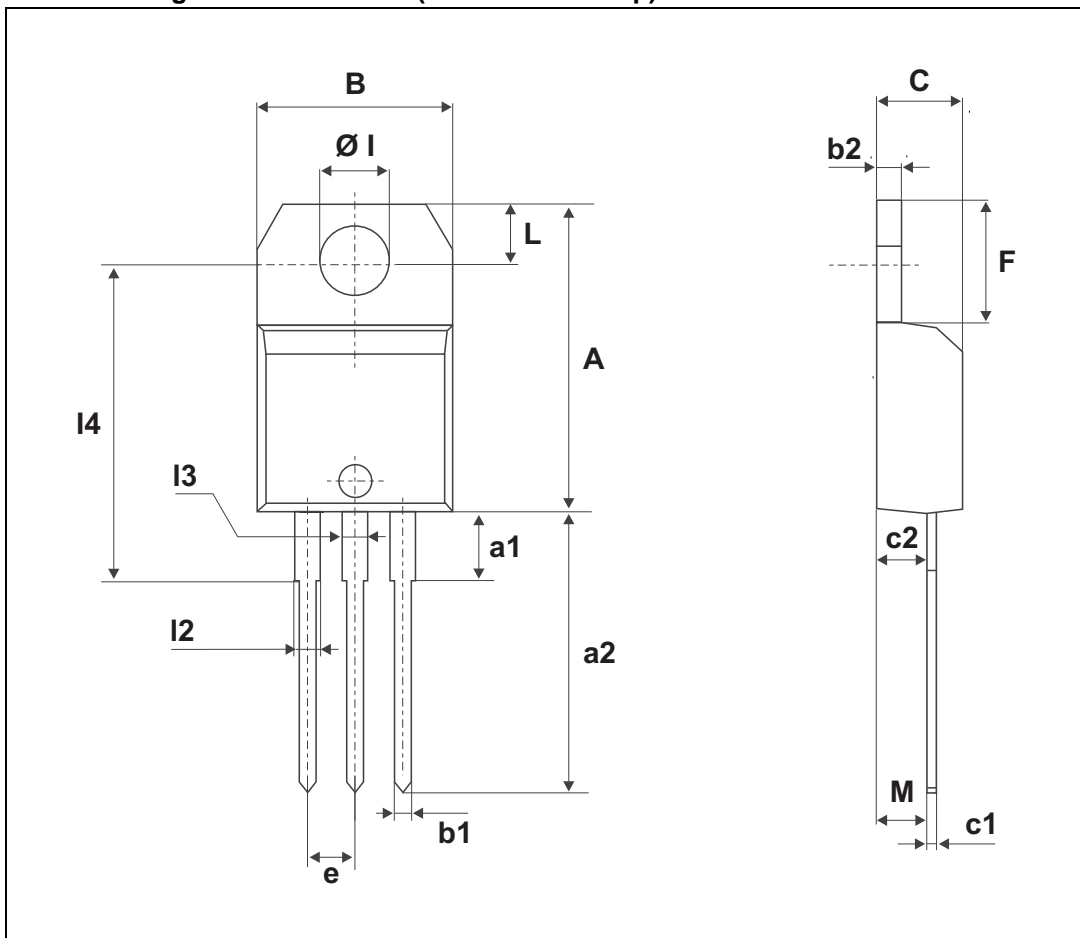


Table 5. TO-220AB (Nlns. &amp; Ins. 20-up) dimension values

| 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        |       | 2.70  | 0.094  |       | 0.107 |
| e    | 2.40        |       | 2.70  | 0.094  |       | 0.106 |
| F    | 6.20        |       | 6.60  | 0.244  |       | 0.259 |
| ØI   | 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 15. D<sup>2</sup>PAK dimensions definitions

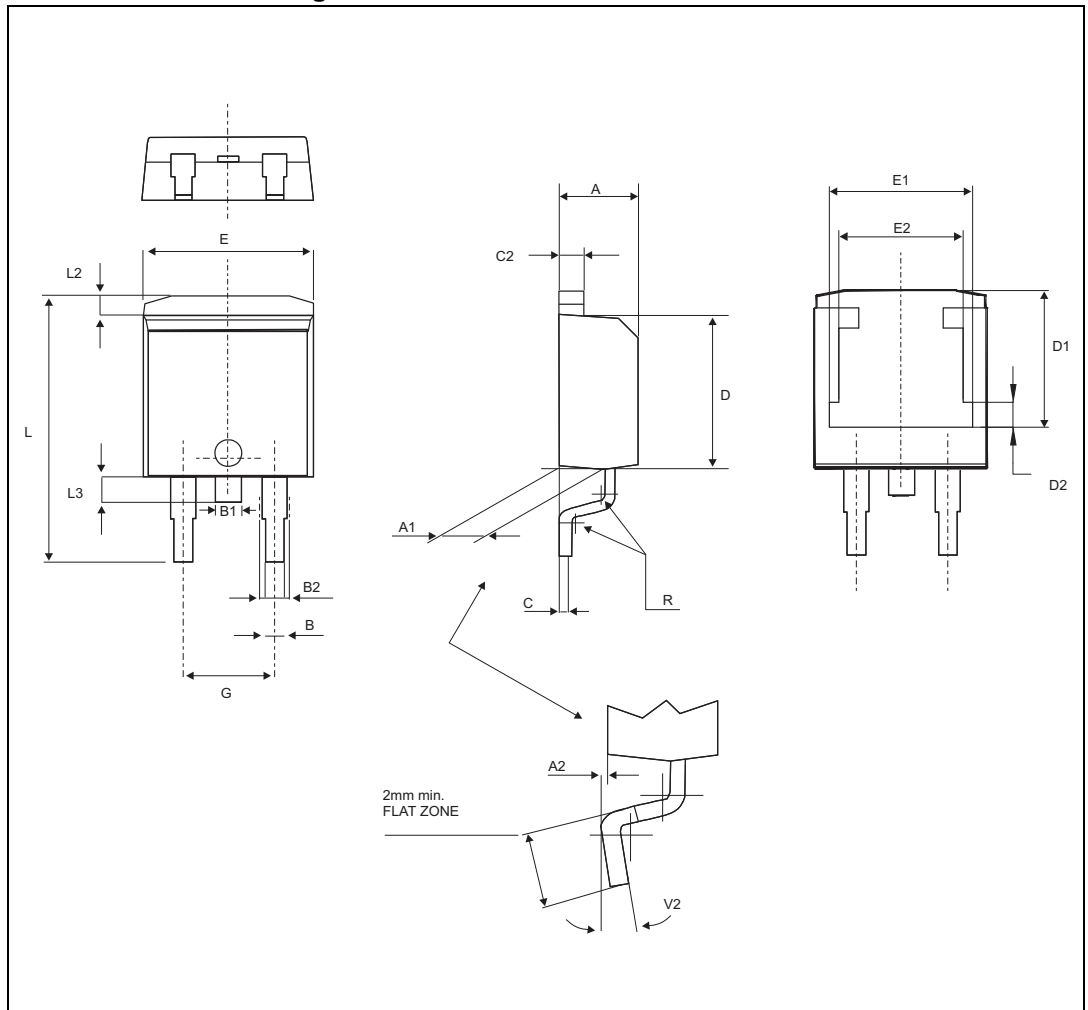
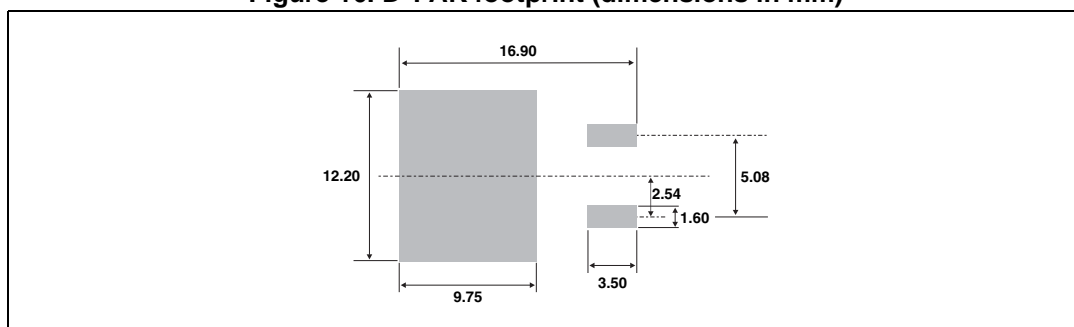




Table 6. D<sup>2</sup>PAK dimensions values

| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 4.30        |      | 4.60  | 0.169  |       | 0.181 |
| A1   | 2.49        |      | 2.69  | 0.098  |       | 0.106 |
| A2   | 0.03        |      | 0.23  | 0.001  |       | 0.009 |
| B    | 0.70        |      | 0.93  | 0.027  |       | 0.037 |
| B1   | 1.20        |      | 1.38  | 0.047  |       | 0.054 |
| B2   | 1.25        | 1.40 |       | 0.048  | 0.055 |       |
| C    | 0.45        |      | 0.60  | 0.017  |       | 0.024 |
| C2   | 1.21        |      | 1.36  | 0.047  |       | 0.054 |
| D    | 8.95        |      | 9.35  | 0.352  |       | 0.368 |
| D1   | 7.5         |      | 8.0   | 0.295  |       | 0.314 |
| D2   | 1.3         |      | 1.7   | 0.051  |       | 0.067 |
| E    | 10.00       |      | 10.28 | 0.393  |       | 0.405 |
| E1   | 8.3         |      | 8.7   | 0.326  |       | 0.342 |
| E2   | 6.85        |      | 7.25  | 0.269  |       | 0.285 |
| G    | 4.88        |      | 5.28  | 0.192  |       | 0.208 |
| L    | 15.00       |      | 15.85 | 0.590  |       | 0.624 |
| L2   | 1.27        |      | 1.40  | 0.050  |       | 0.055 |
| R    | 0.40        |      |       | 0.016  |       |       |
| V2   | 0°          |      | 8°    | 0°     |       | 8°    |

Figure 16. D<sup>2</sup>PAK footprint (dimensions in mm)

## 4 Ordering information

Table 7. Ordering information

| Order code     | Voltage | Sensitivity | Marking    | Package            | Weight | Base qty | Delivery mode |
|----------------|---------|-------------|------------|--------------------|--------|----------|---------------|
| TN2540-600G-TR | 600 V   | 40 mA       | TN2540600G | D <sup>2</sup> PAK | 1.5 g  | 1000     | Tape & reel   |
| TN2540-800G-TR | 800 V   | 40 mA       | TN2540800G | D <sup>2</sup> PAK | 1.5 g  | 1000     | Tape & reel   |
| TXN625RG       | 600 V   | 40 mA       | TXN625     | TO-220AB<br>ins    | 2.3 g  | 50       | Tube          |
| TYN625RG       | 600 V   | 40 mA       | TYN625     | TO-220AB           | 2.3 g  | 50       | Tube          |
| TYN825RG       | 800 V   | 40 mA       | TYN825     | TO-220AB           | 2.3 g  | 50       | Tube          |
| TYN1225RG      | 1200 V  | 40 mA       | TYN1225    | TO-220AB           | 2.3 g  | 50       | Tube          |

## 5 Revision history

Table 8. Document revision history

| Date        | Revision | Changes   |
|-------------|----------|---|
| Apr-2002    | 4A       | Previous update   |
| 13-Feb-2006 | 5        | TO-220AB delivery mode changed from bulk to tube.<br>ECOPACK statement added. |
| 17-Jun-2011 | 6        | Added TXN625.   |
| 13-Sep-2011 | 7        | Added UL certification in <a href="#">Features</a> .                          |
| 07-Feb-2012 | 8        | Added TYN1225.  |
| 20-Aug-2014 | 9        | Updated <a href="#">Section 3: Package information</a> .                      |

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