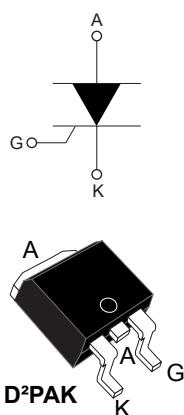


## Standard SCR, D<sup>2</sup>PAK, 25 A, 1200 V



### Features

- Max. blocking voltage =  $V_{DRM}$ ,  $V_{RRM}$  = 1200 V
- $I_{GT}$  maximum = 40 mA
- High static and dynamic commutation at  $T_j$  = 125 °C
  - $di/dt$  = 50 A/ $\mu$ s
  - $dV/dt$  = 1500 V/ $\mu$ s
- ECOPACK<sup>®</sup>2 compliant (RoHS and HF compliance)

### Applications

- Solar
- Wind renewable energy inverters
- Solid State Relay (SSR)
- Uninterruptible Power Supply (UPS)
- AC DC Inrush Current Limiter (ICL)
- Battery charger
- AC DC voltage controlled rectifier
- Industrial welding systems
- Off board automotive battery charger
- Soft starter
- General purpose motor control

#### Product status link

[TN2540-12G](#)

#### Product summary

|                       |        |
|-----------------------|--------|
| $I_{T(RMS)}$          | 25 A   |
| $V_{DRM}$ , $V_{RRM}$ | 1200 V |
| $I_{GT}$              | 40 mA  |
| $T_j$                 | 125 °C |

### Description

Available in SMD D<sup>2</sup>PAK with anode in backside.

The [TN2540-12G](#) SCR is suitable in industrial applications where high immunity is required with a lower gate current.

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values),  $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified**

| Symbol                             | Parameter                                                                                       |                                                   | Value                           | Unit             |
|------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------|------------------|
| V <sub>DRM</sub> /V <sub>RRM</sub> | Repetitive peak off-state voltage (50-60 Hz)                                                    |                                                   | T <sub>j</sub> = 125 °C<br>1200 | V                |
| I <sub>T(RMS)</sub>                | On-state RMS current (180° conduction angle)                                                    |                                                   | T <sub>c</sub> = 102 °C<br>25   | A                |
| I <sub>T(AV)</sub>                 | Average on-state current (180° conduction angle)                                                |                                                   |                                 |                  |
| I <sub>TSM</sub>                   | Non repetitive surge peak on-state current                                                      |                                                   | t <sub>p</sub> = 8.3 ms<br>314  | A                |
|                                    |                                                                                                 |                                                   | t <sub>p</sub> = 10 ms<br>300   |                  |
| I <sup>2</sup> t                   | I <sup>2</sup> t value for fusing                                                               |                                                   | t <sub>p</sub> = 10 ms<br>450   | A <sup>2</sup> s |
| di/dt                              | I <sub>G</sub> = 2 x I <sub>GT</sub> , tr ≤ 100 ns<br>Critical rate of rise of on-state current |                                                   | f = 60 Hz<br>50                 | A/μs             |
| I <sub>GM</sub>                    | Peak gate current                                                                               | t <sub>p</sub> = 20 μs<br>T <sub>j</sub> = 125 °C | 4                               | A                |
| P <sub>G(AV)</sub>                 | Average gate power dissipation                                                                  |                                                   | T <sub>j</sub> = 125 °C<br>1    | W                |
| T <sub>stg</sub>                   | Storage junction temperature range                                                              |                                                   |                                 | -40 to +150 °C   |
| T <sub>j</sub>                     | Operating junction temperature range                                                            |                                                   |                                 | -40 to +125 °C   |

**Table 2. Electrical characteristics ( $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)**

| Symbol          | Test conditions                                             |                         | Value | Unit |      |
|-----------------|-------------------------------------------------------------|-------------------------|-------|------|------|
| I <sub>GT</sub> | V <sub>D</sub> = 12 V, R <sub>L</sub> = 33 Ω                |                         | Min.  | 4    | mA   |
| Max.            |                                                             |                         | 40    |      |      |
| V <sub>GT</sub> |                                                             |                         | Max.  | 1.3  | V    |
| V <sub>GD</sub> | V <sub>D</sub> = V <sub>DRM</sub> , R <sub>L</sub> = 3.3 kΩ | T <sub>j</sub> = 125 °C | Min.  | 0.2  | V    |
| I <sub>H</sub>  | I <sub>T</sub> = 500 mA, gate open                          |                         | Max.  | 80   | mA   |
| I <sub>L</sub>  | I <sub>G</sub> = 1.2 x I <sub>GT</sub>                      |                         | Max.  | 90   | mA   |
| dV/dt           | V <sub>D</sub> = 67 % V <sub>DRM</sub> , gate open          | T <sub>j</sub> = 125 °C | Min.  | 1500 | V/μs |

**Table 3. Static electrical characteristics**

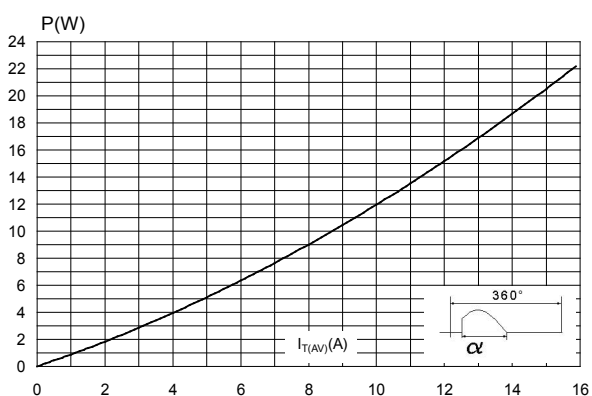
| Symbol                              | Test conditions                                 |                         |      | Value | Unit |
|-------------------------------------|-------------------------------------------------|-------------------------|------|-------|------|
| V <sub>TM</sub>                     | I <sub>TM</sub> = 50 A, t <sub>p</sub> = 380 μs | T <sub>J</sub> = 25 °C  | Max. | 1.60  | V    |
| V <sub>TO</sub>                     | Threshold voltage                               | T <sub>J</sub> = 125 °C | Max. | 0.85  |      |
| R <sub>D</sub>                      | Dynamic resistance                              | T <sub>J</sub> = 125 °C | Max. | 14    | mΩ   |
| I <sub>DRM</sub> , I <sub>RRM</sub> | V <sub>OUT</sub> = 1200 V                       | T <sub>J</sub> = 25 °C  | Max. | 10    | μA   |
|                                     |                                                 | T <sub>J</sub> = 125 °C |      | 6     | mA   |

**Table 4. Thermal resistance parameter**

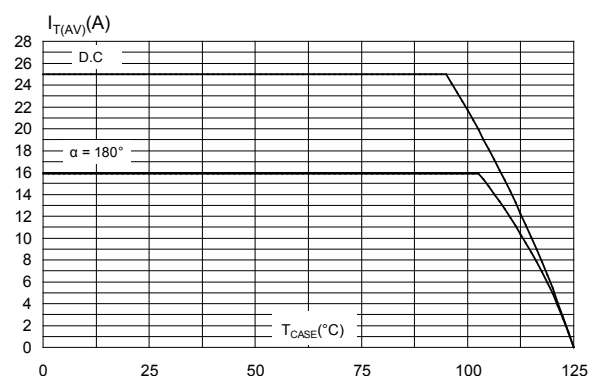
| Symbol        | Parameter                                | Value | Unit                        |
|---------------|------------------------------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | Thermal resistance Junction to case (DC) | Max.  | $^{\circ}\text{C}/\text{W}$ |

## 1.1 Characteristics (curves)

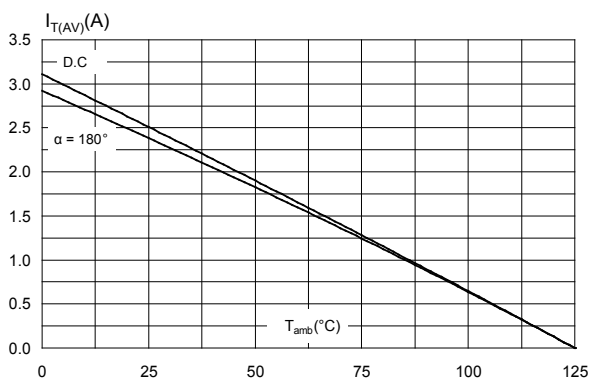
**Figure 1. Maximum average power dissipation versus average on-state current**



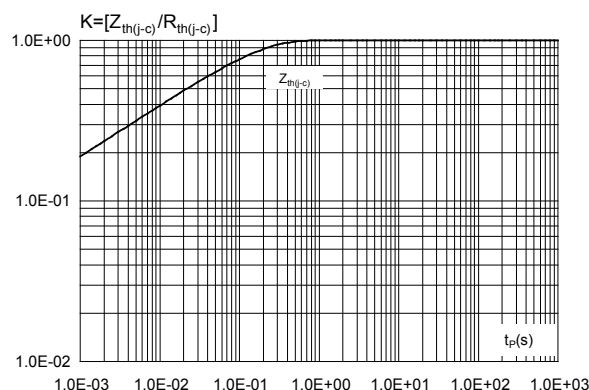
**Figure 2. Average and DC on-state current versus case temperature**



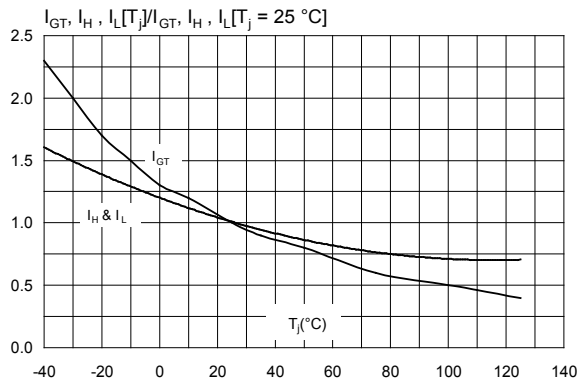
**Figure 3. Average and D.C. on state current versus ambient temperature**



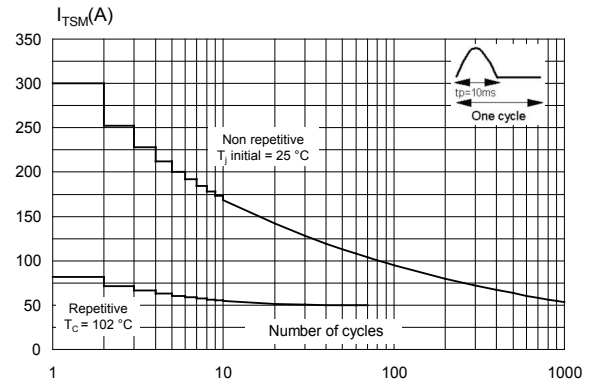
**Figure 4. Relative variation of thermal impedance junction to case**



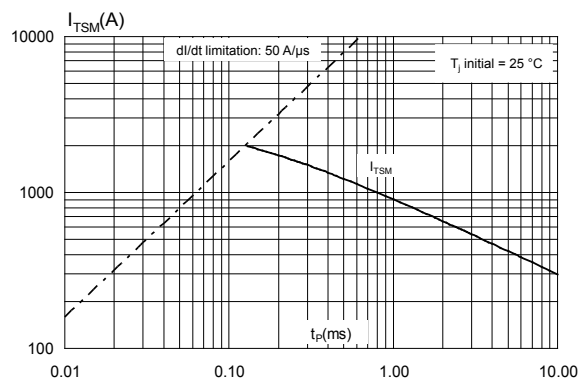
**Figure 5. Relative variation of gate trigger and holding current versus junction temperature**



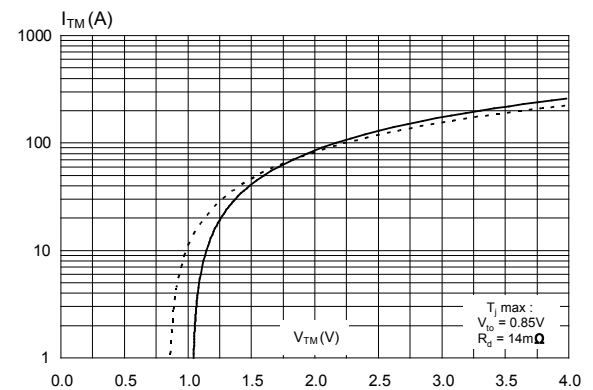
**Figure 6. Surge peak on-state current versus number of cycles**



**Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ ms}$**



**Figure 8. On-state characteristics (maximum values)**



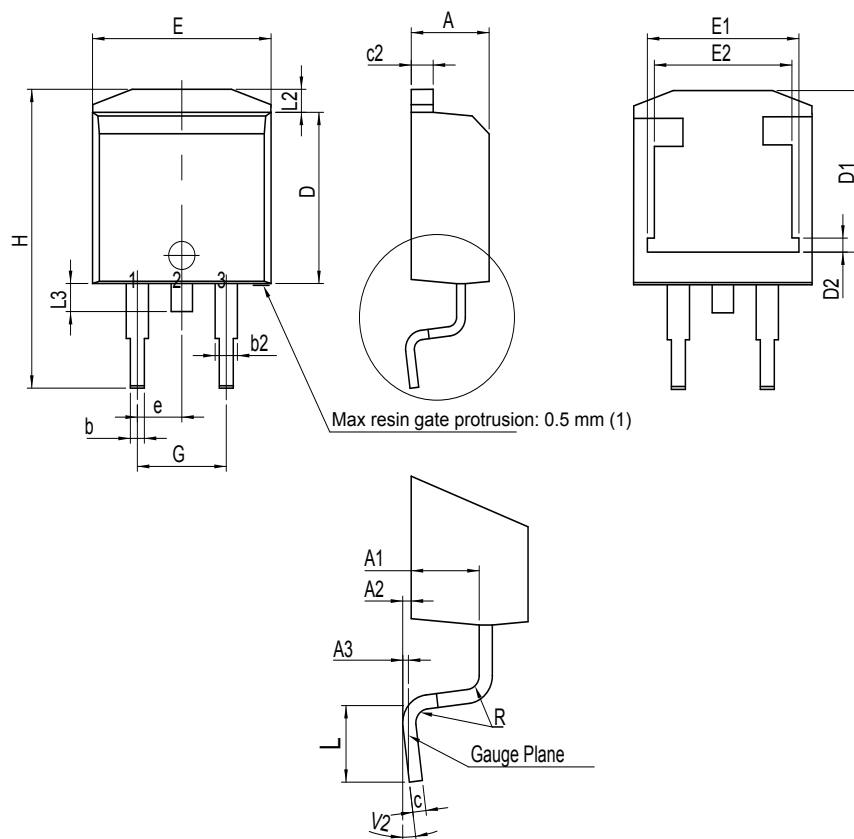
## 2 Package information

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.

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

- ECOPACK®2 compliant
- Lead-free package leads finishing
- Molding compound resin is halogen-free and meets UL standard level V0

**Figure 9. D<sup>2</sup>PAK package outline**



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

**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        |      |       | 0.10000               |        |        |
| 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. Degrees

Technical drawing showing the dimensions of a stepped profile. The profile consists of a main rectangular section and two smaller rectangular sections attached to its right side.

Dimensions:

- Overall width: 16.90
- Overall height: 10.30
- Width of the main section: 8.90
- Width of the top right section: 3.70
- Width of the bottom right section: 3.70
- Height of the top right section: 5.08
- Height of the bottom right section: 1.30

[illegible]

### 3 Ordering information

Figure 12. Ordering information scheme

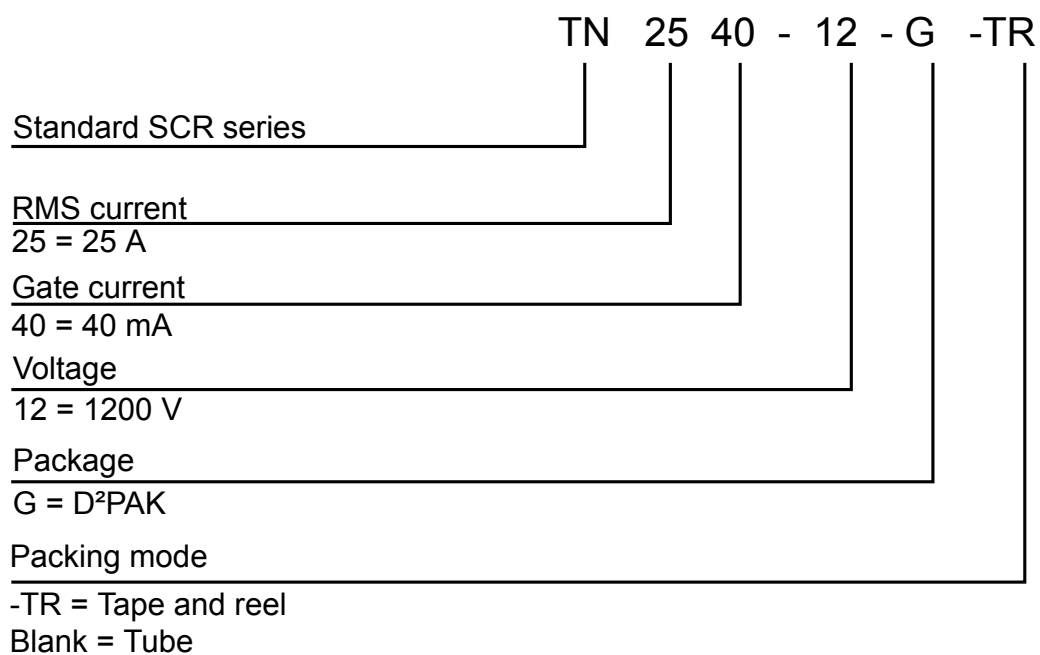


Table 6. Ordering information

| Order code    | Marking    | Package            | Weight | Base qty. | Delivery mode |
|---------------|------------|--------------------|--------|-----------|---------------|
| TN2540-12G-TR | TN2540-12G | D <sup>2</sup> PAK | 1.6 g  | 1000      | Tape and Reel |
| TN2540-12G    |            |                    |        | 50        | Tube          |

## Revision history

**Table 7. Document revision history**

| Date        | Version | Changes          |
|-------------|---------|------------------|
| 18-Oct-2018 | 1       | Initial release. |

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