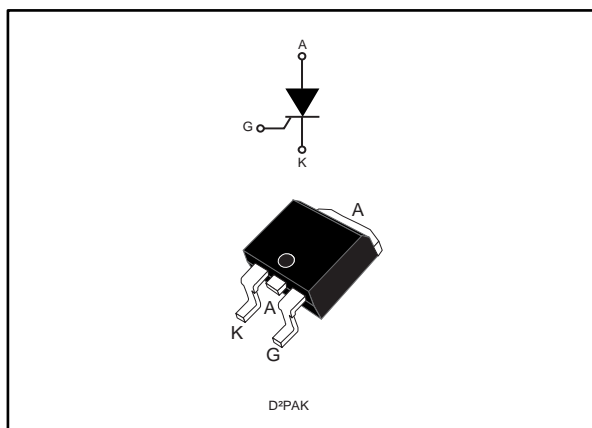


High temperature 20 A SCRs

Datasheet - production data



Features

- High junction temperature: $T_j = 150\text{ }^\circ\text{C}$
- High noise immunity $dV/dt = 400\text{ V}/\mu\text{s}$ up to $150\text{ }^\circ\text{C}$
- Gate triggering current $I_{GT} = 10\text{ mA}$
- Peak off-state voltage $V_{DRM}/V_{RRM} = 600\text{ V}$
- High turn on current rise $dI/dt = 100\text{ A}/\mu\text{s}$
- ECOPACK[®]2 compliant component

Applications

- Motorbike voltage regulator circuits
- Inrush current limiting circuits
- Motor control circuits and starters
- Light dimmers
- Solid state relays

Description

This device offers high thermal performance during operation of up to 20 A_{RMS} , thanks to a junction temperature of up to $150\text{ }^\circ\text{C}$.

Its D²PAK package allows modern SMD designs as well as compact back to back configuration.

The combination of noise immunity and low gate triggering current allows to design strong and compact control circuits.

Table 1: Device summary

| Order code | Package | V_{DRM}/V_{RRM} | I_{GT} |
|------------|--------------------|-------------------|----------|
| TN2010H-6G | D ² PAK | 600 V | 10 mA |

1 Characteristics

Table 2: Absolute maximum ratings (limiting values), $T_j = 25\text{ °C}$ unless otherwise specified

| Symbol | Parameter | | Value | Unit | |
|-------------------|---|-------------------------|-----------------------|-----------|---|
| $I_{T(RMS)}$ | RMS on-state current (180 ° conduction angle) | $T_c = 132\text{ °C}$ | 20 | A | |
| $I_{T(AV)}$ | Average on-state current (180 ° conduction angle) | $T_c = 132\text{ °C}$ | 12.7 | A | |
| | | $T_c = 137\text{ °C}$ | 10 | | |
| | | $T_c = 140\text{ °C}$ | 8 | | |
| I_{TSM} | Non repetitive surge peak on-state current (T_j initial = 25 °C) | $t_p = 8.3\text{ ms}$ | 197 | A | |
| | | $t_p = 10\text{ ms}$ | 180 | | |
| I^2t | I^2t value for fusing | $t_p = 10\text{ ms}$ | 162 | A^2s | |
| di/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$ | $f = 60\text{ Hz}$ | 100 | $A/\mu s$ | |
| V_{DSM}/V_{RSM} | Non repetitive surge peak off-state voltage | $t_p = 10\text{ ms}$ | 700 | V | |
| I_{GM} | Peak gate current | $t_p = 20\text{ }\mu s$ | $T_j = 150\text{ °C}$ | 4 | A |
| $P_{G(AV)}$ | Average gate power dissipation | $T_j = 150\text{ °C}$ | 1 | W | |
| V_{RGM} | Maximum peak reverse gate voltage | | 5 | V | |
| T_{stg} | Storage junction temperature range | | -40 to +150 | °C | |
| T_j | Operating junction temperature range | | -40 to +150 | °C | |

Table 3: Electrical characteristics ($T_j = 25\text{ °C}$ unless otherwise specified)

| Symbol | Test conditions | | Value | Unit | |
|----------|---|-----------------------|-------|------|-----------|
| I_{GT} | $V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$ | Typ. | 5 | mA | |
| | | Max. | 10 | | |
| V_{GT} | | Max. | 1.3 | V | |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$ | $T_j = 150\text{ °C}$ | Min. | 0.1 | V |
| I_H | $I_T = 500\text{ mA}$, gate open | | Max. | 40 | mA |
| I_L | $I_G = 1.2 \times I_{GT}$ | | Max. | 60 | mA |
| dV/dt | $V_D = 402\text{ V}$, gate open | $T_j = 150\text{ °C}$ | Min. | 400 | $V/\mu s$ |
| t_{gt} | $I_{TM} = 40\text{ A}$, $V_D = 402\text{ V}$, $I_G = 20\text{ mA}$, $(di_G/dt)_{max} = 0.2\text{ A}/\mu s$ | | Typ. | 1.9 | μs |
| t_q | $I_{TM} = 40\text{ A}$, $V_D = 402\text{ V}$, $(di/dt)_{off} = 30\text{ A}/\mu s$, $V_R = 25\text{ V}$, $dV_D/dt = 40\text{ V}/\mu s$ | $T_j = 150\text{ °C}$ | Typ. | 70 | μs |

Table 4: Static characteristics

| Symbol | Test conditions | | | Value | Unit |
|-----------------------|---|------------------------------------|------|-------|---------------|
| V_{TM} | $I_{TM} = 40 \text{ A}$, $t_p = 380 \mu\text{s}$ | $T_j = 25 \text{ }^\circ\text{C}$ | Max. | 1.6 | V |
| V_{TO} | Threshold voltage | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 0.82 | |
| R_D | Dynamic resistance | $T_j = 150 \text{ }^\circ\text{C}$ | Max. | 17.5 | m Ω |
| I_{DRM} , I_{RRM} | $V_D = V_{DRM}$, $V_R = V_{RRM}$ | $T_j = 25 \text{ }^\circ\text{C}$ | Max. | 5 | μA |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | | 2 | mA |
| | | $T_j = 150 \text{ }^\circ\text{C}$ | | 3.9 | |

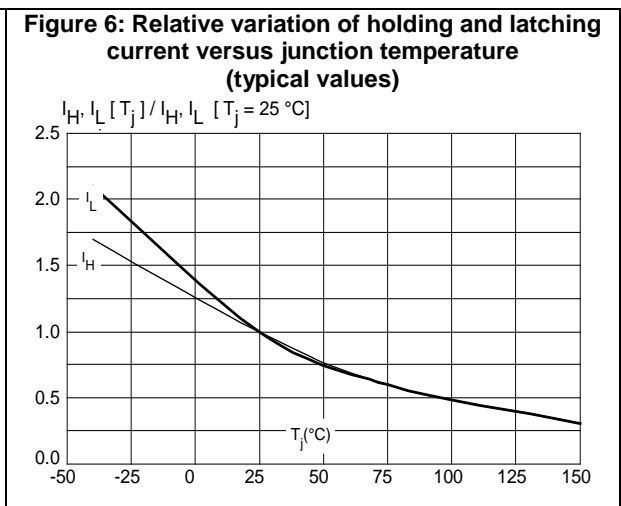
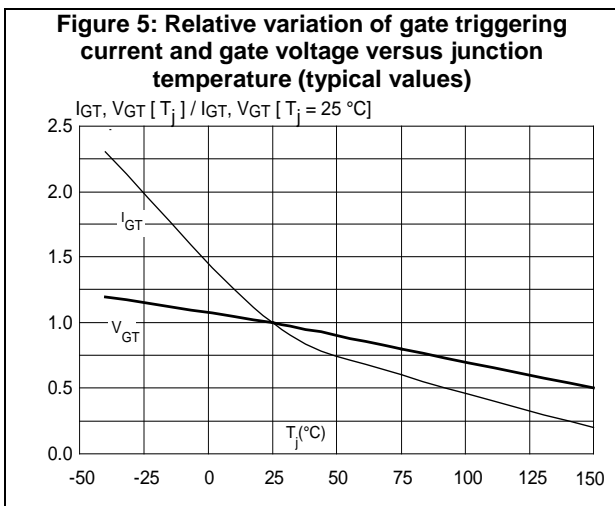
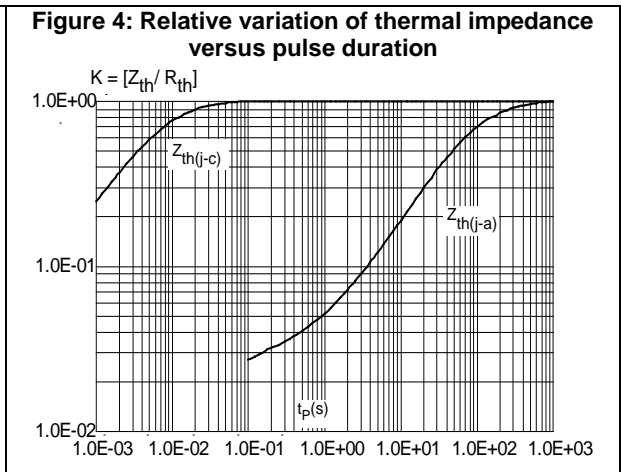
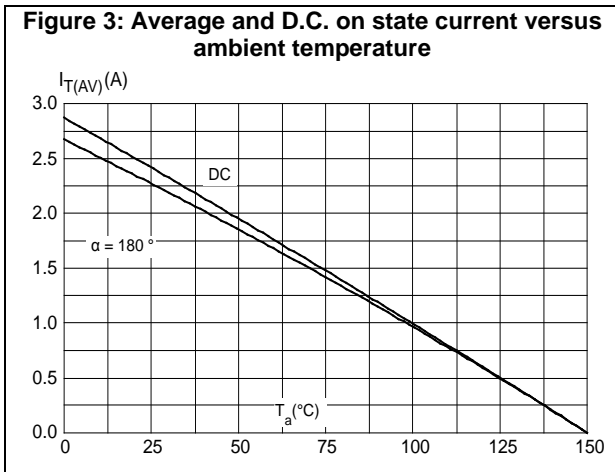
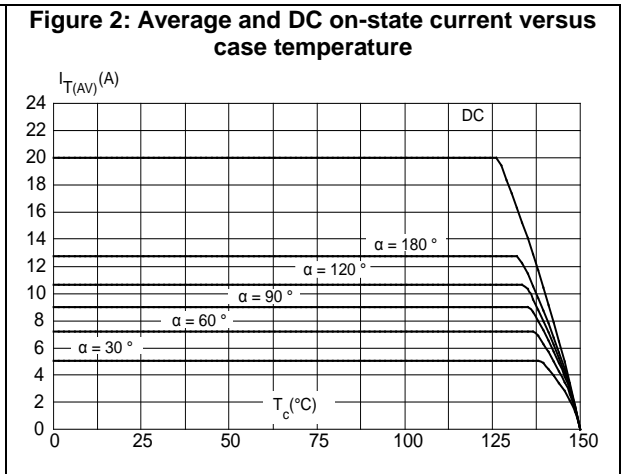
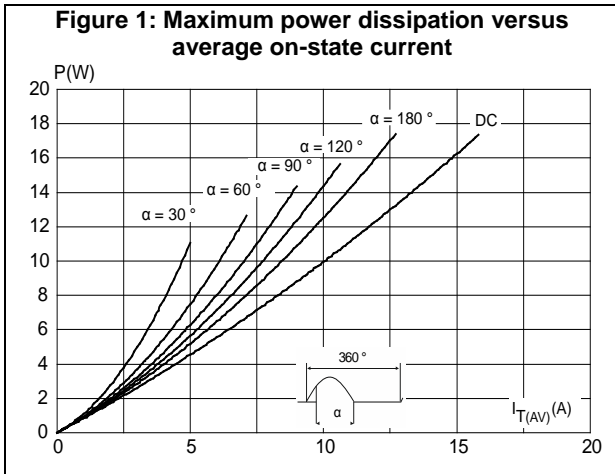
Table 5: Thermal parameters

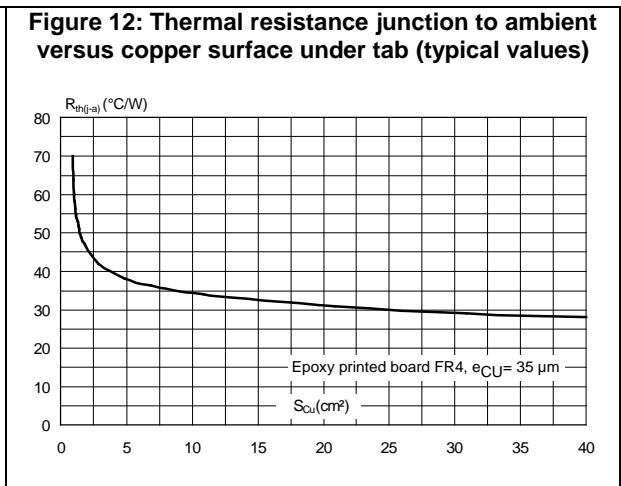
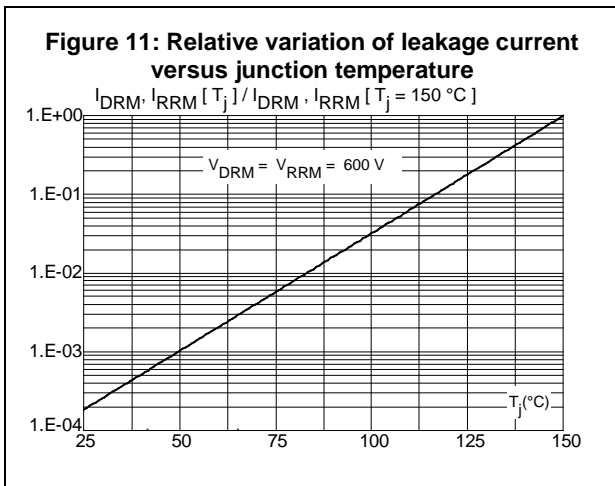
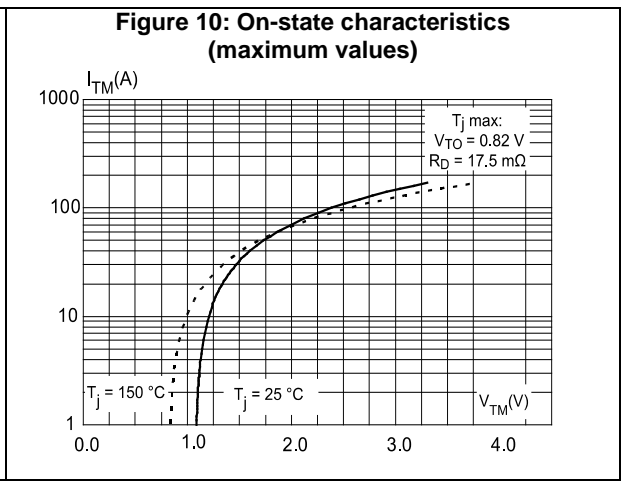
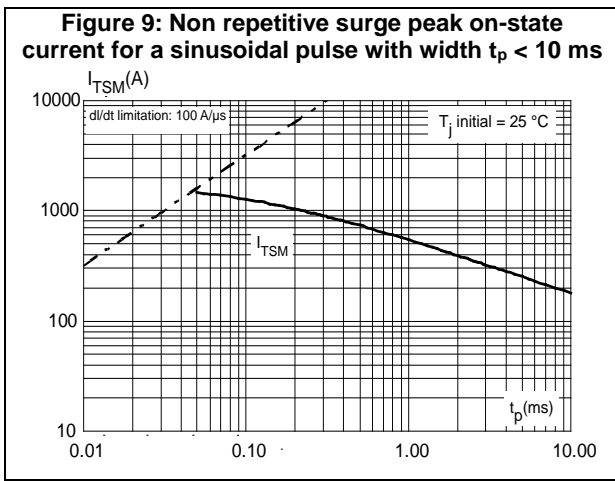
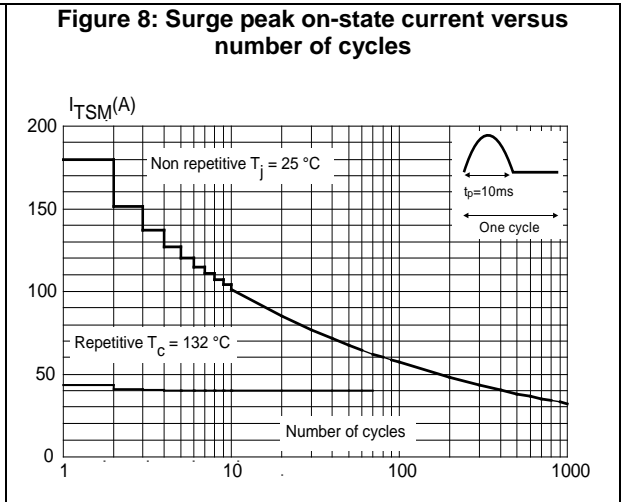
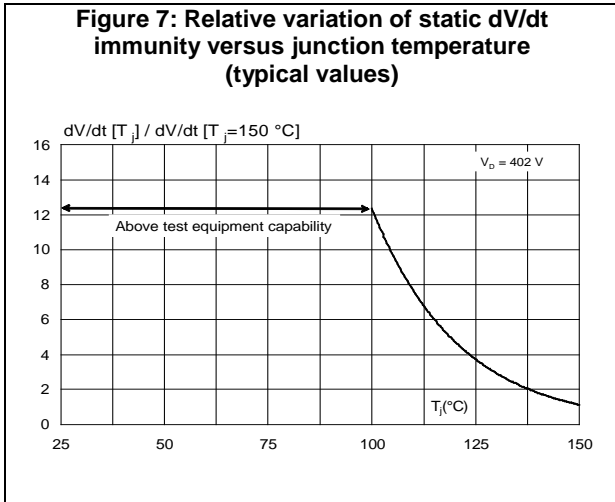
| Symbol | Parameter | | | Value | Unit |
|---------------|--------------------------|------------------------------|------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case (DC) | | Max. | 1.0 | $^\circ\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient (DC) | $S^{(1)} = 2.5 \text{ cm}^2$ | Typ. | 45 | |

Notes:

⁽¹⁾S = Copper surface under tab

1.1 Characteristics (curves)





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.

- Epoxy meets UL94, V0
- Lead-free, halogen-free package

2.1 D²PAK package information

Figure 13: D²PAK package outline

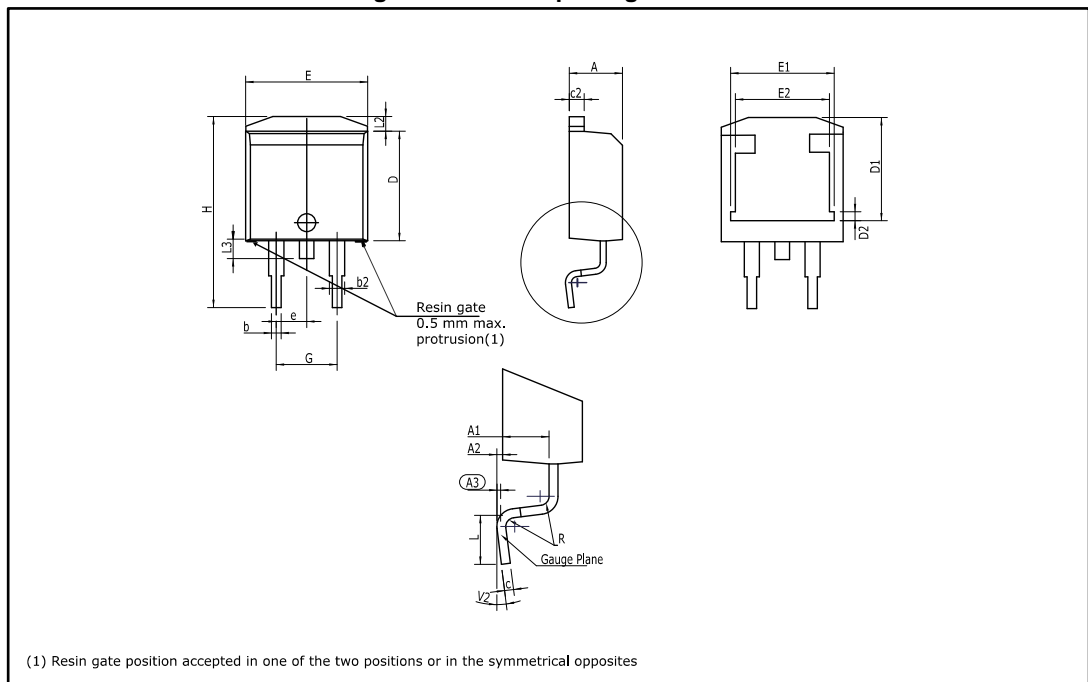


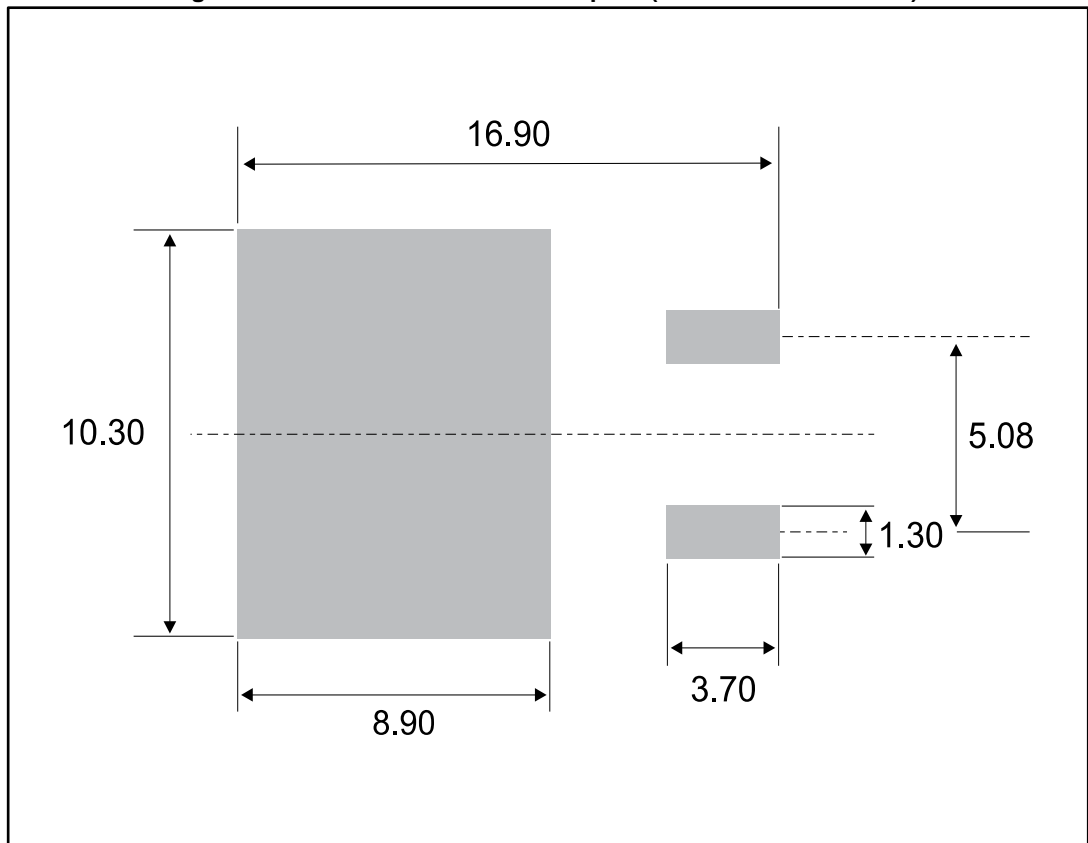
Table 6: D²PAK package mechanical data

| 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 | 1.27 | | 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:

⁽¹⁾Dimensions in inches are given for reference only

Figure 14: D²PAK recommended footprint (dimensions are in mm)



3 Ordering information

Figure 15: Ordering information scheme

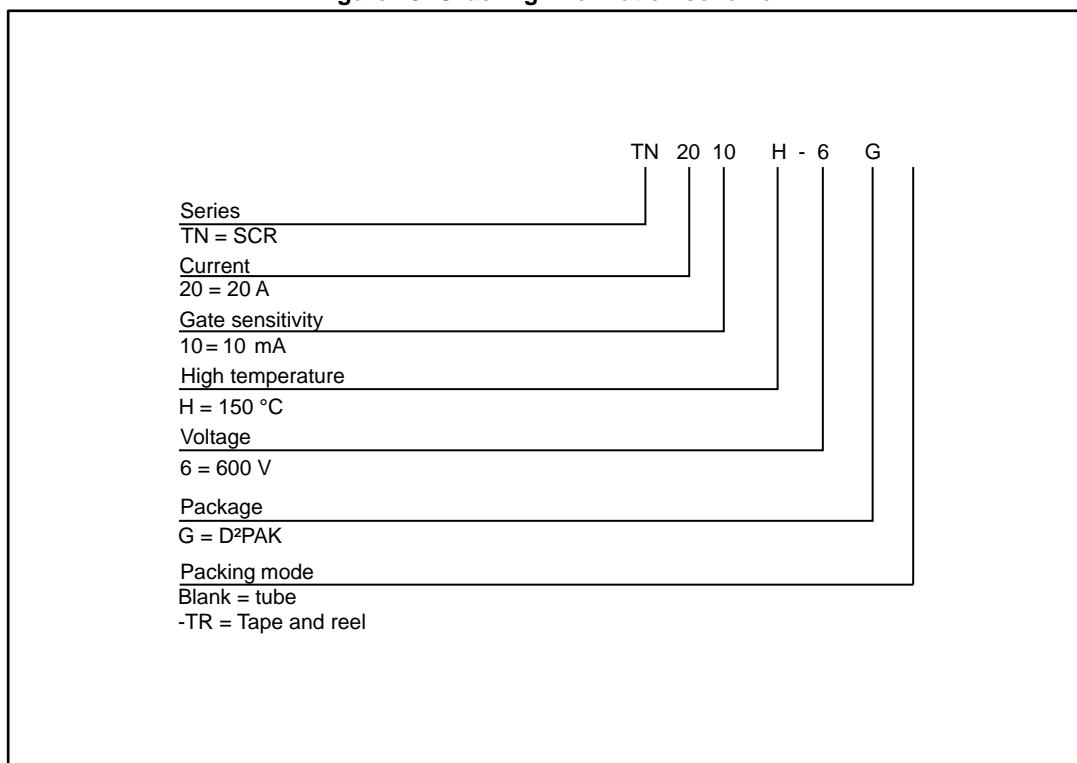


Table 7: Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---------------|----------|--------------------|--------|-----------|---------------|
| TN2010H-6G | TN2010H6 | D ² PAK | 2.3 g | 50 | Tube |
| TN2010H-6G-TR | | | | 1000 | Tape and reel |

4 Revision history

Table 8: Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------|
| 24-Aug-2017 | 1 | Initial release. |

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