# T410H

## High temperature 4 A sensitive TRIACs

### Features

- Medium current TRIAC
- Logic level sensitive TRIAC
- 150 °C max. $T_j$ turn-off commutation
- Clip bounding
- RoHS (2002/95/EC) compliant package

### Applications

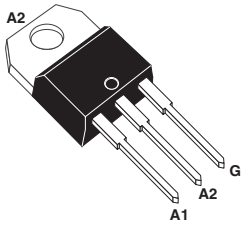
- The T410H is designed for the control of AC actuators in appliances and industrial systems.
- The multi-port drive of the microcontroller can control the multiple loads of such appliances and systems through this sensitive gate TRIAC.

### Description

Specifically designed to operate at 150 °C, the new 4 A T410H TRIAC provides an enhanced performance in terms of power loss and thermal dissipation. This allows the optimization of the heatsink size, leading to space and cost effectiveness when compared to electro-mechanical solutions.

Based on ST logic level technology, the T410H offers an $I_{GT}$ lower than 10 mA and specified minimal commutation and high noise immunity levels valid up to the $T_j$ max.




**TO-220AB**
**T410H-6T**

**Table 1. Device summary**

| Symbol | Value | Unit |
|---|---|---|
| $I_{T(RMS)}$ | 4 | A |
| $V_{DRM}/V_{RRM}$ | 600 | V |
| $I_{GT\ MAX}$ | 10 | mA |

# 1 Characteristics

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | On-state rms current (full sine wave) | | $T_c$ = 141 °C | 4 | A |
| $I_{TSM}$ | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C) | F = 60 Hz | t = 16.7 ms | 42 | A |
| | | F = 50 Hz | t = 20 ms | 40 | |
| $I^2t$ | $I^2t$ Value for fusing | $t_p$ = 10 ms | | 11 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current $I_G$ = 2 x $I_{GT}$ , $t_r \leq$ 100 ns | F = 120 Hz | $T_j$ = 150 °C | 50 | A/µs |
| $V_{DSM}/V_{RSM}$ | Non repetitive surge peak off-state voltage | $t_p$ = 10 ms | $T_j$ = 25 °C | $V_{DRM}/V_{RRM}$ + 100 | V |
| $I_{GM}$ | Peak gate current | $t_p$ = 20 µs | $T_j$ = 150 °C | 4 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j$ = 150 °C | 1 | W |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range | | | - 40 to + 150<br>- 40 to + 150 | °C |

**Table 3. Electrical characteristics ($T_j$ = 25 °C, unless otherwise specified)**

| Symbol | Test conditions | Quadrant | Min. | Max. | Unit |
|---|---|---|---|---|---|
| $I_{GT}$ | $V_D$ = 12 V $R_L$ = 33 Ω | I - II - III | 1 | 10 | mA |
| $V_{GT}$ | | I - II - III | | 1.0 | V |
| $V_{GD}$ | $V_D = V_{DRM}$, $R_L$ = 3.3 kΩ | I - II - III | 0.15 | | V |
| $I_H$ (1) | $I_T$ = 100 mA | | | 25 | mA |
| $I_L$ | $I_G$ = 1.2 $I_{GT}$ | I - III | | 30 | mA |
| | | II | | 35 | |
| dV/dt (1) | $V_D$ = 67% $V_{DRM}$, gate open, $T_j$ = 150 °C | | 75 | | V/µs |
| (dI/dt)c (1) | Logic level, 0.1 V/µs, $T_j$ = 150 °C | | 5.7 | | A/ms |
| | Logic level, 15 V/µs, $T_j$ = 150 °C | | 1.5 | | |

1. For both polarities of A2 referenced to A1.

**Table 4. Static characteristics**

| Symbol | Test conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $V_T$ (1) | $I_{TM}$ = 5.6 A, $t_p$ = 380 µs | $T_j$ = 25 °C | MAX. | 1.5 | V |
| $V_{t0}$ (1) | Threshold voltage | $T_j$ = 150 °C | MAX. | 0.80 | V |
| $R_d$ (1) | Dynamic resistance | $T_j$ = 150 °C | MAX. | 80.0 | mΩ |
| $I_{DRM}$ $I_{RRM}$ | $V_{DRM}$ = $V_{RRM}$ | $T_j$ = 25 °C | MAX. | 5 | µA |
| | | $T_j$ = 150 °C | MAX. | 2.2 | mA |
| | $V_D/V_R$ = 400 V (at peak mains voltage) | $T_j$ = 150 °C | MAX. | 1.75 | |
| | $V_D/V_R$ = 200 V (at peak mains voltage) | $T_j$ = 150 °C | MAX. | 1.5 | |

1. for both polarities of A2 referenced to A1.

**Table 5. Thermal resistance**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case (AC) | 2.20 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient | 60 | |

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

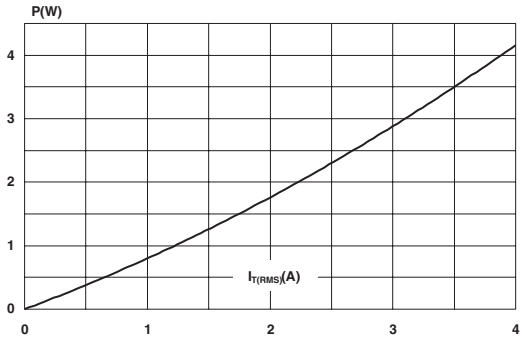



**Figure 2. On-state rms current versus case temperature (full cycle)**

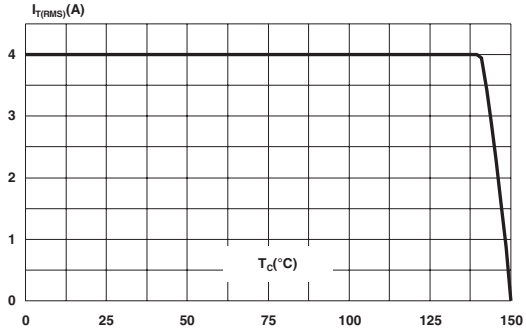



**Figure 3. On-state rms current versus ambient temperature (free air convection, full cycle)**

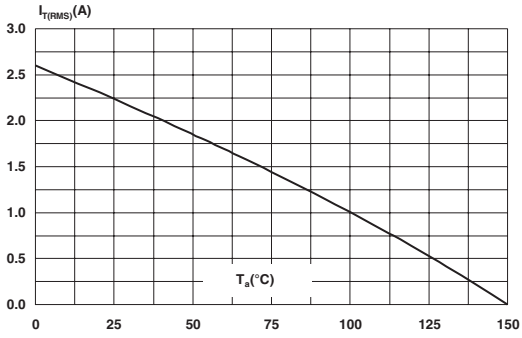



**Figure 4. Relative variation of thermal impedance, versus pulse duration**

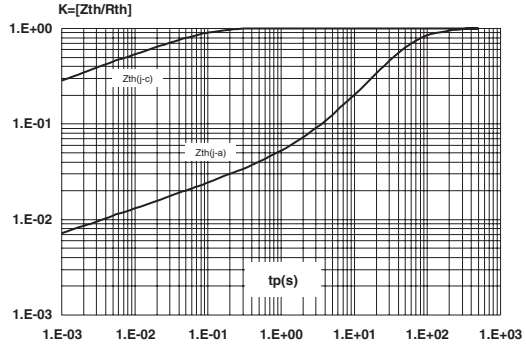


**Figure 5. Relative variation of gate trigger current and voltage versus junction temperature (typical values)**

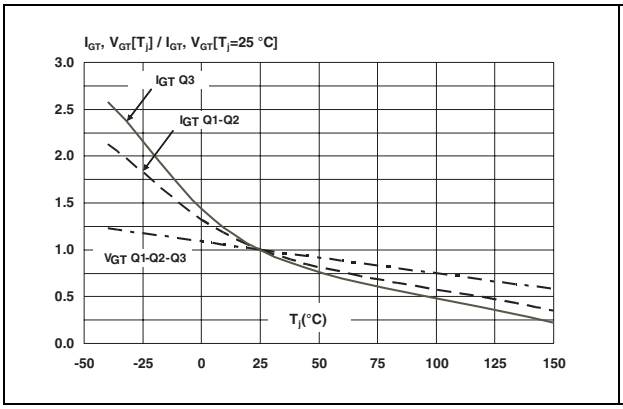



**Figure 6. Relative variation of holding and latching current versus junction temperature (typical values)**

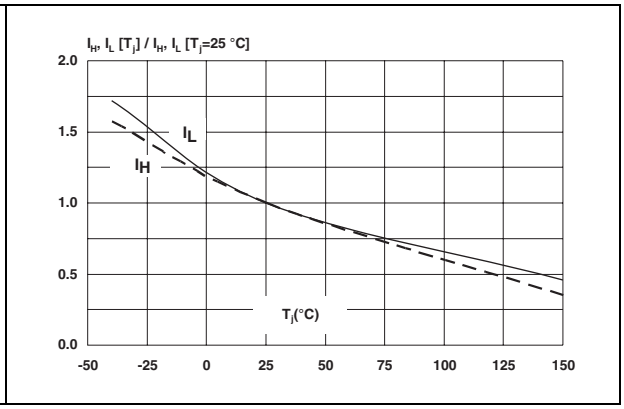



**Figure 7. Surge peak on-state current versus number of cycles**

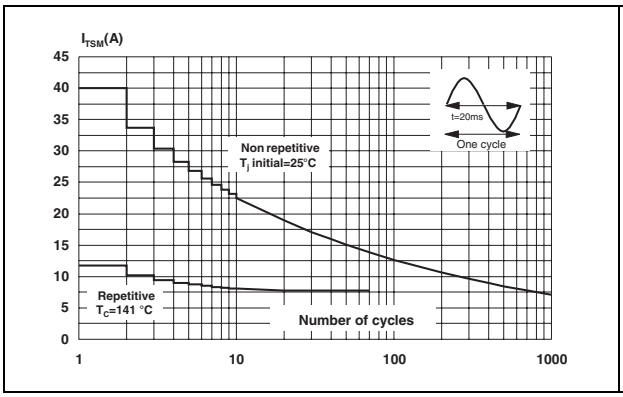



**Figure 8. Non-repetitive surge peak on-state current and corresponding value of $I^2t$**

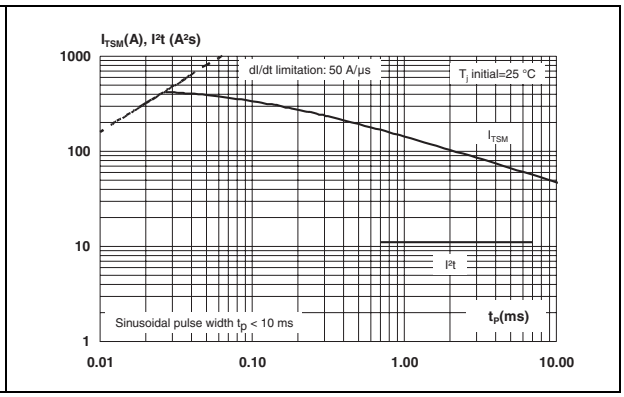



**Figure 9. On-state characteristics (maximum values)**

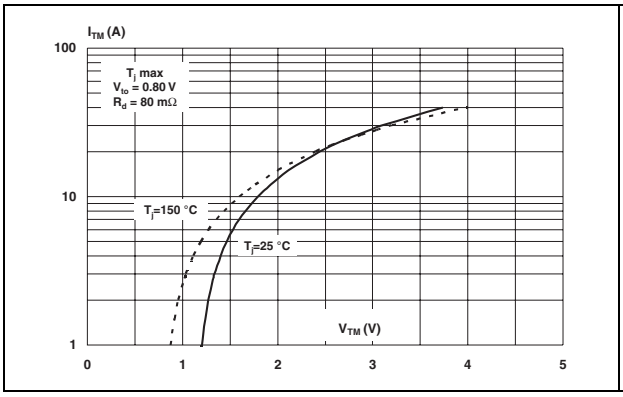



**Figure 10. Relative variation of critical rate of decrease of main current versus junction temperature**

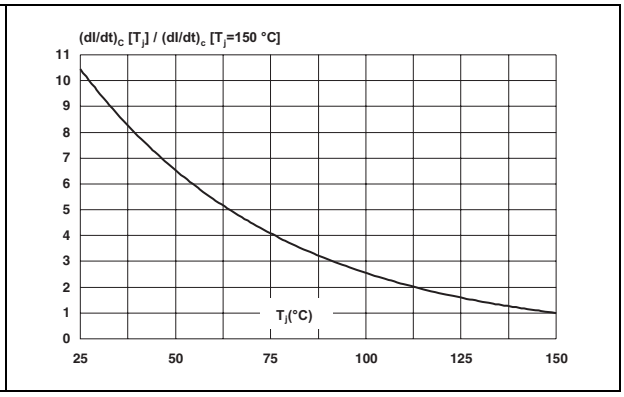


**Figure 11. Relative variation of critical rate of decrease of main current versus reapplied dV/dt (typical values)**

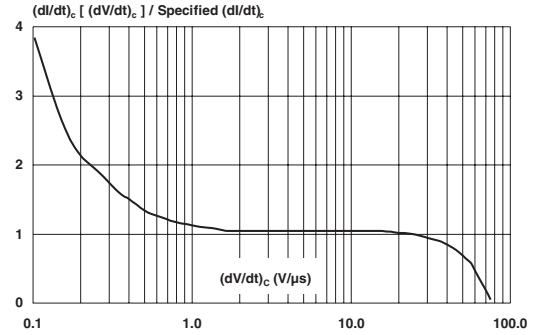



**Figure 12. Relative variation of static dV/dt immunity versus junction temperature**

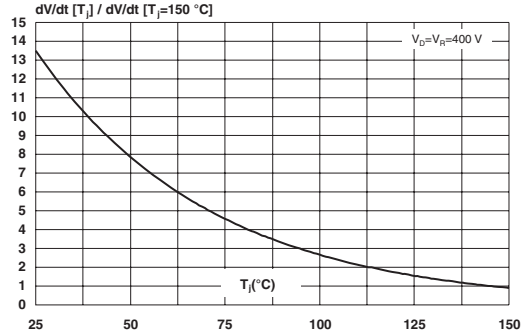



**Figure 13. Variation of leakage current versus junction temperature for different values of blocking voltage**

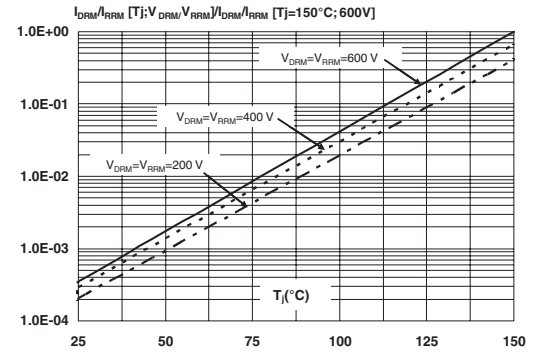
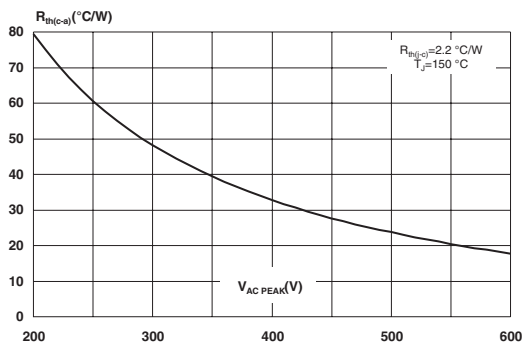
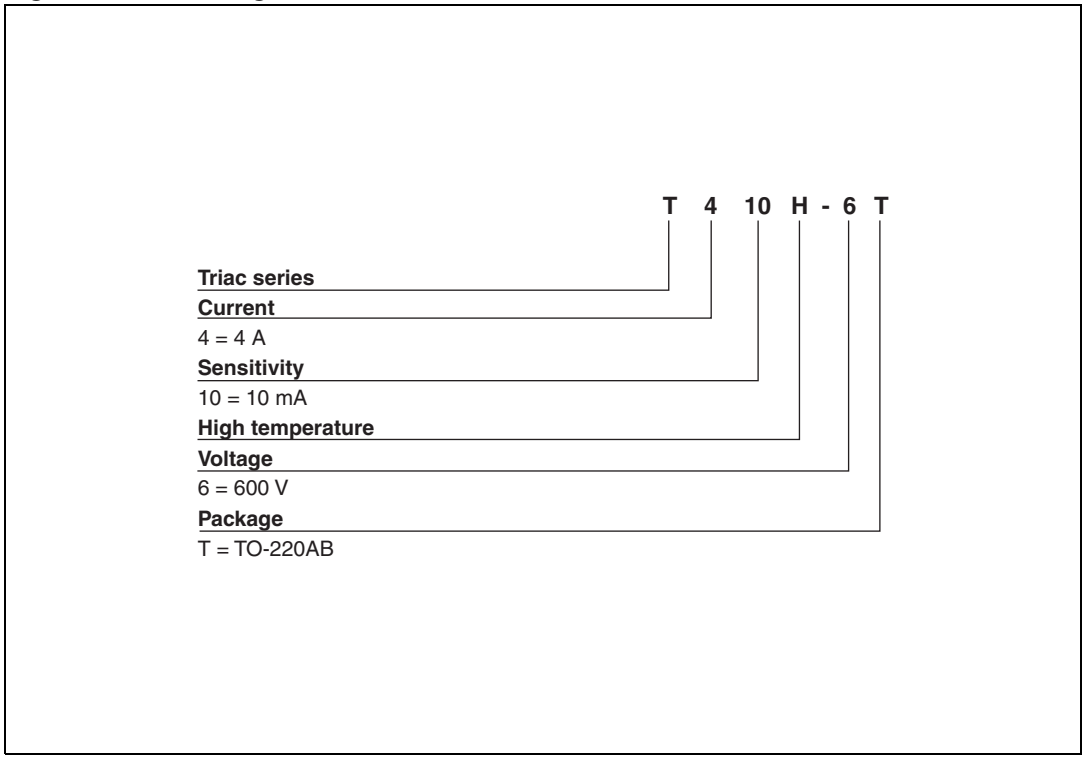



**Figure 14. Acceptable case to ambient thermal resistance versus repetitive peak off-state voltage**



# 2 Ordering information scheme

**Figure 15. Ordering information scheme**

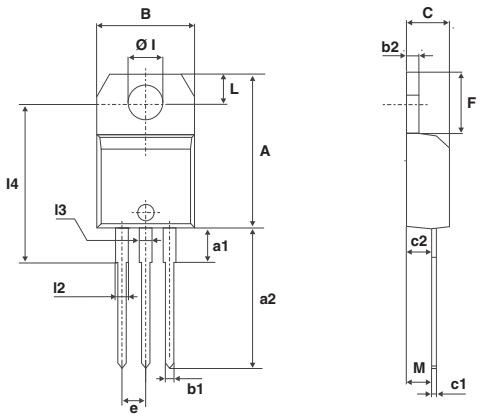


# 3 Package information

- Epoxy meets UL94, V0
- Recommended torque 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. ECOPACK® is an ST trademark.

**Table 6. TO-220AB dimensions**




| 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 | | 2.72 | 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 | |

# 4 Ordering information

**Table 7. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| T410H-6T | T410H 6T | TO-220AB | 2.3 g | 50 | Tube |

# 5 Revision history

**Table 8. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 15-May-2009 | 1 | First issue. |

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