# BTA40, BTA41, BTB41

## 40 A standard TRIACs

## Features

- High current TRIAC
- Low thermal resistance with clip bonding
- High commutation capability
- BTA series UL1557 certified (File ref: 81734)
- Packages are RoHS (2002/95/EC) compliant

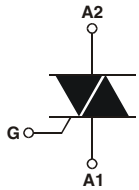
## Applications

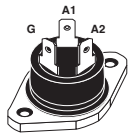
- On/off function in static relays, heating regulation, induction motor starting circuits
- Phase control operations in light dimmers, motor speed controllers, and similar

## Description

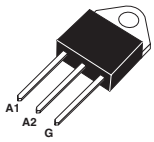
Available in high power packages, the BTA/BTB40-41 series is suitable for general purpose AC switching.

The BTA series provides an insulated tab (rated at 2500 V rms).

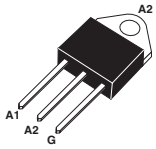



RD91 insulated (BTA40)




TOP3 insulated (BTA41)




TOP3 (BTB41)

**Table 1. Device summary**

| Symbol | Parameter | BTA40[1] | BTA41[1] | BTB41 | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | On-state rms current | 40 | 41 | 41 | A |
| $V_{DRM}/V_{RRM}$ | Repetitive peak off-state voltage | 600 and 800 | 600 and 800 | 600 and 800 | V |
| $I_{GT}$ | Triggering gate current | 50 | 50 | 50 | mA |

1. Insulated package

# 1 Characteristics

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | On-state rms current (full sine wave) | TOP3 | $T_c$ = 95 °C | 40 | A |
| | | RD91 / TOP ins. | $T_c$ = 80 °C | | |
| $I_{TSM}$ | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C) | F = 50 Hz | t = 20 ms | 400 | A |
| | | F = 60 Hz | t = 16.7 ms | 420 | |
| $I^2t$ | $I^2t$ Value for fusing | $t_p$ = 10 ms | | 1000 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100$ ns | F = 120 Hz | $T_j$ = 125 °C | 50 | A/µs |
| $V_{DSM}/V_{RSM}$ | Non repetitive surge peak off-state voltage | $t_p$ = 10 ms | $T_j$ = 25 °C | $V_{DSM}/V_{RSM}$ + 100 | V |
| $I_{GM}$ | Peak gate current | $t_p$ = 20 µs | $T_j$ = 125 °C | 8 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j$ = 125 °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 |

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

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{GT}$ (1) | $V_D$ = 12 V $R_L$ = 33 Ω | I - II - III<br>IV | MAX. | 50<br>100 | mA |
| $V_{GT}$ | | ALL | MAX. | 1.3 | V |
| $V_{GD}$ | $V_D = V_{DRM}$ $R_L$ = 3.3 kΩ $T_j$ = 125 °C | ALL | MIN. | 0.2 | V |
| $I_H$ (2) | $I_T$ = 500 mA | | MAX. | 80 | mA |
| $I_L$ | $I_G = 1.2\ I_{GT}$ | I - III - IV | MAX. | 70 | mA |
| | | II | | 160 | |
| dV/dt(2) | $V_D$ = 67% $V_{DRM}$ gate open | $T_j$ = 125 °C | MIN. | 500 | V/µs |
| (dV/dt)c(2) | (dI/dt)c = 20 A/ms | $T_j$ = 125 °C | MIN. | 10 | V/µs |

1. Minimum $I_{GT}$ is guaranted at 5% of $I_{GT}$ max.
2. for both polarities of A2 referenced to A1

**Table 4. Static characteristics**

| Symbol | Test conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $V_T$ (1) | $I_{TM}$ = 60 A $t_p$ = 380 µs | $T_j$ = 25 °C | MAX. | 1.55 | V |
| $V_{t0}$ (2) | Threshold voltage | $T_j$ = 125 °C | MAX. | 0.85 | V |
| $R_d$ (2) | Dynamic resistance | $T_j$ = 125 °C | MAX. | 10 | mΩ |
| $I_{DRM}$ $I_{RRM}$ | $V_{DRM} = V_{RRM}$ | $T_j$ = 25 °C | MAX. | 5 | µA |
| | | $T_j$ = 125 °C | | 5 | mA |

1. Minimum $I_{GT}$ is guaranted at 5% of $I_{GT}$ max.
2. for both polarities of A2 referenced to A1

**Table 5. Thermal resistance**

| Symbol | Test conditions | | Value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case (AC) | RD91 (insulated) / TOP3 insulated | 0.9 | °C/W |
| | | TOP3 | 0.6 | |
| $R_{th(j-a)}$ | Junction to ambient | TOP3 / TOP3 insulated | 50 | °C/W |

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

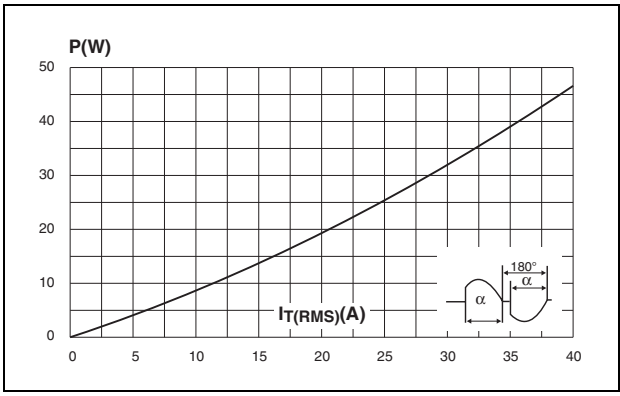



**Figure 2. On-state rms current versus case temperature (full cycle)**

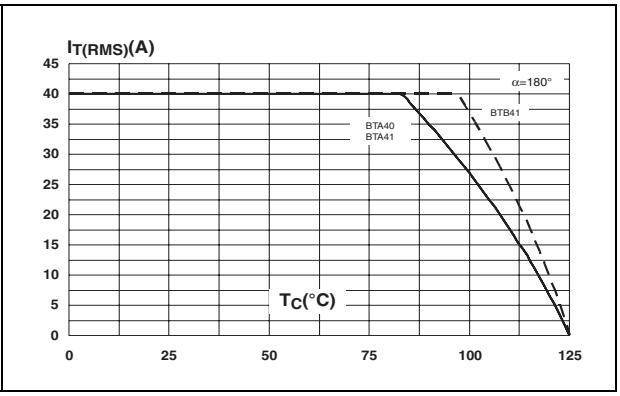



**Figure 3. Relative variation of thermal impedance versus pulse duration**

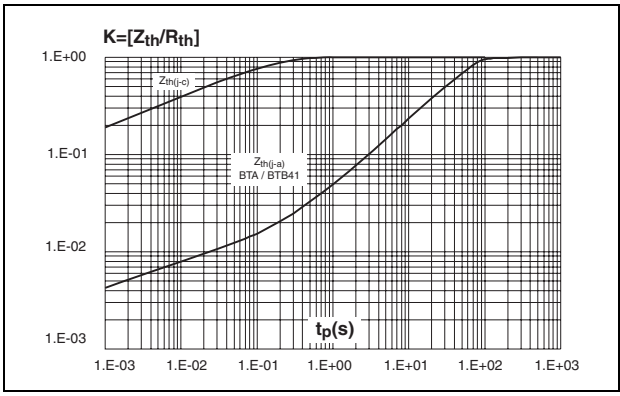



**Figure 4. On-state characteristics (maximum values)**

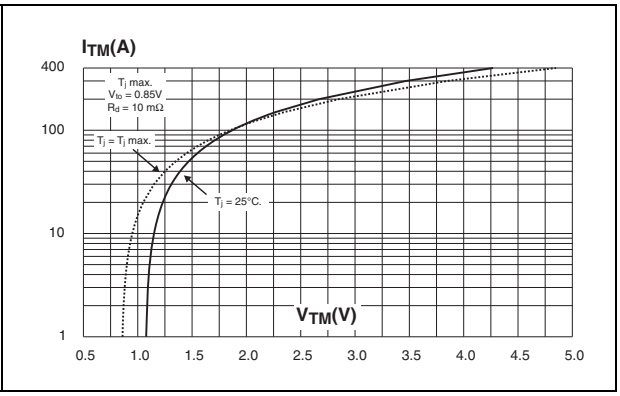


**Figure 5. Surge peak on-state current versus number of cycles**

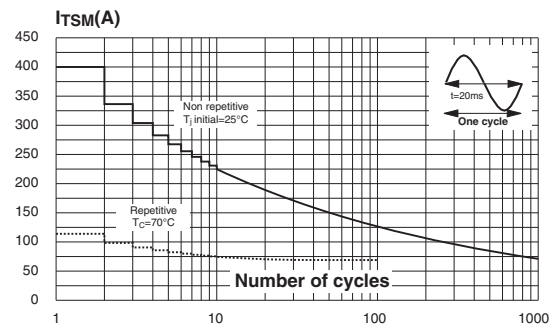



**Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding value of $I^2t$**

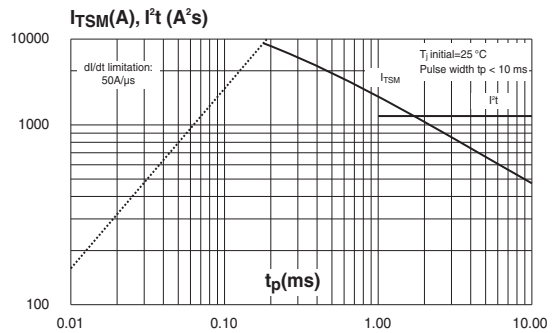



**Figure 7. Relative variation of gate trigger, holding and latching current versus junction temperature**

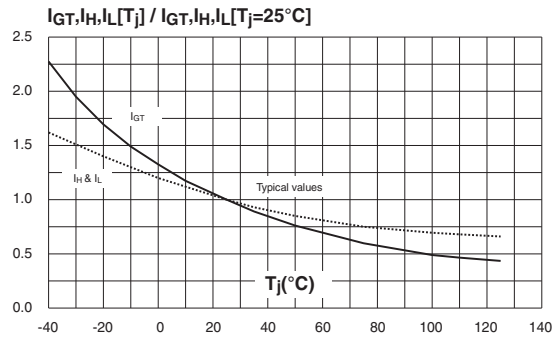



**Figure 8. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)**

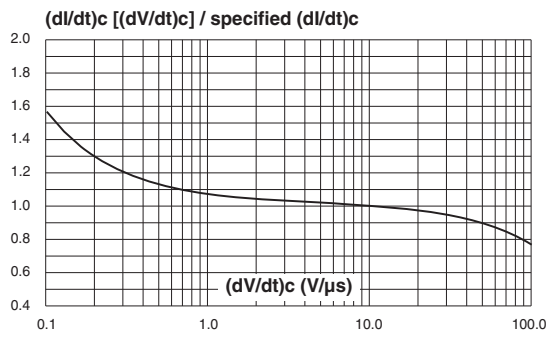
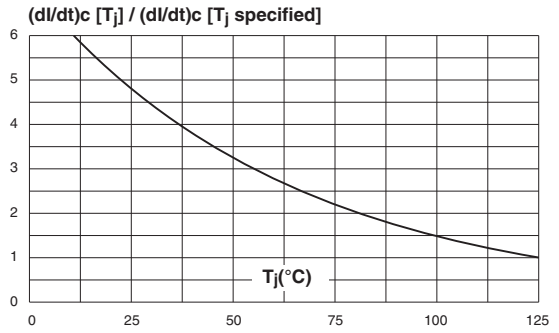
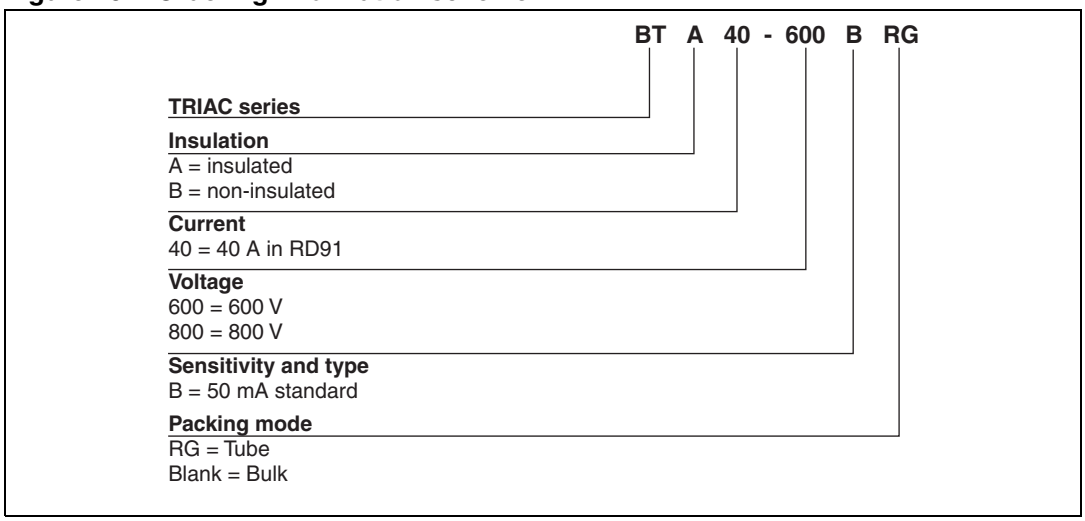



**Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c**



# 2 Ordering information scheme

**Figure 10. Ordering information scheme**

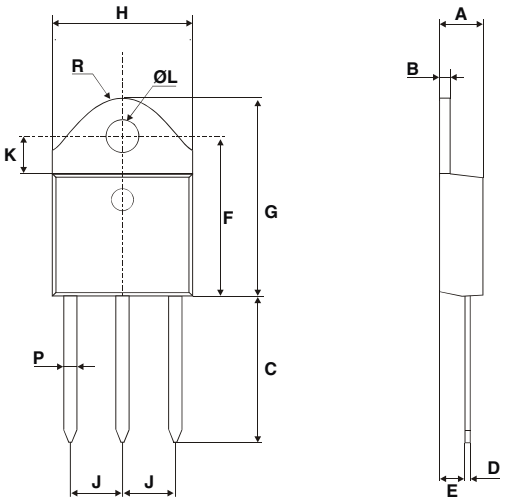


# 3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

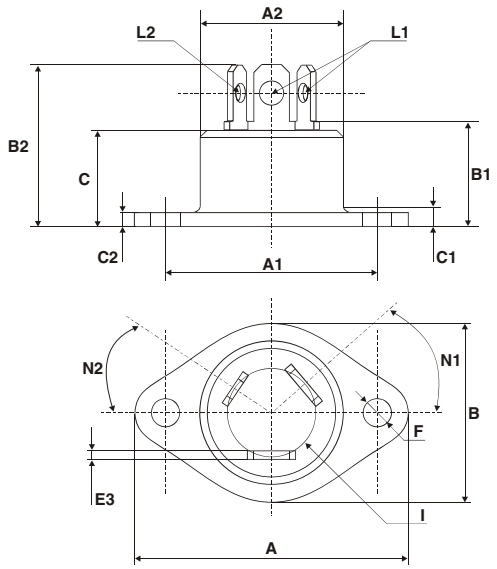
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

**Table 6. TOP3 insulated and non-insulated dimensions**




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 1.45 | 1.55 | 0.057 | 0.061 |
| C | 14.35 | 15.60 | 0.565 | 0.614 |
| D | 0.5 | 0.7 | 0.020 | 0.028 |
| E | 2.7 | 2.9 | 0.106 | 0.114 |
| F | 15.8 | 16.5 | 0.622 | 0.650 |
| G | 20.4 | 21.1 | 0.815 | 0.831 |
| H | 15.1 | 15.5 | 0.594 | 0.610 |
| J | 5.4 | 5.65 | 0.213 | 0.222 |
| K | 3.4 | 3.65 | 0.134 | 0.144 |
| ØL | 4.08 | 4.17 | 0.161 | 0.164 |
| P | 1.20 | 1.40 | 0.047 | 0.055 |
| R | 4.60 typ. | | 0.181 typ. | |

**Table 7. RD91 dimensions**




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | - | 40.00 | - | 1.575 |
| A1 | 29.90 | 30.30 | 1.177 | 1.193 |
| A2 | - | 22.00 | - | 0.867 |
| B | - | 27.00 | - | 1.063 |
| B1 | 13.50 | 16.50 | 0.531 | 0.650 |
| B2 | - | 24.00 | - | 0.945 |
| C | - | 14.00 | - | 0.551 |
| C1 | - | 3.50 | - | 0.138 |
| C2 | 1.95 | 3.00 | 0.077 | 0.118 |
| E3 | 0.70 | 0.90 | 0.027 | 0.035 |
| F | 4.00 | 4.50 | 0.157 | 0.177 |
| I | 11.20 | 13.60 | 0.441 | 0.535 |
| L1 | 3.10 | 3.50 | 0.122 | 0.138 |
| L2 | 1.70 | 1.90 | 0.067 | 0.075 |
| N1 | 33° | 43° | 33° | 43° |
| N2 | 28° | 38° | 28° | 38° |