



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).

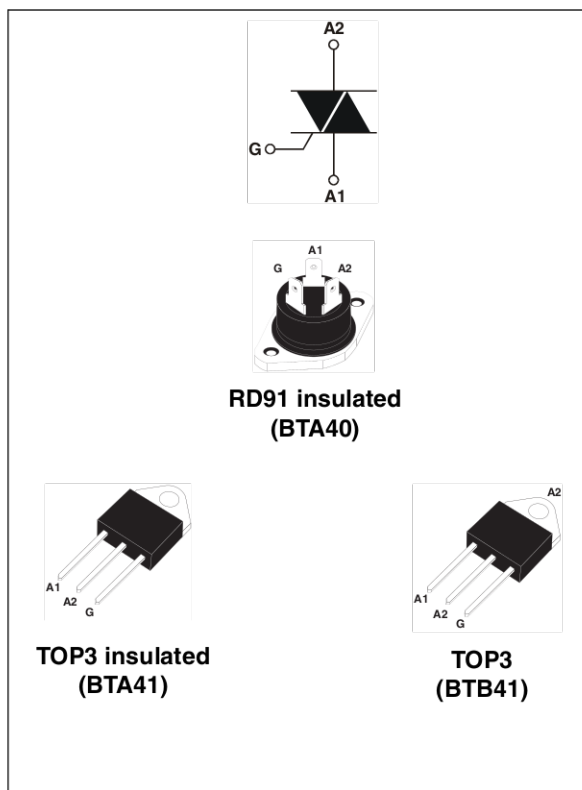


Table 1. Device summary

| 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 | $T_c = 95\text{ }^\circ\text{C}$ | 40 | A |
| | | RD91 / TOP ins. | $T_c = 80\text{ }^\circ\text{C}$ | | |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = $25\text{ }^\circ\text{C}$) | F = 50 Hz | t = 20 ms | 400 | A |
| | | F = 60 Hz | t = 16.7 ms | 420 | |
| I^2t | I^2t Value for fusing | $t_p = 10\text{ ms}$ | | 1000 | 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 = 120 Hz | $T_j = 125\text{ }^\circ\text{C}$ | 50 | $\text{A}/\mu\text{s}$ |
| V_{DSM}/V_{RSM} | Non repetitive surge peak off-state voltage | $t_p = 10\text{ ms}$ | $T_j = 25\text{ }^\circ\text{C}$ | $V_{DSM}/V_{RSM} + 100$ | V |
| I_{GM} | Peak gate current | $t_p = 20\text{ }\mu\text{s}$ | $T_j = 125\text{ }^\circ\text{C}$ | 8 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j = 125\text{ }^\circ\text{C}$ | 1 | W |
| T_{stg} T_j | Storage junction temperature range Operating junction temperature range | | | - 40 to + 150 - 40 to + 125 | $^\circ\text{C}$ |

Table 3. Electrical characteristics ($T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | | | Value | Unit |
|-------------------|--|-----------------------------------|------|-----------|------------------------|
| $I_{GT}^{(1)}$ | $V_D = 12\text{ V}$ $R_L = 33\text{ }\Omega$ | I - II - III IV | MAX. | 50 100 | mA |
| | | ALL | MAX. | 1.3 | |
| V_{GT} | | ALL | MAX. | 0.2 | V |
| V_{GD} | $V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 125\text{ }^\circ\text{C}$ | ALL | MIN. | 0.2 | V |
| $I_H^{(2)}$ | $I_T = 500\text{ mA}$ | | 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 | $T_j = 125\text{ }^\circ\text{C}$ | MIN. | 500 | $\text{V}/\mu\text{s}$ |
| $(dV/dt)_c^{(2)}$ | $(di/dt)_c = 20\text{ A/ms}$ | $T_j = 125\text{ }^\circ\text{C}$ | MIN. | 10 | $\text{V}/\mu\text{s}$ |

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

Table 4. Static characteristics

| Symbol | Test conditions | | Value | Unit | | |
|------------------------|------------------------|--------------------------|-----------------------------------|------|------|---------------|
| $V_T^{(1)}$ | $I_{TM} = 60\text{ A}$ | $t_p = 380\ \mu\text{s}$ | $T_j = 25\text{ }^\circ\text{C}$ | MAX. | 1.55 | V |
| $V_{T0}^{(2)}$ | Threshold voltage | | $T_j = 125\text{ }^\circ\text{C}$ | MAX. | 0.85 | V |
| $R_d^{(2)}$ | Dynamic resistance | | $T_j = 125\text{ }^\circ\text{C}$ | MAX. | 10 | m Ω |
| I_{DRM} I_{RRM} | $V_{DRM} = V_{RRM}$ | | $T_j = 25\text{ }^\circ\text{C}$ | MAX. | 5 | μA |
| | | | $T_j = 125\text{ }^\circ\text{C}$ | | 5 | mA |

1. Minimum I_{GT} is guaranteed at 5% of $I_{GT\text{ max}}$.
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 | $^\circ\text{C/W}$ |
| | | TOP3 | 0.6 | |
| $R_{th(j-a)}$ | Junction to ambient | TOP3 / TOP3 insulated | 50 | $^\circ\text{C/W}$ |

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

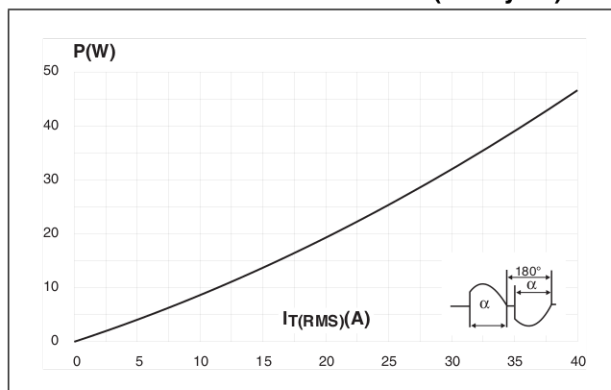


Figure 2. On-state rms current versus case temperature (full cycle)

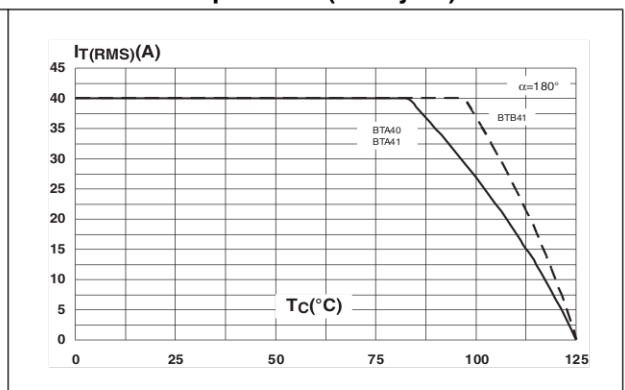


Figure 3. Relative variation of thermal impedance versus pulse duration

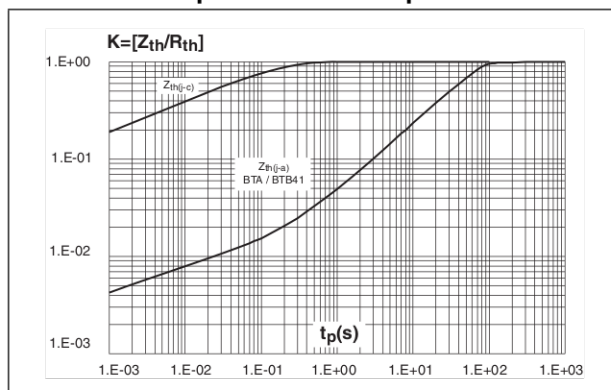


Figure 4. On-state characteristics (maximum values)

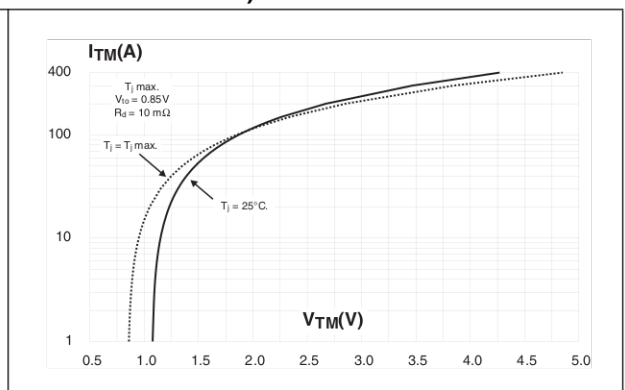


Figure 5. Surge peak on-state current versus number of cycles

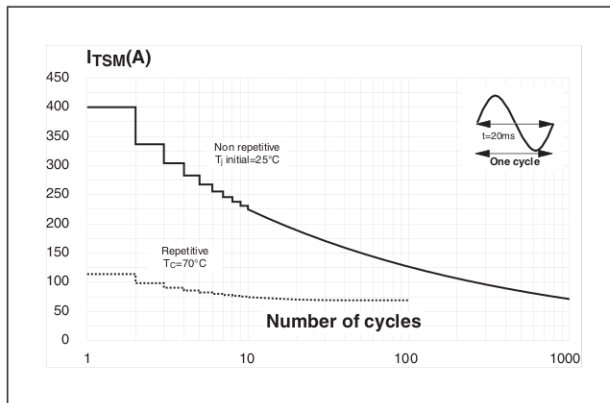


Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding value of I^2t

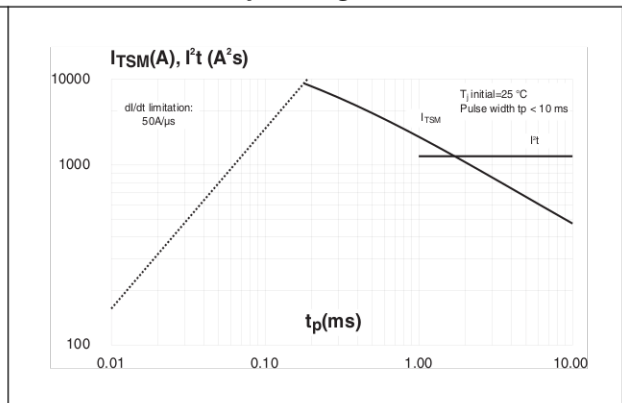


Figure 7. Relative variation of gate trigger, holding and latching current versus junction temperature

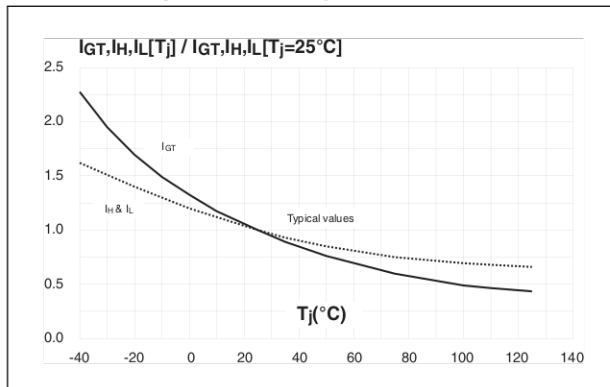


Figure 8. Relative variation of critical rate of decrease of main current versus $(dV/dt)c$ (typical values)

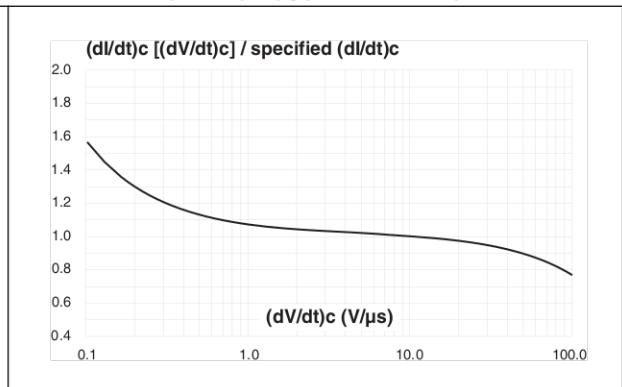
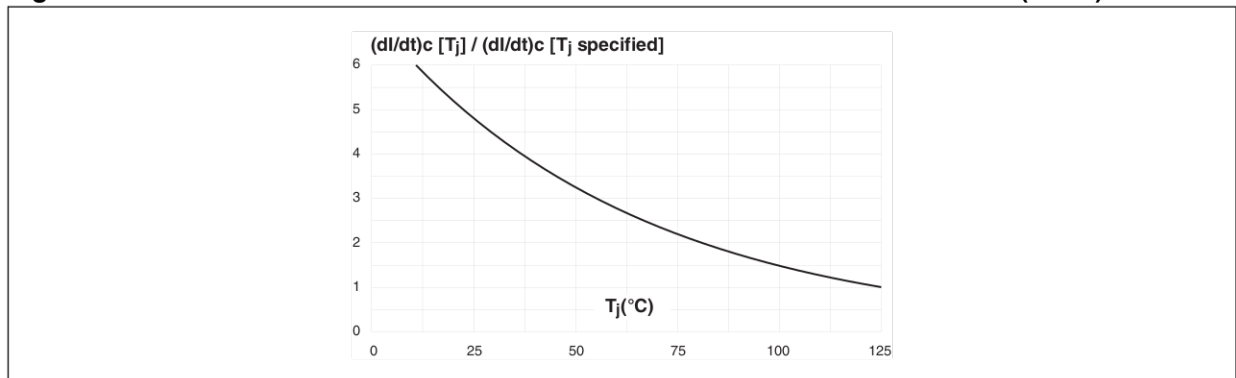
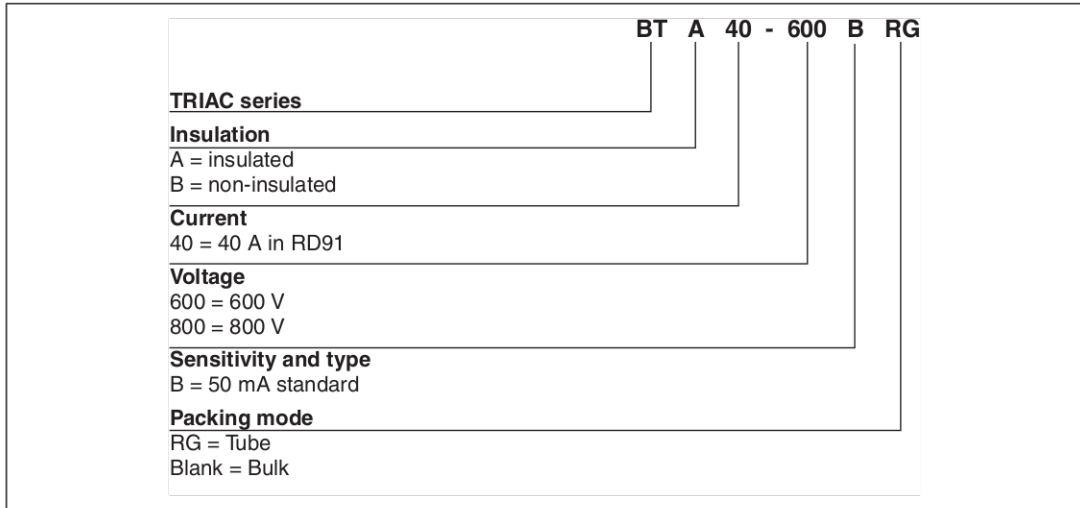


Figure 9. Relative variation of critical rate of decrease of main current versus $(dV/dt)c$



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. | |

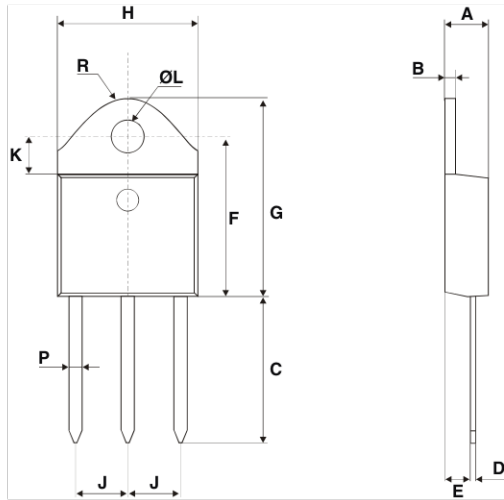


Table 7. RD91 dimensions

| 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° |

4 Ordering information

Table 8. Ordering information

| Order code ⁽¹⁾ | Marking | Package | Weight | Base qty | Delivery mode |
|---------------------------|-----------|-----------|--------|----------|---------------|
| BTA40-xxxB | BTA40xxxB | RD91 | 20 g | 25 | Bulk |
| BTA41-xxxBRG | BTA41xxxB | TOP3 Ins. | 4.5 g | 30 | Tube |
| BTB41-xxxBRG | BTB41xxxB | TOP3 | 4.5 g | 30 | Tube |

1. xxx = voltage

5 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|---|
| Sep-2003 | 5 | Last update. |
| 25-Mar-2005 | 6 | TOP3 delivery mode changed from bulk to tube. |
| 14-Oct-2005 | 7 | T _c values for I _T changed in Table 3. ECOPACK statement added. |
| 10-Aug-2009 | 8 | Updated Table 2 to correctly place packages. Updated Figure 2 . Table 5 changed to correctly place TOP3. Updated ECOPACK statement. |

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