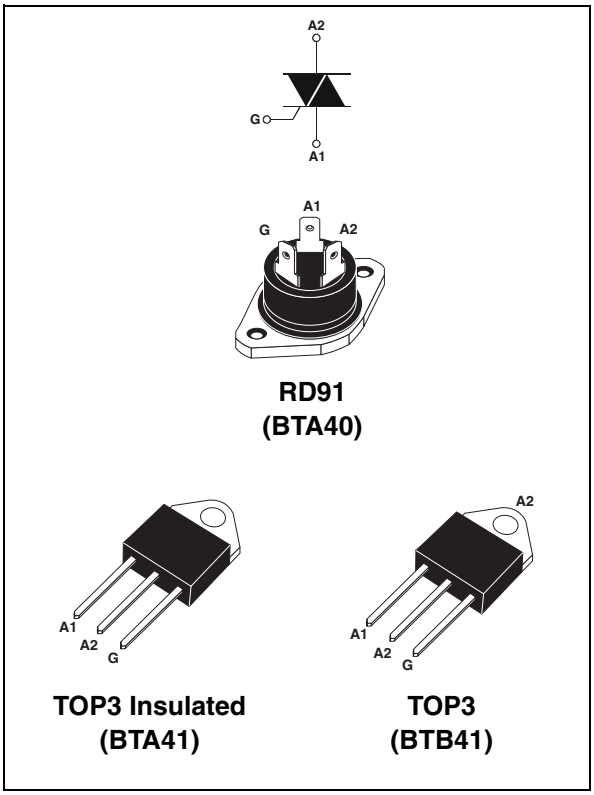
JSMICRO
SEMICONDUCTOR

# BTB41-600BRG

**Table 1: Main Features**

| Symbol | Value | Unit |
|---|---|---|
| $I_{T(RMS)}$ | 40 | A |
| $V_{DRM}/V_{RRM}$ | 600 and 800 | V |
| $I_{GT\ (Q_1)}$ | 50 | mA |




**RD91 (BTA40)**

**TOP3 Insulated (BTA41)**

**TOP3 (BTB41)**

**DESCRIPTION**

Available in high power packages, the **BTA/ BTB40-41** series is suitable for general purpose AC switching. They can be used as an ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits... or for phase control operation in light dimmers, motor speed controllers, ...

Thanks to their clip assembly technique, they provide a superior performance in surge current handling capabilities.

By using an internal ceramic pad, the BTA series provides voltage insulated tab (rated at $2500V_{RMS}$) complying with UL standards (File ref.: E81734).

**Table 2: Order Codes**

| Part Number | Marking |
|---|---|
| BTA40-xxxB | See table 8 on page 6 |
| BTA41-xxxBRG | |
| BTB41-xxxBRG | |

**Table 3: Absolute Maximum Ratings**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | RD91 / TOP3 | $T_c$ = 95°C | 40 | A |
| | | 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 | | 880 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current $I_G$ = 2 x $I_{GT}$ , $t_r \leq$ 100 ns | F = 120 Hz | $T_j$ = 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 |

**Tables 4: Electrical Characteristics** ($T_j$ = 25°C, unless otherwise specified)

| Symbol | Test Conditions | Quadrant | | 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 |

**Table 5: Static Characteristics**

| Symbol | Test Conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $V_T$ (2) | $I_{TM}$ = 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 |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}$ | $T_j$ = 25°C | MAX. | 5 | µA |
| | | $T_j$ = 125°C | | 5 | mA |

**Note 1:** minimum $I_{GT}$ is guaranted at 5% of $I_{GT}$ max.

**Note 2:** for both polarities of A2 referenced to A1.

**Table 6: Thermal resistance**

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

S = Copper surface under tab.

**Figure 1: Maximum power dissipation versus RMS on-state current (full cycle)**

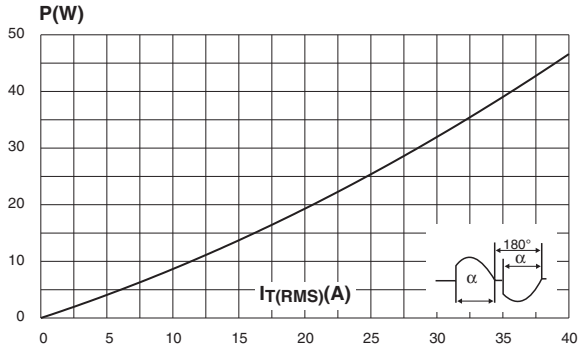



**Figure 2: RMS on-state current versus case temperature (full cycle)**

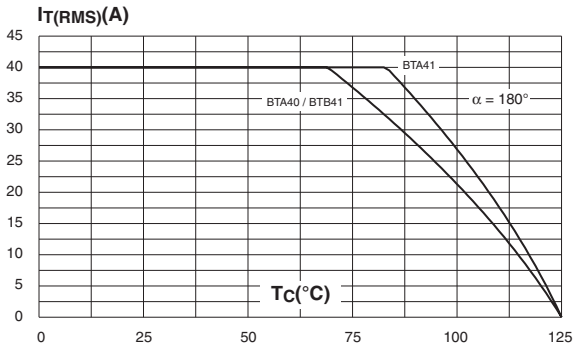



**Figure 3: Relative variation of thermal impedance versus pulse duration**

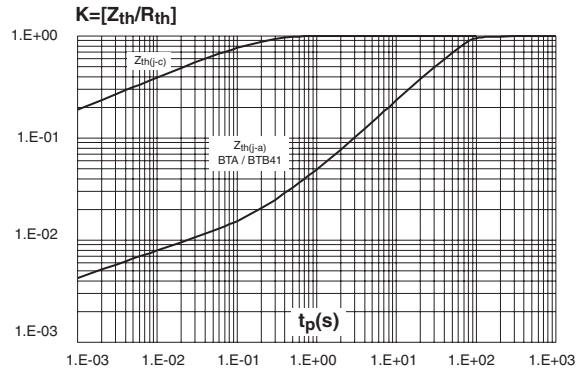



**Figure 4: On-state characteristics (maximum values)**

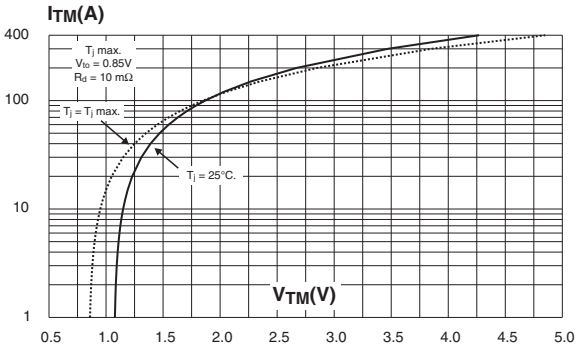


**Figure 5: Surge peak on-state current versus number of cycles**

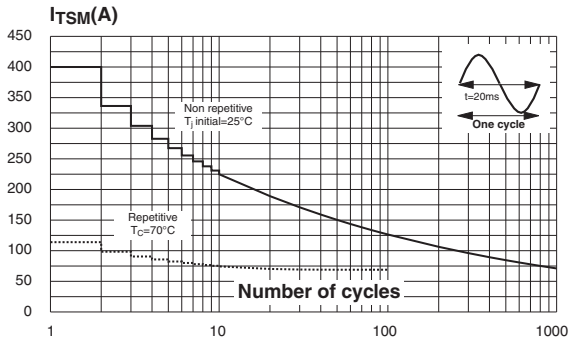



**Figure 6: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p$ < 10 ms and corresponding value of $I^2t$**

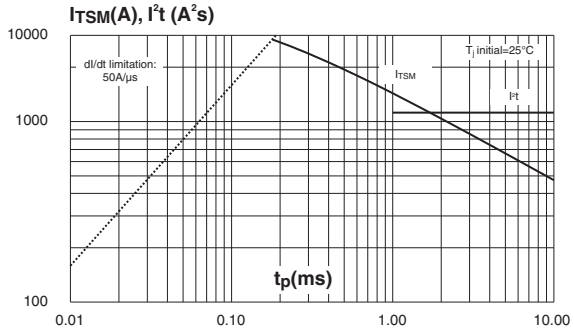



**Figure 7: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)**

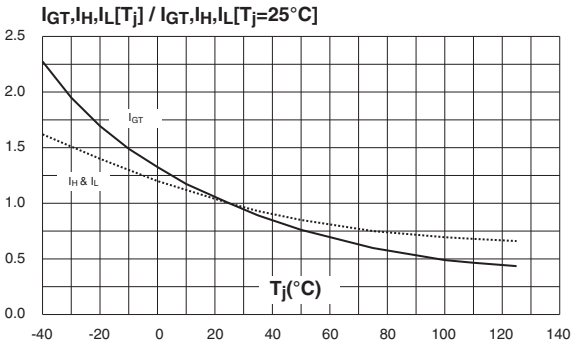



**Figure 8: Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)**

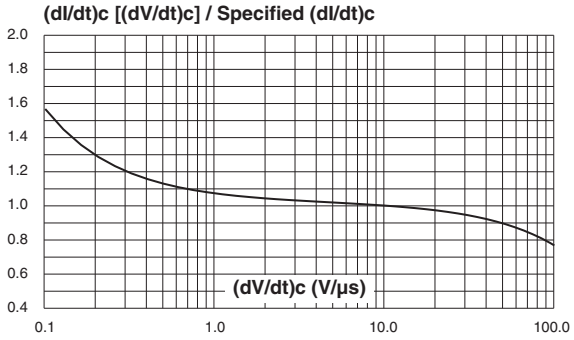



**Figure 9: Relative variation of critical rate of decrease of main current versus (dV/dt)c**

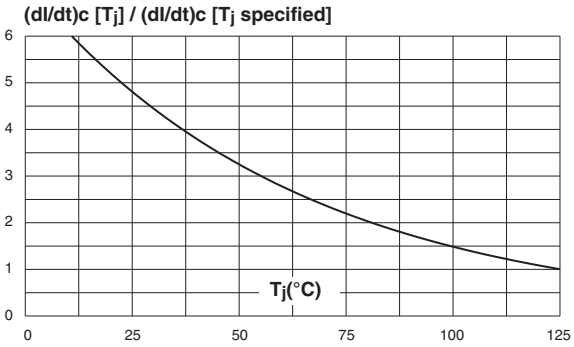


**Figure 10: Ordering Information Scheme**

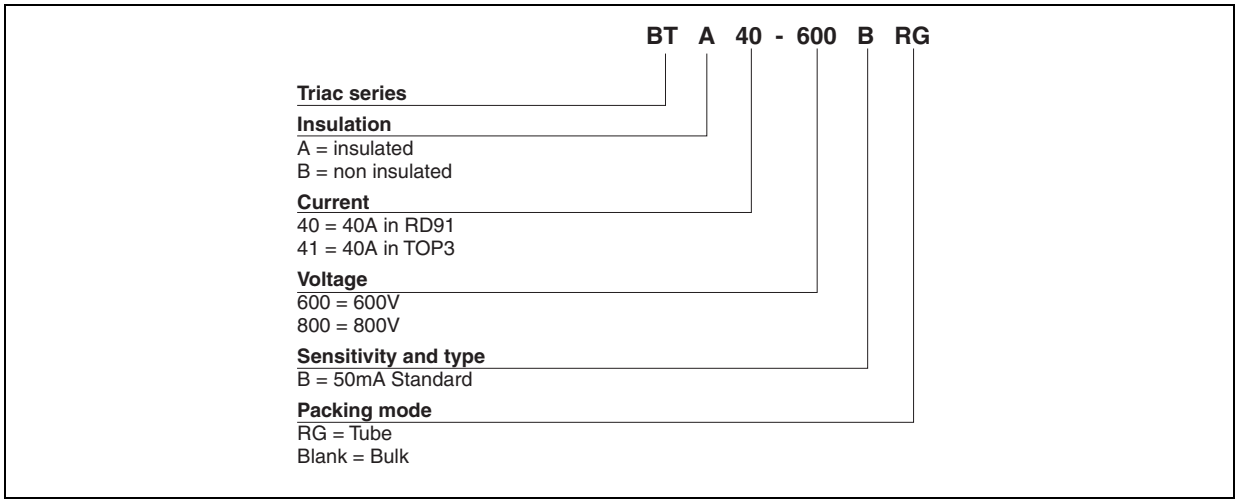
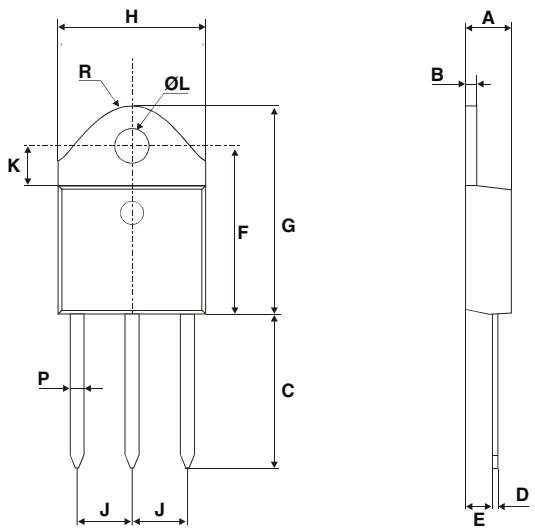



**Table 7: Product Selector**

| Part Numbers | Voltage (xxx) | | Sensitivity | Type | Package |
|---|---|---|---|---|---|
| | 600 V | 800 V | | | |
| BTA40-xxxB | X | X | 50 mA | Standard | RD91 |
| BTA41-xxxBRG | X | X | 50 mA | Standard | TOP3 Ins. |
| BTB41-xxxBRG | X | X | 50 mA | Standard | TOP3 |

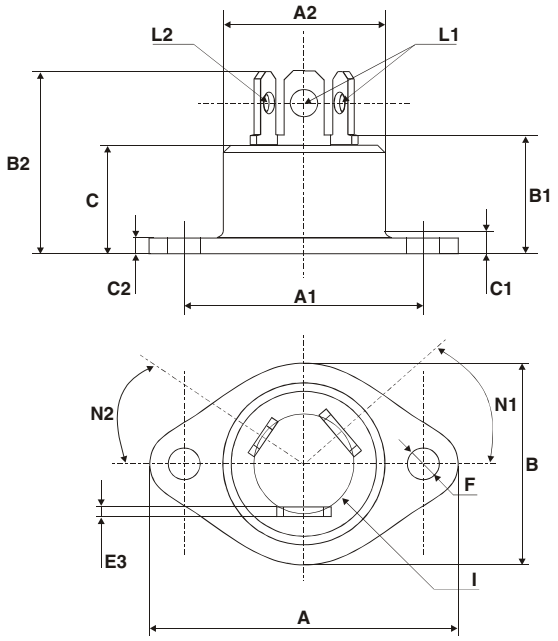
**BTB:** non insulated TOP3 package

**Figure 11: TOP3 (Insulated and non insulated) Package Mechanical Data**




| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | 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 | | | 0.181 | |

**Figure 12: RD91 Package Mechanical Data**




| 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° |

**Table 8: Ordering Information**

| Ordering type | 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 |

**Note:** xxx = voltage

**Table 9: Revision History**

| Date | Revision | Description of 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. |

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