



# BTA/BTB06 Series

SNUBBERLESS™, LOGIC LEVEL & STANDARD

6A TRIACs

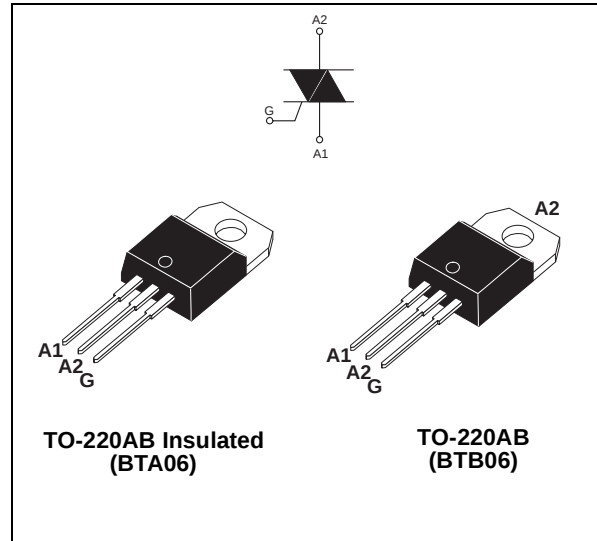
## MAIN FEATURES:

| Symbol            | Value       | Unit |
|-------------------|-------------|------|
| $I_{T(RMS)}$      | 6           | A    |
| $V_{DRM}/V_{RRM}$ | 600 and 800 | V    |
| $I_G(Q_1)$        | 5 to 50     | mA   |

## DESCRIPTION

Suitable for AC switching operations, the BTA/BTB06 series can be used as an ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits... or for phase control in light dimmers, motor speed controllers,...

The snubberless and logic level versions (BTA/BTB...W) are specially recommended for use on inductive loads, thanks to their high commutation performances. By using an internal ceramic pad, the BTA series provides voltage insulated tab (rated at 2500V RMS) complying with UL standards (File ref.: E81734)



## ABSOLUTE MAXIMUM RATINGS

| Symbol             | Parameter                                                                                       |                               |                           | Value                          | Unit                   |
|--------------------|-------------------------------------------------------------------------------------------------|-------------------------------|---------------------------|--------------------------------|------------------------|
| $I_{T(RMS)}$       | RMS on-state current (full sine wave)                                                           | TO-220AB                      | $T_c = 110^\circ\text{C}$ | 6                              | A                      |
|                    |                                                                                                 | TO-220AB Ins.                 | $T_c = 105^\circ\text{C}$ |                                |                        |
| $I_{TSM}$          | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25^\circ\text{C}$ )    | $F = 50\text{ Hz}$            | $t = 20\text{ ms}$        | 60                             | A                      |
|                    |                                                                                                 | $F = 60\text{ Hz}$            | $t = 16.7\text{ ms}$      | 63                             |                        |
| $I^2t$             | $I^2t$ Value for fusing                                                                         | $t_p = 10\text{ ms}$          |                           | 21                             | $\text{A}^2\text{s}$   |
| $di/dt$            | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$ | $F = 120\text{ Hz}$           | $T_j = 125^\circ\text{C}$ | 50                             | $\text{A}/\mu\text{s}$ |
| $I_{GM}$           | Peak gate current                                                                               | $t_p = 20\text{ }\mu\text{s}$ | $T_j = 125^\circ\text{C}$ | 4                              | A                      |
| $P_{G(AV)}$        | Average gate power dissipation                                                                  |                               | $T_j = 125^\circ\text{C}$ | 1                              | W                      |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                      |                               |                           | - 40 to + 150<br>- 40 to + 125 | $^\circ\text{C}$       |

## BTA/BTB06 Series

### ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C, unless otherwise specified)

#### ■ SNUBBERLESS™ and LOGIC LEVEL (3 Quadrants)

| Symbol                   | Test Conditions                                                                     | Quadrant     |      | BTA/BTB06 |     |     |      | Unit |
|--------------------------|-------------------------------------------------------------------------------------|--------------|------|-----------|-----|-----|------|------|
|                          |                                                                                     |              |      | TW        | SW  | CW  | BW   |      |
| I <sub>GT</sub> (1)      | V <sub>D</sub> = 12 V      R <sub>L</sub> = 30 Ω                                    | I - II - III | MAX. | 5         | 10  | 35  | 50   | mA   |
| V <sub>GT</sub>          |                                                                                     | I - II - III | MAX. | 1.3       |     |     |      | V    |
| V <sub>GD</sub>          | V <sub>D</sub> = V <sub>DRM</sub> R <sub>L</sub> = 3.3 kΩ<br>T <sub>j</sub> = 125°C | I - II - III | MIN. | 0.2       |     |     |      | V    |
| I <sub>H</sub> (2)       | I <sub>T</sub> = 100 mA                                                             |              | MAX. | 10        | 15  | 35  | 50   | mA   |
| I <sub>L</sub>           | I <sub>G</sub> = 1.2 I <sub>GT</sub>                                                | I - III      | MAX. | 10        | 25  | 50  | 70   | mA   |
|                          |                                                                                     | II           |      | 15        | 30  | 60  | 80   |      |
| dV/dt (2)                | V <sub>D</sub> = 67 %V <sub>DRM</sub> gate open<br>T <sub>j</sub> = 125°C           |              | MIN. | 20        | 40  | 400 | 1000 | V/μs |
| (dI/dt) <sub>c</sub> (2) | (dV/dt) <sub>c</sub> = 0.1 V/μs    T <sub>j</sub> = 125°C                           |              | MIN. | 2.7       | 3.5 | -   | -    | A/ms |
|                          | (dV/dt) <sub>c</sub> = 10 V/μs    T <sub>j</sub> = 125°C                            |              |      | 1.2       | 2.4 | -   | -    |      |
|                          | Without snubber    T <sub>j</sub> = 125°C                                           |              |      | -         | -   | 3.5 | 5.3  |      |

#### ■ STANDARD (4 Quadrants)

| Symbol                   | Test Conditions                                                                     | Quadrant           |      | BTA/BTB06 |           | Unit |
|--------------------------|-------------------------------------------------------------------------------------|--------------------|------|-----------|-----------|------|
|                          |                                                                                     |                    |      | C         | B         |      |
| I <sub>G</sub> (1)       | V <sub>D</sub> = 12 V    R <sub>L</sub> = 30 Ω                                      | I - II - III<br>IV | MAX. | 25<br>50  | 50<br>100 | mA   |
| V <sub>GT</sub>          |                                                                                     | ALL                | MAX. | 1.3       |           | V    |
| V <sub>GD</sub>          | V <sub>D</sub> = V <sub>DRM</sub> R <sub>L</sub> = 3.3 kΩ    T <sub>j</sub> = 125°C | ALL                | MIN. | 0.2       |           | V    |
| I <sub>H</sub> (2)       | I <sub>T</sub> = 500 mA                                                             |                    | MAX. | 25        | 50        | mA   |
| I <sub>L</sub>           | I <sub>G</sub> = 1.2 I <sub>GT</sub>                                                | I - III - IV       | MAX. | 40        | 50        | mA   |
|                          |                                                                                     | II                 |      | 80        | 100       |      |
| dV/dt (2)                | V <sub>D</sub> = 67 %V <sub>DRM</sub> gate open    T <sub>j</sub> = 125°C           |                    | MIN. | 200       | 400       | V/μs |
| (dV/dt) <sub>c</sub> (2) | (dI/dt) <sub>c</sub> = 2.7 A/ms    T <sub>j</sub> = 125°C                           |                    | MIN. | 5         | 10        | V/μs |

### STATIC CHARACTERISTICS

| Symbol              | Test Conditions                        |                                | Value | Unit |
|---------------------|----------------------------------------|--------------------------------|-------|------|
| V <sub>T</sub> (2)  | I <sub>TM</sub> = 5.5 A    tp = 380 μs | T <sub>j</sub> = 25°C    MAX.  | 1.55  | V    |
| V <sub>to</sub> (2) | Threshold voltage                      | T <sub>j</sub> = 125°C    MAX. | 0.85  | V    |
| R <sub>d</sub> (2)  | Dynamic resistance                     | T <sub>j</sub> = 125°C    MAX. | 60    | mΩ   |
| I <sub>DRM</sub>    | V <sub>DRM</sub> = V <sub>RRM</sub>    | T <sub>j</sub> = 25°C          | 5     | μA   |
| I <sub>RRM</sub>    |                                        | T <sub>j</sub> = 125°C         | 1     | mA   |

**Note 1:** minimum I<sub>GT</sub> is guaranteed at 5% of I<sub>GT</sub> max.

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

## THERMAL RESISTANCES

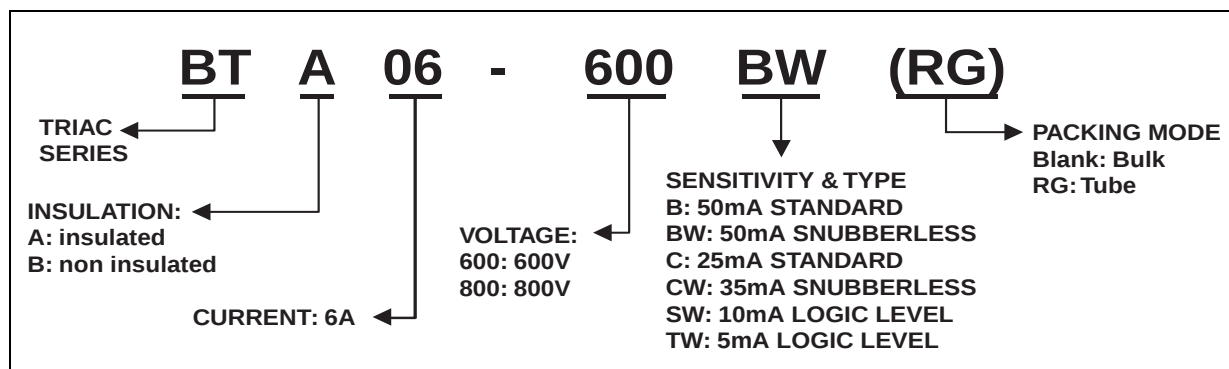
| Symbol        | Parameter             | Value                          | Unit |
|---------------|-----------------------|--------------------------------|------|
| $R_{th(j-c)}$ | Junction to case (AC) | TO-220AB                       | °C/W |
|               |                       | TO-220AB Insulated             |      |
| $R_{th(j-a)}$ | Junction to ambient   | TO-220AB<br>TO-220AB Insulated | °C/W |

## PRODUCT SELECTOR

| Part Number     | Voltage (xxx) |       | Sensitivity | Type        | Package  |
|-----------------|---------------|-------|-------------|-------------|----------|
|                 | 600 V         | 800 V |             |             |          |
| BTA/BTB06-xxxB  | X             | X     | 50 mA       | Standard    | TO-220AB |
| BTA/BTB06-xxxBW | X             | X     | 50 mA       | Snubberless | TO-220AB |
| BTA/BTB06-xxxC  | X             | X     | 25 mA       | Standard    | TO-220AB |
| BTA/BTB06-xxxCW | X             | X     | 35 mA       | Snubberless | TO-220AB |
| BTA/BTB06-xxxsW | X             | X     | 10 mA       | Logic level | TO-220AB |
| BTA/BTB06-xxsTW | X             | X     | 5 mA        | Logic level | TO-220AB |

BTB: non insulated TO-220AB package

## ORDERING INFORMATION

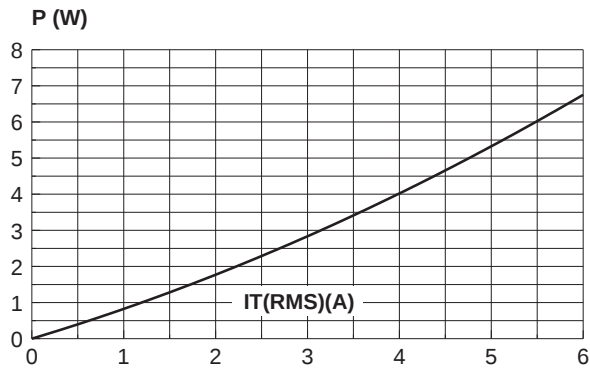


## OTHER INFORMATION

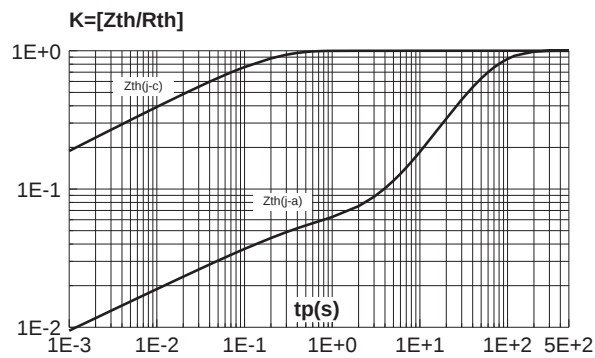
| Part Number       | Marking         | Weight | Base quantity | Packing mode |
|-------------------|-----------------|--------|---------------|--------------|
| BTA/BTB06-xxxyz   | BTA/BTB06-xxxyz | 2.3 g  | 250           | Bulk         |
| BTA/BTB06-xxxyzRG | BTA/BTB06-xxxyz | 2.3 g  | 50            | Tube         |

**Note:** xxx = voltage, y = sensitivity, z = type

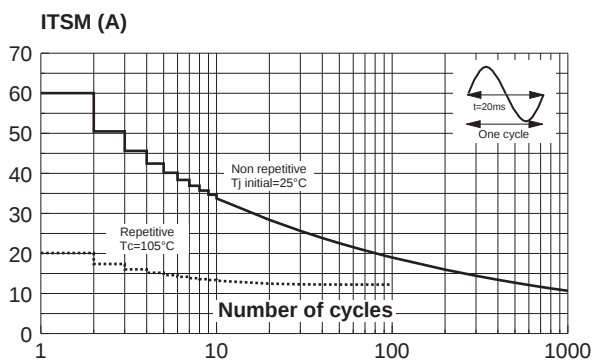
**Fig. 1:** Maximum power dissipation versus RMS on-state current (full cycle).



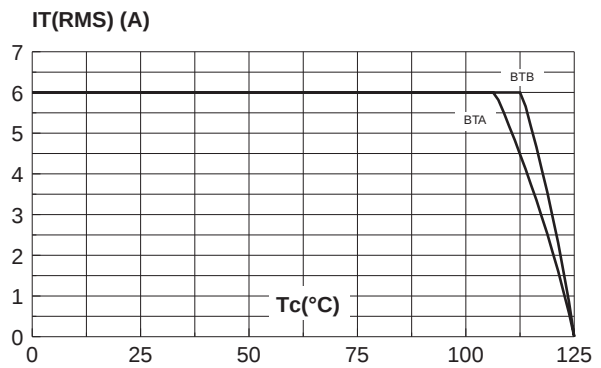
**Fig. 3:** Relative variation of thermal impedance versus pulse duration.



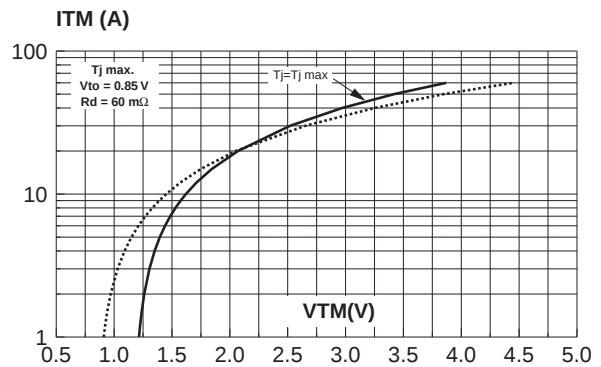
**Fig. 5:** Surge peak on-state current versus number of cycles.



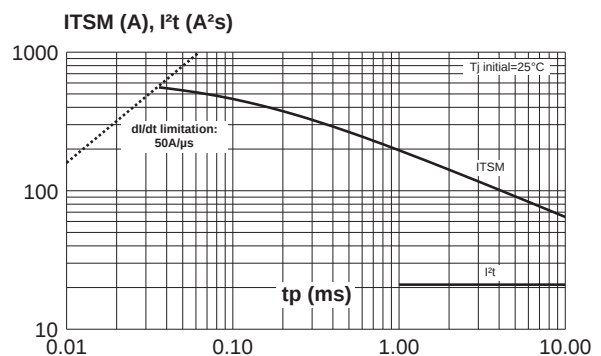
**Fig. 2:** RMS on-state current versus case temperature (full cycle).



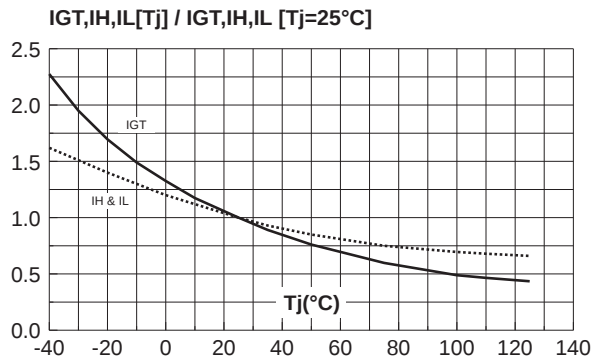
**Fig. 4:** On-state characteristics (maximum values).



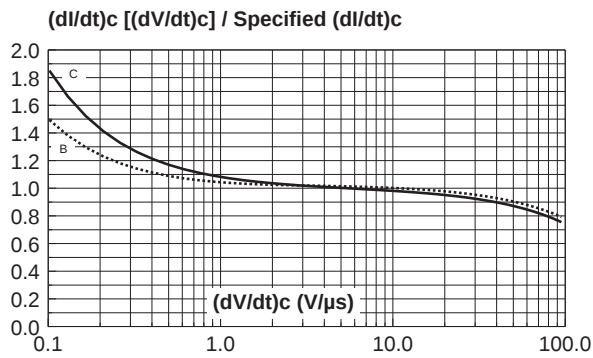
**Fig. 6:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$ , and corresponding value of  $I^2t$ .



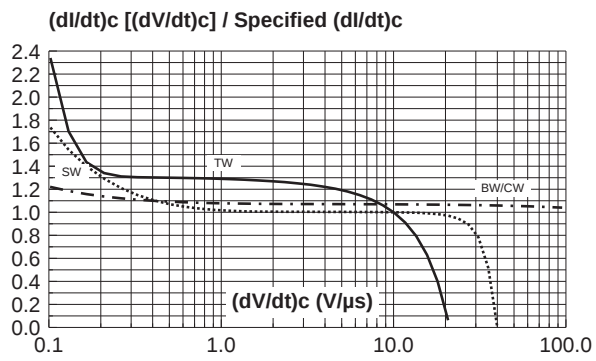
**Fig. 7:** Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).



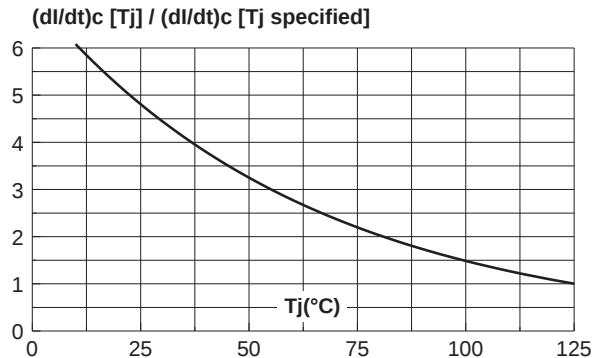
**Fig. 8-2:** Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values). Standard Types



**Fig. 8-1:** Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values). Snubberless & Logic Level Types



**Fig. 9:** Relative variation of critical rate of decrease of main current versus junction temperature.



## PACKAGE MECHANICAL DATA

TO-220AB / TO-220AB Ins.

| 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 |
| I    | 3.75        |       | 3.85  | 0.147  |       | 0.151 |
| I4   | 15.80       | 16.40 | 16.80 | 0.622  | 0.646 | 0.661 |
| L    | 2.65        |       | 2.95  | 0.104  |       | 0.116 |
| I2   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| I3   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| M    |             | 2.60  |       |        | 0.102 |       |

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