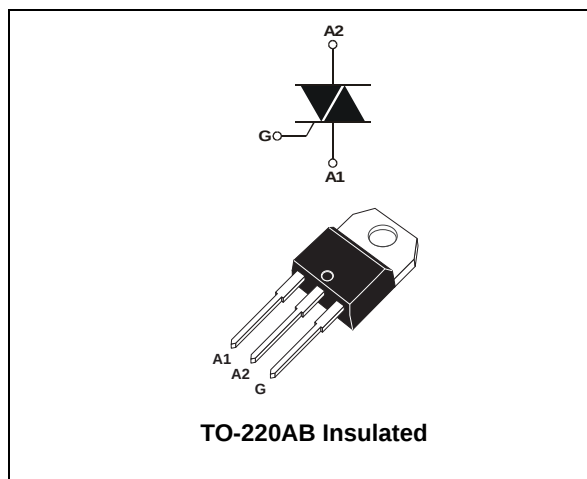


## 20 A Snubberless™ Triacs

Datasheet - production data



### Features

- $I_{T(RMS)} = 20\text{ A}$
- $V_{DRM}, V_{RRM} = 600\text{ and }700\text{ V}$
- $I_{GT(Q1)}(\text{max}) = 35\text{ and }50\text{ mA}$

### Description

The BTA20 Triacs use high performance glass passivated chip technology. The Snubberless concept offers suppression of the RC network and is suitable for applications such as phase control and static switching on inductive or resistive load.

Thanks to their clip assembly technique, the BTA20 Triacs provide a superior performance in surge current handling capabilities.

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

TM: Snubberless is a trademark of STMicroelectronics.

# 1 Characteristics

**Table 1. Absolute maximum ratings**

| Symbol                                 | Parameter                                                                                                   |                         |                         | Value                                     | Unit             |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------------------------|------------------|
| I <sub>T(RMS)</sub>                    | On-state rms current (full sine wave)                                                                       |                         | T <sub>c</sub> = 70 °C  | 20                                        | A                |
| I <sub>TSM</sub>                       | Non repetitive surge peak on-state current (full cycle, T <sub>j</sub> initial = 25°C)                      | F = 50 Hz               | t = 10 ms               | 210                                       | A                |
|                                        |                                                                                                             | F = 60 Hz               | t = 8.3 ms              | 200                                       |                  |
| I <sup>2</sup> t                       | I <sup>2</sup> t Value for fusing                                                                           | t <sub>p</sub> = 10 ms  |                         | 200                                       | A <sup>2</sup> s |
| dI/dt                                  | Critical rate of rise of on-state current<br>I <sub>G</sub> = 2 x I <sub>GT</sub> , t <sub>r</sub> ≤ 100 ns | Repetitive<br>F = 50 Hz | T <sub>j</sub> = 125 °C | 50                                        | A/μs             |
|                                        |                                                                                                             | Non repetitive          |                         | 100                                       |                  |
| V <sub>DSM</sub> ,<br>V <sub>RSM</sub> | Non repetitive peak off-state voltage                                                                       | t <sub>p</sub> = 10 ms  | T <sub>j</sub> = 25 °C  | V <sub>DRM</sub> /V <sub>RRM</sub><br>100 | V                |
| I <sub>GM</sub>                        | Peak gate current                                                                                           | t <sub>p</sub> = 20 μs  | T <sub>j</sub> = 125 °C | 4                                         | A                |
| V <sub>GM</sub>                        | Peak positive gate voltage                                                                                  | t <sub>p</sub> = 20 μs  |                         | 16                                        | V                |
| P <sub>G(AV)</sub>                     | Average gate power dissipation                                                                              |                         | T <sub>j</sub> = 125 °C | 1                                         | W                |
| T <sub>stg</sub>                       | Storage junction temperature range                                                                          |                         |                         | - 40 to + 150                             | °C               |
| T <sub>j</sub>                         | Operating junction temperature range                                                                        |                         |                         | - 40 to + 125                             |                  |

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol                              | Test conditions                                                 | Quadrant              |      | BTA20 |     | Unit |
|-------------------------------------|-----------------------------------------------------------------|-----------------------|------|-------|-----|------|
|                                     |                                                                 |                       |      | BW    | CW  |      |
| $I_{GT}^{(1)}$                      | $V_D = 12\text{ V}$ , $R_L = 33\text{ Ω}$                       | ALL                   | Min. | 2     | 1   | mA   |
|                                     |                                                                 |                       | Max. | 50    | 35  |      |
| $V_{GT}$                            |                                                                 | ALL                   | Max. | 1.5   |     | V    |
| $V_{GD}$                            | $V_D = V_{DRM}$ , $R_L = 3.3\text{ kΩ}$ , $T_j = 125\text{ °C}$ | ALL                   | Min. | 0.2   |     | V    |
| $I_H^{(2)}$                         | $I_T = 500\text{ mA}$ , gate open                               |                       | Max. | 75    | 50  | mA   |
| $I_L$                               | $I_G = 1.2 I_{GT}$                                              | I - III               | Typ. | 50    | -   | mA   |
|                                     |                                                                 | II                    |      | 90    | -   |      |
|                                     |                                                                 | I - II - III          | Max. | -     | 80  |      |
| dV/dt <sup>(2)</sup>                | $V_D = 67\% V_{DRM}$ , gate open                                | $T_j = 125\text{ °C}$ | Typ. | 750   | 500 | V/μs |
|                                     |                                                                 |                       | Min. | 500   | 250 |      |
| (dV/dt) <sub>C</sub> <sup>(2)</sup> | (dI/dt) <sub>C</sub> = 20 A/ms                                  | $T_j = 125\text{ °C}$ | Typ. | 36    | 22  | V/μs |
|                                     |                                                                 |                       | Min. | 18    | 11  |      |

1. Minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

2. For both polarities of A2 referenced to A1.

Table 3. Static characteristics

| Symbol         | Parameter                                               |                                   |      | Value | Unit          |
|----------------|---------------------------------------------------------|-----------------------------------|------|-------|---------------|
| $V_{TM}^{(1)}$ | $I_{TM} = 28\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$ | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 1.70  | V             |
| $I_{DRM}$      | $V_{DRM} = V_{RRM}$                                     | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 10    | $\mu\text{A}$ |
| $I_{RRM}$      |                                                         | $T_j = 125\text{ }^\circ\text{C}$ |      | 3     | mA            |

1. For both polarities of A2 referenced to A1.

Table 4. Thermal resistances

| Symbol        | Parameter               | Value | Unit               |
|---------------|-------------------------|-------|--------------------|
| $R_{th(j-c)}$ | Junction to case for AC | 2.1   | $^\circ\text{C/W}$ |
| $R_{th(j-c)}$ | Junction to case for DC | 2.8   |                    |
| $R_{th(j-a)}$ | Junction to ambient     | 60    |                    |

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

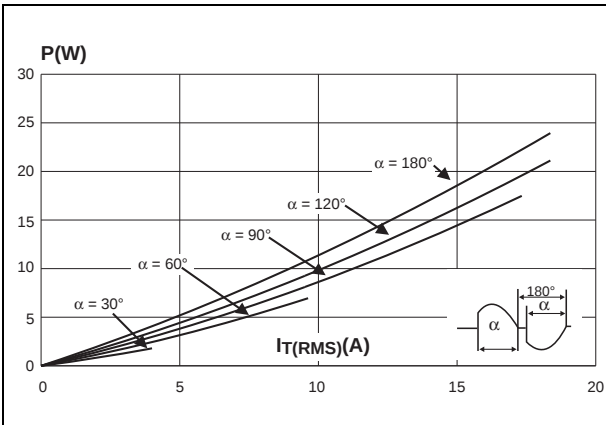


Figure 2. Correlation between maximum rms power dissipation and maximum allowable temperatures

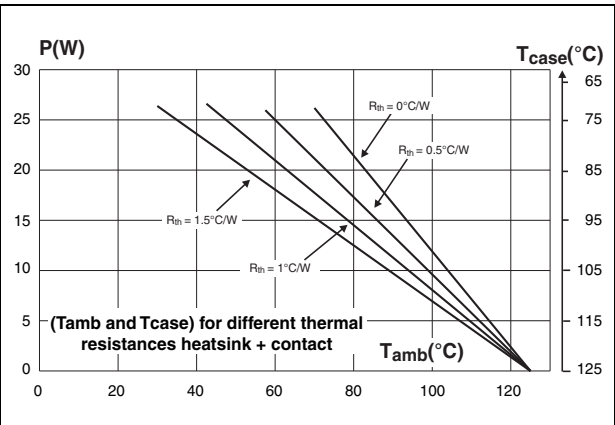


Figure 3. On-state rms current versus case temperature (full cycle)

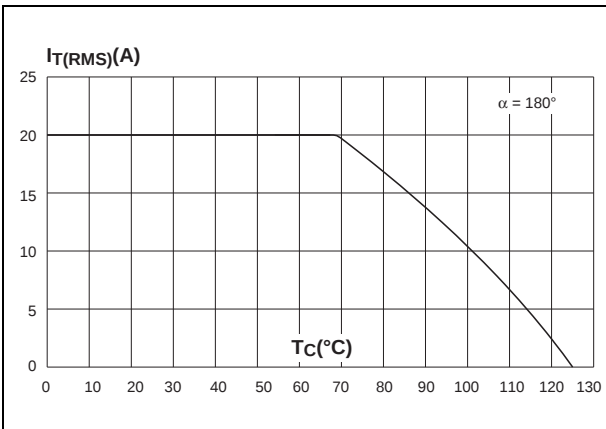


Figure 4. Relative variation of thermal impedance versus pulse duration

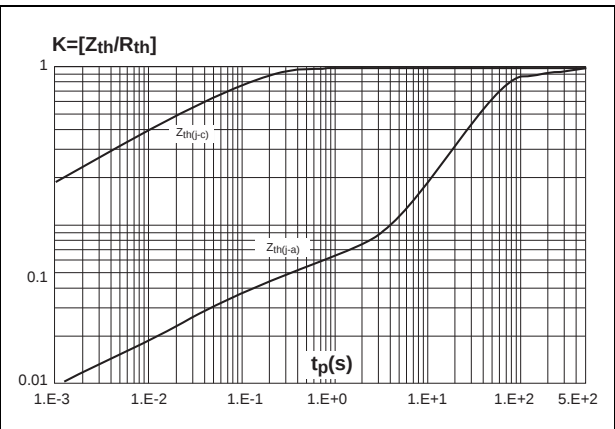


Figure 5. On-state characteristics (maximum values)

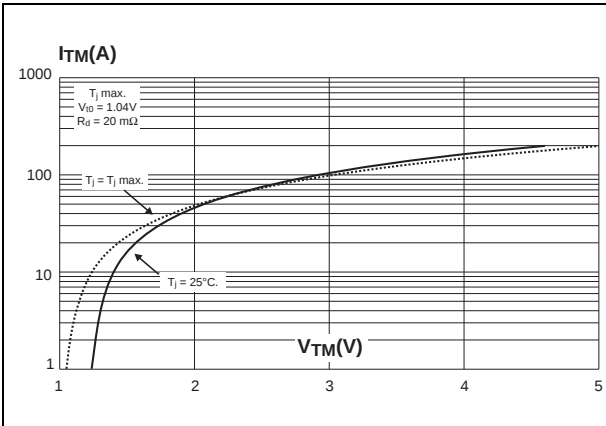


Figure 6. Non repetitive surge peak on-state current versus number of cycles

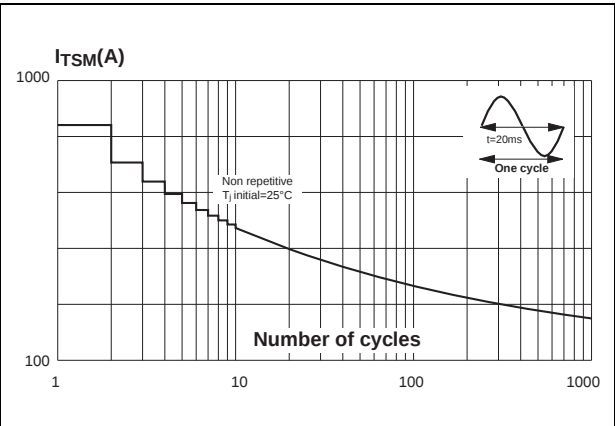


Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse and corresponding value of  $I^2t$

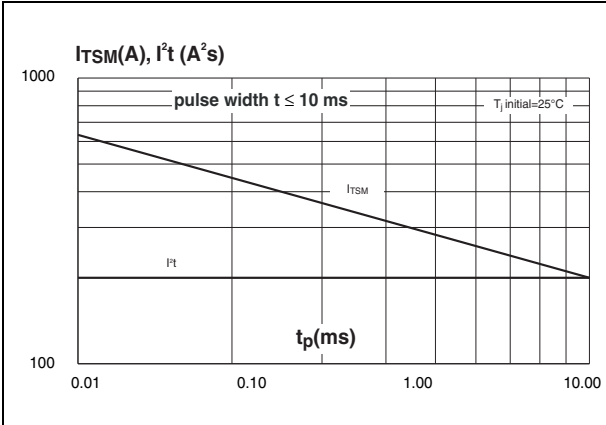
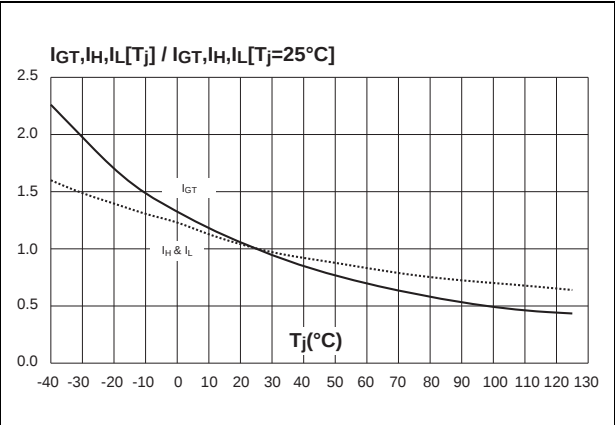


Figure 8. Relative variation of gate trigger current and holding current versus junction temperature



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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

**Figure 9. TO-220AB package dimensions (definitions)**

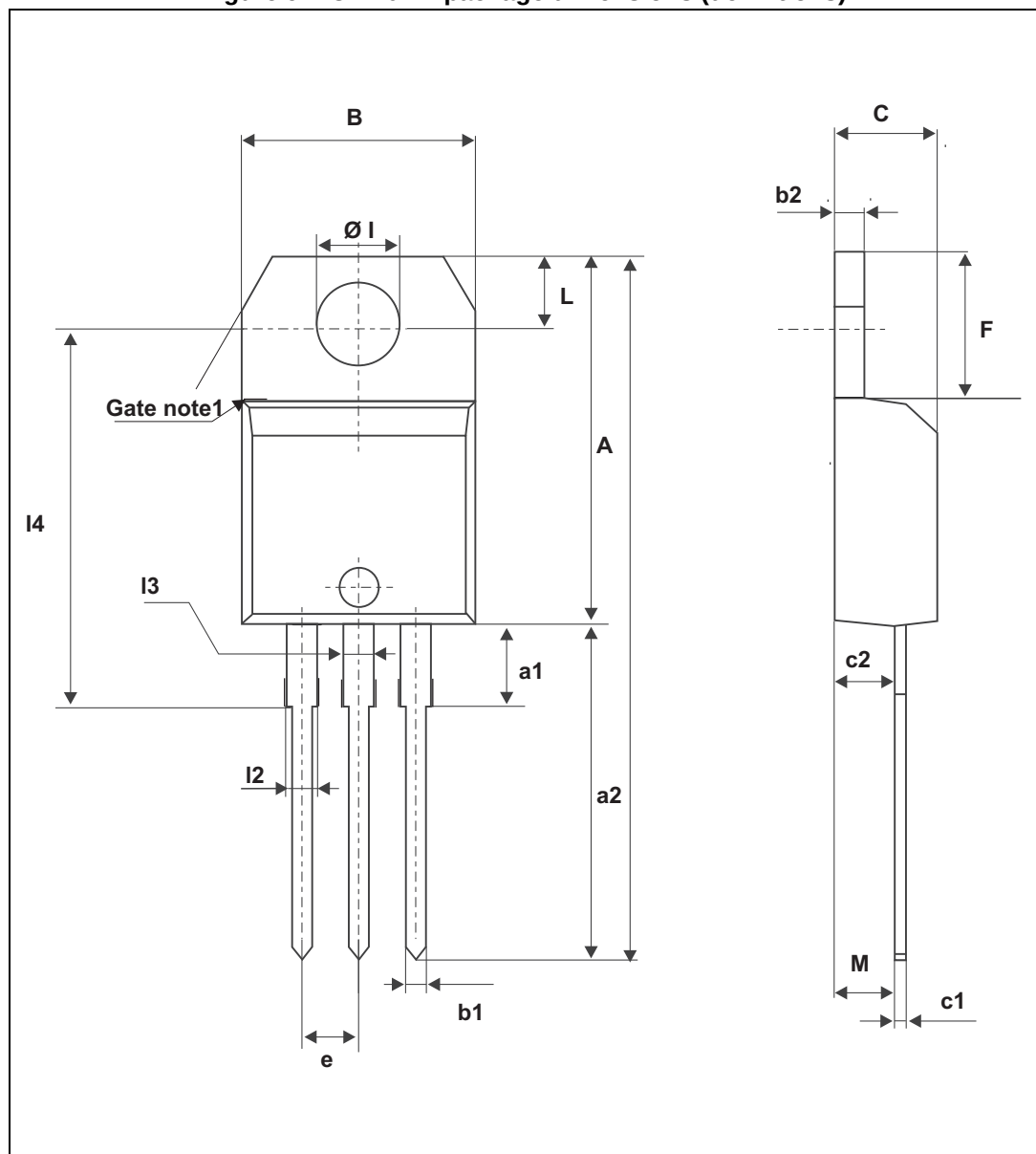


Table 5. TO-220AB package dimension values

| 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 |
| 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 |       |

### 3 Ordering information

Figure 10. Ordering information scheme

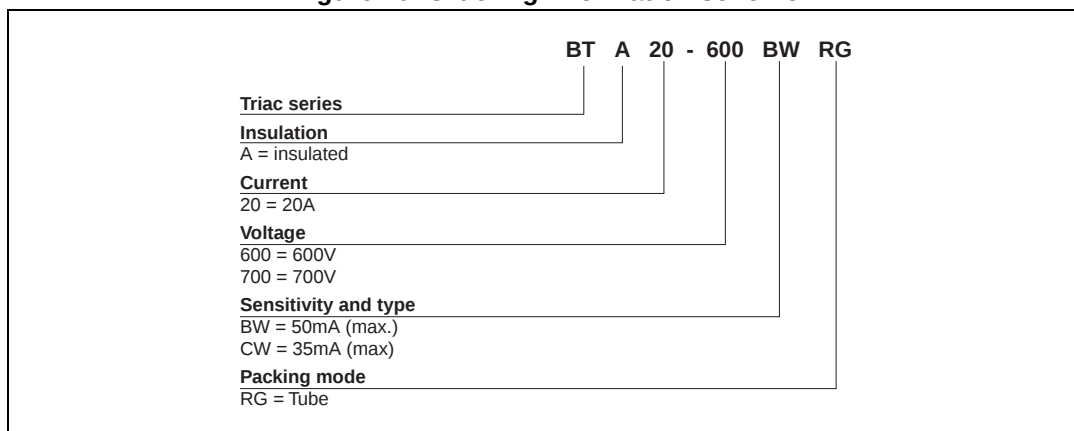


Table 6. Product selector

| Order code    | Voltage |       | Sensitivity | Type        | Package       |
|---------------|---------|-------|-------------|-------------|---------------|
|               | 600 V   | 700 V |             |             |               |
| BTA20-600CWRG | X       |       | 35 mA       | Snubberless | TO-220AB Ins. |
| BTA20-700BWRG |         | X     | 50 mA       |             |               |
| BTA20-700CWRG |         | X     | 35 mA       |             |               |

Table 7. Ordering information

| Ordering type | Marking     | Package       | Weight | Base qty | Delivery mode |
|---------------|-------------|---------------|--------|----------|---------------|
| BTA20-600CWRG | BTA20-600CW | TO-220AB Ins. | 2.3 g  | 50       | Tube          |
| BTA20-700BWRG | BTA20-700BW |               |        |          |               |
| BTA20-700CWRG | BTA20-700CW |               |        |          |               |

### 4 Revision history

Table 8. Document revision history

| Date        | Revision | Changes                                                      |
|-------------|----------|--------------------------------------------------------------|
| Sep-2001    | 1A       | Initial release.                                             |
| 08-Feb-2006 | 2        | TO-220AB Ins. delivery mode changed from bulk to tube.       |
| 09-Jul-2012 | 3        | Updated dI/dt repetitive value in <a href="#">Table 1</a> .  |
| 01-Sep-2014 | 4        | Updated $V_{DRM}/V_{RRM}$ value in <a href="#">Table 1</a> . |

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