



# BTA/BTB24, BTA25, BTA26 and T25 Series

SNUBBERLESS™ & STANDARD

25A TRIACs

## MAIN FEATURES:

| Symbol            | Value       | Unit |
|-------------------|-------------|------|
| $I_{T(RMS)}$      | 25          | A    |
| $V_{DRM}/V_{RRM}$ | 600 and 800 | V    |
| $I_{GT}(Q_1)$     | 35 to 50    | mA   |

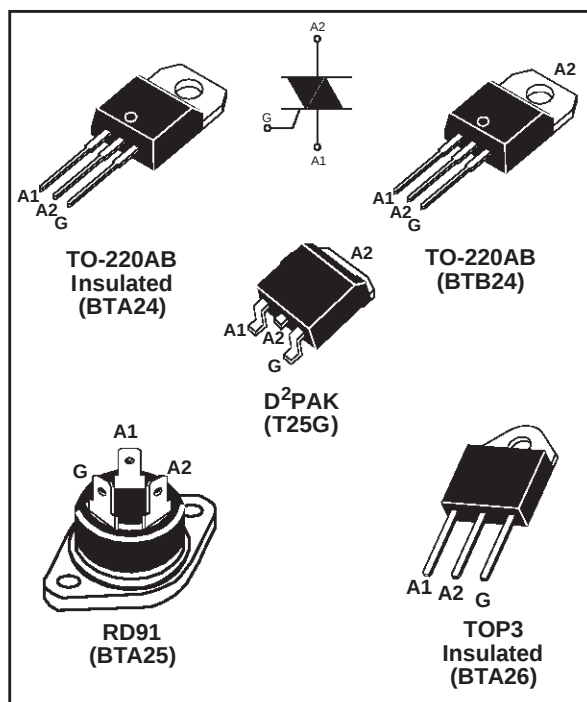
## DESCRIPTION

Available either in through-hole or surface and T25 mount packages, the BTA/BTB24-25-26 triac series is suitable for general purpose AC power switching. They can be used as an ON/OFF function in applications such as static relays, heating regulation, water heaters, induction motor starting circuits...or for phase control operation in high power motor speed controllers, soft start circuits...The snubberless versions (BTA/BTB...W and T25 series) 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)                                                        | D PAK<br>TO-220AB              | $T_c = 100^\circ\text{C}$ | 25                      | A                |
|                    |                                                                                              | RD91<br>TOP3 Ins.              | $T_c = 90^\circ\text{C}$  |                         |                  |
|                    |                                                                                              | TO-220AB Ins.                  | $T_c = 75^\circ\text{C}$  |                         |                  |
| $I_{TSM}$          | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25^\circ\text{C}$ ) | F = 60 Hz                      | t = 16.7 ms               | 260                     | A                |
|                    |                                                                                              | F = 50 Hz                      | t = 20 ms                 | 250                     |                  |
| $I_t$              | I t Value for fusing                                                                         | tp = 10 ms                     |                           | 340                     | A s              |
| di/dt              | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , tr ≤ 100 ns           | F = 120 Hz                     | $T_j = 125^\circ\text{C}$ | 50                      | A/μs             |
| $V_{DSM}/V_{RSM}$  | Non repetitive surge peak off-state voltage                                                  | tp = 10 ms                     | $T_j = 25^\circ\text{C}$  | $V_{DRM}/V_{RRM} + 100$ | V                |
| $I_{GM}$           | Peak gate current                                                                            | tp = 20 μs                     | $T_j = 125^\circ\text{C}$ | 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/BTB24, BTA25, BTA26 and T25 Series

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

#### ■ SNUBBERLESS™ (3 Quadrants) T25-G, BTA/BTB24...W, BTA25...W, BTA26...W

| Symbol              | Test Conditions                                                                     | Quadrant     |      | T25   | BTA/BTB |      | Unit |
|---------------------|-------------------------------------------------------------------------------------|--------------|------|-------|---------|------|------|
|                     |                                                                                     |              |      | T2535 | CW      | BW   |      |
| I <sub>GT</sub> (1) | V <sub>D</sub> = 12 V    R <sub>L</sub> = 33 Ω                                      | I - II - III | MAX. | 35    | 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    T <sub>j</sub> = 125°C | I - II - III | MIN. | 0.2   |         |      | V    |
| I <sub>H</sub> (2)  | I <sub>T</sub> = 500 mA                                                             |              | MAX. | 50    | 50      | 75   | mA   |
| I <sub>L</sub>      | I <sub>G</sub> = 1.2 I <sub>GT</sub>                                                | I - III      | MAX. | 70    | 70      | 80   | mA   |
|                     |                                                                                     | II           |      | 80    | 80      | 100  |      |
| dV/dt (2)           | V <sub>D</sub> = 67 % V <sub>DRM</sub> gate open    T <sub>j</sub> = 125°C          |              | MIN. | 500   | 500     | 1000 | V/μs |
| (dI/dt)c (2)        | Without snubber    T <sub>j</sub> = 125°C                                           |              | MIN. | 13    | 13      | 22   | A/ms |

#### ■ STANDARD (4 Quadrants): BTA25...B, BTA26...B

| Symbol              | Test Conditions                                                                     | Quadrant           |      | Value     | Unit |
|---------------------|-------------------------------------------------------------------------------------|--------------------|------|-----------|------|
| I <sub>GT</sub> (1) | V <sub>D</sub> = 12 V    R <sub>L</sub> = 33 Ω                                      | I - II - III<br>IV | MAX. | 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. | 80        | mA   |
| I <sub>L</sub>      | I <sub>G</sub> = 1.2 I <sub>GT</sub>                                                | I - III - IV       | MAX. | 70        | mA   |
|                     |                                                                                     | II                 |      | 160       |      |
| dV/dt (2)           | V <sub>D</sub> = 67 % V <sub>DRM</sub> gate open    T <sub>j</sub> = 125°C          |                    | MIN. | 500       | V/μs |
| (dV/dt)c (2)        | (dI/dt)c = 13.3 A/ms    T <sub>j</sub> = 125°C                                      |                    | MIN. | 10        | V/μs |

### STATIC CHARACTERISTICS

| Symbol              | Test Conditions                       |                        |      | Value | Unit |
|---------------------|---------------------------------------|------------------------|------|-------|------|
| V <sub>TM</sub> (2) | I <sub>TM</sub> = 35 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. | 16    | mΩ   |
| I <sub>DRM</sub>    | V <sub>DRM</sub> = V <sub>RRM</sub>   | T <sub>j</sub> = 25°C  | MAX. | 5     | μA   |
| I <sub>RRM</sub>    |                                       | T <sub>j</sub> = 125°C |      | 3     | mA   |

**Note 1:** minimum IGT is guaranteed at 5% of IGT 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) |          | D PAK<br>TO-220AB                  | °C/W |
|               |                       |          | RD91 (Insulated)<br>TOP3 Insulated |      |
|               |                       |          | TO-220AB Insulated                 |      |
| $R_{th(j-a)}$ | Junction to ambient   | S = 1 cm | D PAK                              | °C/W |
|               |                       |          | TOP3 Insulated                     |      |
|               |                       |          | TO-220AB                           |      |
|               |                       |          | TO-220AB Insulated                 |      |

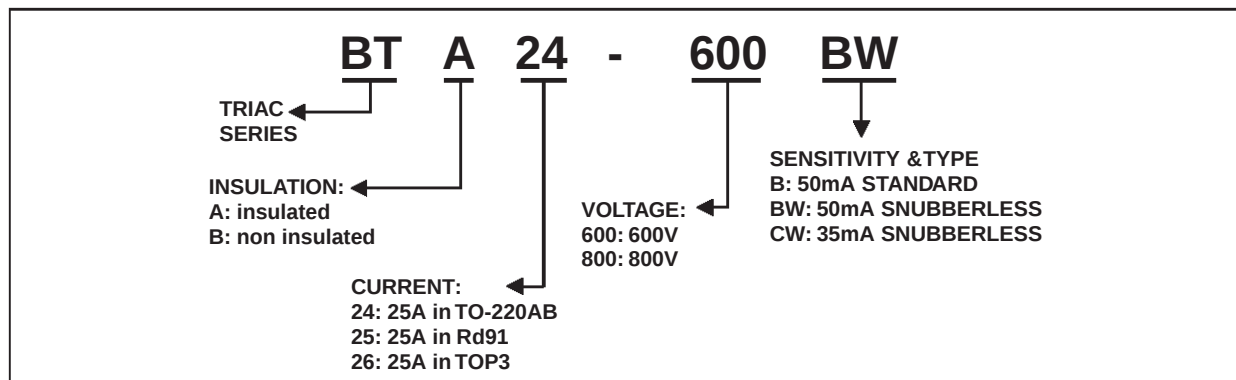
S: Copper surface under tab

## PRODUCT SELECTOR

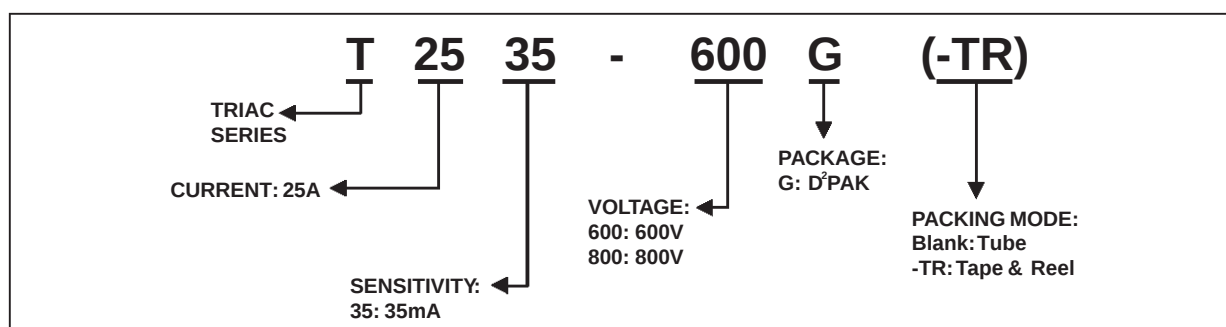
| Part Number     | Voltage (xxx) |       | Sensitivity | Type        | Package   |
|-----------------|---------------|-------|-------------|-------------|-----------|
|                 | 600 V         | 800 V |             |             |           |
| BTA/BTB24-xxxBW | X             | X     | 50 mA       | Snubberless | TO-220AB  |
| BTA/BTB24-xxxCW | X             | X     | 35 mA       | Snubberless | TO-220AB  |
| BTA25-xxxB      | X             | X     | 50 mA       | Standard    | RD-91     |
| BTA25-xxxBW     | X             | X     | 50 mA       | Snubberless | RD-91     |
| BTA25-xxxCW     | X             | X     | 35 mA       | Snubberless | RD-91     |
| BTA26-xxxB      | X             | X     | 50 mA       | Standard    | TOP3 Ins. |
| BTA26-xxxBW     | X             | X     | 50 mA       | Snubberless | TOP3 Ins. |
| BTA26-xxxCW     | X             | X     | 35 mA       | Snubberless | TOP3 Ins. |
| T2535-xxxG      | X             | X     | 35 mA       | Snubberless | D PAK     |

BTB: Non insulated TO-220AB package

## ORDERING INFORMATION



## BTA/BTB24, BTA25, BTA26 and T25 Series

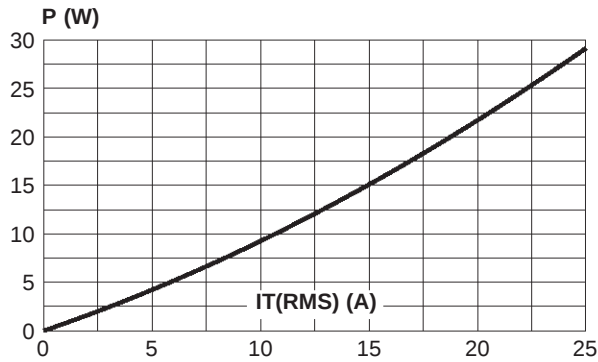


### OTHER INFORMATION

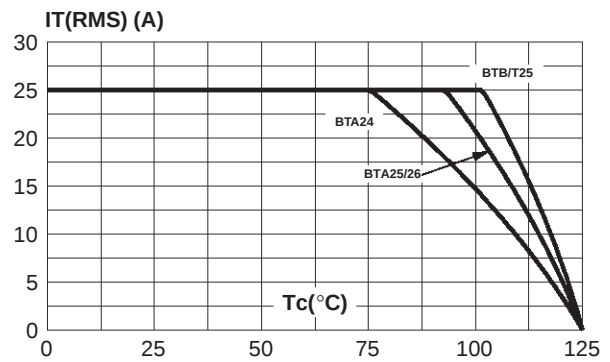
| Part Number     | Marking        | Weight | Base quantity | Packing mode |
|-----------------|----------------|--------|---------------|--------------|
| BTA/BTB24-xxxyz | BTA/BTB24xxxyz | 2.3 g  | 250           | Bulk         |
| BTA25-xxxyz     | BTA25xxxyz     | 20 g   | 25            | Bulk         |
| BTA26-xxxyz     | BTA26xxxyz     | 4.5 g  | 120           | Bulk         |
| T2535-xxxG      | T2535xxxG      | 1.5 g  | 50            | Tube         |
| T2535-xxxG-TR   | T2535xxxG      | 1.5 g  | 1000          | Tape & reel  |

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

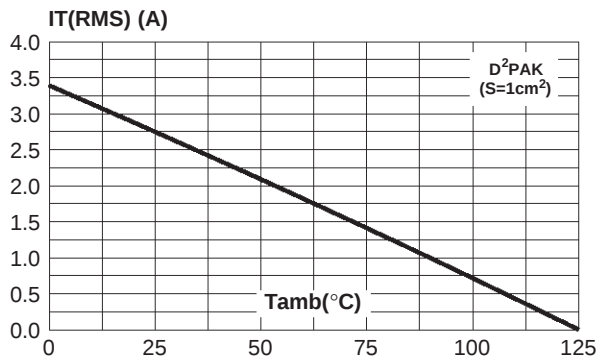
**Fig. 1:** Maximum power dissipation versus RMS on-state current (full cycle).



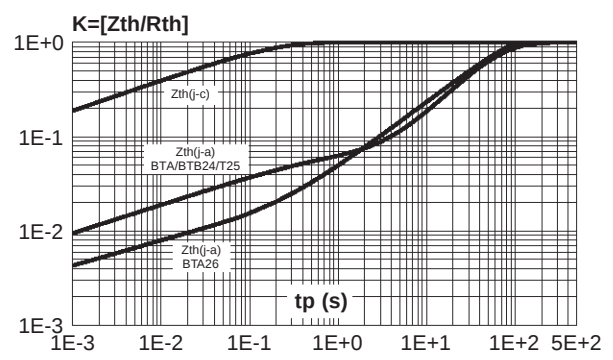
**Fig. 2-1:** RMS on-state current versus case temperature (full cycle).



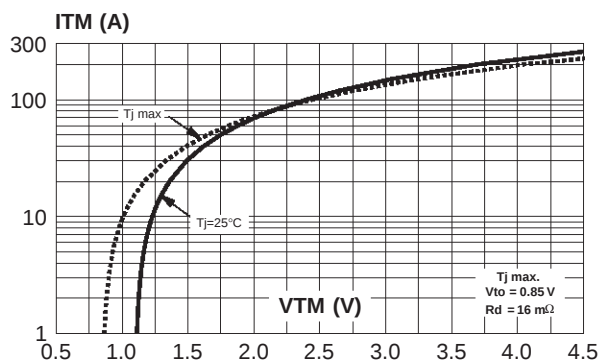
**Fig. 2-2:** D PAK RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35  $\mu$ m), full cycle.



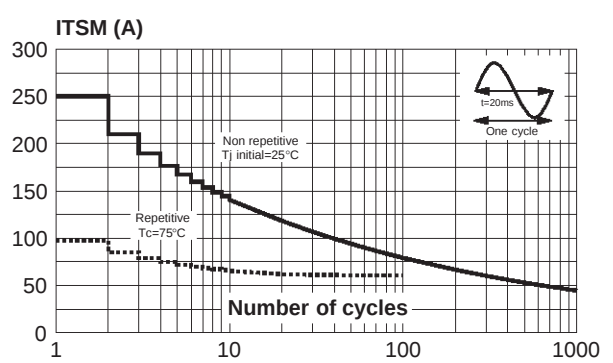
**Fig. 3:** Relative variation of thermal impedance versus pulse duration.



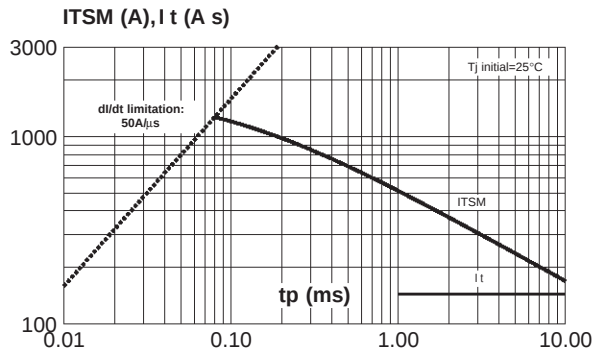
**Fig. 4:** On-state characteristics (maximum values).



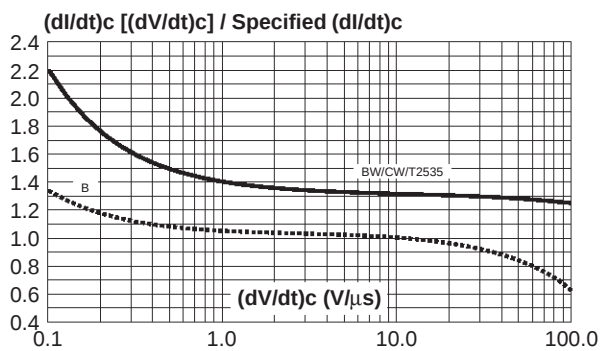
**Fig. 5:** Surge peak on-state current versus number of cycles.



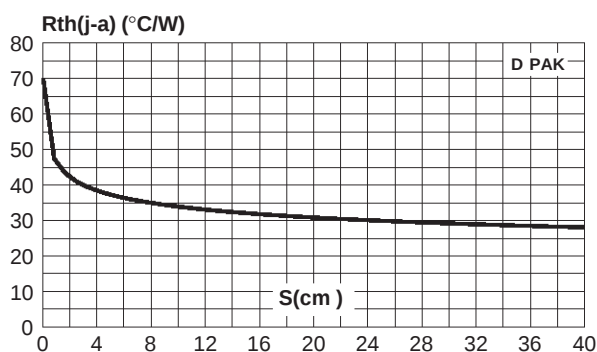
**Fig. 6:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$ , and corresponding value of  $I_t$ .



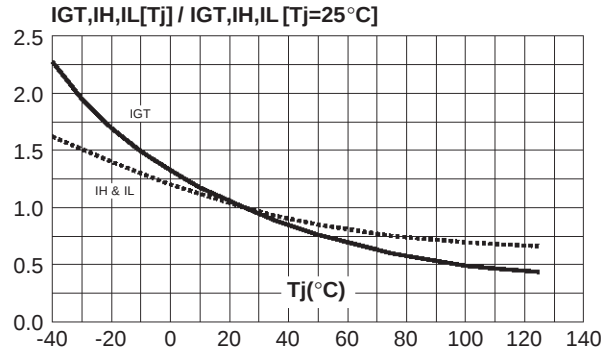
**Fig. 8:** Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values).



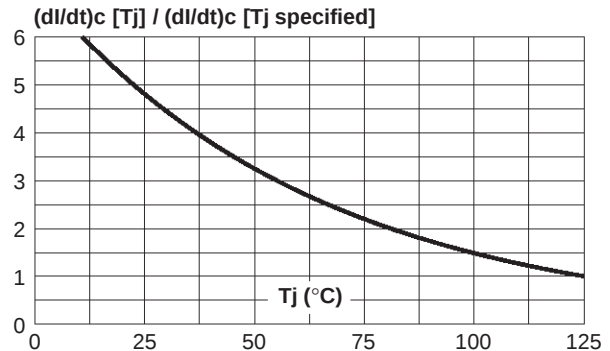
**Fig. 10:** D PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness:  $35\text{ }\mu\text{m}$ ).



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

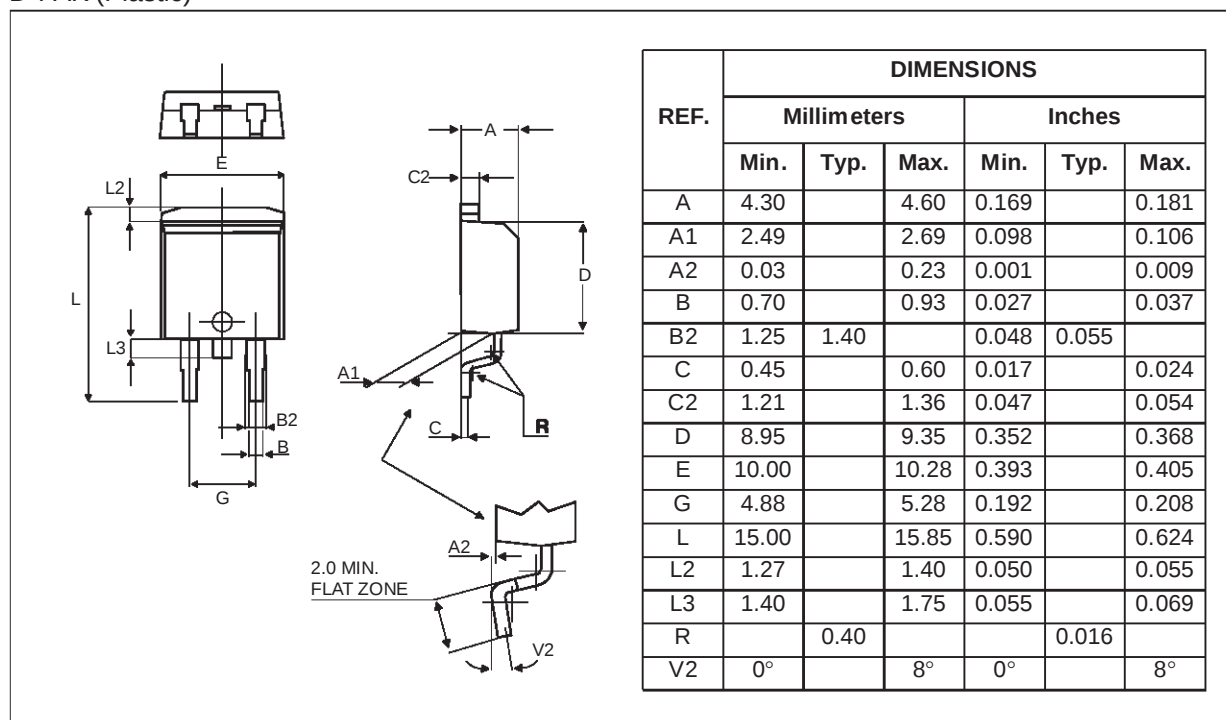


**Fig. 9:** Relative variation of critical rate of decrease of main current versus junction temperature.



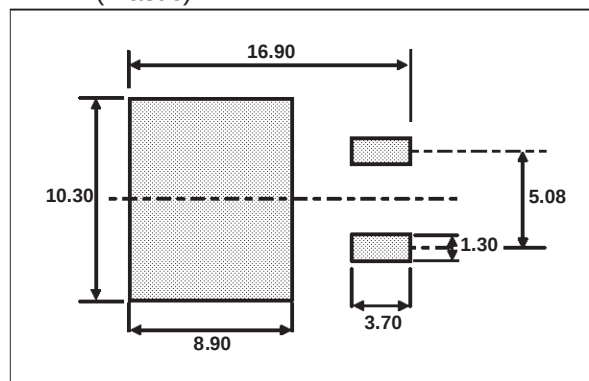
## PACKAGE MECHANICAL DATA

D PAK (Plastic)



## FOOTPRINT DIMENSIONS (in millimeters)

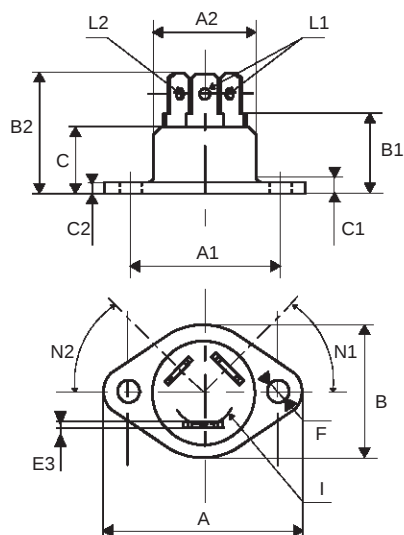
D PAK (Plastic)



## BTA/BTB24, BTA25, BTA26 and T25 Series

### PACKAGE MECHANICAL DATA

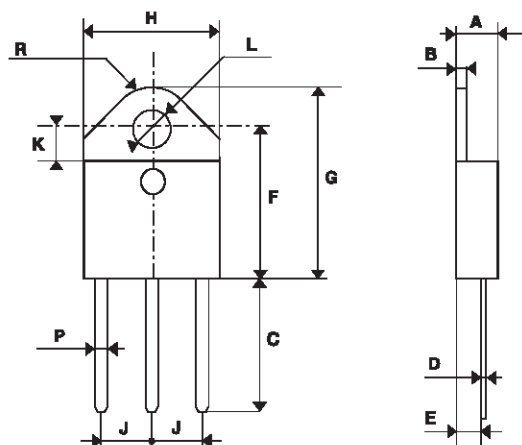
RD91 (Plastic)



| 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°   |

### PACKAGE MECHANICAL DATA

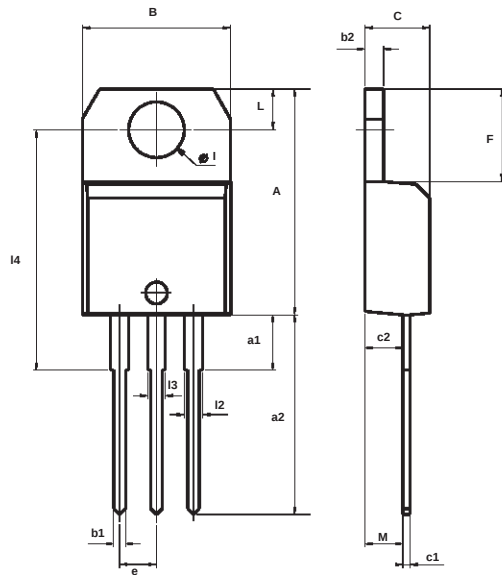
TOP3 (Plastic)



| 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 |
| L    | 4.08        |      | 4.17  | 0.161  |       | 0.164 |
| P    | 1.20        |      | 1.40  | 0.047  |       | 0.055 |
| R    |             | 4.60 |       |        | 0.181 |       |

## PACKAGE MECHANICAL DATA

TO-220AB (Plastic)



| 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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