

## BTA/BTB12 and T12 Series

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

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

| Symbol                   | Test Conditions                                                                     | Quadrant     |      | T12   | BTA/BTB12 |     |      | Unit |
|--------------------------|-------------------------------------------------------------------------------------|--------------|------|-------|-----------|-----|------|------|
|                          |                                                                                     |              |      | T1235 | SW        | CW  | BW   |      |
| I <sub>GT</sub> (1)      | V <sub>D</sub> = 12 V      R <sub>L</sub> = 30 Ω                                    | I - II - III | MAX. | 35    | 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. | 35    | 15        | 35  | 50   | mA   |
| I <sub>L</sub>           | I <sub>G</sub> = 1.2 I <sub>GT</sub>                                                | I - III      | MAX. | 50    | 25        | 50  | 70   | mA   |
|                          |                                                                                     | II           |      | 60    | 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. | 500   | 40        | 500 | 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. | -     | 6.5       | -   | -    | A/ms |
|                          | (dV/dt) <sub>c</sub> = 10 V/μs    T <sub>j</sub> = 125°C                            |              |      | -     | 2.9       | -   | -    |      |
|                          | Without snubber    T <sub>j</sub> = 125°C                                           |              |      | 6.5   | -         | 6.5 | 12   |      |

#### ■ STANDARD (4 Quadrants)

| Symbol                   | Test Conditions                                                                     | Quadrant           |      | BTA/BTB06 |           | Unit |
|--------------------------|-------------------------------------------------------------------------------------|--------------------|------|-----------|-----------|------|
|                          |                                                                                     |                    |      | C         | B         |      |
| I <sub>GT</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 |                    | 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> = 5.3 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> = 17 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. | 35    | 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) |                       | D <sup>2</sup> PAK/TO-220AB    | °C/W |
|               |                       |                       | TO-220AB Insulated             |      |
| $R_{th(j-a)}$ | Junction to ambient   | S = 1 cm <sup>2</sup> | D <sup>2</sup> PAK             | °C/W |
|               |                       |                       | TO-220AB<br>TO-220AB Insulated |      |

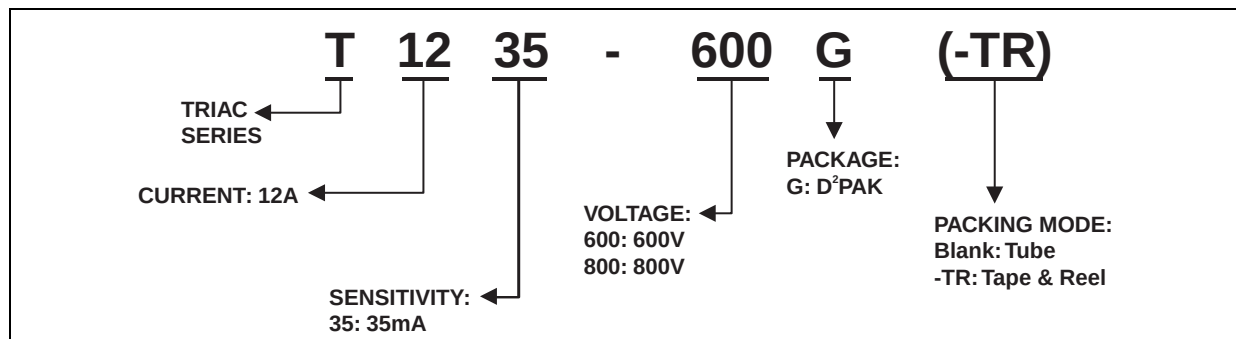
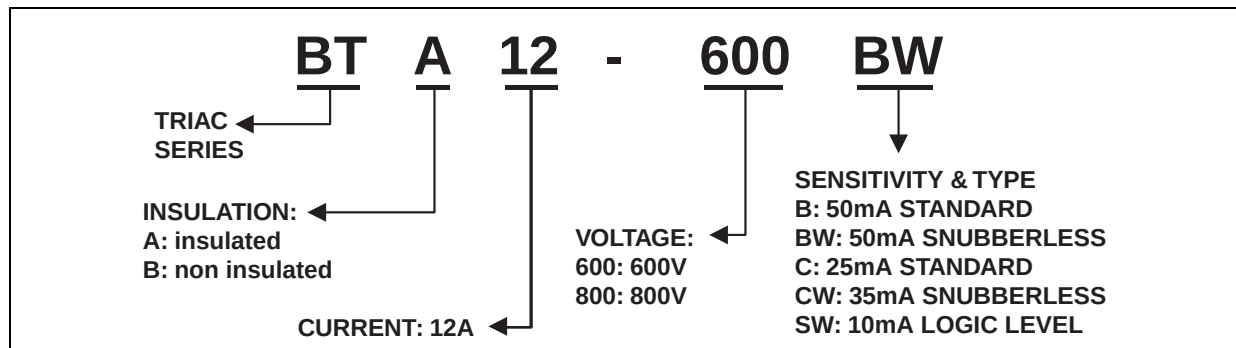
S = Copper surface under tab

## PRODUCT SELECTOR

| Part Number     | Voltage (xxx) |       | Sensitivity | Type        | Package            |
|-----------------|---------------|-------|-------------|-------------|--------------------|
|                 | 600 V         | 800 V |             |             |                    |
| BTA/BTB12-xxxB  | X             | X     | 50 mA       | Standard    | TO-220AB           |
| BTA/BTB12-xxxBW | X             | X     | 50 mA       | Snubberless | TO-220AB           |
| BTA/BTB12-xxxC  | X             | X     | 25 mA       | Standard    | TO-220AB           |
| BTA/BTB12-xxxCW | X             | X     | 35 mA       | Snubberless | TO-220AB           |
| BTA/BTB12-xxxSW | X             | X     | 10 mA       | Logic level | TO-220AB           |
| T1235-xxxG      | X             | X     | 35 mA       | Snubberless | D <sup>2</sup> PAK |

BTB: non insulated TO-220AB package

## ORDERING INFORMATION



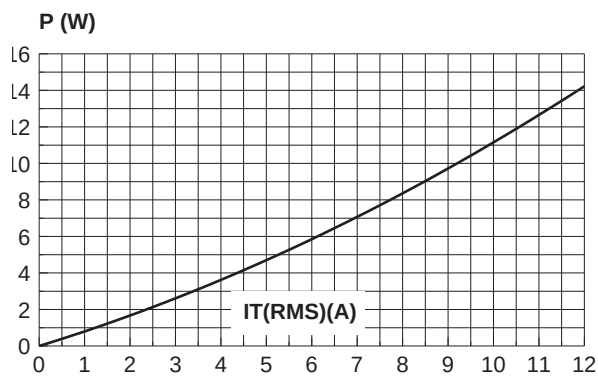
## BTA/BTB12 and T12 Series

### OTHER INFORMATION

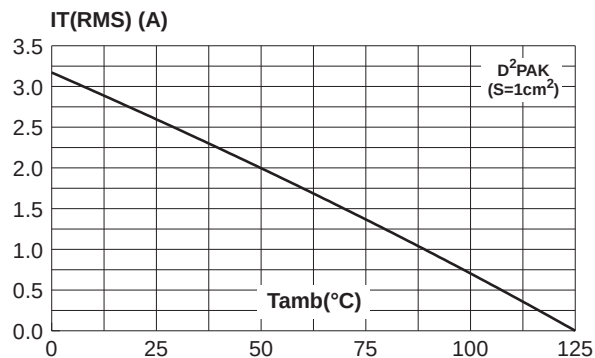
| Part Number      | Marking          | Weight | Base quantity | Packing mode |
|------------------|------------------|--------|---------------|--------------|
| BTA/BTB12-xxxxyz | BTA/BTB12-xxxxyz | 2.3 g  | 250           | Bulk         |
| T1235-xxxG       | T1235xxxG        | 1.5 g  | 50            | Tube         |
| T1235-xxxG-TR    | T1235xxxG        | 1.5 g  | 1000          | Tape & reel  |

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

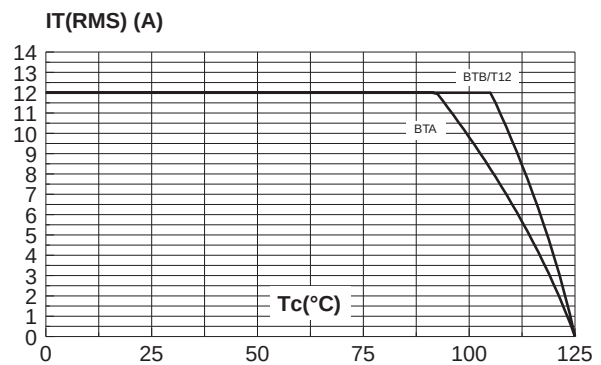
**Fig. 1:** Maximum power dissipation versus RMS on-state current (full cycle).



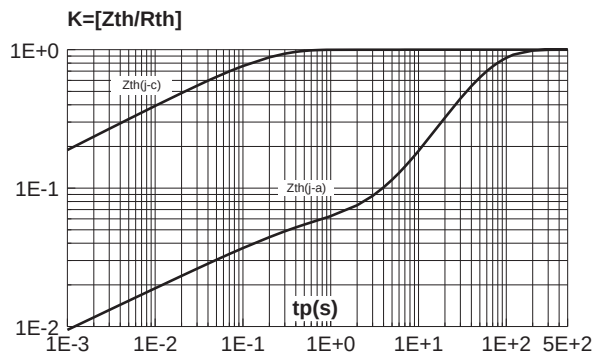
**Fig. 2-2:** RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35μm), full cycle.



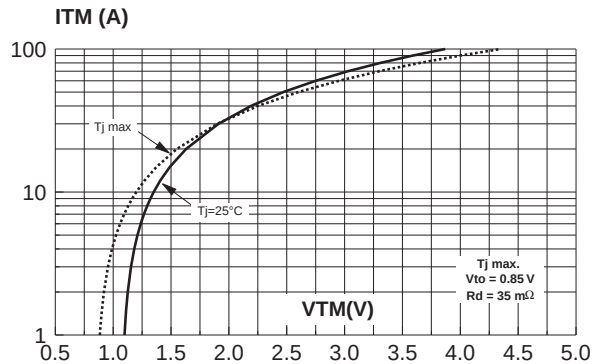
**Fig. 2-1:** RMS on-state current versus case temperature (full cycle).



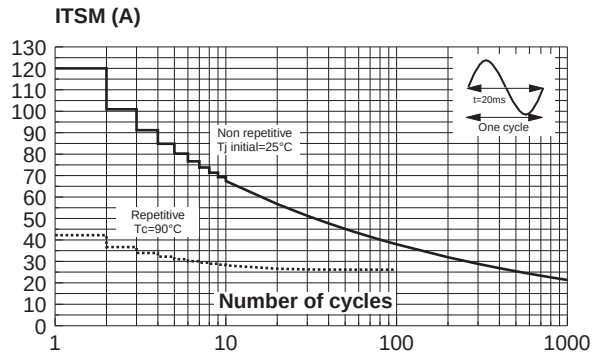
**Fig. 3:** Relative variation of thermal impedance versus pulse duration.



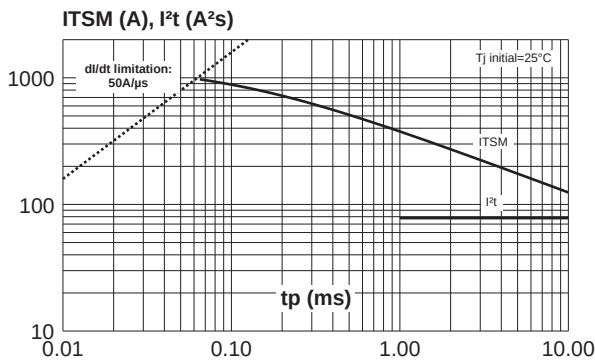
**Fig. 4:** On-state characteristics (maximum values).



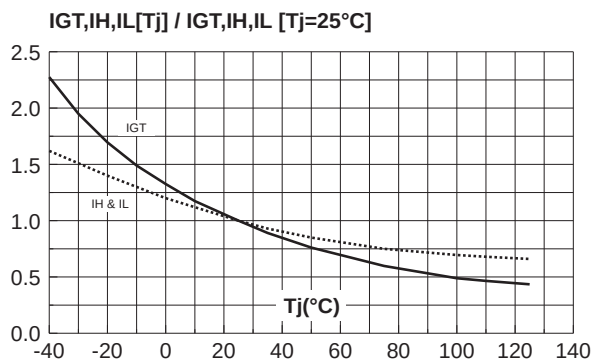
**Fig. 5:** Surge peak on-state current versus number of cycles.



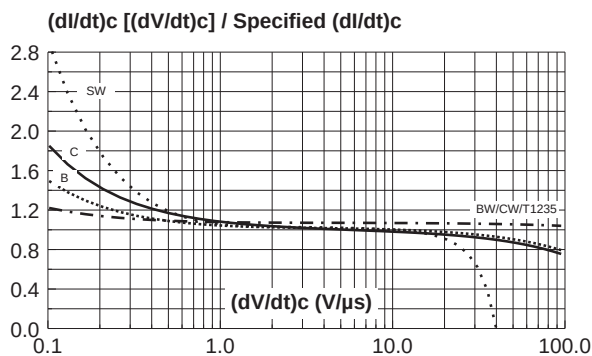
**Fig. 6:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$ , and corresponding value of  $I^2t$ .



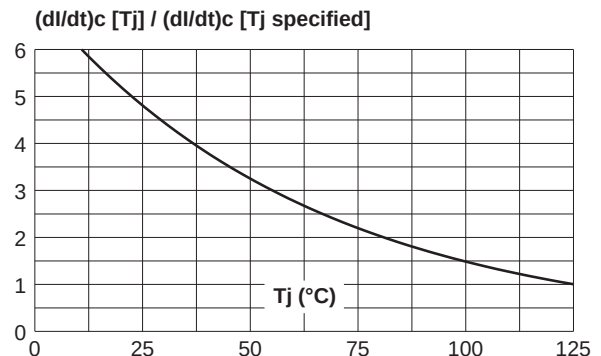
**Fig. 7:** Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).



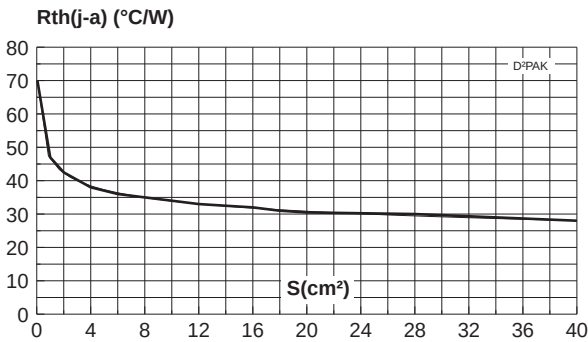
**Fig. 8:** Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values).



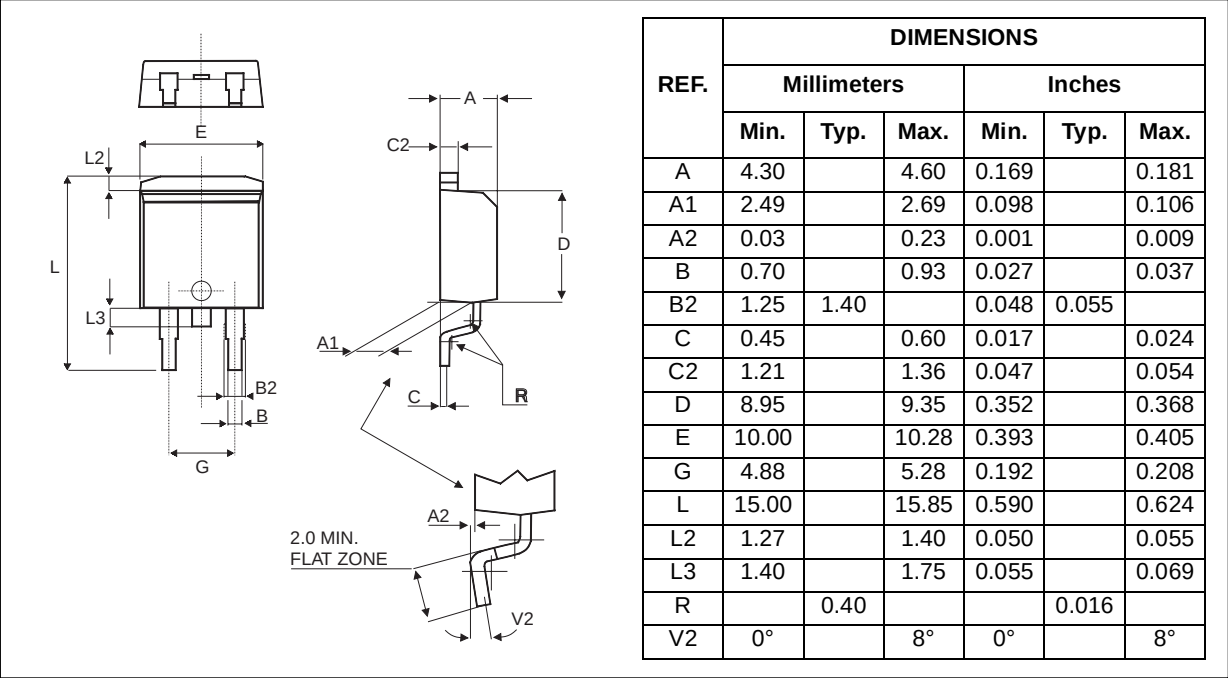
**Fig. 9:** Relative variation of critical rate of decrease of main current versus junction temperature.



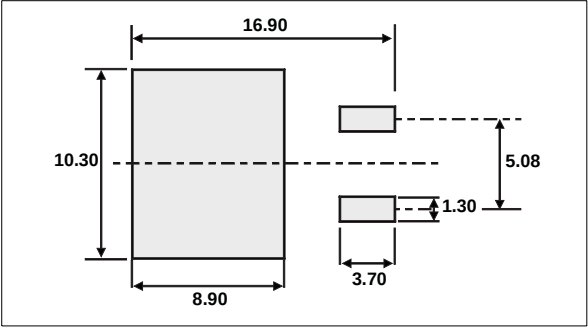
**Fig. 10:** D<sup>2</sup>PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 µm).



**PACKAGE MECHANICAL DATA**  
D<sup>2</sup>PAK (Plastic)

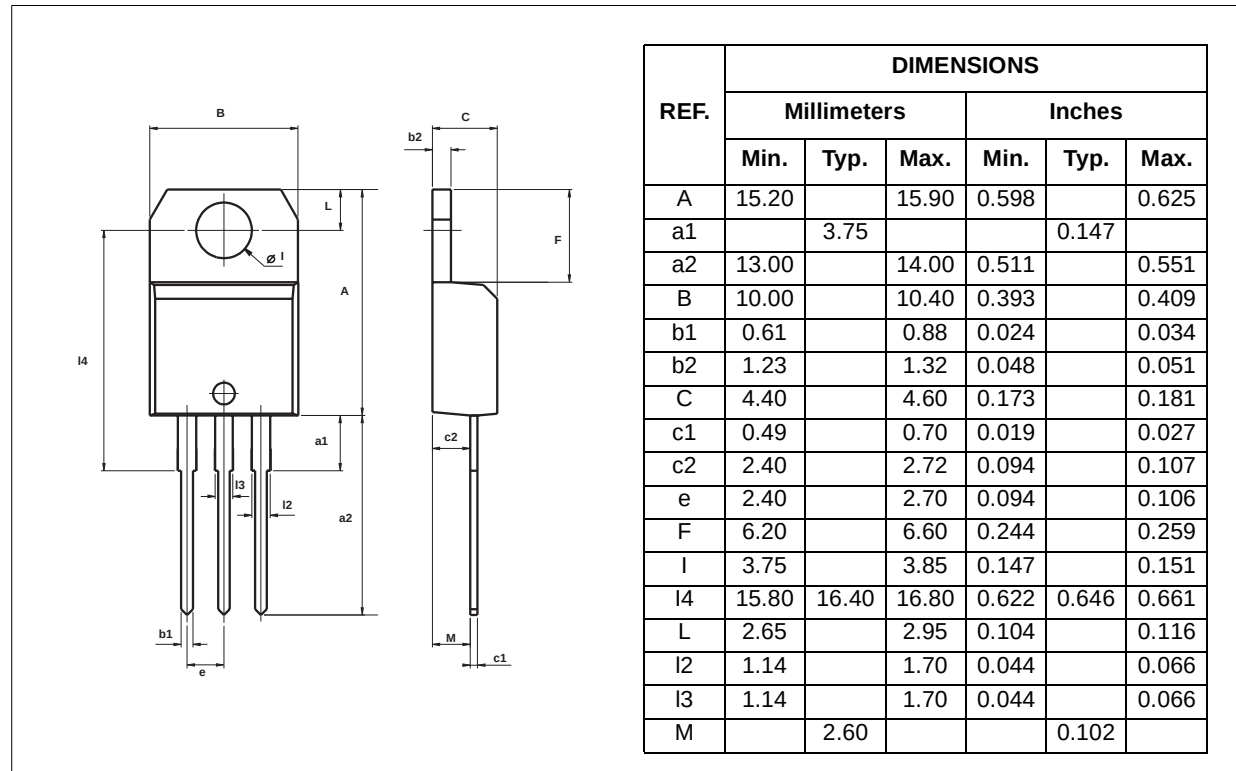


**FOOTPRINT DIMENSIONS (in millimeters)**  
D<sup>2</sup>PAK (Plastic)



## PACKAGE MECHANICAL DATA

TO-220AB / TO-220AB Ins.



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