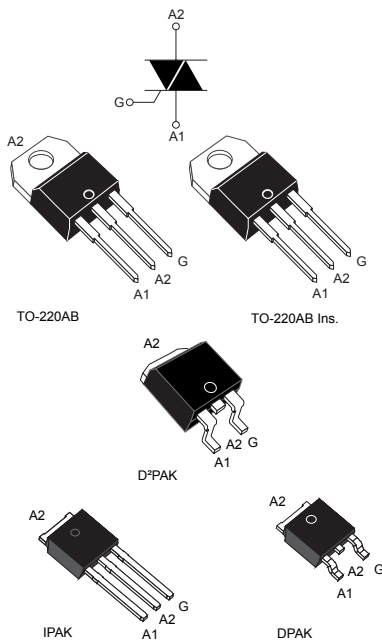




THE DATASHEET OF BTB08-800T



Snubberless™, logic level and standard 8 A Triacs



Features

- On-state rms current, $I_{T(RMS)}$ 8 A
- Repetitive peak off-state voltage, V_{DRM} / V_{RRM} 600 V to 800 V
- Triggering gate current, I_{GT} 5 to 50 mA

Description

Available either in through-hole and surface-mount packages, these devices are 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 and motor speed controllers, etc.

The Snubberless versions (BTA, BTB08_XXXXW and T8 series) are specially recommended for use on inductive loads, thanks to their high commutation performance.

Logic level versions are designed to interface directly with low power drivers such as Microcontrollers.

By using an internal ceramic pad, the BTA series provide voltage insulated tab (rated at 2500 V_{RMS}) in compliance with UL standards (file ref.: E81734).

Product status link

[BTA08](#)

[BTB08](#)

[T810](#)

[T835](#)

[T850](#)

1 Characteristics

Table 1. Absolute maximum ratings ($T_j = 25\text{ °C}$ unless otherwise stated)

| Symbol | Parameter | | | Value | Unit |
|--------------|--|--|------------------------|-------------|------------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | IPAK, DPAK, TO-220AB, D ² PAK | $T_c = 110\text{ °C}$ | 8 | A |
| | | TO-220AB Ins. | $T_c = 100\text{ °C}$ | | |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C) | $f = 50\text{ Hz}$ | $t = 20\text{ ms}$ | 80 | A |
| | | $f = 60\text{ Hz}$ | $t_p = 16.7\text{ ms}$ | 84 | |
| I^2t | I^2t value for fusing | | $t_p = 10\text{ ms}$ | 36 | A ² s |
| di/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$ | $f = 120\text{ Hz}$ | $T_j = 125\text{ °C}$ | 50 | A/ μ s |
| I_{GM} | Peak gate current | $t_p = 20\text{ }\mu$ s | $T_j = 125\text{ °C}$ | 4 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j = 125\text{ °C}$ | 1 | W |
| T_{stg} | Storage junction temperature range | | | -40 to +150 | $^{\circ}$ C |
| T_j | Operating junction temperature range | | | -40 to +125 | $^{\circ}$ C |

Table 2. Electrical characteristics ($T_j = 25\text{ °C}$, unless otherwise specified) Snubberless and logic level (3 quadrants)

| Symbol | Parameter | Quadrant | | T8 | | | BTA08/BTB08 | | | | Unit |
|-------------------|--|--------------|------|-----|-----|------|-------------|------|-----|------|------------|
| | | | | 10 | 35 | 50 | TW | SW | CW | BW | |
| $I_{GT}^{(1)}$ | $V_D = 12\text{ V}$, $R_L = 30\text{ }\Omega$ | I - II - III | Max. | 10 | 35 | 50 | 5 | 10 | 35 | 50 | mA |
| V_{GT} | | I - II - III | Max. | 1.2 | | | | V | | | |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$, $T_j = 125\text{ °C}$ | I - II - III | Min. | 0.2 | | | | V | | | |
| $I_H^{(2)}$ | $I_T = 100\text{ mA}$ | I - II - III | Max. | 15 | 35 | 75 | 10 | 15 | 35 | 50 | mA |
| I_L | $I_G = 1.2 \times I_{GT}$ | I - III | Max. | 25 | 50 | 70 | 10 | 25 | 50 | 70 | mA |
| | | II | Max. | 30 | 60 | 110 | 15 | 30 | 60 | 80 | |
| $dV/dt^{(2)}$ | $V_D = 67\% V_{DRM}$, gate open, $T_j = 125\text{ °C}$ | | Max. | 40 | 400 | 1000 | 20 | 40 | 400 | 1000 | V/ μ s |
| $(di/dt)_c^{(2)}$ | $(dV/dt)_c = 0.1\text{ V}/\mu$ s, $T_j = 125\text{ °C}$ | | Min. | 5.4 | | | 3.5 | 5.4 | | | A/ms |
| | $(dV/dt)_c = 10\text{ V}/\mu$ s, $T_j = 125\text{ °C}$ | | Min. | 2.8 | | | 1.5 | 2.98 | | | |
| | Without snubber, $T_j = 125\text{ °C}$ | | Min. | | 4.5 | 7 | | | 4.5 | 7 | |

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

2. For both polarities of A2 referenced to A1

Table 3. Standard (4 quadrants)

| Symbol | Parameter | Quadrant | | BTA08/BTB08 | | Unit |
|-------------------|---|--------------|------|-------------|-----|------------------|
| | | | | C | B | |
| $I_{GT}^{(1)}$ | $V_D = 12\text{ V}, R_L = 33\ \Omega$ | I - II - III | Max. | 25 | 50 | mA |
| | | IV | | 50 | 100 | |
| V_{GT} | | All | Max. | 1.3 | | V |
| V_{GD} | $V_D = V_{DRM}, R_L = 33\text{ k}\Omega, T_j = 125\text{ }^\circ\text{C}$ | All | Min. | 0.2 | | V |
| $I_H^{(2)}$ | $I_T = 500\text{ mA}$ | I - II - III | Max. | 25 | 50 | mA |
| I_L | $I_G = 1.2\ I_{GT}$ | I - III - IV | Max. | 40 | 50 | mA |
| | | II | | 80 | 100 | |
| $dV/dt^{(2)}$ | $V_D = 67\% V_{DRM}$ gate open, $T_j = 125\text{ }^\circ\text{C}$ | | Min. | 200 | 400 | V/ μs |
| $(dV/dt)_C^{(2)}$ | $(dI/dt)_C = 3.5\text{ A/ms}, T_j = 125\text{ }^\circ\text{C}$ | | Min. | 5 | 10 | V/ μs |

1. Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.
2. For both polarities of A2 referenced to A1

Table 4. Static electrical characteristics

| Symbol | Test conditions | | | Value | Unit |
|--------------------|--|-----------------------------------|------|-------|---------------|
| $V_{TM}^{(1)}$ | $I_{TM} = 11\text{ A}, t_p = 380\ \mu\text{s}$ | $T_j = 25\text{ }^\circ\text{C}$ | Max. | 1.55 | V |
| $V_{TO}^{(1)}$ | threshold on-state voltage | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 0.85 | V |
| $R_D^{(1)}$ | Dynamic resistance | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 50 | m Ω |
| $I_{DRM}\ I_{RRM}$ | $V_{DRM} = V_{RRM}$ | $T_j = 25\text{ }^\circ\text{C}$ | Max. | 5 | μA |
| | | $T_j = 125\text{ }^\circ\text{C}$ | Max. | 1 | mA |

1. For both polarities of A2 referenced to A1

Table 5. Thermal resistance

| Symbol | Parameter | | Value | Unit | |
|---------------|---|-------------------------------|--------------------------------|--------------------|-----|
| $R_{th(j-c)}$ | Max. junction to case thermal resistance (AC) | | IPAK / D2PAK / DPAK / TO-220AB | $^\circ\text{C/W}$ | |
| | | | TO-220AB Insulated | | |
| $R_{th(j-a)}$ | Junction to ambient (typ.) | $S = 2\text{ cm}^2^{(1)}$ | D ² PAK | $^\circ\text{C/W}$ | |
| | | $S = 1\text{ cm}^2^{(1)}$ | DPAK | | |
| | Junction to ambient (typ.) | TO-220AB / TO-220AB Insulated | | | 60 |
| | | IPAK | | | 100 |

1. S = Copper surface under tab.

1.1 Characteristics (curves)

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

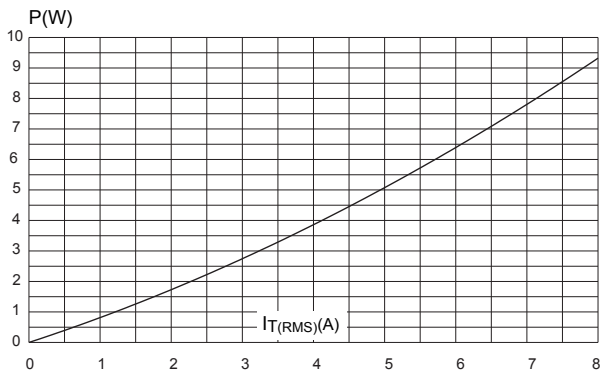


Figure 2. RMS on-state current versus temperature (full cycle)

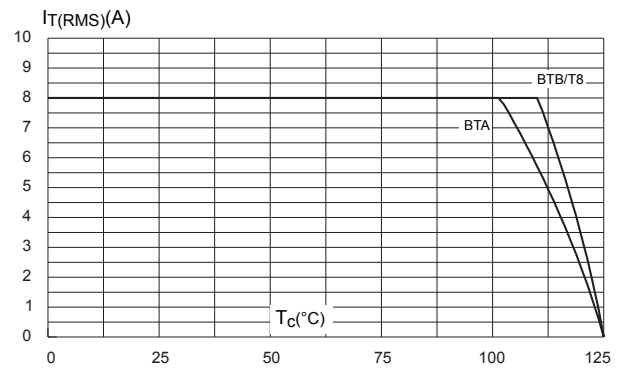


Figure 3. RMS on-state current versus ambient temperature (full cycle)

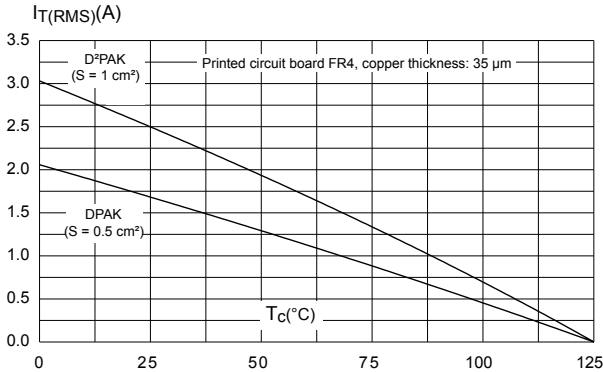


Figure 4. Relative variation of thermal impedance versus pulse duration

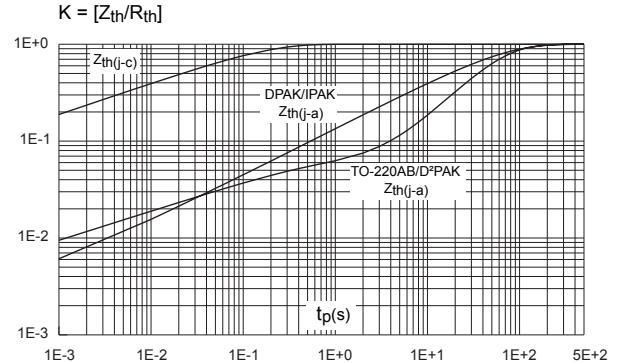


Figure 5. On-state characteristics (maximum values)

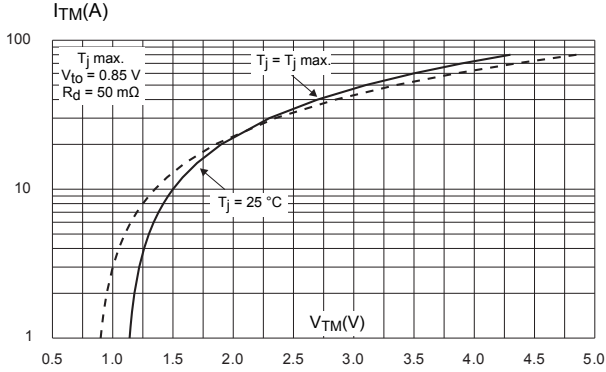


Figure 6. Surge peak on-state current versus number of cycles

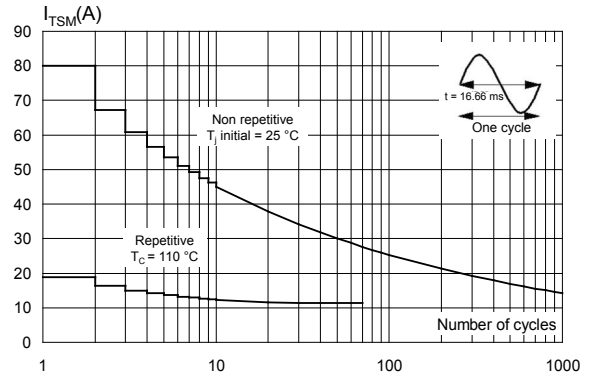


Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse ($t_p < 10$ ms)

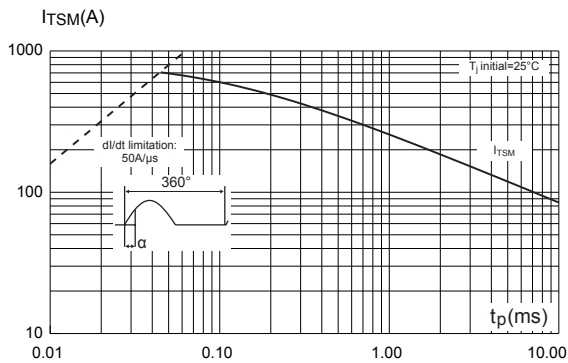


Figure 8. Relative variation of gate trigger current

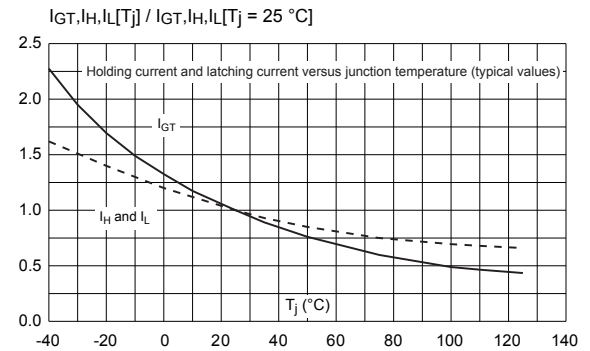


Figure 9. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

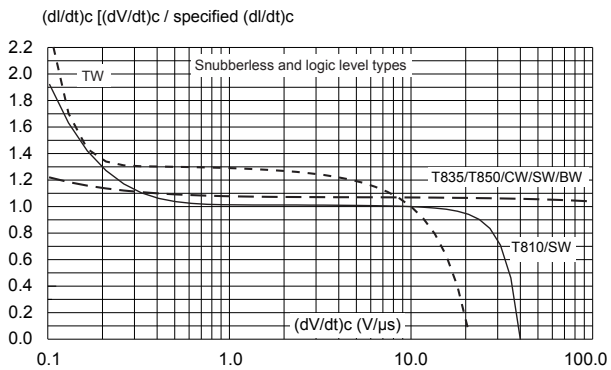


Figure 10. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

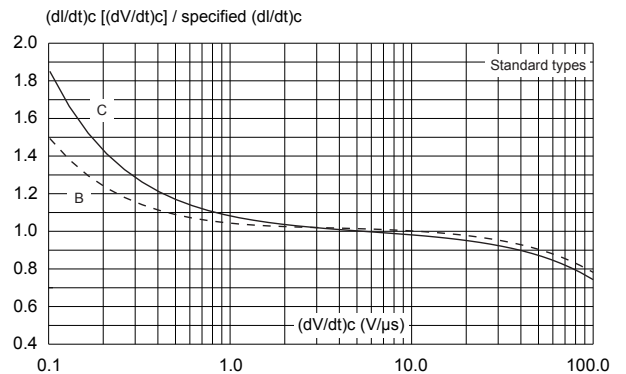


Figure 11. Relative variation of critical rate of decrease of main current versus junction temperature

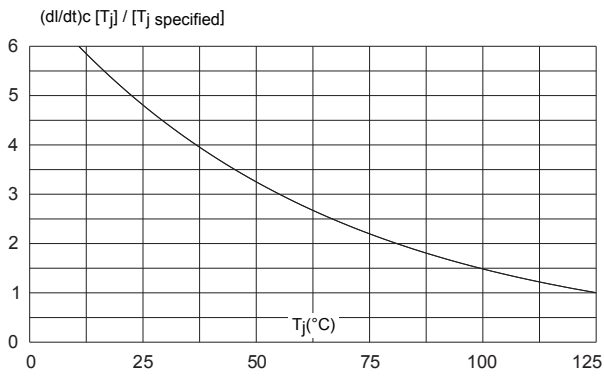
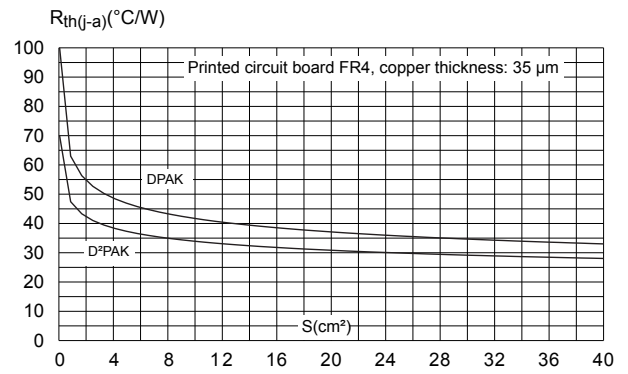


Figure 12. DPAK and D2PAK thermal resistance junction to ambient versus copper surface under tab



2 Package information

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

2.1 DPAK package information

- Epoxy meets UL94, V0
- Lead-free package
- Recommended torque: 0.4 to 0.6 N·m

Figure 13. DPAK package outline

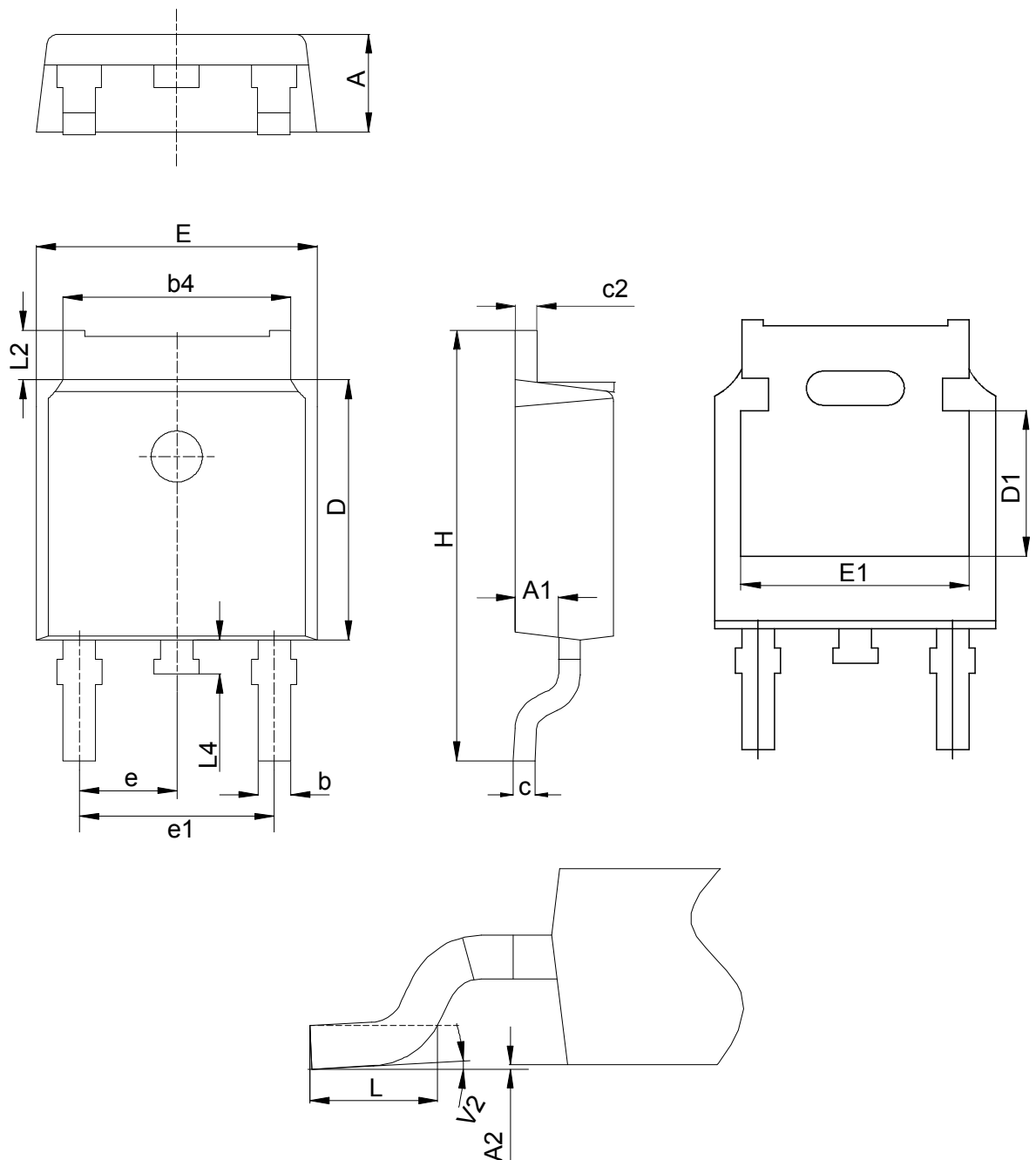
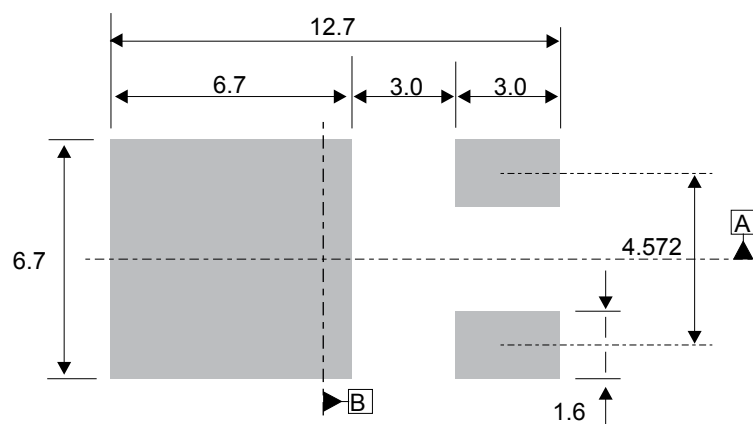


Table 6. DPAK package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|-----------------------|--------|--------|
| | Millimeters | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.18 | | 2.40 | 0.0858 | | 0.0945 |
| A1 | 0.90 | | 1.10 | 0.0354 | | 0.0433 |
| A2 | 0.03 | | 0.23 | 0.0012 | | 0.0091 |
| b | 0.64 | | 0.90 | 0.0252 | | 0.354 |
| b4 | 4.95 | | 5.46 | 0.1949 | | 0.2150 |
| c | 0.46 | | 0.61 | 0.0181 | | 0.0240 |
| c2 | 0.46 | | 0.60 | 0.0181 | | 0.0236 |
| D | 5.97 | | 6.22 | 0.2350 | | 0.2449 |
| D1 | 5.10 | | | 0.2008 | | |
| E | 6.35 | | 6.73 | 0.2500 | | 0.2650 |
| E1 | 4.32 | | | 0.1701 | | |
| e | | 2.29 | | | 0.0900 | |
| e1 | | 4.57 | | | 0.1800 | |
| H | 9.35 | | 10.40 | 0.3681 | | 0.4094 |
| L | 1.00 | | 1.78 | 0.0394 | | 0.0701 |
| L2 | | | 1.27 | | | 0.0500 |
| L4 | 0.60 | | 1.02 | 0.0236 | | 0.0402 |
| V2 | 0° | | +8° | 0° | | +8° |

1. Dimensions in inches are given for reference only

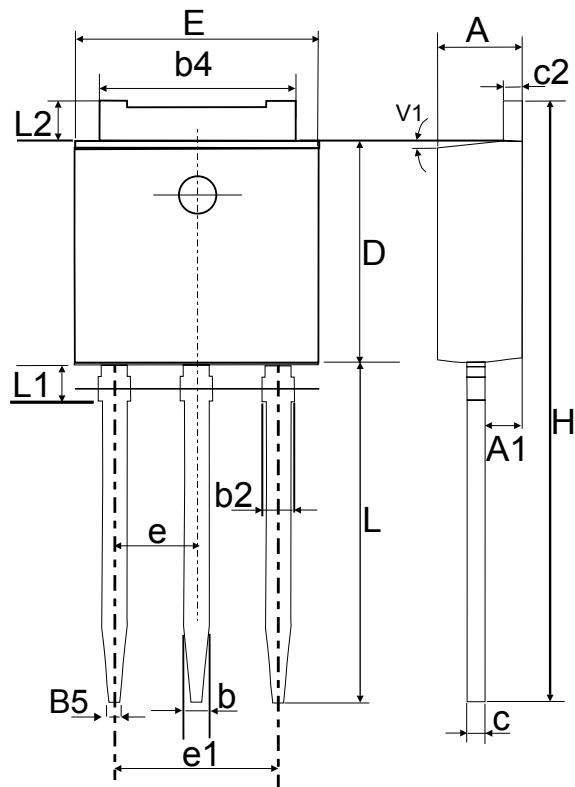
Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Figure 14. DPAK recommended footprint (dimensions are in mm)


The device must be positioned within $\oplus 0.05 \text{ AB}$

2.2 IPAK package information

Figure 15. IPAK package outline



Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

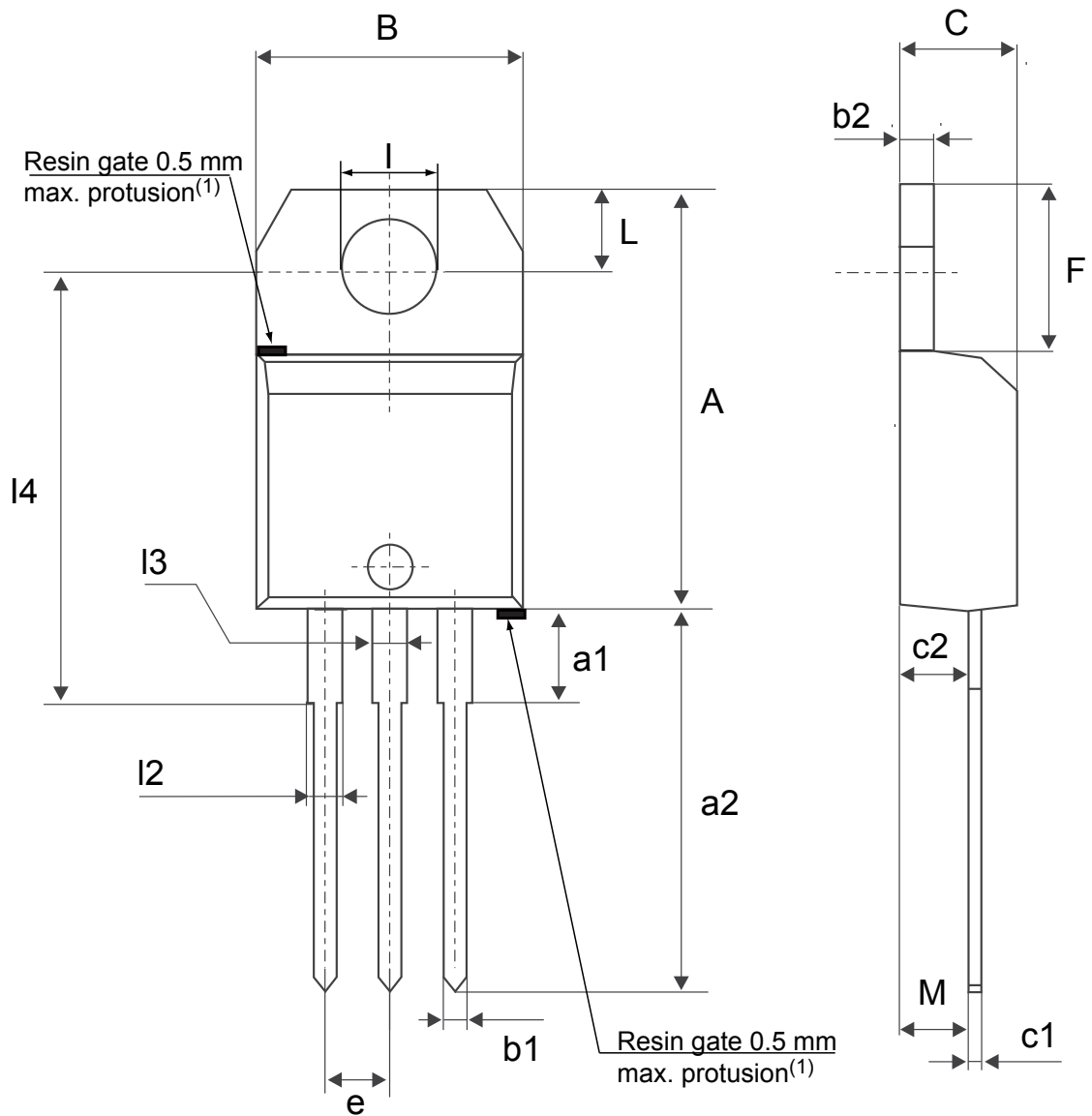
Table 7. IPAK package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|-------|------|-----------------------|--------|--------|
| | Millimeters | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.20 | | 2.40 | 0.0866 | | 0.0945 |
| A1 | 0.90 | | 1.10 | 0.0354 | | 0.0433 |
| b | 0.64 | | 0.90 | 0.0252 | | 0.0354 |
| b2 | | | 0.95 | | | 0.0374 |
| b4 | 5.20 | | 5.43 | 0.2047 | | 0.2138 |
| B5 | | 0.30 | | | 0.0118 | |
| c | 0.45 | | 0.60 | 0.0177 | | 0.0236 |
| c2 | 0.46 | | 0.60 | 0.0181 | | 0.0236 |
| D | 6.00 | | 6.20 | 0.2362 | | 0.2441 |
| E | 6.40 | | 6.65 | 0.2520 | | 0.2618 |
| e | | 2.28 | | | 0.0898 | |
| e1 | 4.40 | | 4.60 | 0.1732 | | 0.1811 |
| H | | 16.10 | | | 0.6339 | |
| L | 9.00 | | 9.60 | 0.3545 | | 0.3780 |
| L1 | 0.80 | | 1.20 | 0.0315 | | 0.0472 |
| L2 | | 0.80 | 1.25 | | 0.0315 | 0.0492 |
| V1 | | 10° | | | 10° | |

1. Inch dimensions are for reference only.

2.3 TO-220AB insulated package information

Figure 16. TO-220AB insulated package outline



(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites.

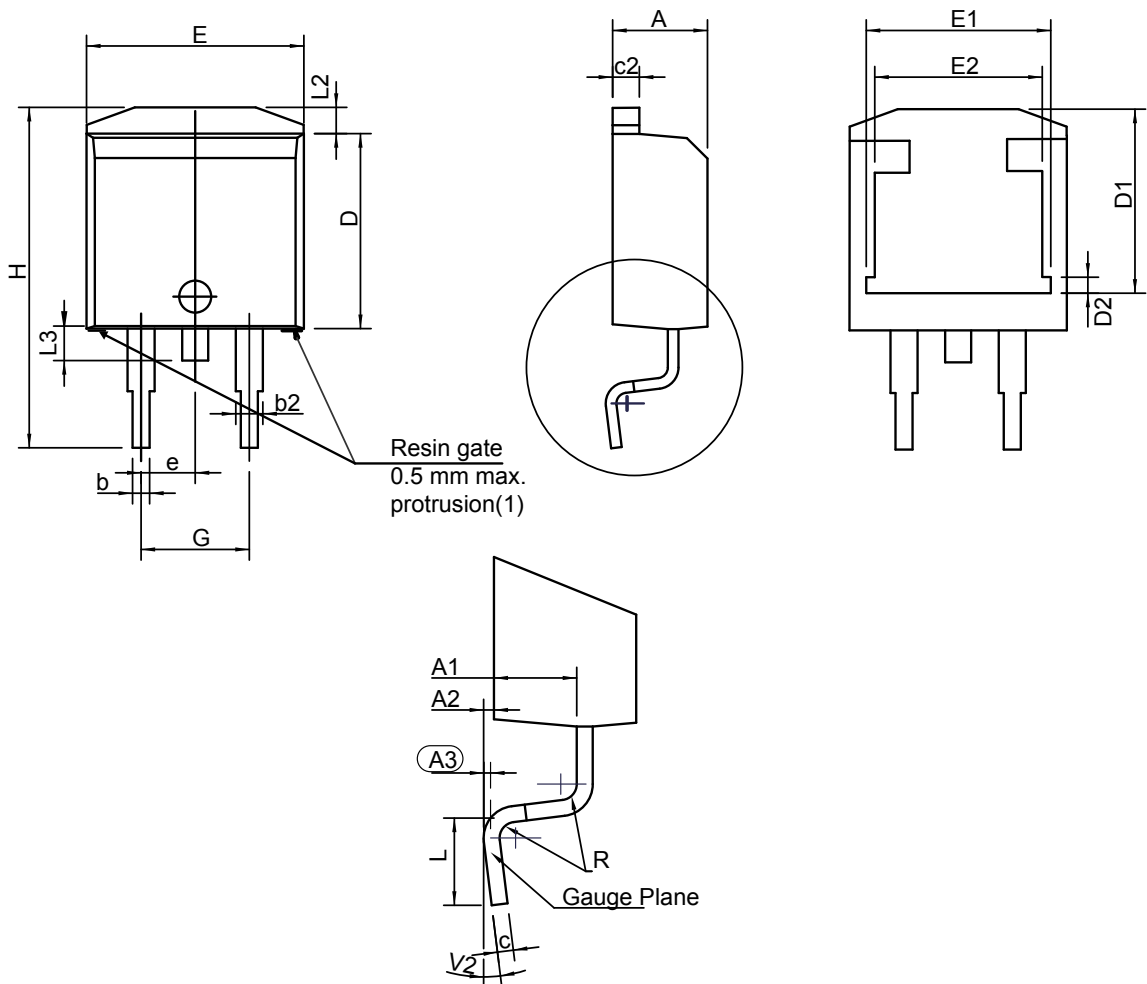
Table 8. TO-220AB insulated package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|--------|--------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 15.20 | | 15.90 | 0.5984 | | 0.6260 |
| a1 | | 3.75 | | | 0.1476 | |
| a2 | 13.00 | | 14.00 | 0.5118 | | 0.5512 |
| B | 10.00 | | 10.40 | 0.3937 | | 0.4094 |
| b1 | 0.61 | | 0.88 | 0.0240 | | 0.0346 |
| b2 | 1.23 | | 1.32 | 0.0484 | | 0.0520 |
| C | 4.40 | | 4.60 | 0.1732 | | 0.1811 |
| c1 | 0.49 | | 0.70 | 0.0193 | | 0.0276 |
| c2 | 2.40 | | 2.72 | 0.0945 | | 0.1071 |
| e | 2.40 | | 2.70 | 0.0945 | | 0.1063 |
| F | 6.20 | | 6.60 | 0.2441 | | 0.2598 |
| I | 3.73 | | 3.88 | 0.1469 | | 0.1528 |
| L | 2.65 | | 2.95 | 0.1043 | | 0.1161 |
| I2 | 1.14 | | 1.70 | 0.0449 | | 0.0669 |
| I3 | 1.14 | | 1.70 | 0.0449 | | 0.0669 |
| I4 | 15.80 | 16.40 | 16.80 | 0.6220 | 0.6457 | 0.6614 |
| M | | 2.6 | | | 0.1024 | |

1. Inch dimensions are for reference only.

2.4 D²PAK package information

Figure 17. D²PAK package outline



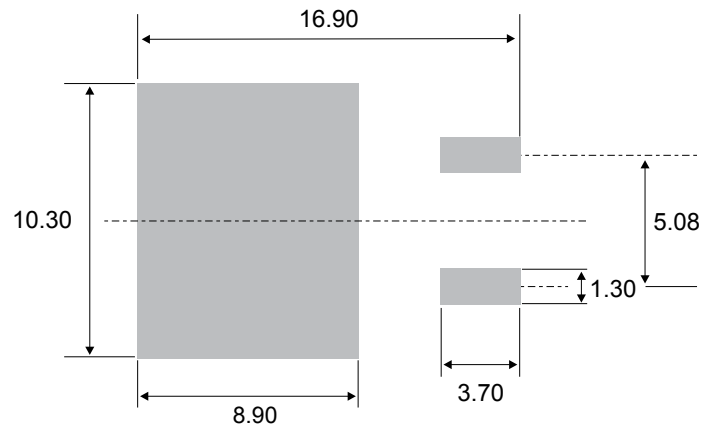
(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites

Table 9. D²PAK package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|--------|--------|--------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.30 | | 4.60 | 0.1693 | | 0.1811 |
| A1 | 2.49 | | 2.69 | 0.0980 | | 0.1059 |
| A2 | 0.03 | | 0.23 | 0.0012 | | 0.0091 |
| A3 | | 0.25 | | | 0.0098 | |
| b | 0.70 | | 0.93 | 0.0276 | | 0.0366 |
| b2 | 1.25 | | 1.7 | 0.0492 | | 0.0669 |
| c | 0.45 | | 0.60 | 0.0177 | | 0.0236 |
| c2 | 1.21 | | 1.36 | 0.0476 | | 0.0535 |
| D | 8.95 | | 9.35 | 0.3524 | | 0.3681 |
| D1 | 7.50 | | 8.00 | 0.2953 | | 0.3150 |
| D2 | 1.30 | | 1.70 | 0.0512 | | 0.0669 |
| e | 2.54 | | | 0.1 | | |
| E | 10.00 | | 10.28 | 0.3937 | | 0.4047 |
| E1 | 8.30 | | 8.70 | 0.3268 | | 0.3425 |
| E2 | 6.85 | | 7.25 | 0.2697 | | 0.2854 |
| G | 4.88 | | 5.28 | 0.1921 | | 0.2079 |
| H | 15 | | 15.85 | 0.5906 | | 0.6240 |
| L | 1.78 | | 2.28 | 0.0701 | | 0.0898 |
| L2 | 1.27 | | 1.40 | 0.0500 | | 0.0551 |
| L3 | 1.40 | | 1.75 | 0.0551 | | 0.0689 |
| R | | 0.40 | | | 0.0157 | |
| V2 | 0° | | 8° | 0° | | 8° |

1. Dimensions in inches are given for reference only

Figure 18. D²PAK recommended footprint (dimensions are in mm)



3 Ordering information

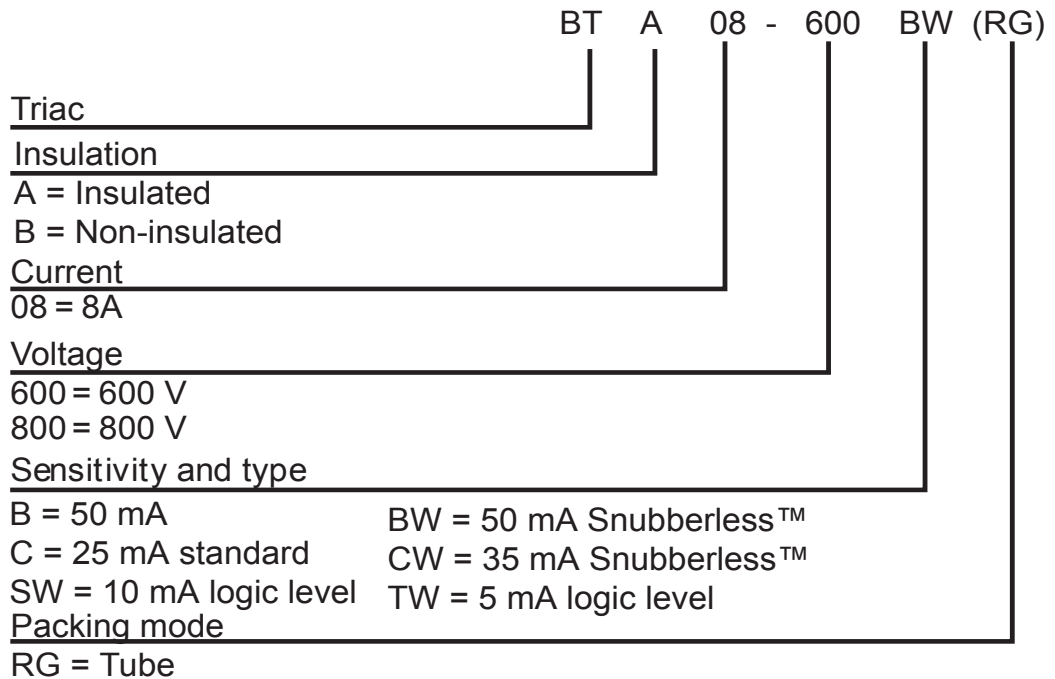
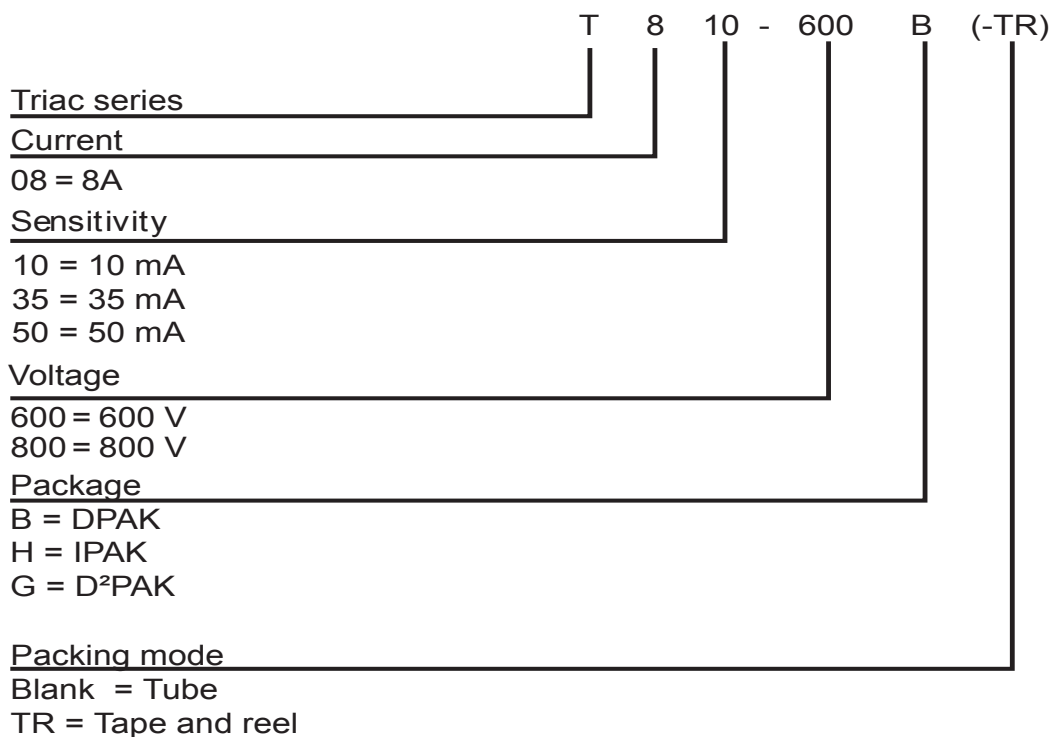
Figure 19. Ordering information scheme (BTA08 and BTB08 series)

Figure 20. Ordering information scheme (T8 series)


Table 10. Product selector

| Part Number | Voltage (xxx) | | Sensitivity | Type | Package |
|-------------|---------------|-----|-------------|--------------|--------------------|
| | 600 | 800 | | | |
| T810-xxxB | X | X | 10 mA | Logic Level | DPAK |
| T835-xxxH | X | | 35 mA | Snubberless™ | IPAK |
| T810-xxxG | X | | 10 mA | Logic Level | D ² PAK |
| T835-xxxG | X | X | 35 mA | Snubberless™ | D ² PAK |
| T850-xxxG | X | X | 50 mA | Snubberless™ | D ² PAK |
| BTA08-xxxS | X | | 10 mA | Logic Level | TO-220AB Ins. |
| BTA08-xxxC | X | X | 35 mA | Standard | TO-220AB Ins. |
| BTA08-xxxB | X | | 50 mA | Standard | TO-220AB Ins. |
| BTA08-xxxTW | X | | 5 mA | Logic Level | TO-220AB Ins. |
| BTA08-xxxSW | X | | 10 mA | Logic Level | TO-220AB Ins. |
| BTA08-xxxCW | X | | 35 mA | Snubberless™ | TO-220AB Ins. |
| BTA08-xxxBW | X | X | 50 mA | Snubberless™ | TO-220AB Ins. |
| BTB08-xxxS | X | | 10 mA | Logic Level | TO-220AB |
| BTB08-xxxC | X | | 35 mA | Standard | TO-220AB |
| BTB08-xxxB | X | | 50 mA | Standard | TO-220AB |
| BTB08-xxxTW | X | X | 5 mA | Logic Level | TO-220AB |
| BTB08-xxxSW | X | | 10 mA | Logic Level | TO-220AB |
| BTB08-xxxCW | X | X | 35 mA | Snubberless™ | TO-220AB |
| BTB08-xxxBW | X | | 50 mA | Snubberless™ | TO-220AB |

Table 11. Ordering information

| Order code | Marking | Package | Weight | Base qty. | Delivery mode | | |
|---------------|-------------|--------------------|--------|--------------------|---------------|------|---------------|
| T810-600B | T8 1060 | DPAK | 0.30 | 75 | Tube | | |
| T835-600B | T8 3560 | | | | | | |
| T835-800B | T8 3580 | | | | | | |
| T810-600B-TR | T8 1060 | | | D ² PAK | 1.50 | 2500 | Tape&Reel 13" |
| T810-800B-TR | T8 1080 | | | | | | |
| T835-600B-TR | T8 3560 | | | | | | |
| T835-800B-TR | T8 3580 | | | | | | |
| T835-600H | T8 3560 | IPAK | 0.40 | 75 | Tube | | |
| T835-600G | T835-600G | D ² PAK | 1.50 | 50 | Tube | | |
| T835-8G | T835-8G | | | | | | |
| T850-6G | T850-6G | | | | | | |
| T850-8G | T850-8G | | | | | | |
| T810-600G-TR | T810-600G | | | 1000 | Tape&Reel 13" | | |
| T835-600G-TR | T835-600G | | | | | | |
| T835-8G-TR | T835-8G | | | | | | |
| T850-6G-TR | T850-6G | | | | | | |
| T850-8G-TR | T850-8G | TO-220AB | 2.30 | 50 | Tube | | |
| BTA08-600SRG | BTA08-600S | | | | | | |
| BTA08-600BRG | BTA08-600B | | | | | | |
| BTA08-600CRG | BTA08-600C | | | | | | |
| BTA08-800CRG | BTA08-800C | | | | | | |
| BTA08-600BWRG | BTA08-600BW | | | | | | |
| BTA08-600CWRG | BTA08-600CW | | | | | | |
| BTA08-600SWRG | BTA08-600SW | | | | | | |
| BTA08-600TWRG | BTA08-600TW | | | | | | |
| BTA08-800BWRG | BTA08-800BW | | | | | | |
| BTB08-600BRG | BTB08-600B | | | | | | |
| BTB08-600CRG | BTB08-600C | | | | | | |
| BTB08-600SRG | BTB08-600S | | | | | | |
| BTB08-600BWRG | BTB08-600BW | | | | | | |
| BTB08-600CWRG | BTB08-600CW | | | | | | |
| BTB08-600SWRG | BTB08-600SW | | | | | | |
| BTB08-600TWRG | BTB08-600TW | | | | | | |
| BTB08-800CWRG | BTB08-800CW | | | | | | |
| BTB08-800TWRG | BTB08-800TW | | | | | | |

Table 12. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| Apr-2002 | 5A | Last update. |
| 13-Feb-2006 | 6 | TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added. |
| 10-Mar-2010 | 7 | Updated ECOPACK statement and Figure 26 |
| 02-Jun-2014 | 8 | Updated DPAK and IPAK package information and reformatted to current standard. |
| 07-Nov-2016 | 9 | Updated Table 1 and reformatted to current standard. |
| 06-Jan-2017 | 10 | Updated Figure 20: "Ordering information scheme (T8 series)", Table 10: "Product selector" and Table 11: "Ordering information". |
| 09-Feb-2017 | 11 | Added T850 package information. |
| 24-Apr-2017 | 12 | Updated Figure 6.. Minor text changes to improve readability. |
| 14-Mar-2018 | 13 | Updated Table 2. Electrical characteristics (T_j = 25 °C, unless otherwise specified) Snubberless and logic level (3 quadrants) , cover image , Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)_c (typical values) and Figure 20. Ordering information scheme (T8 series) . |
| 14-May-2018 | 14 | Updated product status links. |
| 09-Aug-2018 | 15 | Updated Table 3. Standard (4 quadrants) . |

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