



BTA312 series B and C

12 A Three-quadrant triacs high commutation

Rev. 01 — 13 March 2007

Product data sheet

1. Product profile

1.1 General description

Passivated, new generation, high commutation triacs, in a SOT78 plastic package.

1.2 Features

- Very high commutation performance maximized at each gate sensitivity
- High immunity to dV/dt

1.3 Applications

- High power motor control e.g. washing machines, vacuum cleaners
- Non-linear rectifier-fed motor loads
- Refrigeration and air conditioning compressors
- Electronic thermostats

1.4 Quick reference data

- $V_{DRM} \leq 600$ V (BTA312-600B/C)
- $V_{DRM} \leq 800$ V (BTA312-800B/C)
- $I_{TSM} \leq 95$ A ($t = 20$ ms)
- $I_{GT} \leq 50$ mA (BTA312 series B)
- $I_{GT} \leq 35$ mA (BTA312 series C)
- $I_{T(RMS)} \leq 12$ A

2. Pinning information

Table 1. Pinning

| Pin | Description | Simplified outline | Symbol |
|-----|-------------------------------------|--------------------|--------|
| 1 | main terminal 1 (T1) | | |
| 2 | main terminal 2 (T2) | | |
| 3 | gate (G) | | |
| mb | mounting base; main terminal 2 (T2) | | |

3. Ordering information

Table 2. Ordering information

| Type number | Package | | Version |
|-------------|---------|--|---------|
| | Name | Description | |
| BTA312-600B | SC-46 | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |
| BTA312-600C | | | |
| BTA312-800B | | | |
| BTA312-800C | | | |

4. Limiting values

Table 3. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|---------------------|--------------------------------------|--|-----|------|------------------|---|
| V_{DRM} | repetitive peak off-state voltage | BTA312-600B; BTA312-600C | [1] | - | 600 | V |
| | | BTA312-800B; BTA312-800C | - | - | 800 | V |
| $I_{\text{T(RMS)}}$ | RMS on-state current | full sine wave; $T_{\text{mb}} \leq 101\text{ °C}$; see Figure 4 and 5 | - | 12 | A | |
| I_{TSM} | non-repetitive peak on-state current | full sine wave; $T_{\text{j}} = 25\text{ °C}$ prior to surge; see Figure 2 and 3 | - | - | - | |
| | | $t = 20\text{ ms}$ | - | 95 | A | |
| | | $t = 16.7\text{ ms}$ | - | 105 | A | |
| I^2t | I^2t for fusing | $t = 10\text{ ms}$ | - | 45 | A ² s | |
| di_{T}/dt | rate of rise of on-state current | $I_{\text{TM}} = 20\text{ A}$; $I_{\text{G}} = 0.2\text{ A}$; $di_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$ | - | 100 | A/ μs | |
| I_{GM} | peak gate current | | - | 2 | A | |
| P_{GM} | peak gate power | | - | 5 | W | |
| $P_{\text{G(AV)}}$ | average gate power | over any 20 ms period | - | 0.5 | W | |
| T_{stg} | storage temperature | | -40 | +150 | °C | |
| T_{j} | junction temperature | | - | 125 | °C | |

- [1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .

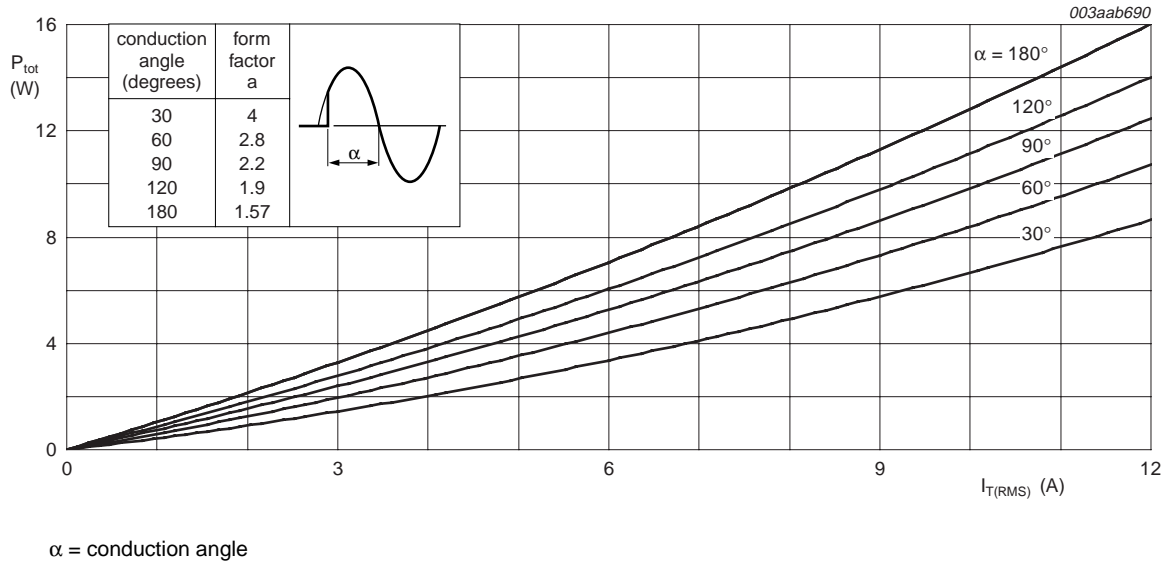


Fig 1. Total power dissipation as a function of RMS on-state current; maximum values

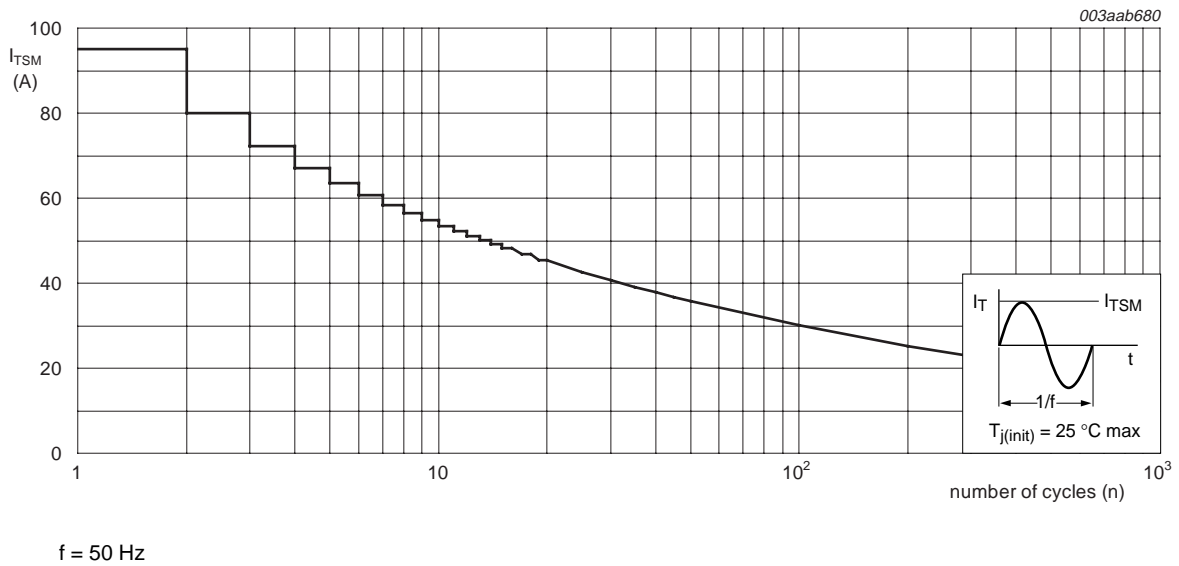
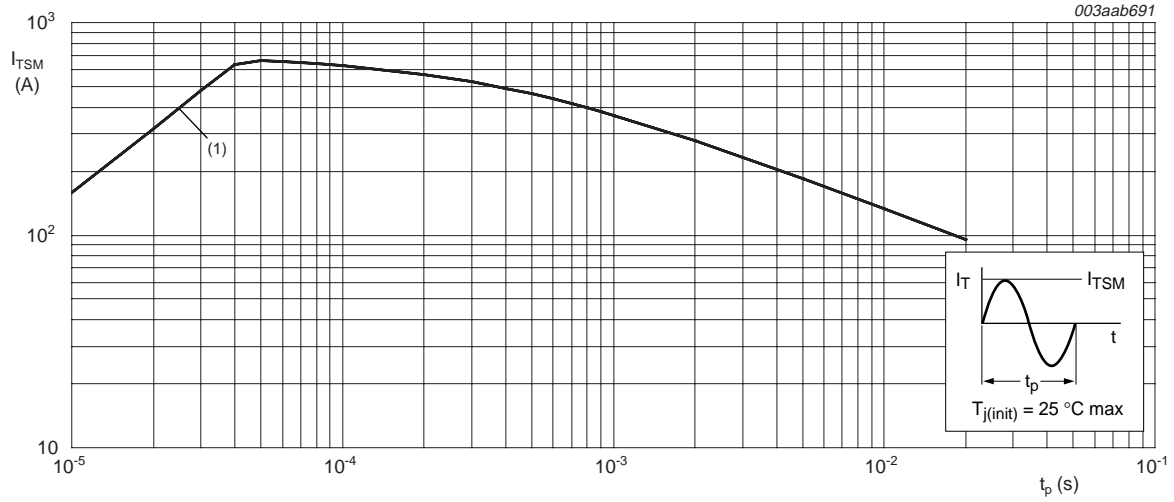


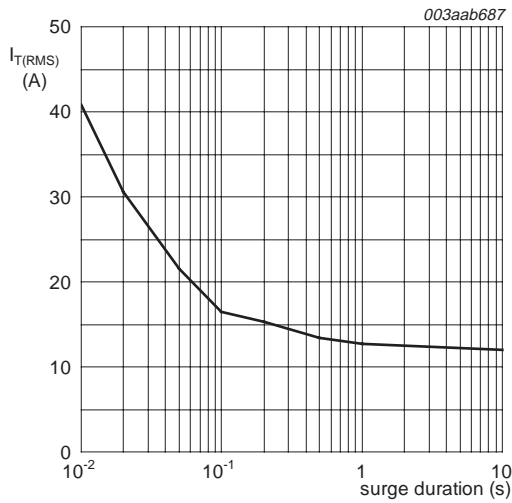
Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20 \text{ ms}$

(1) di_T/dt limit

Fig 3. Non-repetitive peak on-state current as a function of pulse duration; maximum values



$f = 50 \text{ Hz}$

$T_{mb} = 101 \text{ °C}$

Fig 4. RMS on-state current as a function of surge duration; maximum values

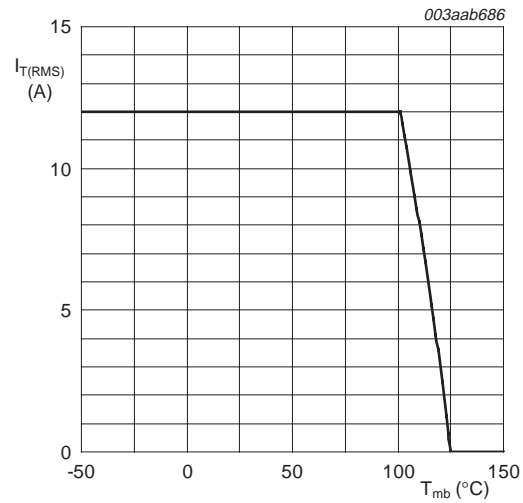
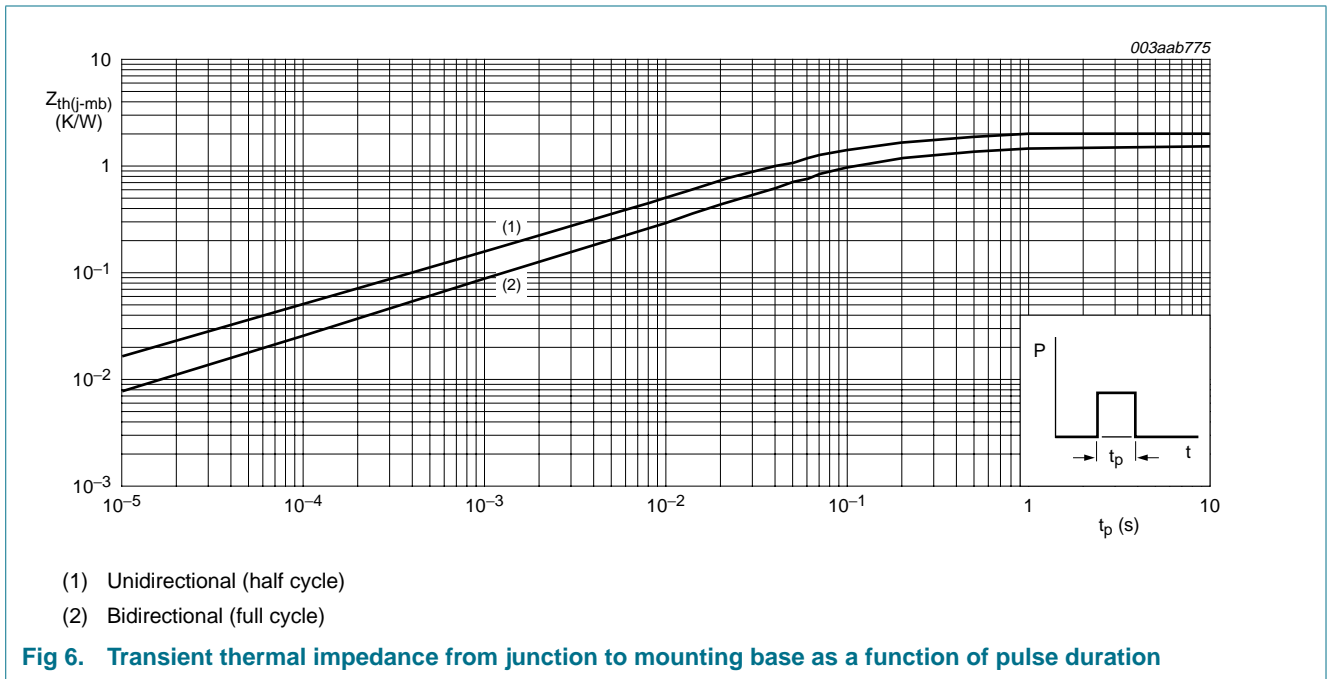


Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

5. Thermal characteristics

Table 4. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|---|--|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | half cycle; see Figure 6 | - | - | 2.0 | K/W |
| | | full cycle; see Figure 6 | - | - | 1.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |



6. Static characteristics

Table 5. Static characteristics

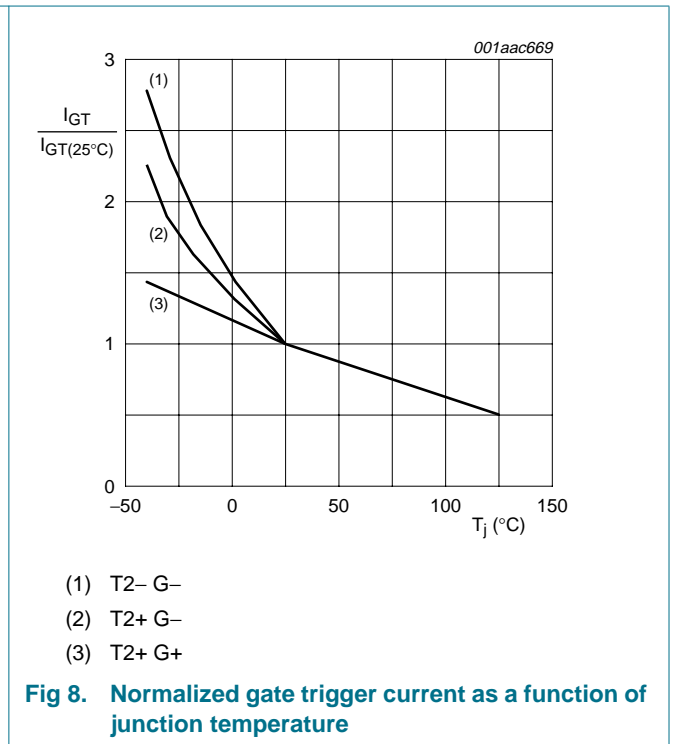
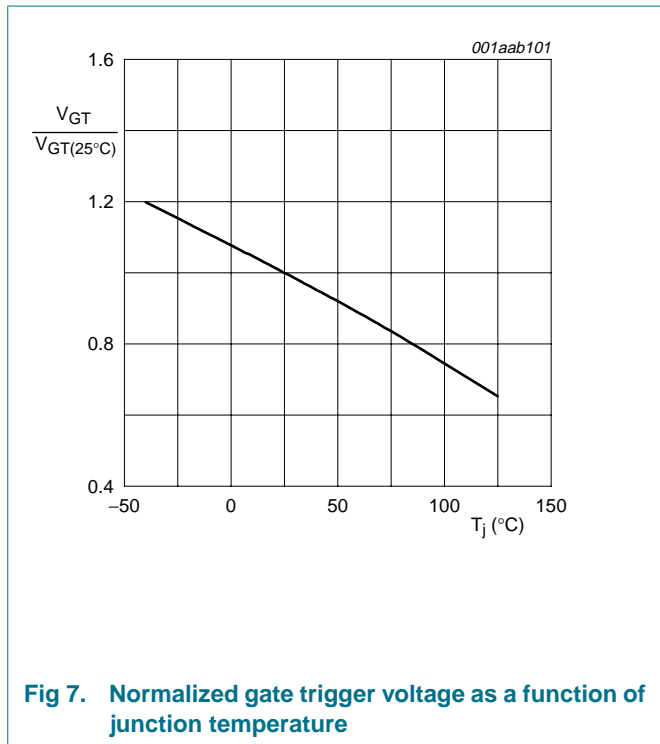
$T_j = 25\text{ °C}$ unless otherwise specified.

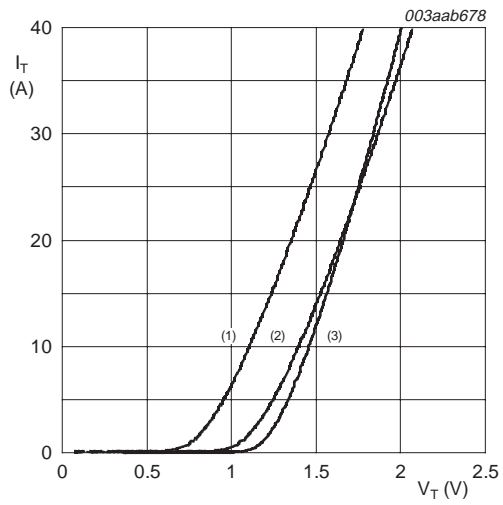
| Symbol | Parameter | Conditions | BTA312-600B BTA312-800B | | | BTA312-600C BTA312-800C | | | Unit |
|----------|----------------------|---|----------------------------|-----|-----|----------------------------|-----|-----|------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| I_{GT} | gate trigger current | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 8 | | | | | | | |
| | | T2+ G+ | 2 | - | 50 | 2 | - | 35 | mA |
| | | T2+ G- | 2 | - | 50 | 2 | - | 35 | mA |
| I_L | latching current | $V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$; see Figure 10 | | | | | | | |
| | | T2+ G+ | - | - | 60 | - | - | 50 | mA |
| | | T2+ G- | - | - | 90 | - | - | 60 | mA |
| I_H | holding current | $V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$; see Figure 11 | - | - | 60 | - | - | 35 | mA |
| | | T2- G- | - | - | 60 | - | - | 50 | mA |
| | | | - | - | 60 | - | - | 35 | mA |
| V_T | on-state voltage | $I_T = 15\text{ A}$; see Figure 9 | - | 1.3 | 1.6 | - | 1.3 | 1.6 | V |
| V_{GT} | gate trigger voltage | $V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 7 | - | 0.8 | 1.5 | - | 0.8 | 1.5 | V |
| | | $V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$ | 0.25 | 0.4 | - | 0.25 | 0.4 | - | V |
| I_D | off-state current | $V_D = V_{DRM(max)}$; $T_j = 125\text{ °C}$ | - | 0.1 | 0.5 | - | 0.1 | 0.5 | mA |

7. Dynamic characteristics

Table 6. Dynamic characteristics

| Symbol | Parameter | Conditions | BTA312-600B BTA312-800B | | | BTA312-600C BTA312-800C | | | Unit |
|---------------|---------------------------------------|---|----------------------------|------|-----|----------------------------|-----|-----|------------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| dV_D/dt | rate of rise of off-state voltage | $V_{DM} = 0.67 \times V_{DRM(max)}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit | 1000 | 2000 | - | 500 | - | - | V/ μ s |
| dI_{com}/dt | rate of change of commutating current | $V_{DM} = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; without snubber; gate open circuit | 30 | - | - | 20 | - | - | A/ms |
| t_{gt} | gate-controlled turn-on time | $I_{TM} = 20\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$ | - | 2 | - | - | 2 | - | μ s |





$V_o = 1.127 \text{ V}$

$R_s = 0.027 \text{ } \Omega$

- (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
- (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig 9. On-state current as a function of on-state voltage

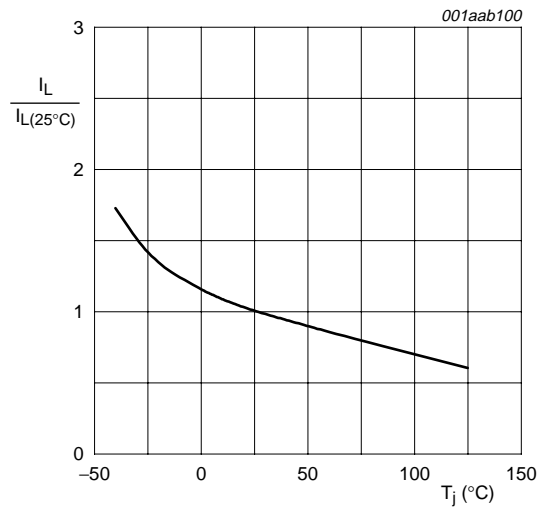


Fig 10. Normalized latching current as a function of junction temperature

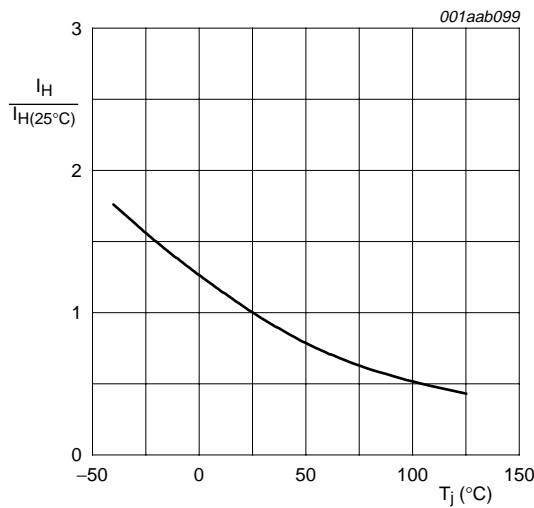


Fig 11. Normalized holding current as a function of junction temperature

8. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78

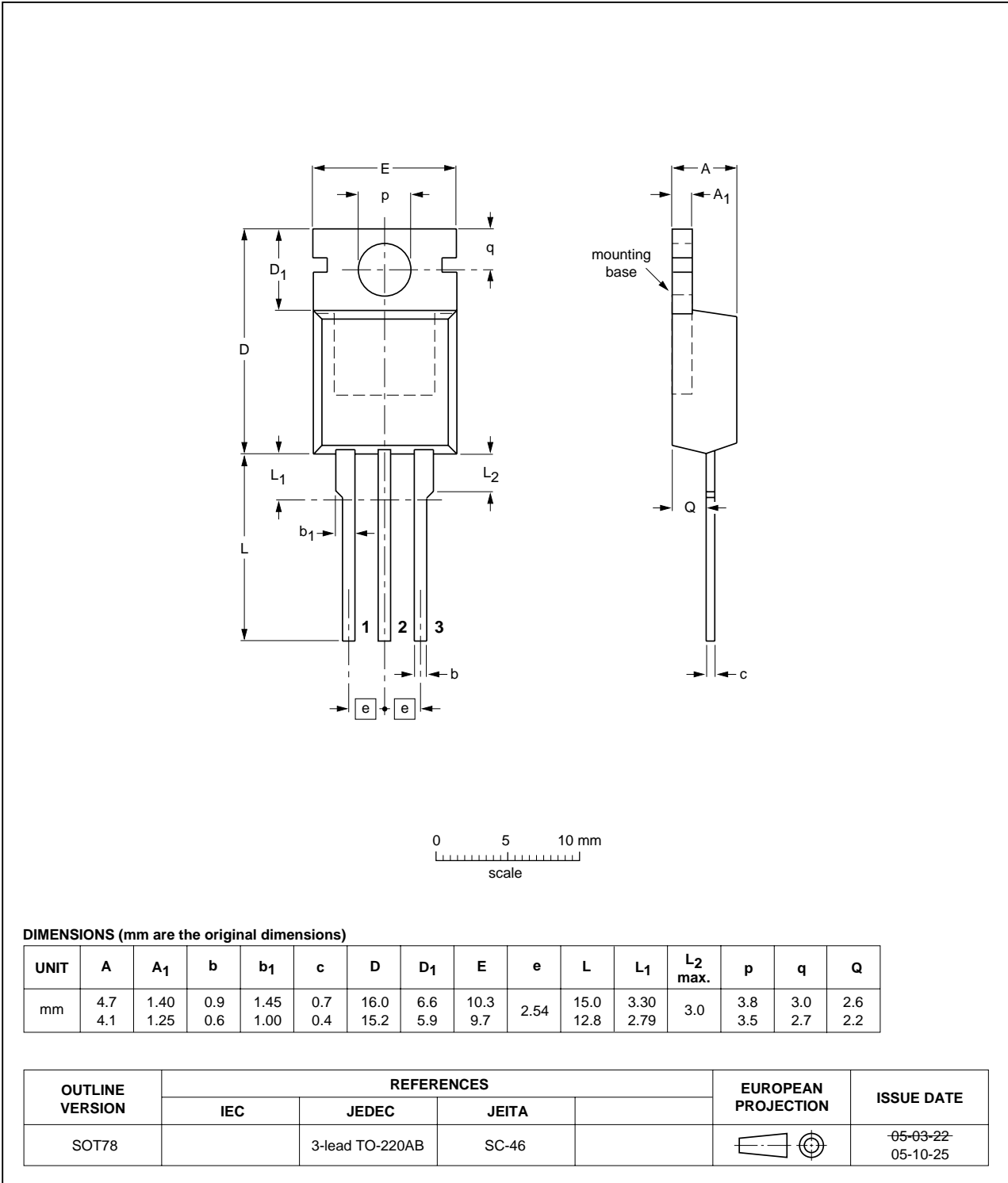


Fig 12. Package outline SOT78 (3-lead TO-220AB)

9. Revision history

Table 7. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--------------|--------------------|---------------|------------|
| BTA312_SER_B_C_1 | 20070313 | Product data sheet | - | - |

10. Legal information

10.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

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