## 1. Product profile

### 1.1 General description

Passivated, guaranteed commutation, sensitive gate triacs in a SOT54 plastic package

### 1.2 Features

- Guaranteed commutation performance at each gate sensitivity
- Sensitive gate
- Easily interfaced with low power drivers including microcontrollers

### 1.3 Applications

- Motor control
- Solenoid drivers

### 1.4 Quick reference data

- $V_{DRM} \leq 600$ V (BTA2008-600D)
- $V_{DRM} \leq 600$ V (BTA2008-600E)
- $V_{DRM} \leq 800$ V (BTA2008-800D)
- $V_{DRM} \leq 800$ V (BTA2008-800E)
- $I_{TSM} \leq 9$ A (t = 20 ms)
- $I_{GT} \leq 5$ mA (BTA2008-600D)
- $I_{GT} \leq 5$ mA (BTA2008-800D)
- $I_{GT} \leq 10$ mA (BTA2008-600E)
- $I_{GT} \leq 10$ mA (BTA2008-800E)
- $I_{T(RMS)} \leq 0.8$ A

## 2. Pinning information

**Table 1.** Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|--------------------|----------------|
| 1 | main terminal 2 (T2) | | |
| 2 | gate (G) | | |
| 3 | main terminal 1 (T1) | | |
| | | 3 2 1 | sym051 |
| | | **SOT54 (TO-92)** | |

## 3. Ordering information

**Table 2.    Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | **Name** | **Description** | | **Version** |
| BTA2008-600D | TO-92 | plastic single-ended leaded (through hole) package; 3 leads | | SOT54 |
| BTA2008-600E | | | | |
| BTA2008-800D | | | | |
| BTA2008-800E | | | | |

## 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 | BTA2008-600D; BTA2008-600E | [1] | - | 600 | V |
| | | BTA2008-800D; BTA2008-800E | | - | 800 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{lead} \leq 70$ °C; see Figure 4 and 5 | | - | 0.8 | A |
| $I_{TSM}$ | non-repetitive peak on-state current | full sine wave; $T_j = 25$ °C prior to surge; see Figure 2 and 3 | | | | |
| | | t = 20 ms | | - | 9 | A |
| | | t = 16.7 ms | | - | 9.9 | A |
| $I^2t$ | $I^2t$ for fusing | $t_p = 10$ ms | | - | 0.41 | $A^2s$ |
| $dI_T/dt$ | rate of rise of on-state current | $I_{TM} = 1.5$ A; $I_G = 20$ mA; $dI_G/dt = 0.2$ A/µs | | - | 100 | A/µs |
| $I_{GM}$ | peak gate current | | | - | 1 | A |
| $P_{GM}$ | peak gate power | | | - | 5 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | | - | 0.1 | 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 6 A/µs.
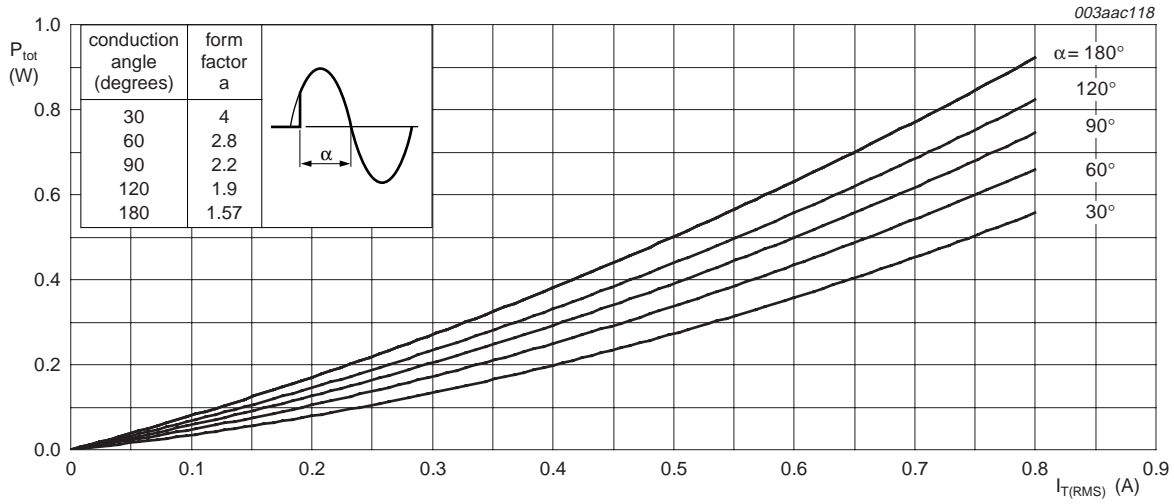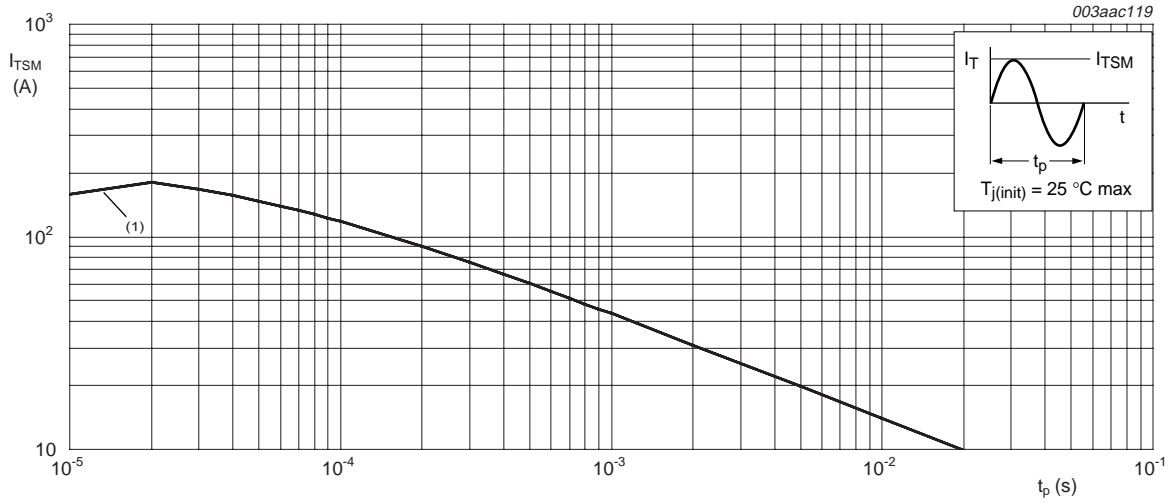
α = conduction angle

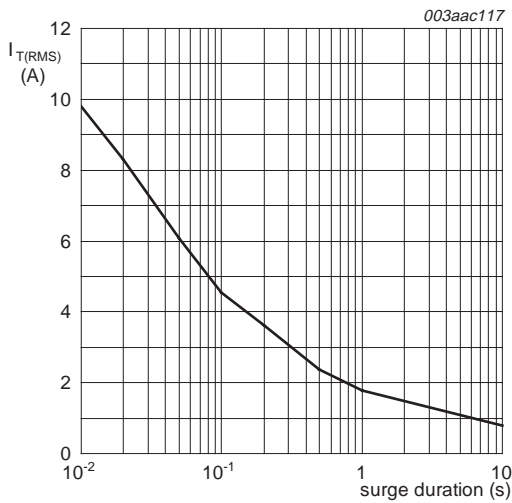**Fig 1.    Total power dissipation as a function of RMS on-state current; maximum values**
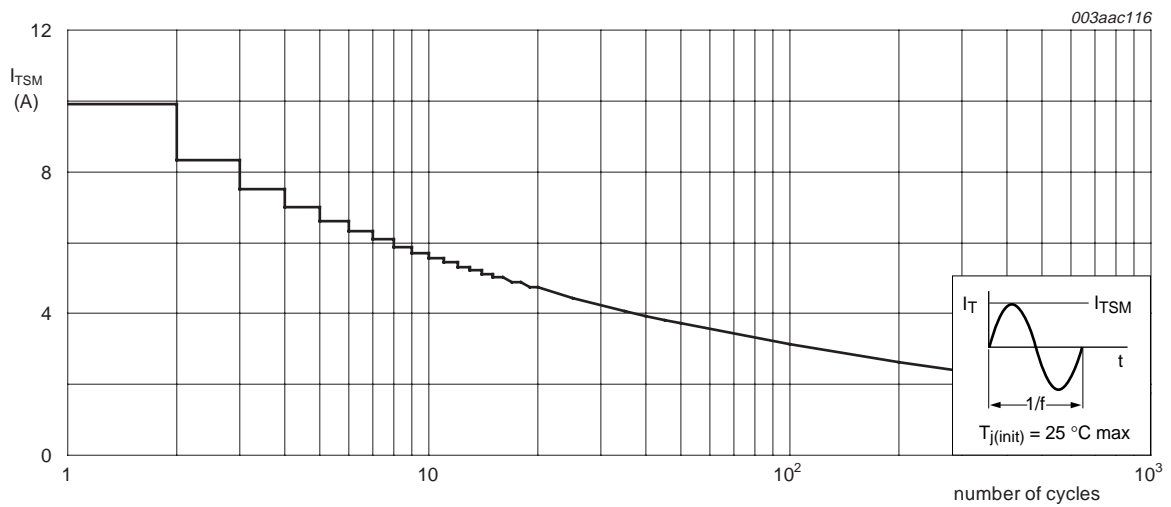


f = 50 Hz

**Fig 2.    Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values**
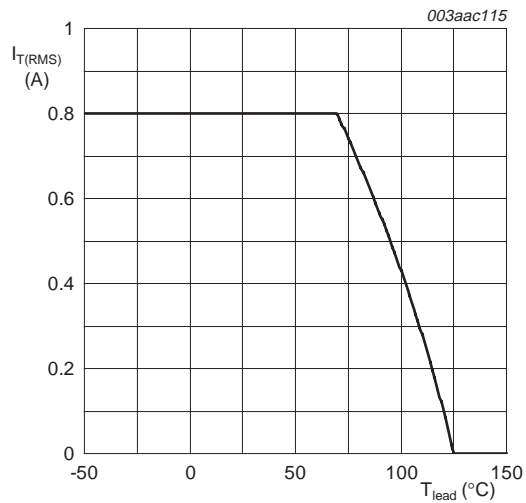
$t_p \leq 20$ ms

(1) $dI_T/dt$ limit

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



$f = 50$ Hz

$T_{lead} = 70$ °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 lead temperature; maximum values**

BTA2008_SER_D_E_1

**Product data sheet** Rev. 01 — 18 January 2008 4 of 12

## 5. Thermal characteristics

**Table 4. Thermal characteristics**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $R_{th(j\text{-}lead)}$ | thermal resistance from junction to lead | full cycle; see Figure 6 | - | - | 60 | K/W |
| $R_{th(j\text{-}a)}$ | thermal resistance from junction to ambient | printed circuit board mounted; lead length 4 mm | - | 150 | - | K/W |
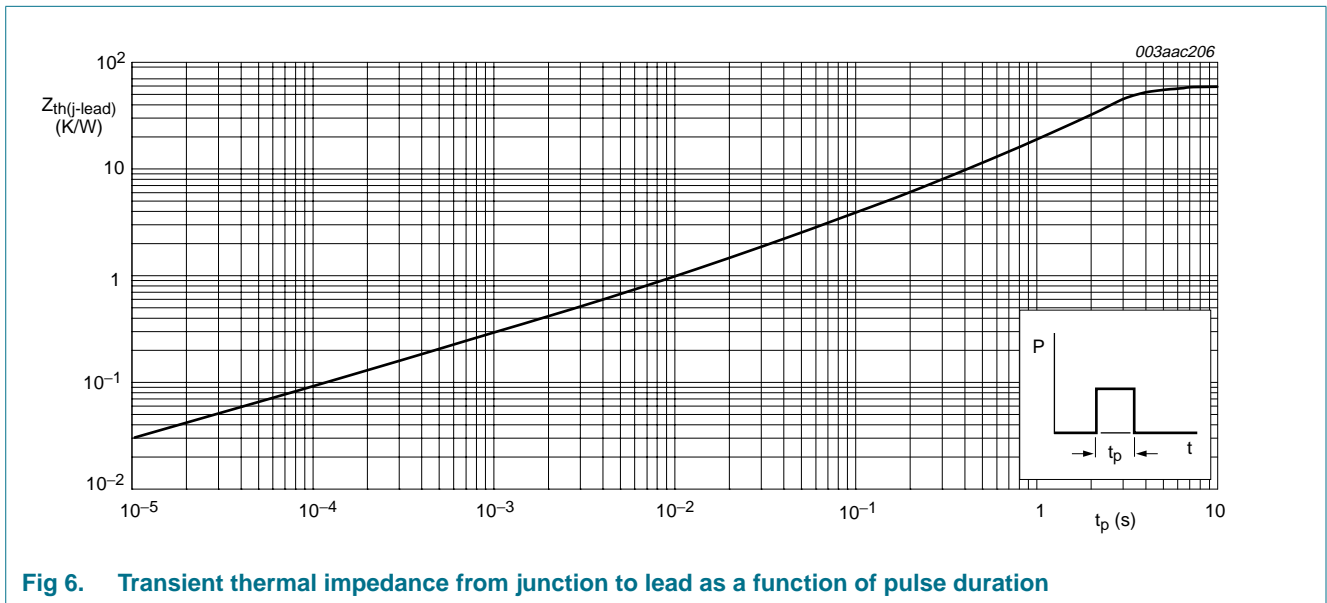


**Fig 6. Transient thermal impedance from junction to lead as a function of pulse duration**
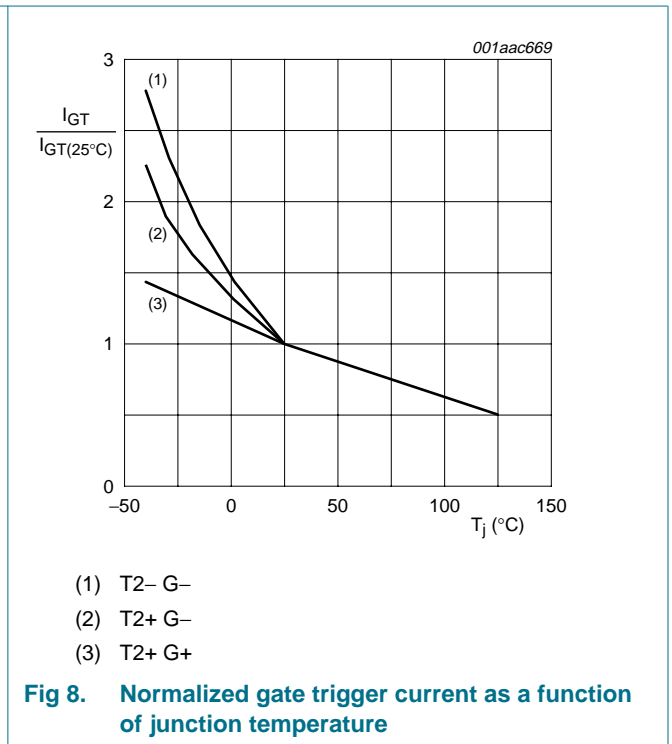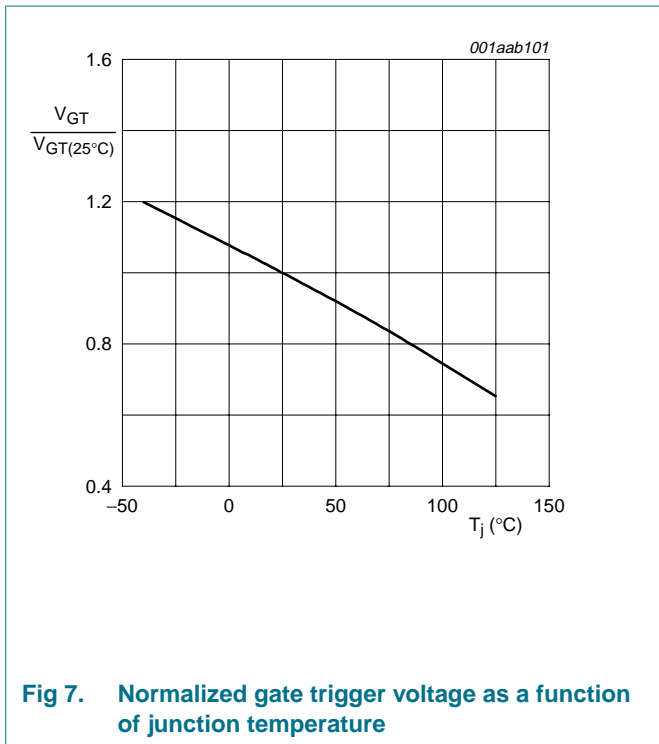
## 6. Static characteristics

**Table 5. Static characteristics**
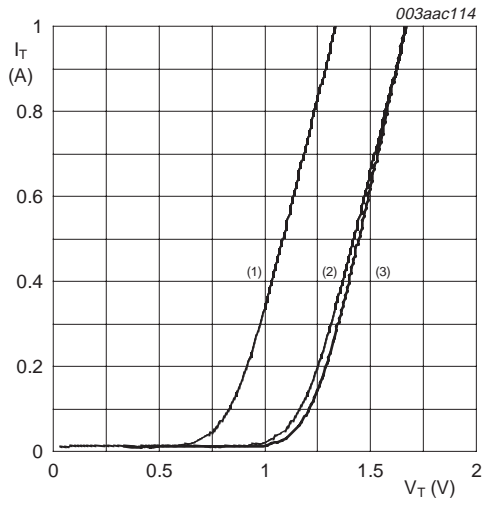
*$T_j$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | BTA2008-600D BTA2008-800D | | | BTA2008-600E BTA2008-800E | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $I_{GT}$ | gate trigger current | $V_D$ = 12 V; $I_T$ = 0.1 A; see Figure 8 | | | | | | | |
| | | T2+ G+ | 0.25 | - | 5 | 0.5 | - | 10 | mA |
| | | T2+ G− | 0.25 | - | 5 | 0.5 | - | 10 | mA |
| | | T2− G− | 0.25 | - | 5 | 0.5 | - | 10 | mA |
| $I_L$ | latching current | $V_D$ = 12 V; $I_{GT}$ = 0.1 A; see Figure 10 | | | | | | | |
| | | T2+ G+ | - | - | 10 | - | - | 12 | mA |
| | | T2+ G− | - | - | 20 | - | - | 20 | mA |
| | | T2− G− | - | - | 10 | - | - | 12 | mA |
| $I_H$ | holding current | $V_D$ = 12 V; $I_{GT}$ = 0.1 A; see Figure 11 | - | - | 10 | - | - | 12 | mA |
| $V_T$ | on-state voltage | $I_T$ = 0.85 A; see Figure 9 | - | 1.35 | 1.6 | - | 1.35 | 1.6 | V |
| $V_{GT}$ | gate trigger voltage | $V_D$ = 12 V; $I_T$ = 0.1 A; see Figure 7 | - | 0.9 | 2 | - | 0.9 | 2 | V |
| | | $V_D$ = 400 V; $I_T$ = 0.1 A; $T_j$ = 125 °C | 0.2 | 0.3 | - | 0.2 | 0.3 | - | V |
| $I_D$ | off-state current | $V_D$ = $V_{DRM(max)}$; $T_j$ = 125 °C | - | 0.1 | 0.5 | - | 0.1 | 0.5 | mA |

## 7. Dynamic characteristics

**Table 6.** **Dynamic characteristics**

| Symbol | Parameter | Conditions | BTA2008-600D BTA2008-800D | | | BTA2008-600E BTA2008-800E | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $dV_D/dt$ | rate of rise of off-state voltage | $V_{DM} = 0.67 \times V_{DRM(max)}$; $T_j = 125\ °C$; exponential waveform; gate open circuit | 200 | - | - | 600 | - | - | V/µs |
| $dI_{com}/dt$ | rate of change of commutating current | $V_{DM} = 400\ V$; $T_j = 125\ °C$; $I_{T(RMS)} = 0.8\ A$; $dV/dt = 10\ V/µs$; gate open circuit | 0.5 | - | - | 1.6 | - | - | A/ms |
| $t_{gt}$ | gate-controlled turn-on time | $I_{TM} = 1\ A$; $V_D = V_{DRM(max)}$; $I_G = 0.1\ A$; $dI_G/dt = 5\ A/µs$ | - | 2 | - | - | 2 | - | µs |



**Fig 7.** **Normalized gate trigger voltage as a function of junction temperature**



(1) T2− G−
(2) T2+ G−
(3) T2+ G+

**Fig 8.** **Normalized gate trigger current as a function of junction temperature**

$V_o$ = 0.835 V

$R_s$ = 0.5 $\Omega$

(1)   $T_j$ = 125 °C; typical values

(2)   $T_j$ = 125 °C; maximum values

(3)   $T_j$ = 25 °C; maximum values

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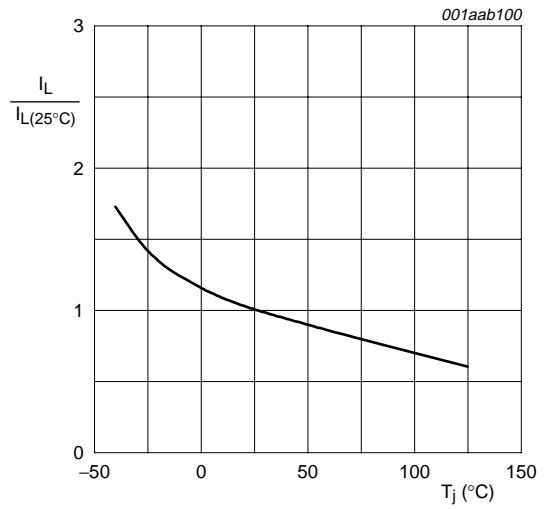


**Fig 10.   Normalized latching current as a function of junction temperature**
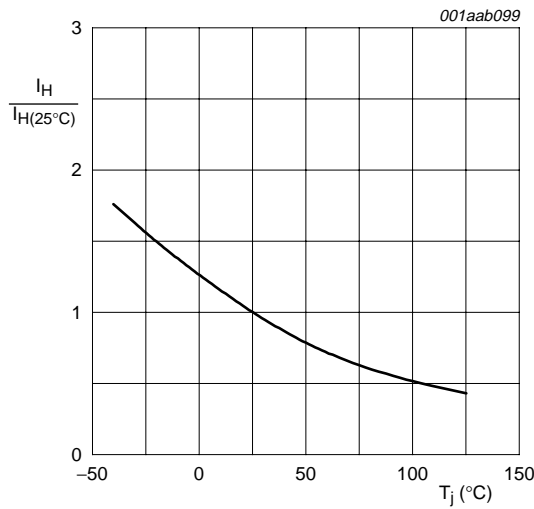


**Fig 11.   Normalized holding current as a function of junction temperature**

## 8. Package outline

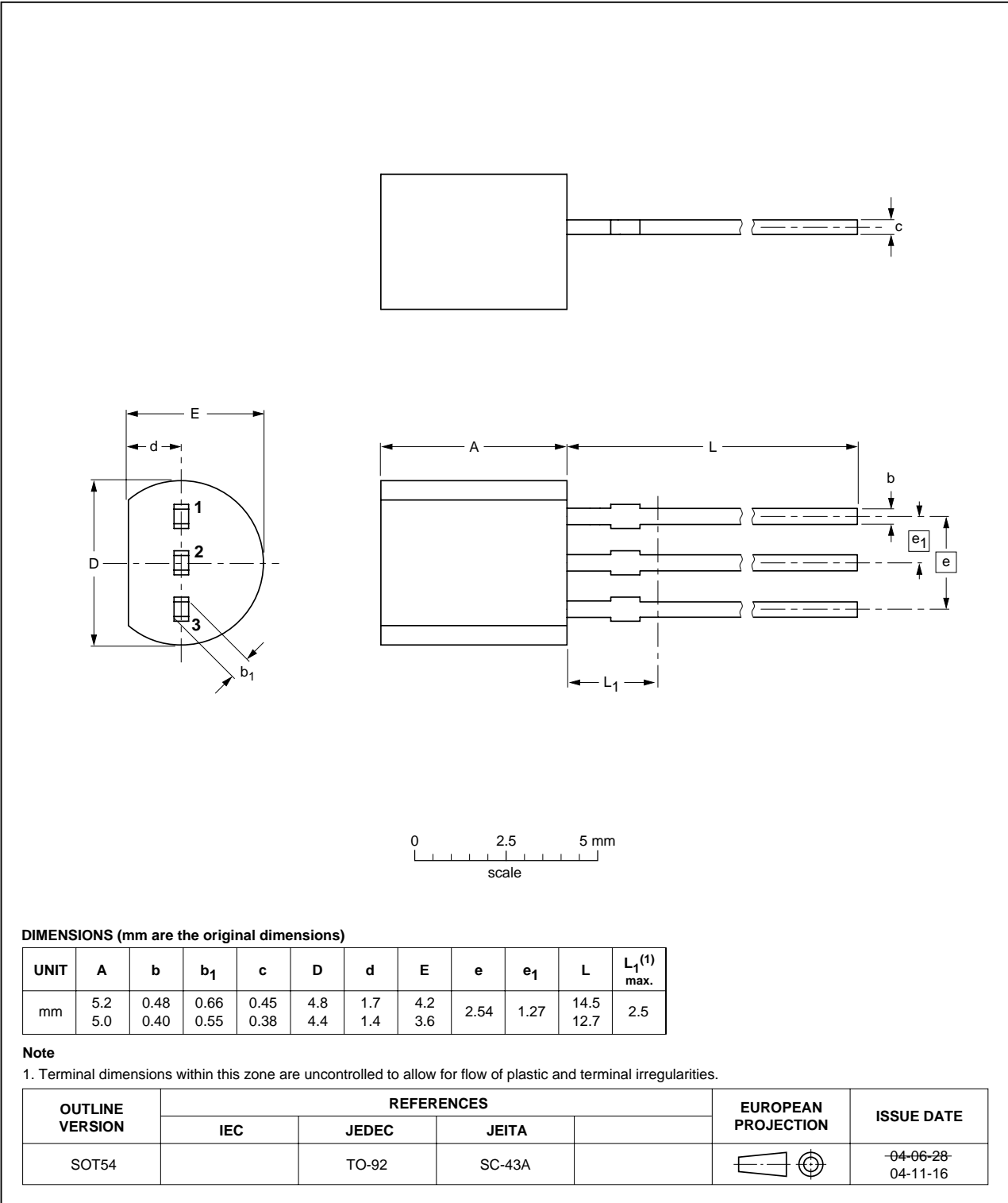**Plastic single-ended leaded (through hole) package; 3 leads** **SOT54**

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | b | b$_1$ | c | D | d | E | e | e$_1$ | L | L$_1$ $^{(1)}$ max. |
|------|---|---|------|---|---|---|---|---|------|---|--------|
| mm | 5.2 5.0 | 0.48 0.40 | 0.66 0.55 | 0.45 0.38 | 4.8 4.4 | 1.7 1.4 | 4.2 3.6 | 2.54 | 1.27 | 14.5 12.7 | 2.5 |

**Note**

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|------|-------|---|---------------------|------------|
| | IEC | JEDEC | JEITA | | | |
| SOT54 | | TO-92 | SC-43A | | | ~~04-06-28~~ 04-11-16 |

**Fig 12. Package outline SOT54 (TO-92)**

BTA2008_SER_D_E_1

**Product data sheet** **Rev. 01 — 18 January 2008** **9 of 12**

## 9. Revision history

**Table 7.    Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BTA2008_SER_D_E_1 | 20080118 | Product data sheet | - | - |

# 10. Legal information

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| Document status[1][2] | Product status[3] | Definition |
|---|---|---|
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[2] The term 'short data sheet' is explained in section "Definitions".

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