

# BTA2008 series D and E

0.8 A Three-quadrant triacs high commutation

Rev. 01 — 18 January 2008

Product data sheet

## 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
- Easily interfaced with low power drivers including microcontrollers
- Sensitive gate

### 1.3 Applications

- Motor control
- Solenoid drivers

### 1.4 Quick reference data

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

## 2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	main terminal 2 (T2)	<p>SOT54 (TO-92)</p>	<p>T2—T1 G sym051</p>
2	gate (G)		
3	main terminal 1 (T1)		

### 3. Ordering information

**Table 2. Ordering information**

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

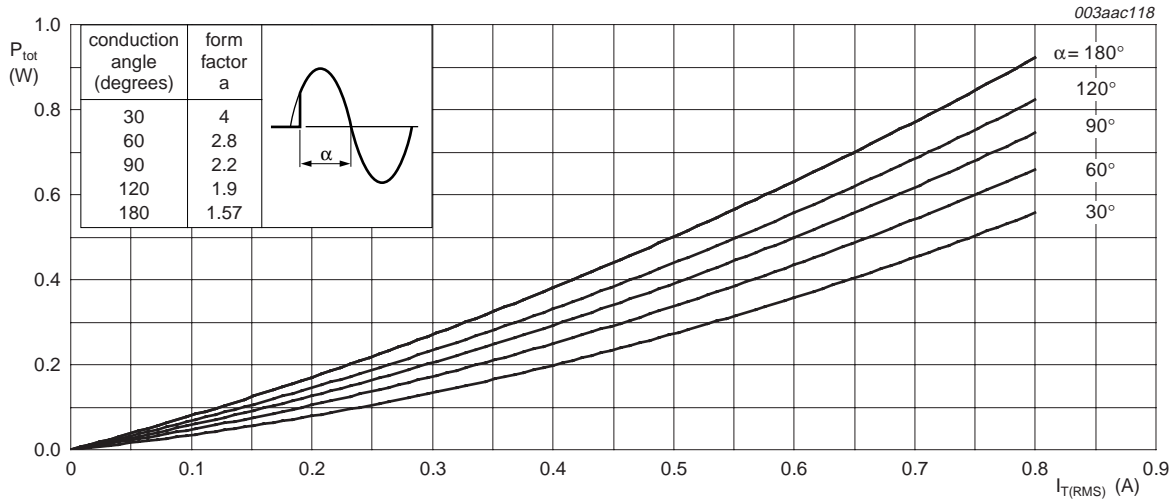
### 4. Limiting values

**Table 3. Limiting values**

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

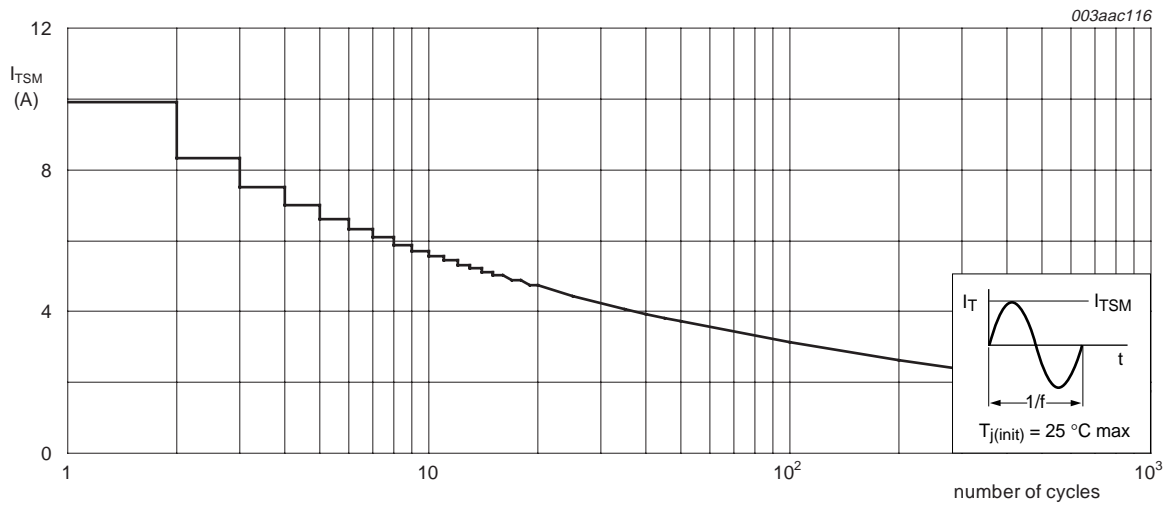
Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{\text{DRM}}$	repetitive peak off-state voltage	BTA2008-600D; BTA2008-600E	[1]	-	600	V
		BTA2008-800D; BTA2008-800E		-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{lead}} \leq 70\text{ °C}$ ; see <a href="#">Figure 4</a> and <a href="#">5</a>	-	0.8	A	
$I_{\text{TSM}}$	non-repetitive peak on-state current	full sine wave; $T_{\text{j}} = 25\text{ °C}$ prior to surge; see <a href="#">Figure 2</a> and <a href="#">3</a>				
		$t = 20\text{ ms}$	-	9	A	
		$t = 16.7\text{ ms}$	-	9.9	A	
$I^2t$	$I^2t$ for fusing	$t_{\text{p}} = 10\text{ ms}$	-	0.41	$\text{A}^2\text{s}$	
$di_{\text{T}}/dt$	rate of rise of on-state current	$I_{\text{TM}} = 1.5\text{ A}$ ; $I_{\text{G}} = 20\text{ mA}$ ; $di_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$	
$I_{\text{GM}}$	peak gate current		-	1	A	
$P_{\text{GM}}$	peak gate power		-	5	W	
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period	-	0.1	W	
$T_{\text{stg}}$	storage temperature		-40	+150	°C	
$T_{\text{j}}$	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/ $\mu\text{s}$ .



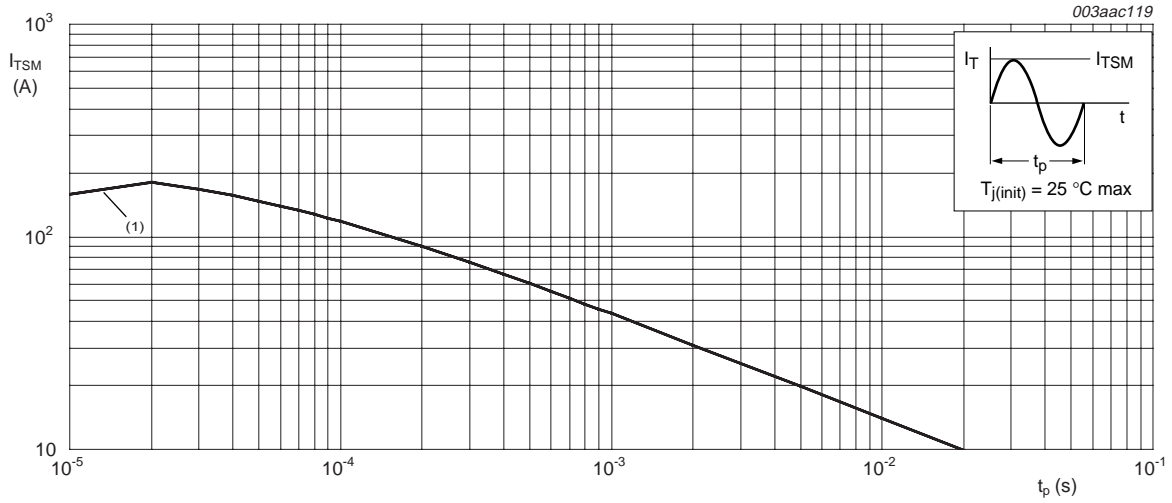
$\alpha$  = conduction angle

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



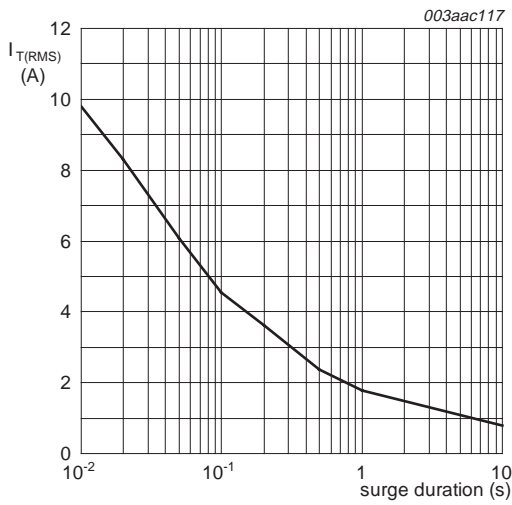
f = 50 Hz

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



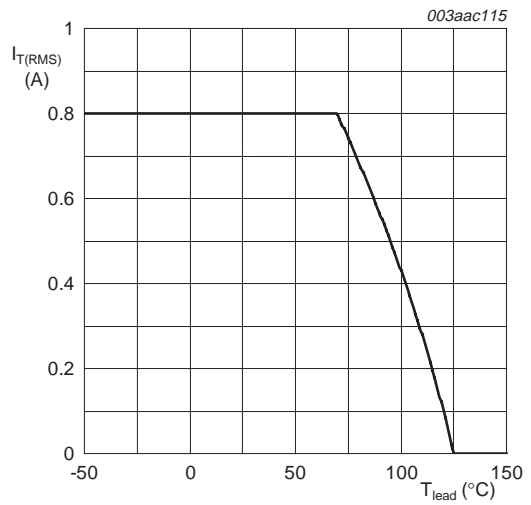
$t_p \leq 20 \text{ ms}$   
 (1)  $di_T/dt$  limit

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



$f = 50 \text{ Hz}$   
 $T_{\text{lead}} = 70 \text{ °C}$

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

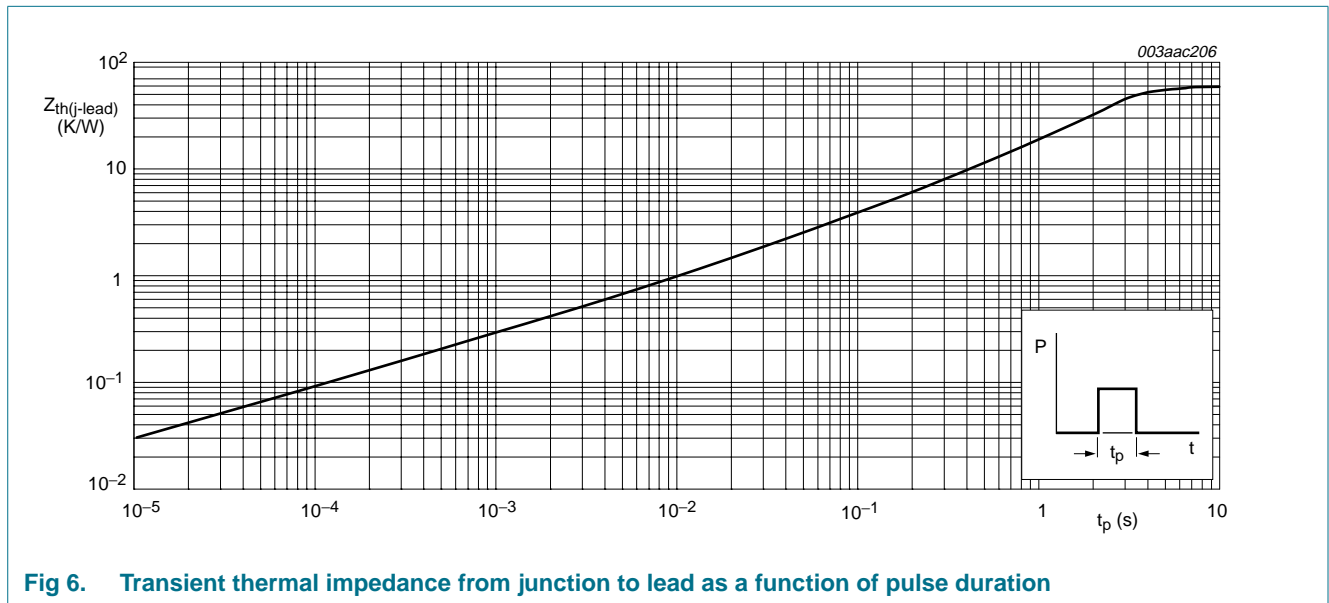


**Fig 5. RMS on-state current as a function of lead temperature; maximum values**

**5. Thermal characteristics**

**Table 4. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-lead)}$	thermal resistance from junction to lead	full cycle; see <a href="#">Figure 6</a>	-	-	60	K/W
$R_{th(j-a)}$	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**

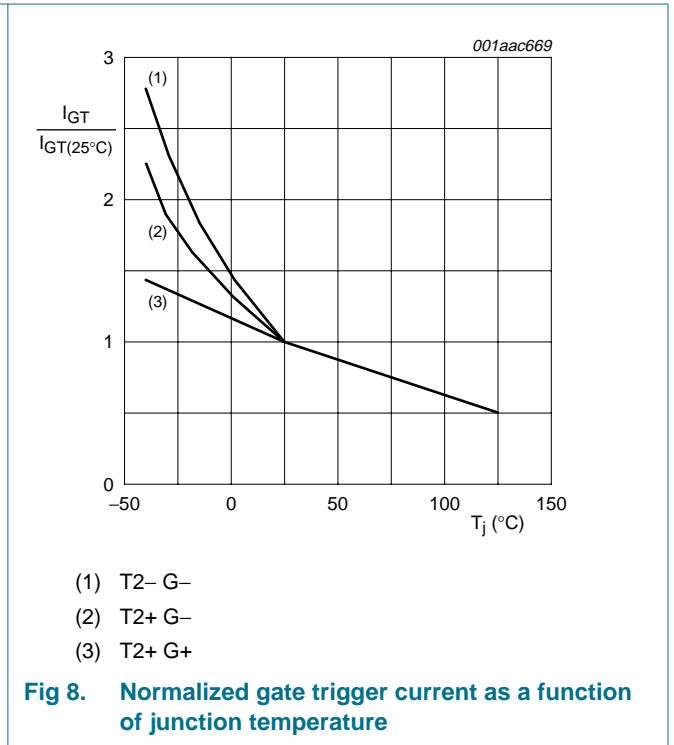
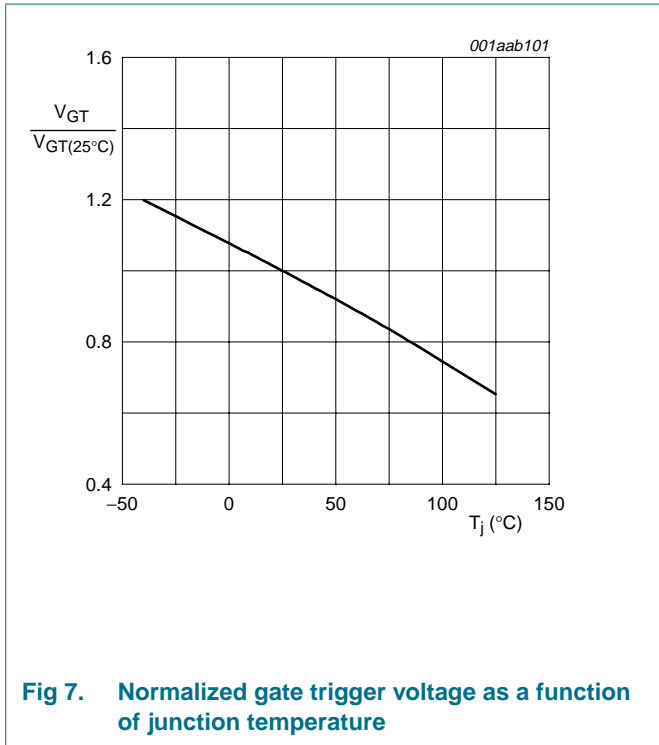
**Table 5. Static characteristics**  
*T<sub>j</sub> = 25 °C unless otherwise specified.*

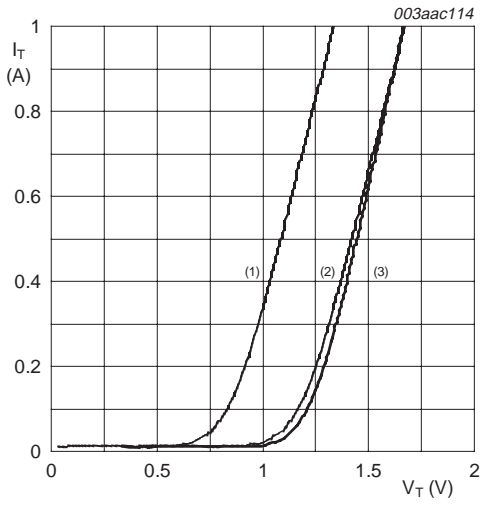
Symbol	Parameter	Conditions	BTA2008-600D BTA2008-800D			BTA2008-600E BTA2008-800E			Unit
			Min	Typ	Max	Min	Typ	Max	
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; see <a href="#">Figure 8</a>							
		T2+ G+	0.25	-	5	0.5	-	10	mA
		T2+ G-	0.25	-	5	0.5	-	10	mA
		T2- G-	0.25	-	5	0.5	-	10	mA
I <sub>L</sub>	latching current	V <sub>D</sub> = 12 V; I <sub>GT</sub> = 0.1 A; see <a href="#">Figure 10</a>							
		T2+ G+	-	-	10	-	-	12	mA
		T2+ G-	-	-	20	-	-	20	mA
		T2- G-	-	-	10	-	-	12	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; I <sub>GT</sub> = 0.1 A; see <a href="#">Figure 11</a>	-	-	10	-	-	12	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 0.85 A; see <a href="#">Figure 9</a>	-	1.35	1.6	-	1.35	1.6	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; see <a href="#">Figure 7</a>	-	0.9	2	-	0.9	2	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 125 °C	0.2	0.3	-	0.2	0.3	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = V <sub>DRM(max)</sub> ; T <sub>j</sub> = 125 °C	-	0.1	0.5	-	0.1	0.5	mA

**7. Dynamic characteristics**

**Table 6. Dynamic characteristics**

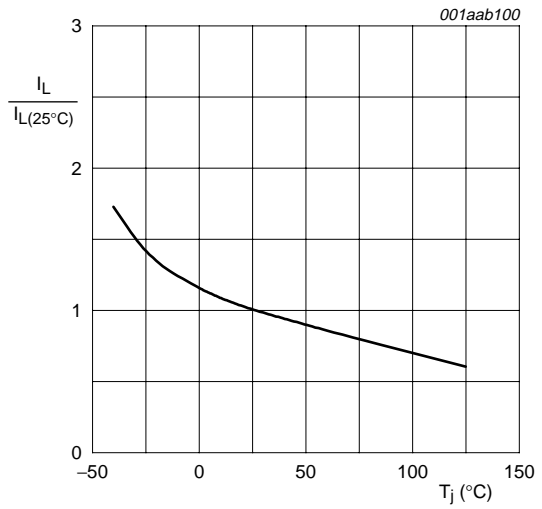
Symbol	Parameter	Conditions	BTA2008-600D BTA2008-800D			BTA2008-600E BTA2008-800E			Unit
			Min	Typ	Max	Min	Typ	Max	
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 0.67 \times V_{DRM(max)}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; exponential waveform; gate open circuit	200	-	-	600	-	-	V/ $\mu\text{s}$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



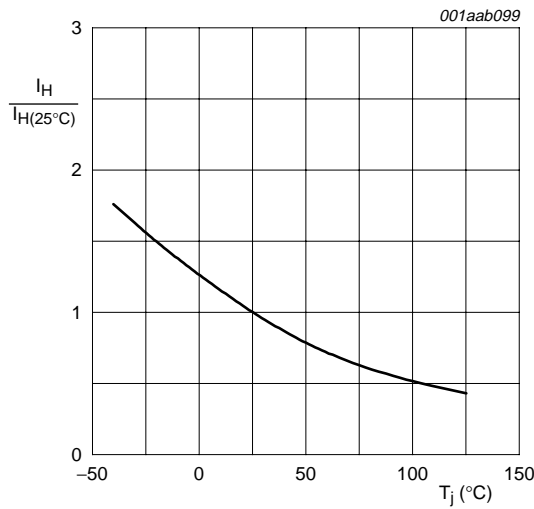


$V_o = 0.835 \text{ V}$   
 $R_s = 0.5 \ \Omega$   
 (1)  $T_j = 125 \text{ }^\circ\text{C}$ ; typical values  
 (2)  $T_j = 125 \text{ }^\circ\text{C}$ ; maximum values  
 (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

**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 leaded (through hole) package; 3 leads

SOT54

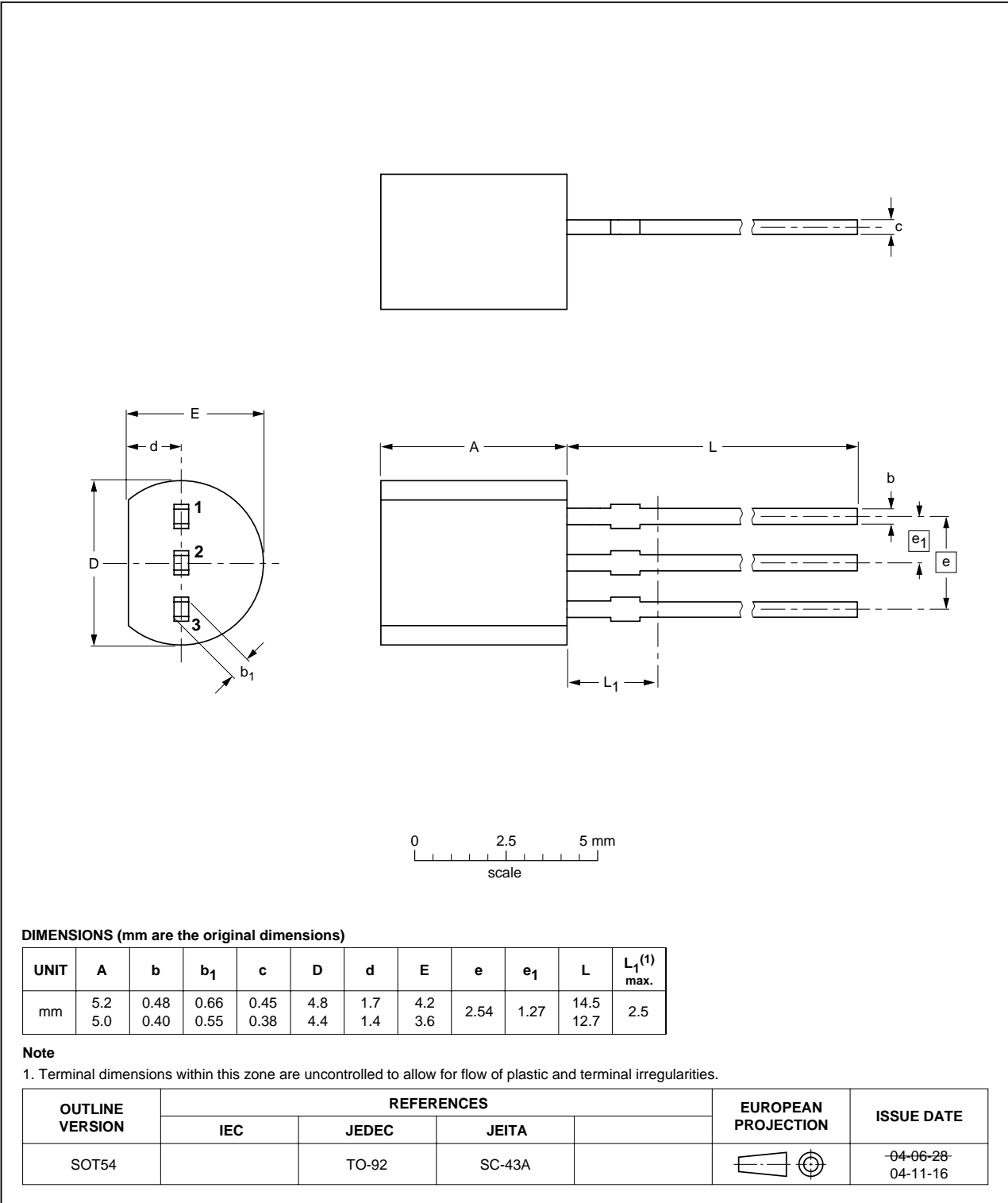


Fig 12. Package outline SOT54 (TO-92)

## 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 <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.
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