

# BTA208B-1000C

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## Three-quadrant triacs high commutation

Rev. 01 — 5 December 2005

Product data sheet

## 1. Product profile

### 1.1 General description

Passivated high voltage, high commutation triac in a SOT404 surface mounted device, plastic package. This triac is intended for use in motor control circuits where high blocking voltage, high static and dynamic  $dV/dt$  as well as high  $dI/dt$  can occur. This device will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

### 1.2 Features

- False trigger immunity
- 1000 V,  $V_{DRM}$  guaranteed

### 1.3 Applications

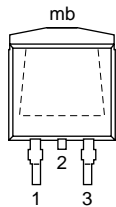
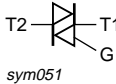
- Motor control
- Reversible induction motors

### 1.4 Quick reference data

- $I_{TSM} \leq 65$  A
- $I_{T(RMS)} \leq 8$  A
- $V_{DRM} \leq 1000$  V
- $I_{GT} \leq 35$  mA

## 2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)		 <i>sym051</i>
2	main terminal 2 (T2)		
3	gate (G)		
mb	mounting base; main terminal 2		

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### 3. Ordering information

Table 2: Ordering information

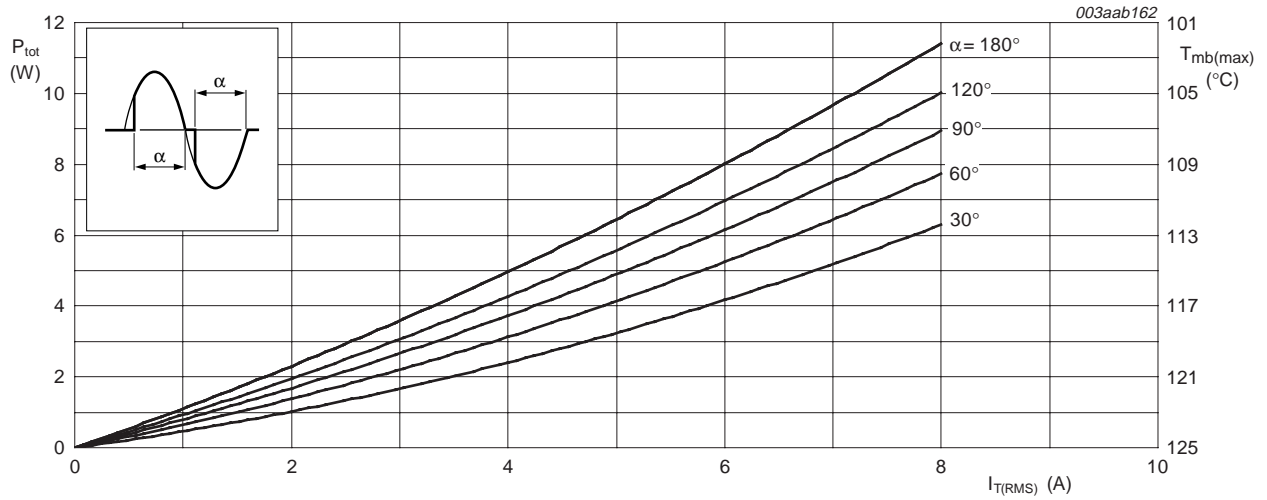
Type number	Package		Version
	Name	Description	
BTA208B-1000C	D2PAK	plastic single-ended surface mounted package; 3 leads (one lead cropped)	SOT404

### 4. Limiting values

Table 3: Limiting values

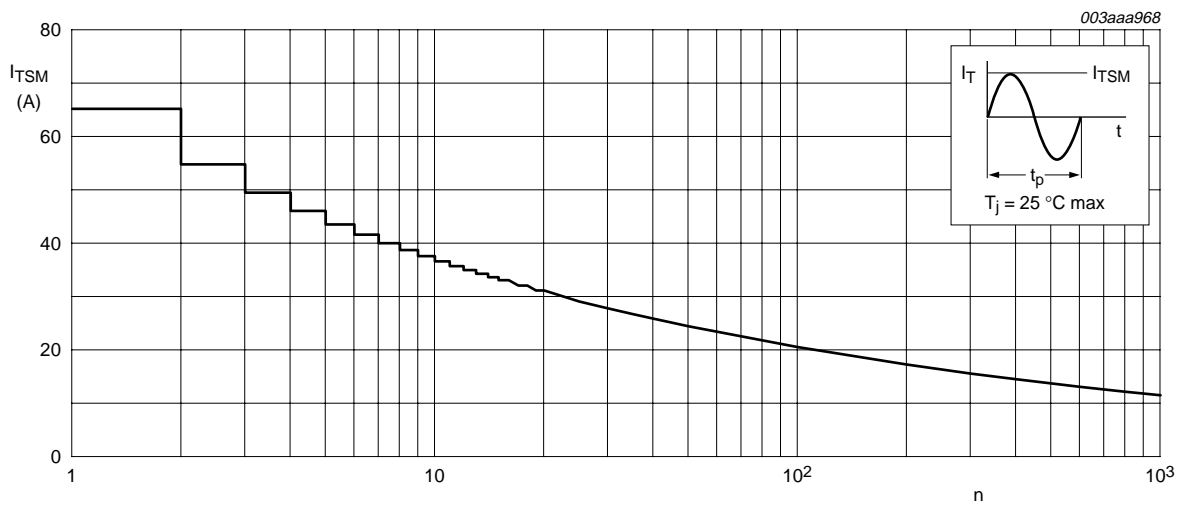
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	1000	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102\text{ °C}$ ; see <a href="#">Figure 4</a> and <a href="#">5</a>	-	8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge; see <a href="#">Figure 2</a> and <a href="#">3</a>			
		$t = 20\text{ ms}$	-	65	A
		$t = 16.7\text{ ms}$	-	71	A
$I^2t$	$I^2t$ for fusing	$t = 10\text{ ms}$	-	21	A <sup>2</sup> s
$di_T/dt$	rate of rise of on-state current	$I_{TM} = 12\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	A/ $\mu\text{s}$
$I_{GM}$	peak gate current		-	2	A
$P_{GM}$	peak gate power		-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.5	W
$T_{stg}$	storage temperature		-40	+150	°C
$T_j$	junction temperature		-	125	°C



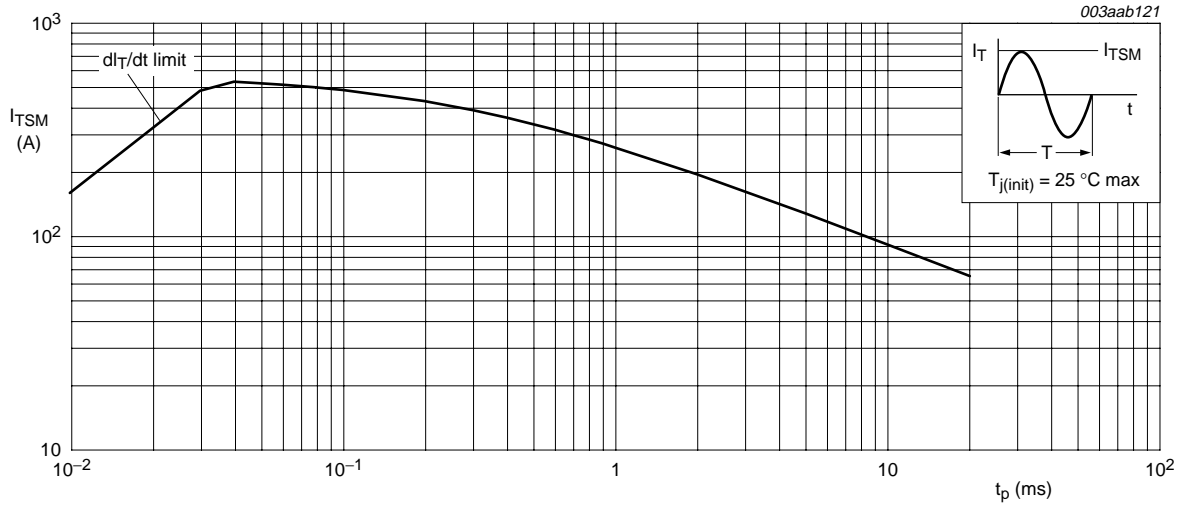
$\alpha$  = conduction angle

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

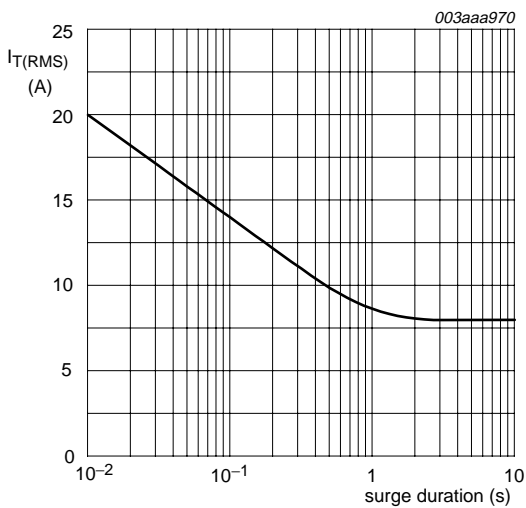


$f = 50$  Hz

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

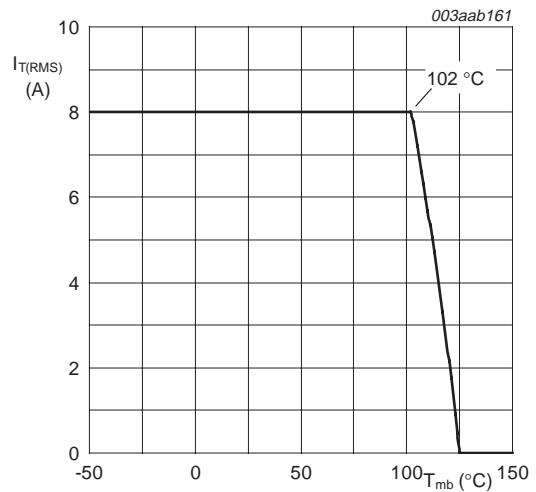


**Fig 3. Non-repetitive peak on-state current as a function of pulse duration; maximum values**



f = 50 Hz;  $T_{mb} \leq 102\text{ }^{\circ}\text{C}$

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

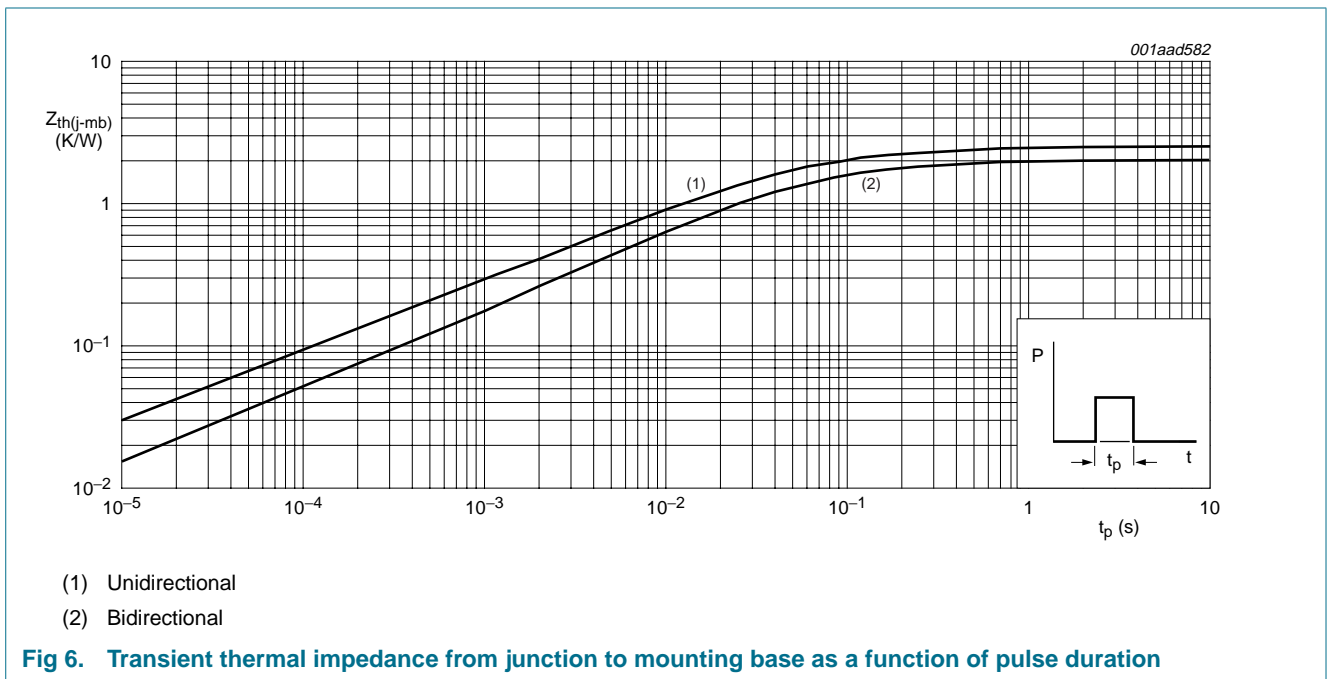


**Fig 5. RMS on-state current as a function of mounting base temperature; maximum values**

## 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	full cycle; see <a href="#">Figure 6</a>	-	-	2	K/W
		half cycle; see <a href="#">Figure 6</a>	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	minimum footprint	-	55	-	K/W



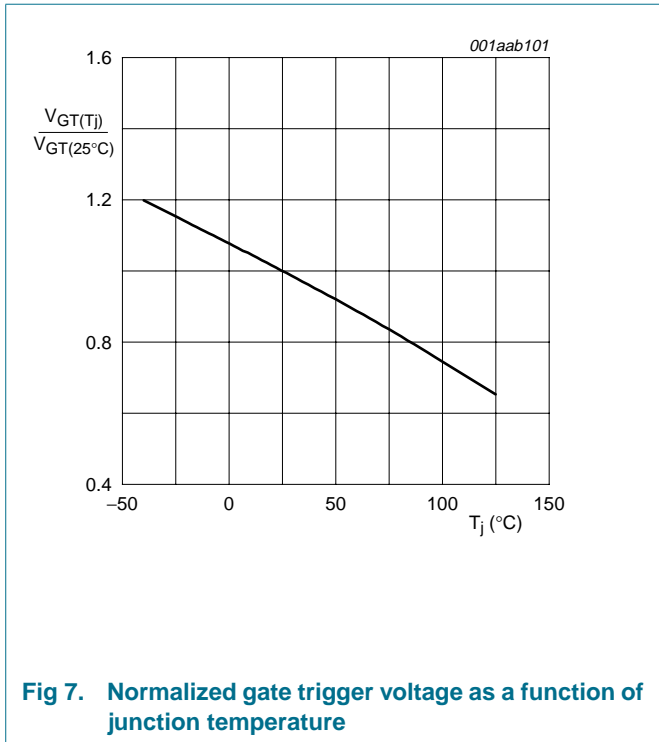
## 6. Characteristics

**Table 5: Characteristics**

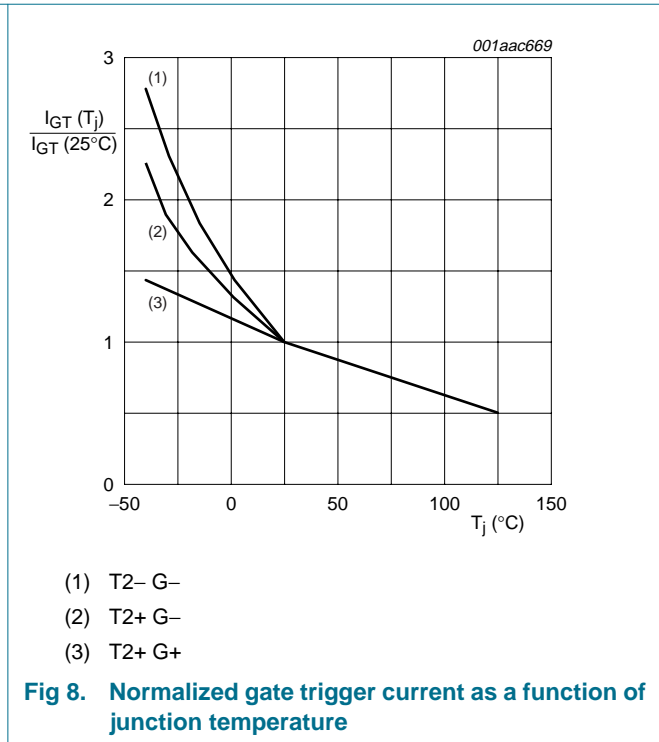
$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; see <a href="#">Figure 8</a> [1]				
		T2+ G+	2	6	35	mA
		T2+ G-	2	13	35	mA
		T2- G-	2	23	35	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$ ; see <a href="#">Figure 10</a>				
		T2+ G+	-	25	50	mA
		T2+ G-	-	48	75	mA
		T2- G-	-	30	50	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$ ; see <a href="#">Figure 11</a>	-	20	50	mA
$V_T$	on-state voltage	$I_T = 10\text{ A}$ ; see <a href="#">Figure 9</a>	-	1.3	1.65	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; see <a href="#">Figure 7</a>	-	0.7	1.5	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$	0.25	0.4	-	V
$I_D$	off-state current	$V_D = V_{DRM(max)}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}$ ; $T_j = 125\text{ °C}$ ; exponential waveform; gate open circuit	1000	4000	-	V/ $\mu$ s
$di_{com}/dt$	rate of change of commutating current	$V_{DM} = 400\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{T(RMS)} = 8\text{ A}$ ; without snubber; gate open circuit; see <a href="#">Figure 12</a>	12	32	-	A/ms
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 12\text{ A}$ ; $V_D = V_{DRM(max)}$ ; $I_G = 0.1\text{ A}$ ; $di_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	$\mu$ s

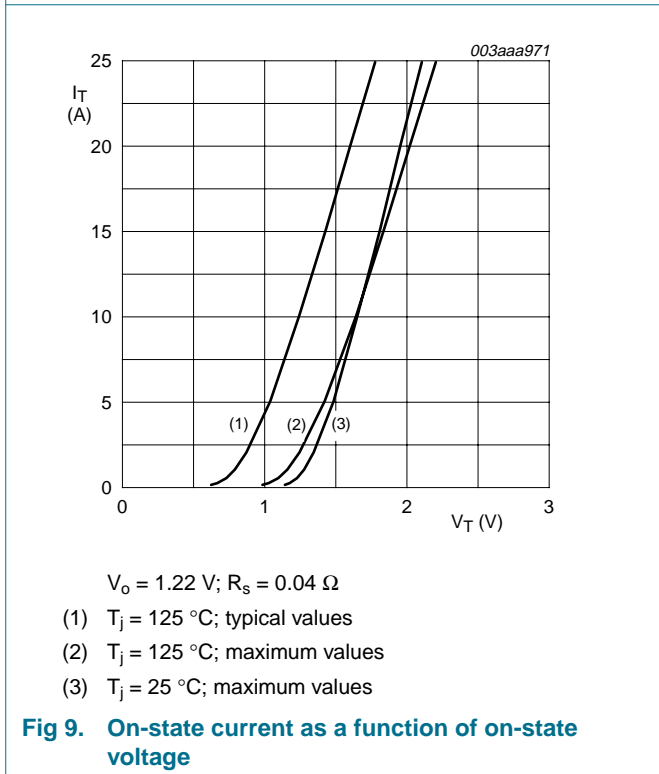
[1] Device will not trigger in the T2- G+ quadrant.



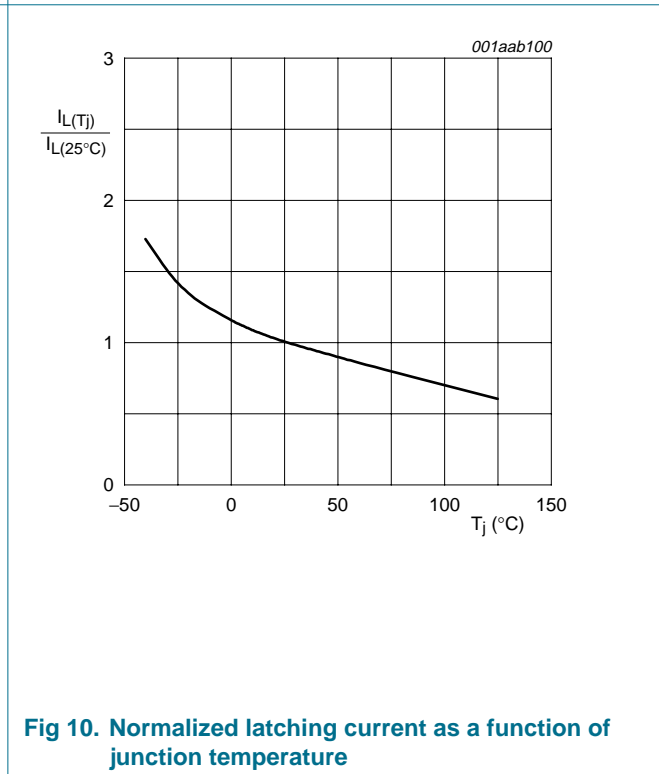
**Fig 7. Normalized gate trigger voltage as a function of junction temperature**



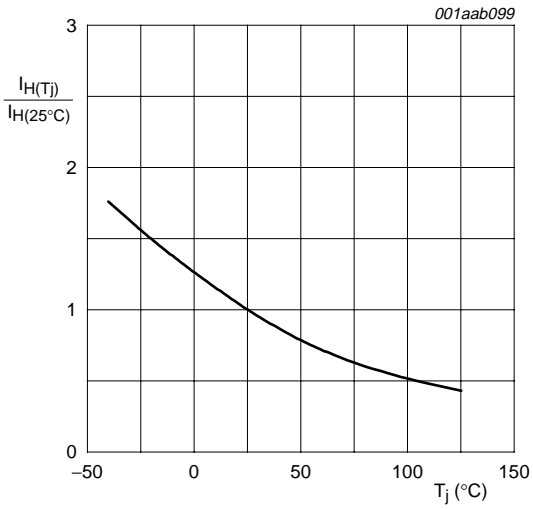
**Fig 8. Normalized gate trigger current as a function of junction temperature**



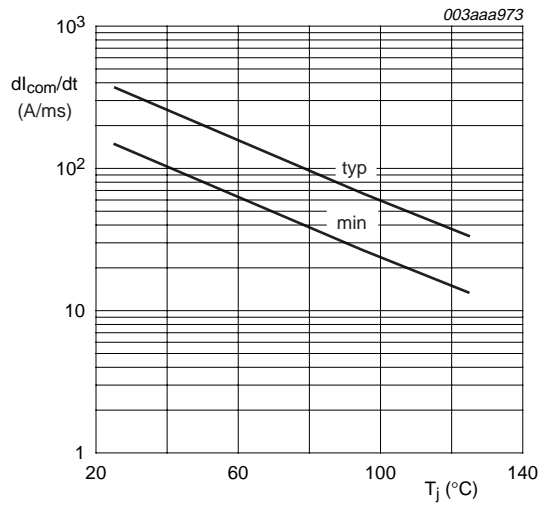
**Fig 9. On-state current as a function of on-state voltage**



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



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



**Fig 12. Rate of change of commutating current as a function of junction temperature; typical and minimum values**



7. Package outline

Plastic single-ended surface mounted package (D2PAK); 3 leads (one lead cropped)

SOT404

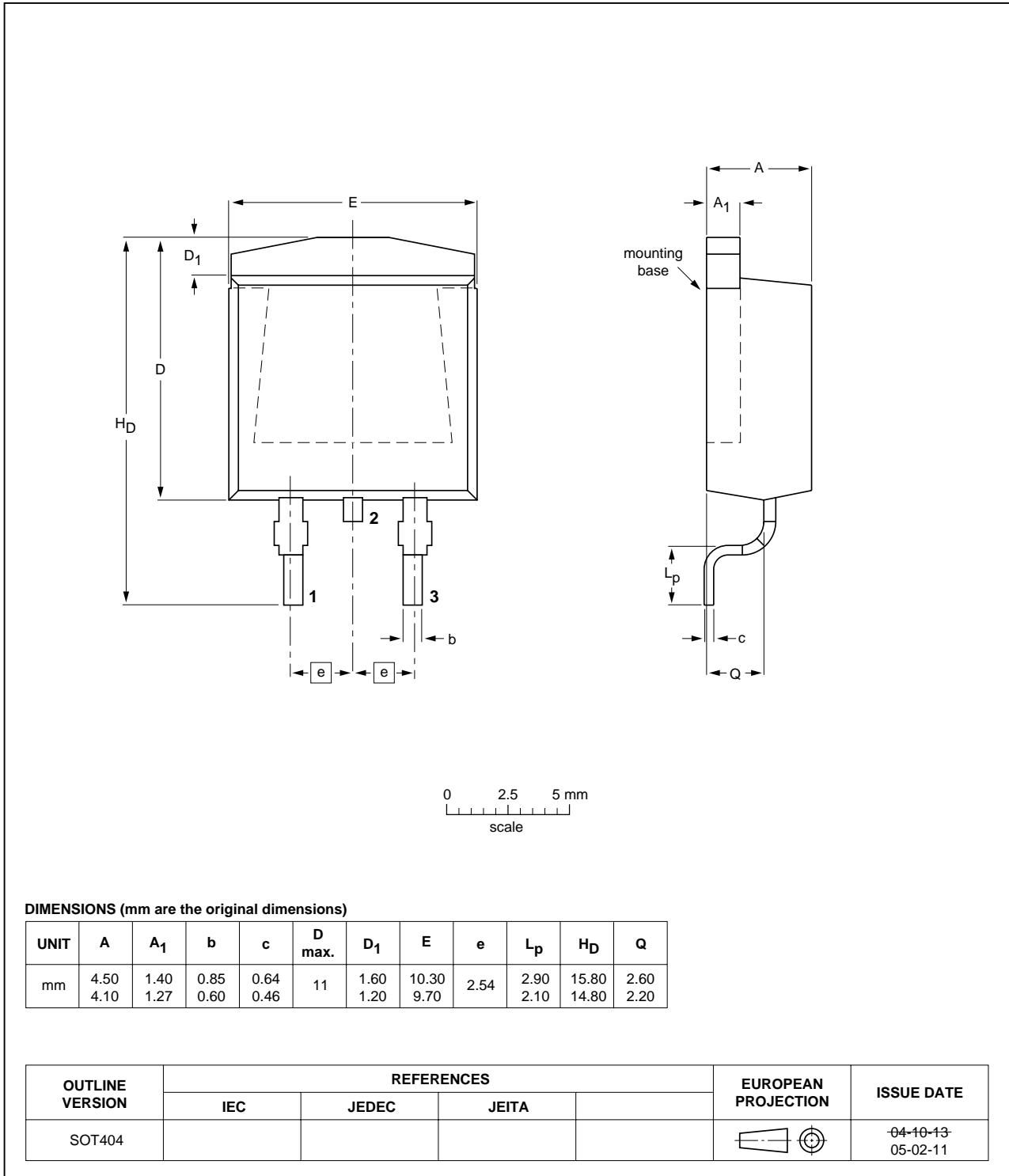


Fig 13. Package outline SOT404 (D2PAK)



## 8. Revision history

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**Table 6: Revision history**

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BTA208B-1000C_1	20051205	Product data sheet	-	-	-

## 9. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2] [3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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