

# BTA208S-600B; BTA208S-800B

Three-quadrant triacs high commutation

Rev. 02 — 31 May 2005

Product data sheet

## 1. Product profile

### 1.1 General description

Passivated high commutation triac in a plastic envelope, suitable for surface mounting, intended for use in circuits where high static and dynamic  $dV/dt$  and high  $dI/dt$  can occur. These devices will commute the full rated RMS current at the maximum rated junction temperature, without the aid of a snubber.

### 1.2 Features

- High maximum junction temperature
- High commutation capability
- Surface mounting package
- Low thermal resistance

### 1.3 Quick reference data

- $V_{DRM} \leq 600$  V (BTA208S-600B)
- $V_{DRM} \leq 800$  V (BTA208S-800B)
- $I_{T(RMS)} \leq 8$  A
- $I_{TSM} \leq 65$  A

## 2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)	<p>SOT428 (DPAK)</p>	
2	main terminal 2 (T2)		
3	gate (G)		
mb	mounting base		

[1] Connected to main terminal 2 (T2).

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### 3. Ordering information

Table 2: Ordering information

Type number	Package		Version
	Name	Description	
BTA208S-600B	TO-252	plastic single-ended surface mounted package (DPAK); 3 leads (one lead cropped)	SOT428
BTA208S-800B			

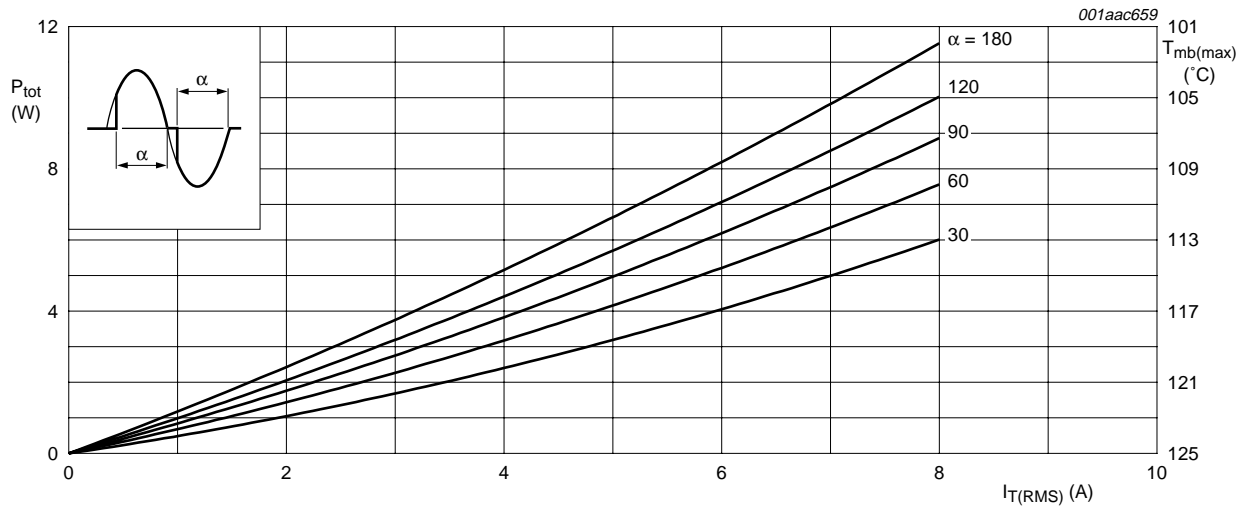
### 4. Limiting values

Table 3: Limiting values

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

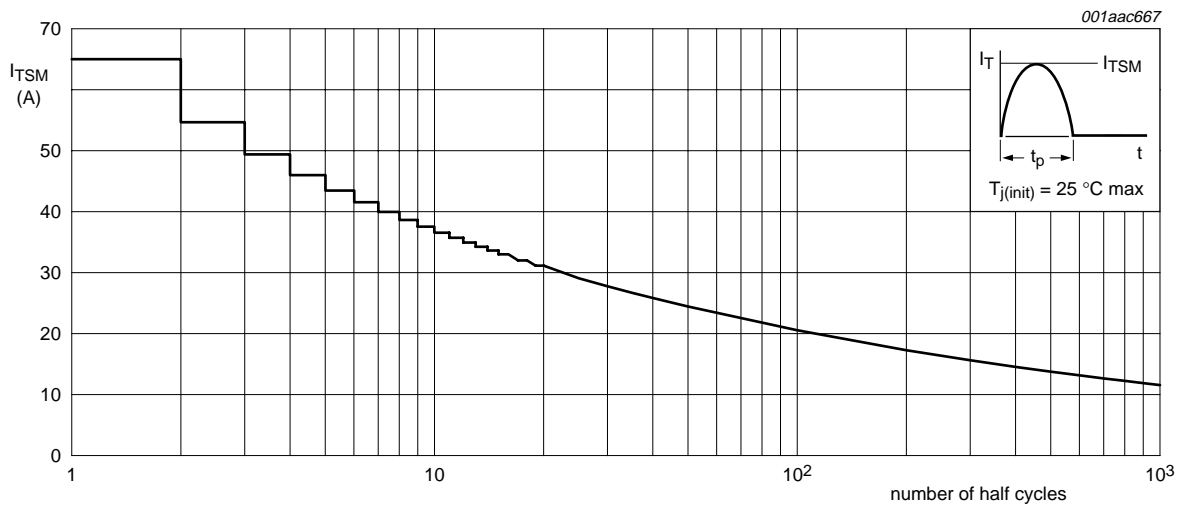
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage				
	BTA208S-600B		[1]	600	V
	BTA208S-800B		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102\text{ °C}$ ; see <a href="#">Figure 4</a> and <a href="#">5</a>	-	8	A
$I_{TSM}$	non-repetitive peak 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
$dl_T/dt$	rate of rise of on-state current	$I_{TM} = 12\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $dl_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	A/ $\mu\text{s}$
$I_{GM}$	peak gate current		-	2	A
$V_{GM}$	peak gate voltage		-	5	V
$P_{GM}$	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

[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/ $\mu\text{s}$ .



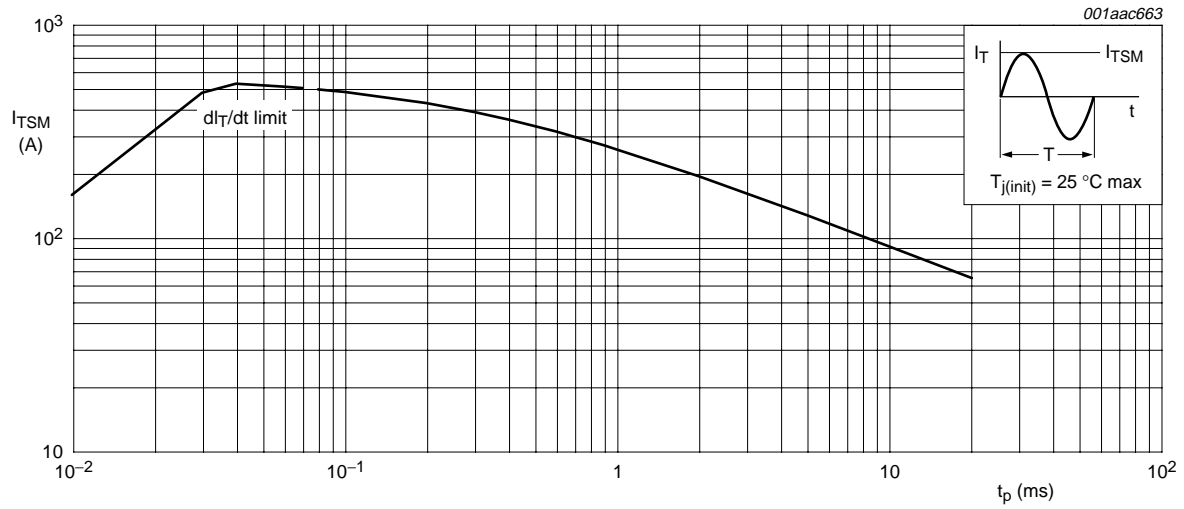
$\alpha$  = conduction angle

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



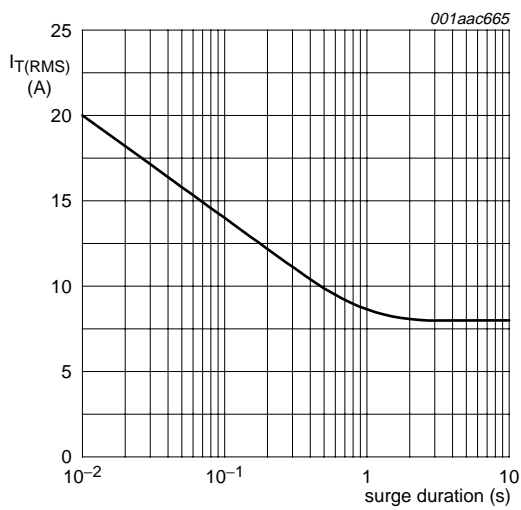
$f = 50$  Hz

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



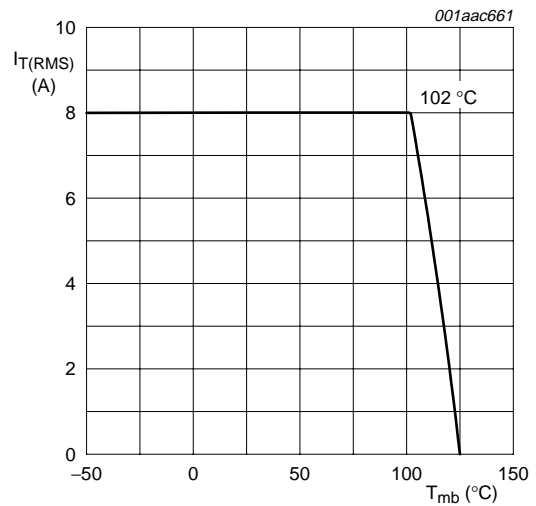
$t_p \leq 20 \text{ ms}$

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



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

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

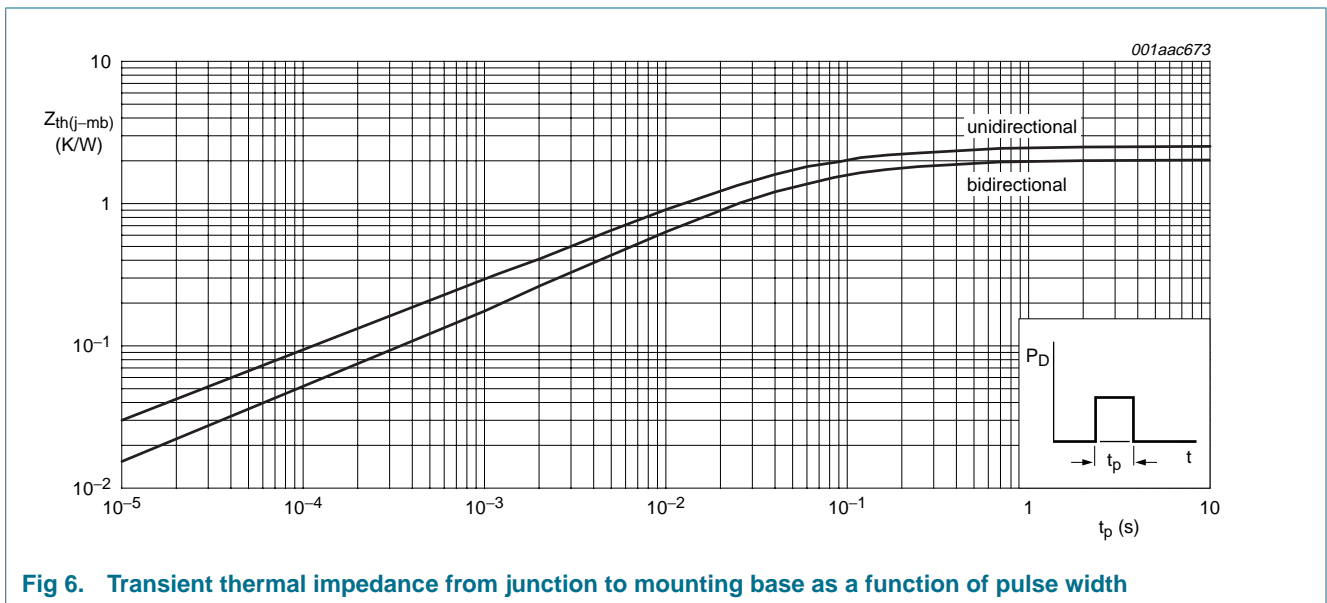


**Fig 5. RMS on-state current as a function of mounting base temperature; maximum values**

## 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>	-	-	2.0	K/W
		half cycle; see <a href="#">Figure 6</a>	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed-circuit board (FR4) mounted; footprint as in <a href="#">Figure 14</a>	-	75	-	K/W



## 6. Static characteristics

**Table 5: Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; see <a href="#">Figure 8</a>	[1]			
		T2+ G+	2	18	50	mA
		T2+ G-	2	21	50	mA
		T2- G-	2	34	50	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$ ; see <a href="#">Figure 10</a>				
		T2+ G+	-	31	60	mA
		T2+ G-	-	34	90	mA
		T2- G-	-	30	60	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$ ; see <a href="#">Figure 11</a>	-	31	60	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

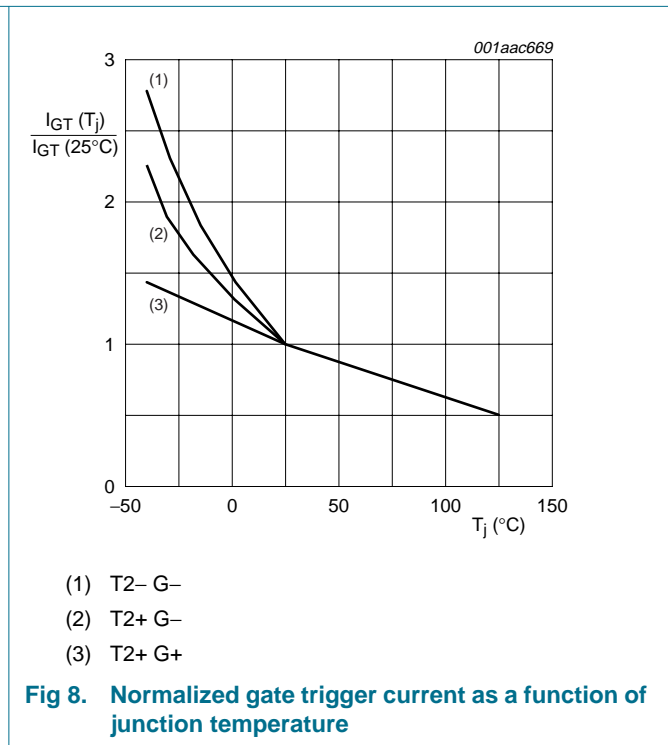
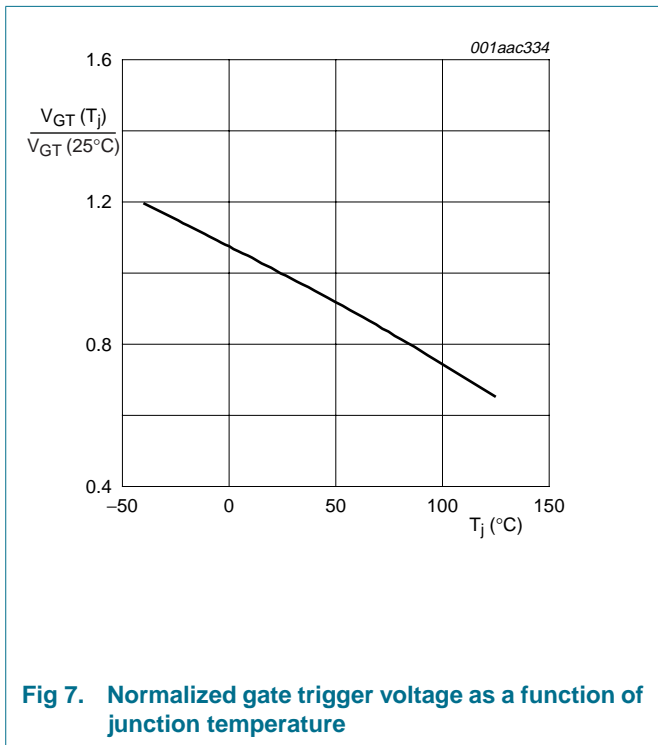
[1] Device does not trigger in the T2- G+ quadrant.

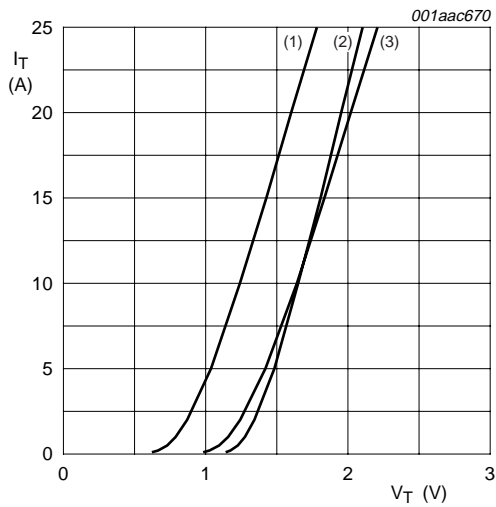
## 7. Dynamic characteristics

**Table 6: Dynamic characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 0.67V_{DRM(max)}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; exponential waveform; gate open circuit	1000	4000	-	V/ $\mu\text{s}$
$di_{com}/dt$	rate of rise of commutating current	$V_{DM} = 400\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; $I_{T(RMS)} = 8\text{ A}$ ; without snubber; gate open circuit; see <a href="#">Figure 12</a>	-	14	-	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	-	$\mu\text{s}$

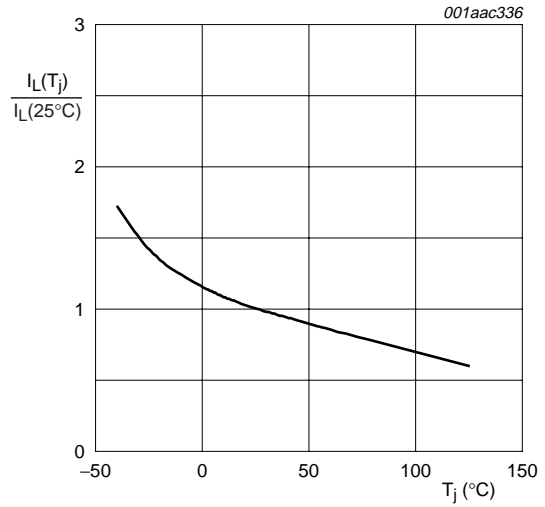




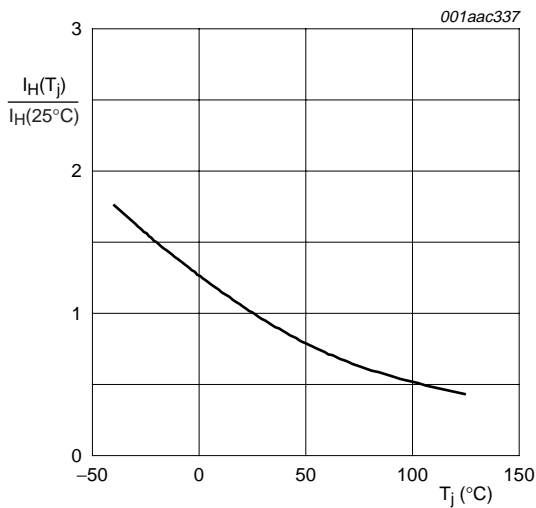
$V_O = 1.264\text{ V}$ ;  $R_S = 37.8\text{ m}\Omega$

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

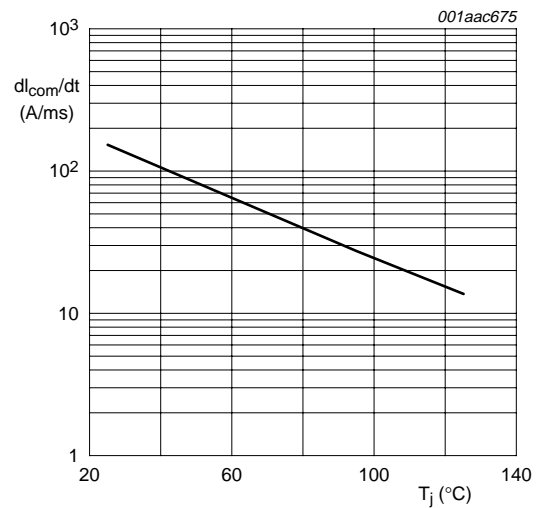
**Fig 9. On-state characteristic**



**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 rise of commutating current as a function of junction temperature; typical values**

## 8. Package information

Plastic meets UL94 V-0 at 1/8 inch.



**9. Package outline**

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

SOT428

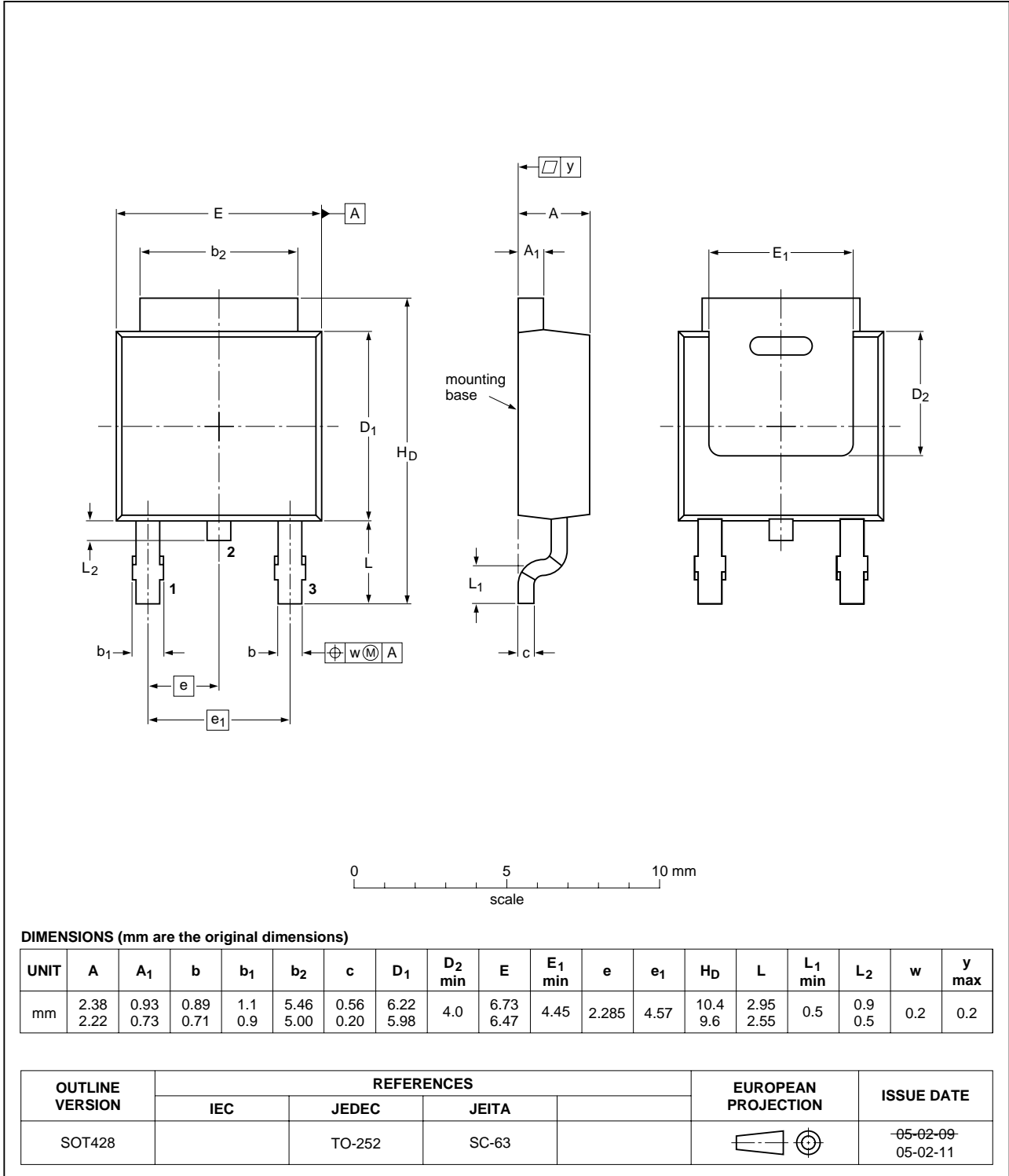
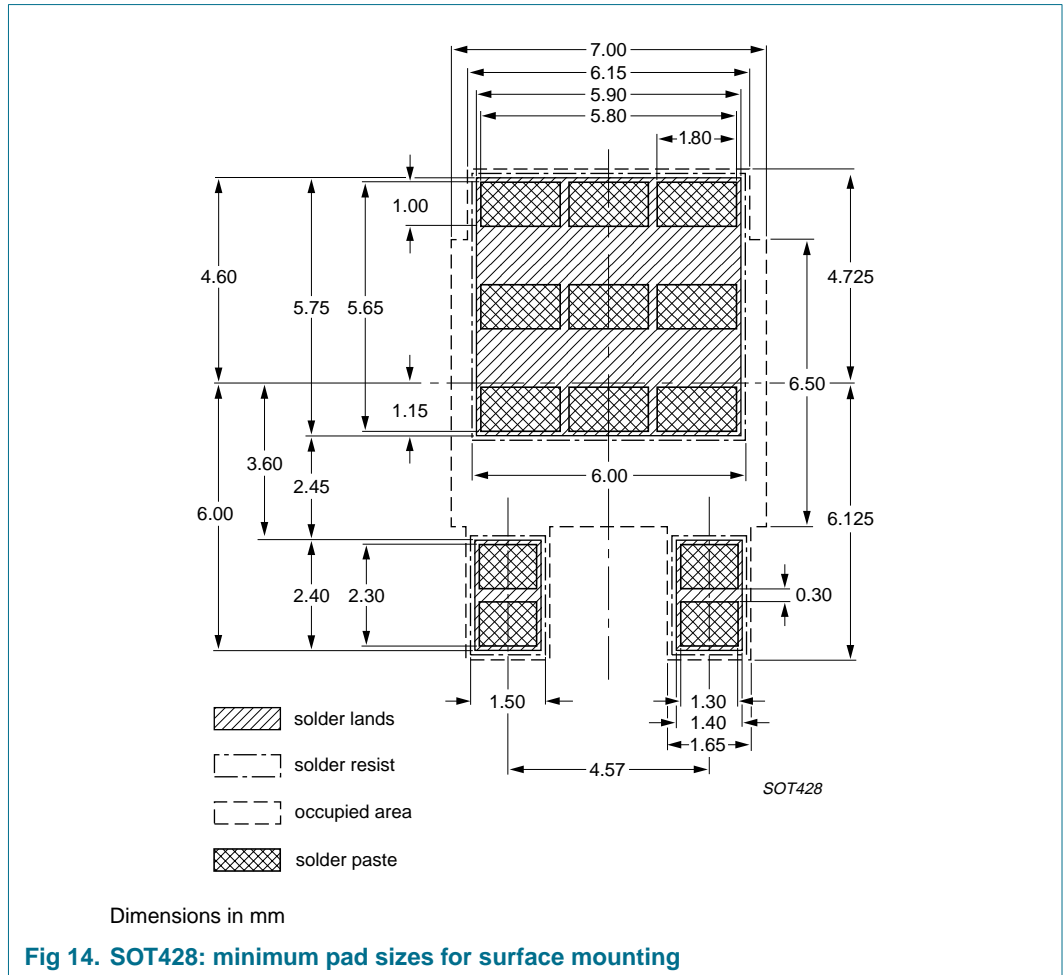


Fig 13. Package outline SOT428 (TO-252)

**10. Mounting**



## 11. Revision history

**Table 7: Revision history**

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BTA208S_SER_B_2	20050531	Product data sheet	-	9397 750 14861	BTA208S_SERIES_B_1
Modifications:					
			<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li><li>• 500 V types removed.</li><li>• Alternative pinning types removed.</li></ul>		
BTA208S_SERIES_B_1	19970901	Product specification	-	-	-

## 12. 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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**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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