



# BTA208S-600F

3Q Hi-Com Triac

Rev. 5 — 13 April 2011

Product data sheet

## 1. Product profile

### 1.1 General description

Planar passivated high commutation three quadrant triac in a SOT428 plastic package. This "series F" triac balances the requirements of commutation performance and gate sensitivity. The "less sensitive gate" "series F" is intended for interfacing with low power drivers including microcontrollers.

### 1.2 Features and benefits

- 3Q technology for improved noise immunity
- Good immunity to false turn-on by dV/dt
- High commutation capability with maximum false trigger immunity
- High voltage capability
- Less sensitive gate suitable for higher "noise" environment applications
- Planar passivated for voltage ruggedness and reliability
- Surface-mountable package
- Triggering in three quadrants only

### 1.3 Applications

- Electronic thermostats
- General purpose motor controls

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{DRM}}$	repetitive peak off-state voltage		-	-	600	V
$I_{\text{TSM}}$	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$ ; $t_{\text{p}} = 20\text{ ms}$ ; see <a href="#">Figure 4</a> ; see <a href="#">Figure 5</a>	-	-	65	A
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 102\text{ °C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a> ; see <a href="#">Figure 3</a>	-	-	8	A

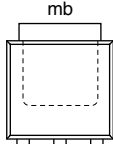



**Table 1. Quick reference data ...continued**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ see <a href="#">Figure 7</a>	-	-	25	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ see <a href="#">Figure 7</a>	-	-	25	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ see <a href="#">Figure 7</a>	-	-	25	mA

## 2. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		 sym051
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

**SOT428 (DPAK)**

## 3. Ordering information

**Table 3. Ordering information**

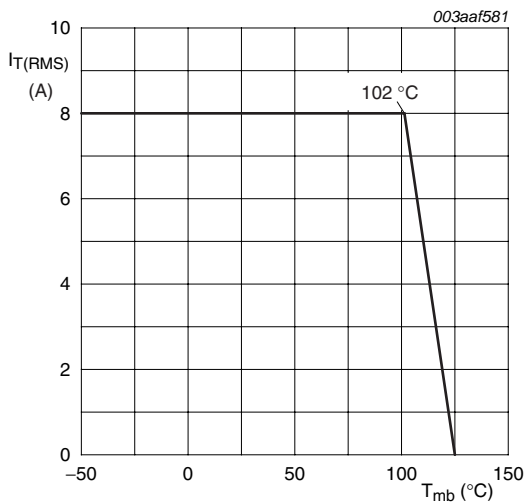
Type number	Package		Version
	Name	Description	
BTA208S-600F	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

## 4. Limiting values

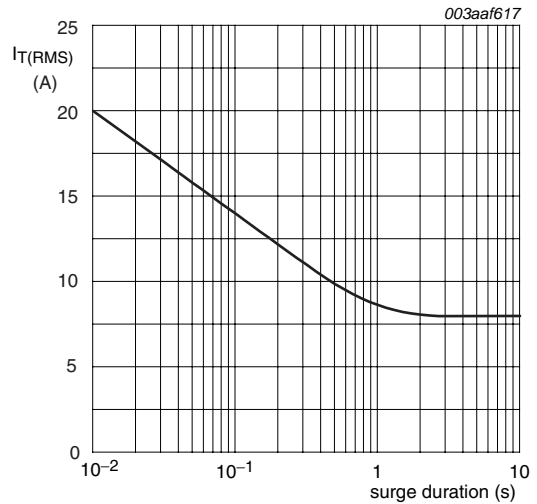
**Table 4. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a> ; see <a href="#">Figure 3</a>	-	8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 20\text{ ms}$ ; see <a href="#">Figure 4</a> ; see <a href="#">Figure 5</a>	-	65	A
		full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 16.7\text{ ms}$	-	72	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse	-	21	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_T = 12\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$
$I_{GM}$	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	$^{\circ}\text{C}$
$T_j$	junction temperature		-	125	$^{\circ}\text{C}$



**Fig 1. RMS on-state current as a function of heatsink temperature; maximum values**



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

**Fig 2. RMS on-state current as a function of surge duration; maximum value**

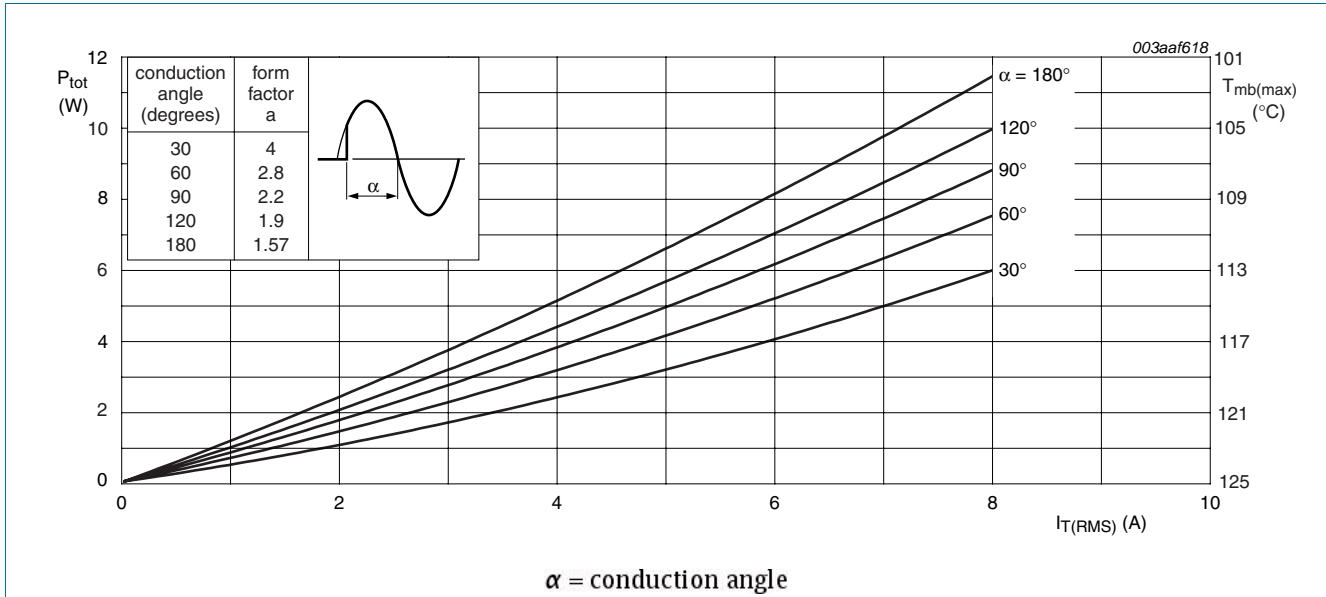


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

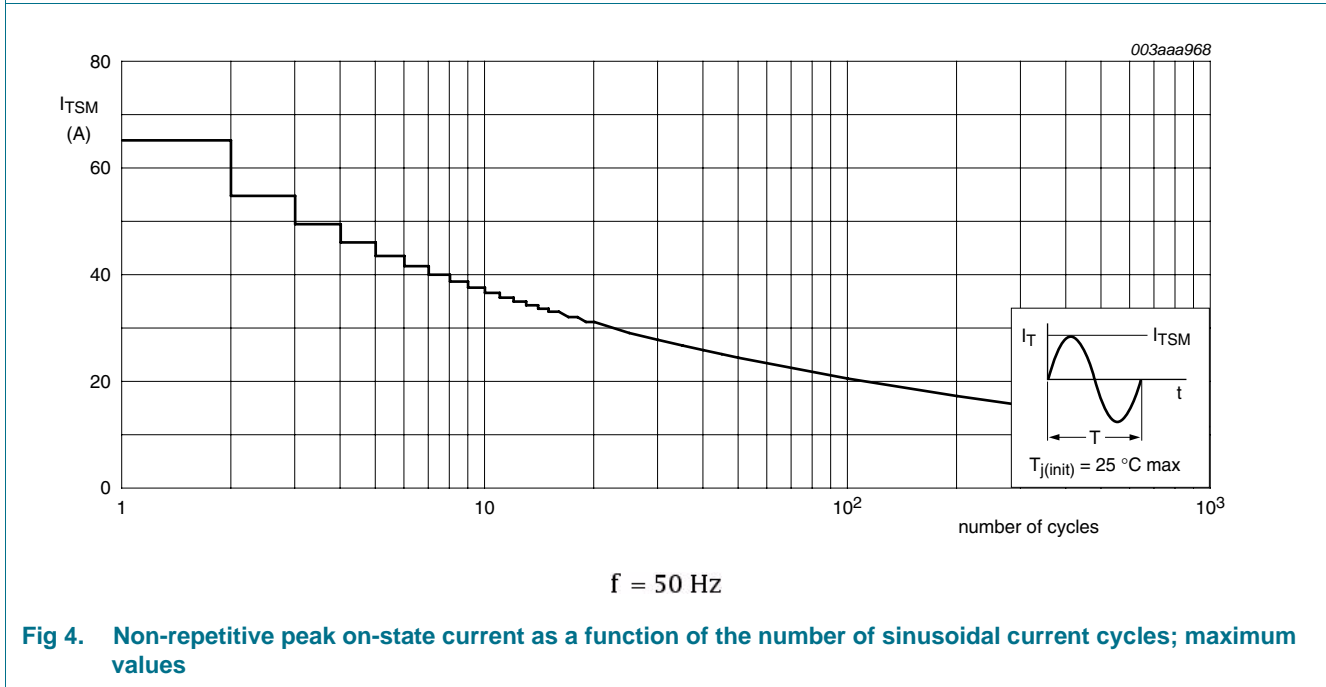
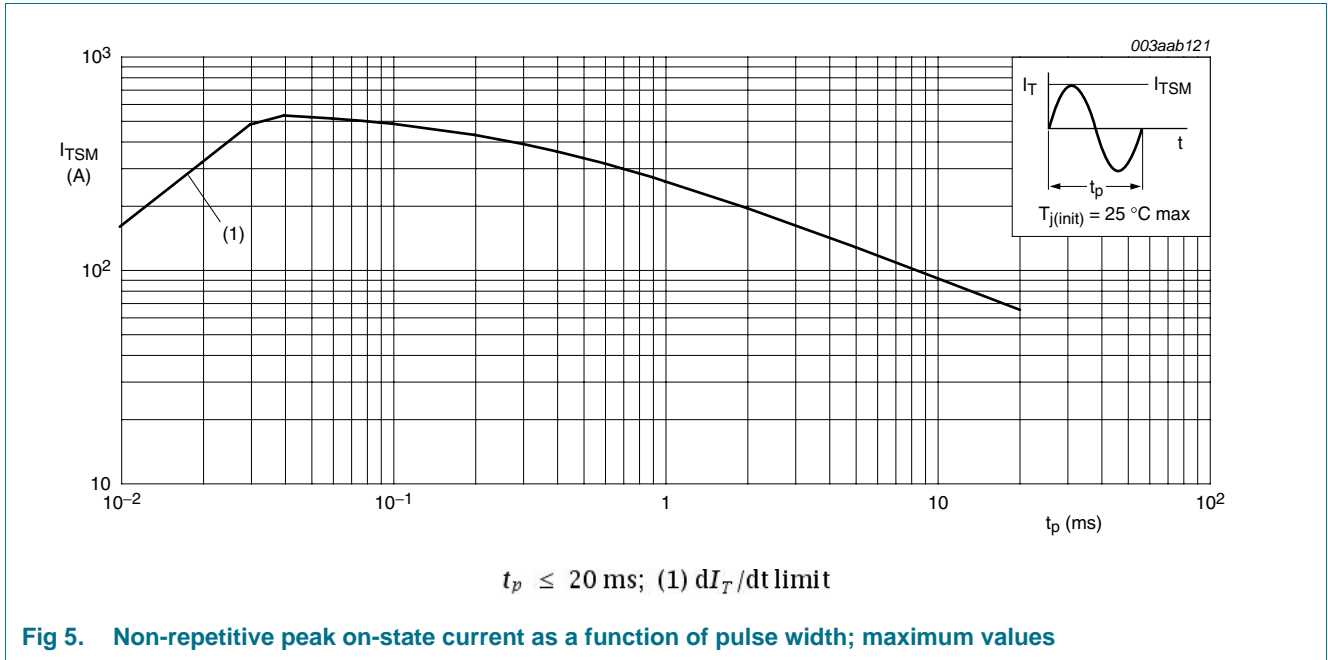


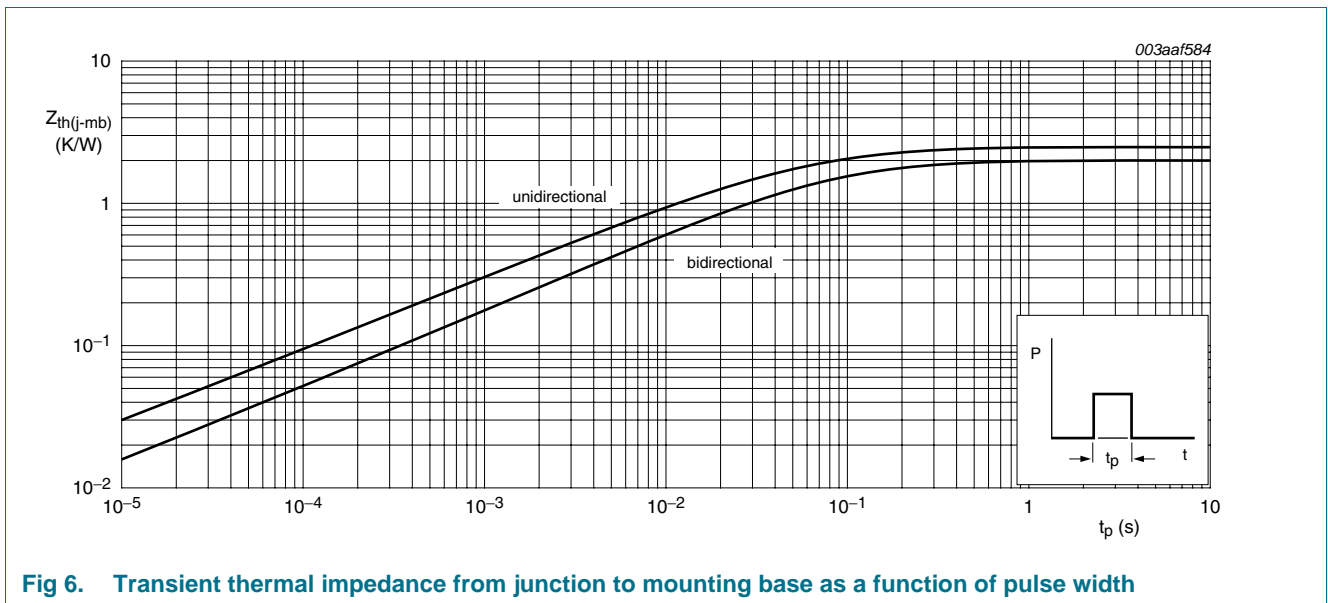
Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



## 5. Thermal characteristics

**Table 5. Thermal characteristics**

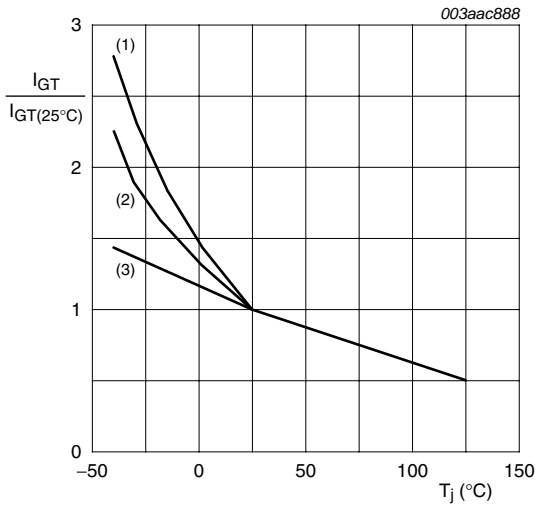
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; see <a href="#">Figure 6</a>	-	-	2	K/W
		half cycle; see <a href="#">Figure 6</a>	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	75	-	K/W



## 6. Characteristics

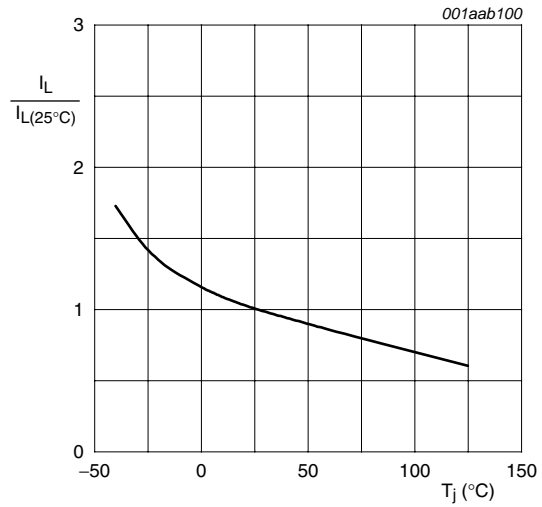
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 7</a>	-	-	25	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 7</a>	-	-	25	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 7</a>	-	-	25	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2+ G+; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 8</a>	-	-	30	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 8</a>	-	-	40	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 8</a>	-	-	40	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 9</a>	-	-	30	mA
$V_T$	on-state voltage	$I_T = 10\text{ A}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 10</a>	-	-	1.65	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 11</a>	-	-	1.5	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$ ; see <a href="#">Figure 11</a>	0.25	-	-	V
$I_D$	off-state current	$V_D = 600\text{ V}$ ; $T_j = 125\text{ °C}$	-	-	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$ ; $T_j = 110\text{ °C}$ ; exponential waveform; gate open circuit	70	-	-	V/ $\mu$ s
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{T(RMS)} = 8\text{ A}$ ; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$ ; gate open circuit; see <a href="#">Figure 12</a>	14	-	-	A/ms

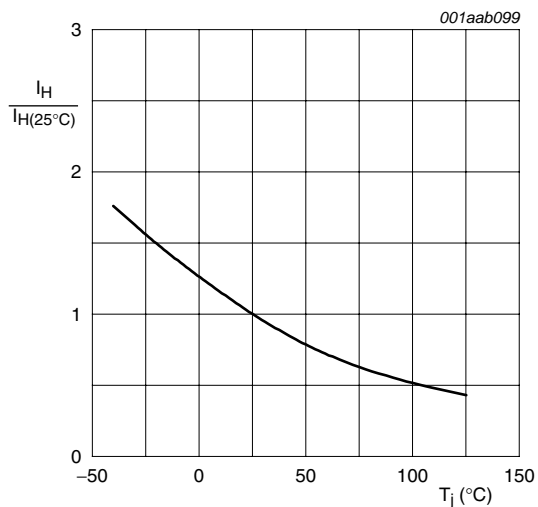


- (1) T2- G-
- (2) T2+ G-
- (3) T2+ G+

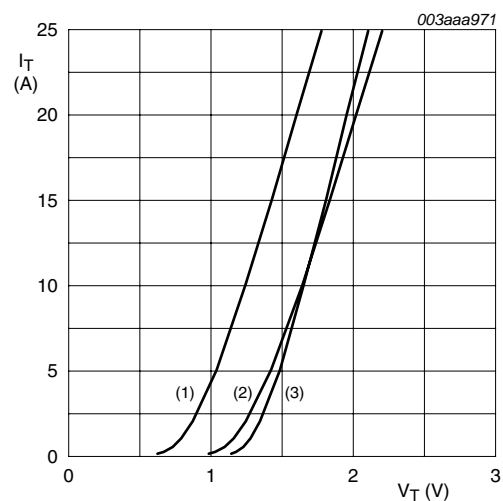
**Fig 7. Normalized gate trigger current as a function of junction temperature**



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



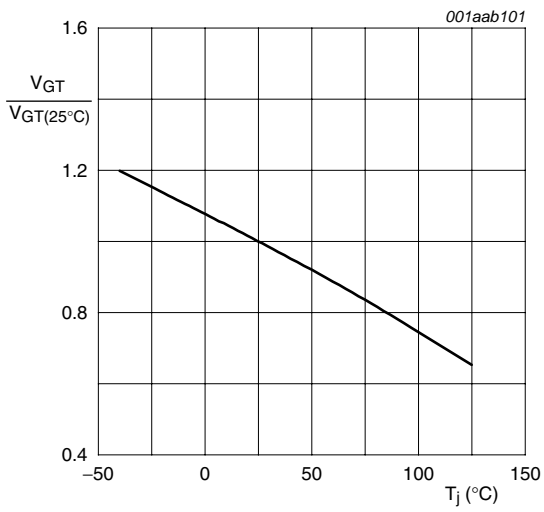
**Fig 9. Normalized holding current as a function of junction temperature**



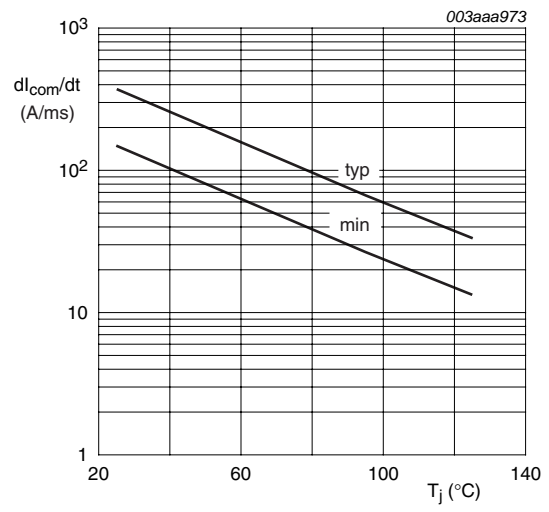
$V_o = 1.264 \text{ V}; R_s = 0.0378 \ \Omega$

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

**Fig 10. On-state current as a function of on-state voltage**



**Fig 11. Normalized gate trigger voltage 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 (DPAK); 3 leads (one lead cropped)

SOT428

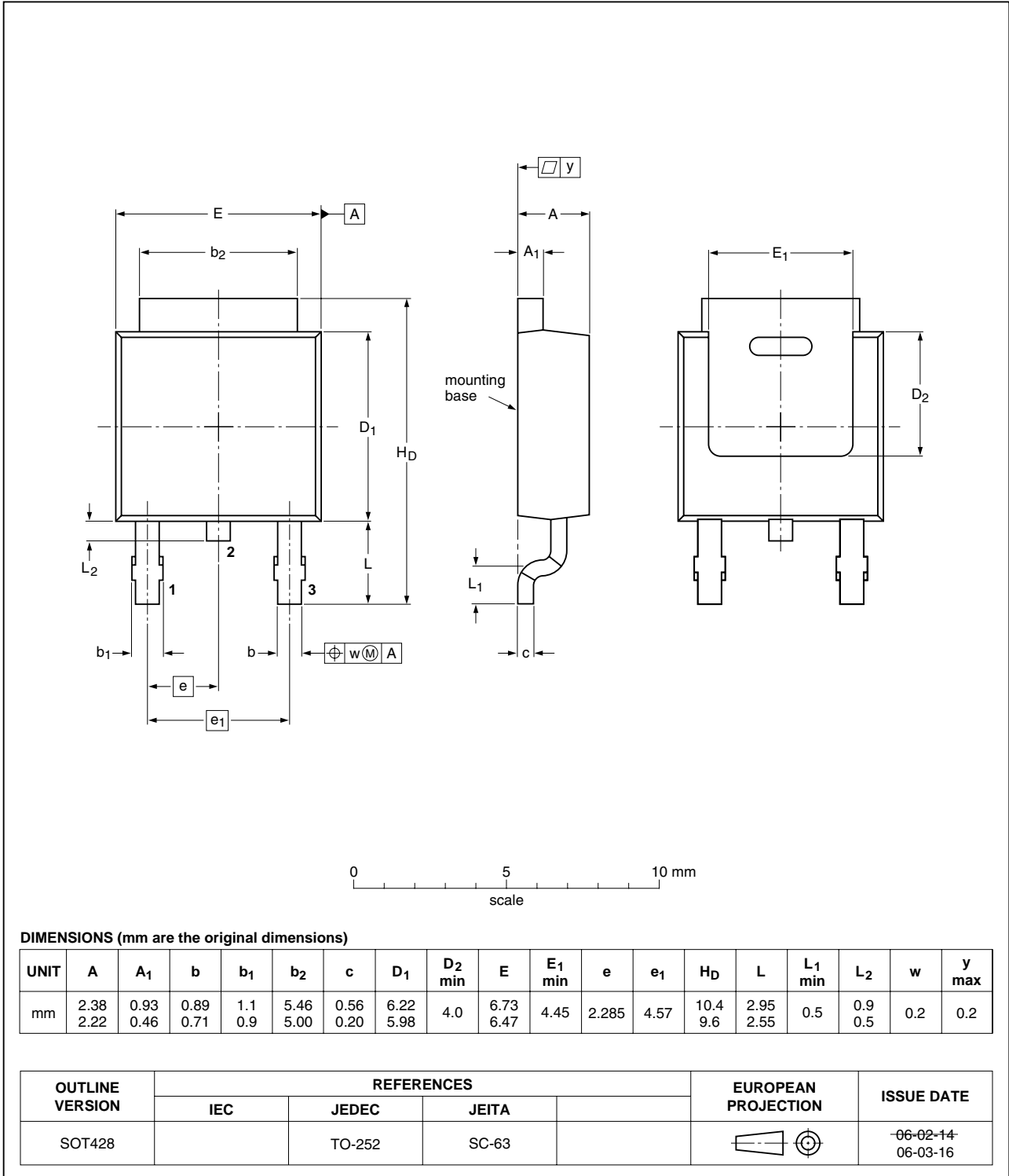


Fig 13. Package outline SOT428 (DPAK)

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA208S-600F v.5	20110413	Product data sheet	-	BTA208S_SERIES_D_E_F_4
Modifications:		<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Type number BTA208S-600F separated from data sheet BTA208S_SERIES_D_E_F_4.</li></ul>		
BTA208S_SERIES_D_E_F_4	20020301	Product specification	-	BTA208S_SERIES_D_E_F_3

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1]</sup> <sup>[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.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".

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