



BTA208X-1000C

3Q Hi-Com Triac

Rev. 4 — 24 January 2011

Product data sheet

1. Product profile

1.1 General description

Planar passivated high commutation three quadrant triac in a SOT186A "full pack" plastic package. This triac is intended for use in motor control circuits where very high blocking voltage, high static and dynamic dV/dt as well as high dI_{com}/dt can occur. This "series C" triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

1.2 Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- Isolated mounting base package
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only
- Very high voltage capability

1.3 Applications

- Compressor starting controls
- General purpose motor controls
- Reversing induction motor control circuits e.g. vertical axis washing machines

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	1000	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	-	65	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 73\text{ °C}$; see Figure 3 ; see Figure 1 ; see Figure 2	-	-	8	A

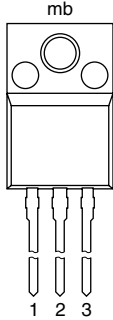



Table 1. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _j = 25 °C; see Figure 7	2	6	35	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; see Figure 7	2	13	35	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; see Figure 7	2	23	35	mA

2. Pinning information

Table 2. Pinning information

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

SOT186A (TO-220F)

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BTA208X-1000C	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

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		-	1000	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_h \leq 73^\circ\text{C}$; see Figure 3 ; see Figure 1 ; see Figure 2	-	8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{J(init)}} = 25^\circ\text{C}$; $t_p = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	65	A
		full sine wave; $T_{\text{J(init)}} = 25^\circ\text{C}$; $t_p = 16.7\text{ ms}$	-	71	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	21	A^2s
dl_{T}/dt	rate of rise of on-state current	$I_{\text{T}} = 12\text{ A}$; $I_{\text{G}} = 0.2\text{ A}$; $dl_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	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
$P_{\text{G(AV)}}$	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	$^\circ\text{C}$

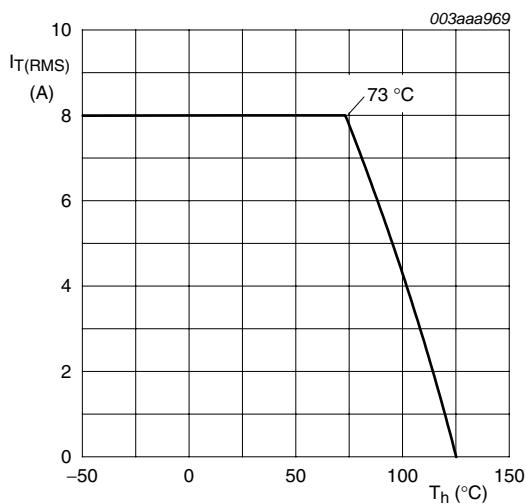
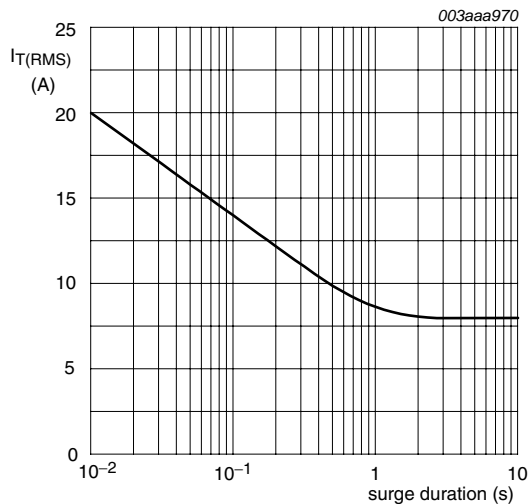


Fig 1. RMS on-state current as a function of heatsink temperature; maximum values



$f = 50\text{ Hz}$; $T_h = 73^\circ\text{C}$

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

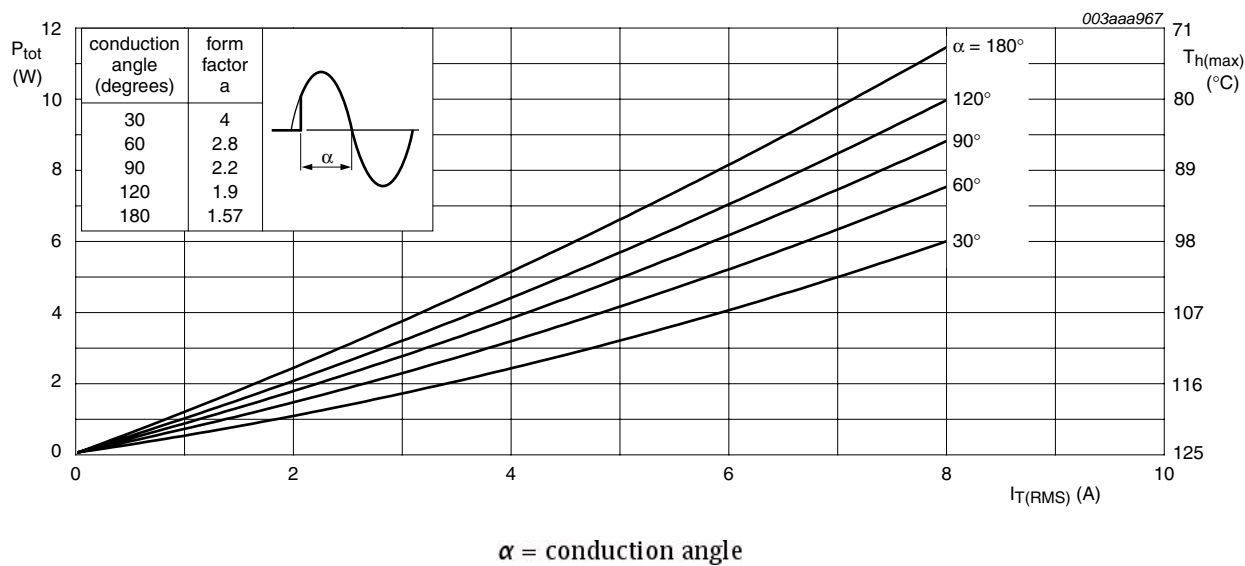


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

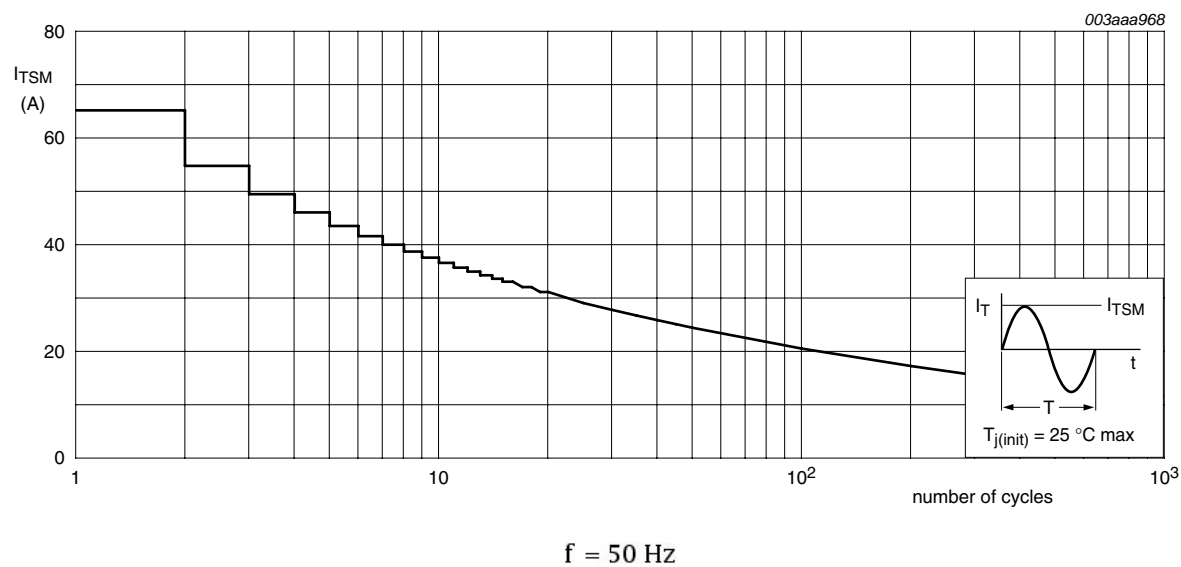
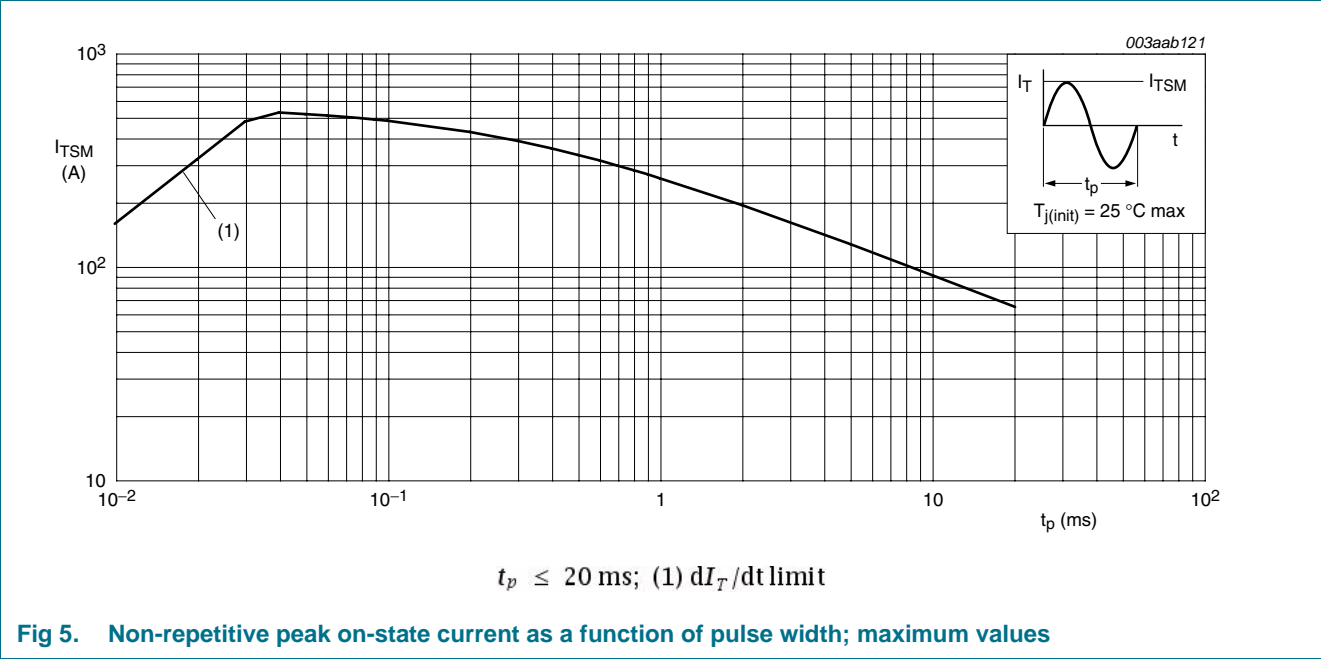


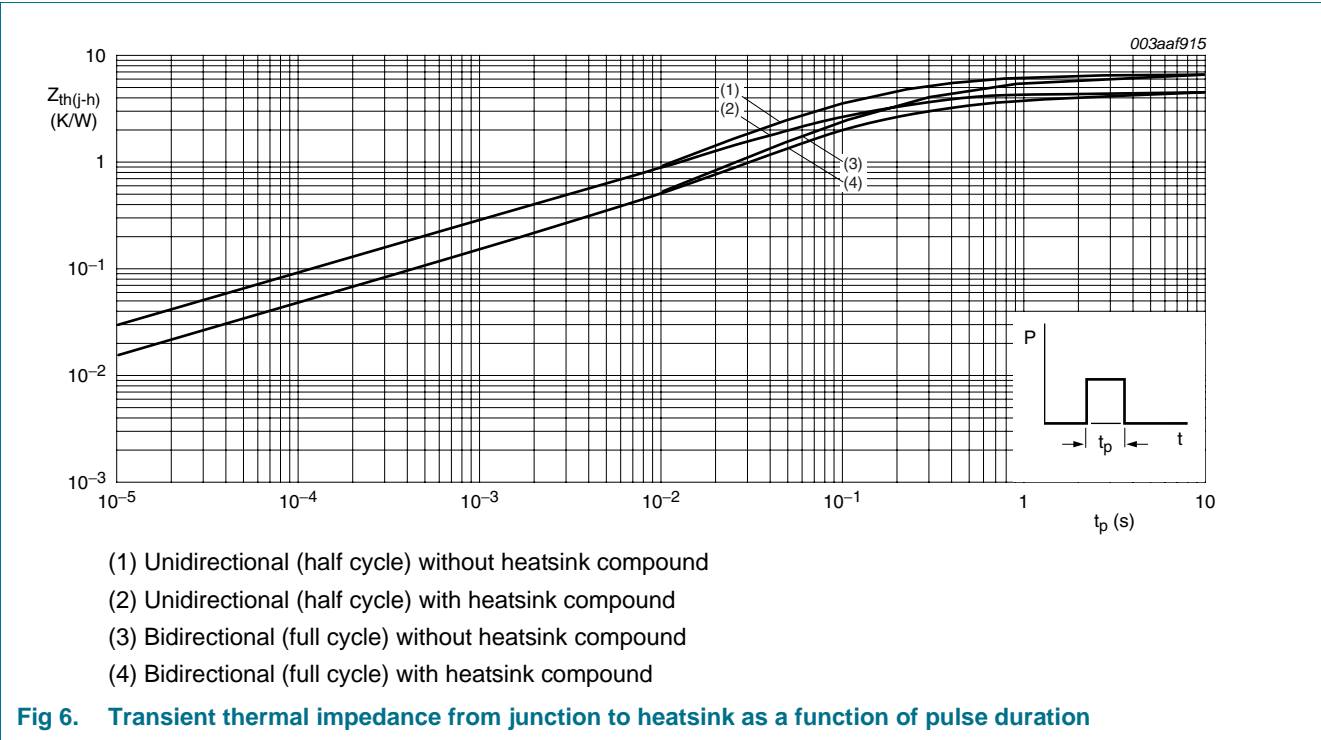
Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	full cycle or half cycle; with heatsink compound; see Figure 6	-	-	4.5	K/W
		full cycle or half cycle; without heatsink compound; see Figure 6	-	-	6.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W



6. Isolation characteristics

Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free ; 50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; T _h = 25 °C	-	-	2500	V
C_{isol}	isolation capacitance	from main terminal 2 to external heatsink ; f = 1 MHz; T _h = 25 °C	-	10	-	pF

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
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 Figure 7	2	6	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; see Figure 7	2	13	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; see Figure 7	2	23	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ }^\circ\text{C}$; see Figure 8	-	25	50	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; see Figure 8	-	48	75	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; see Figure 8	-	30	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 9	-	20	50	mA
V_T	on-state voltage	$I_T = 10\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 10	-	1.3	1.65	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 11	-	0.7	1.5	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$	0.25	0.4	-	V
I_D	off-state current	$V_D = 1000\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 670\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; exponential waveform; gate open circuit	1000	4000	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 8\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit; snubberless condition; see Figure 12	12	32	-	A/ms

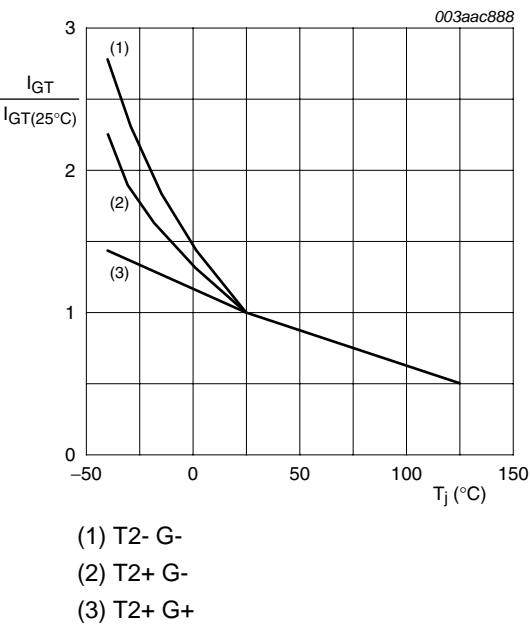


Fig 7. Normalized gate trigger current as a function of junction temperature

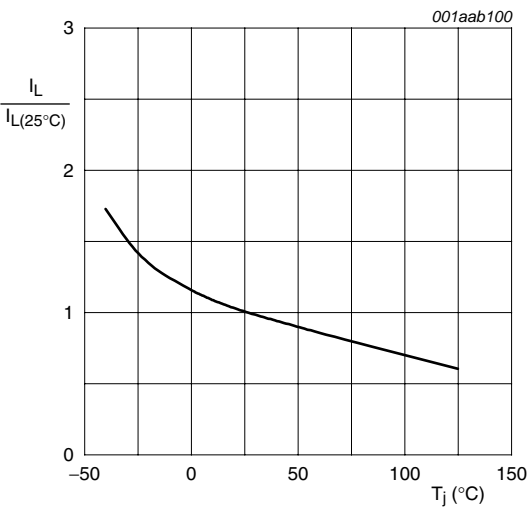


Fig 8. Normalized latching current as a function of junction temperature

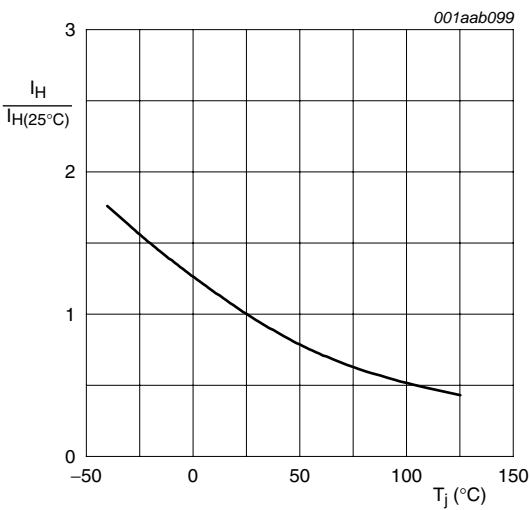
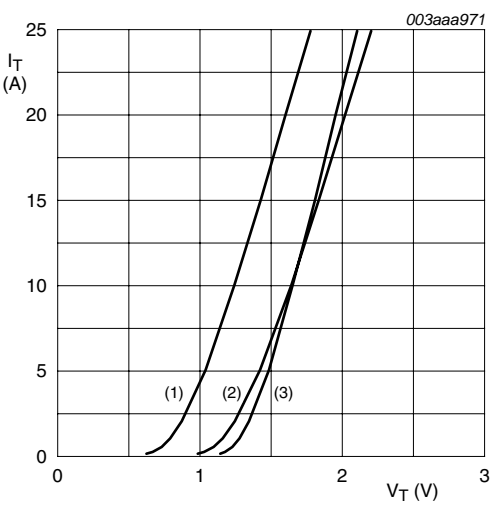
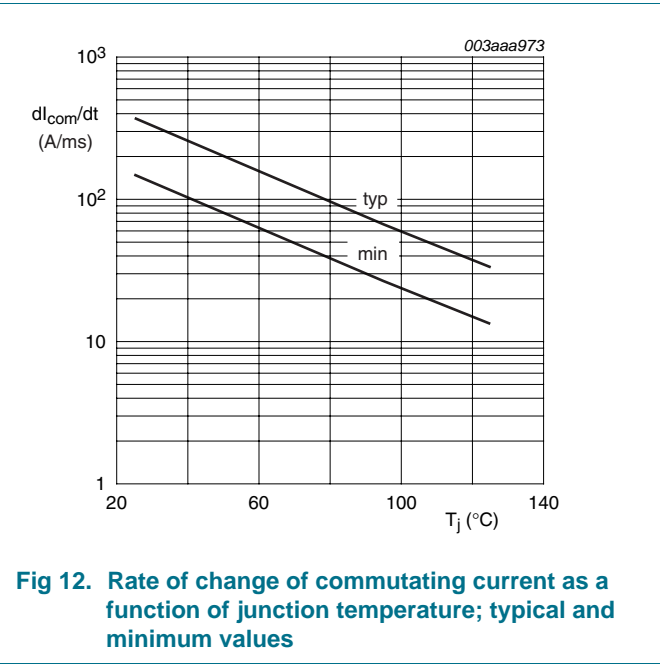
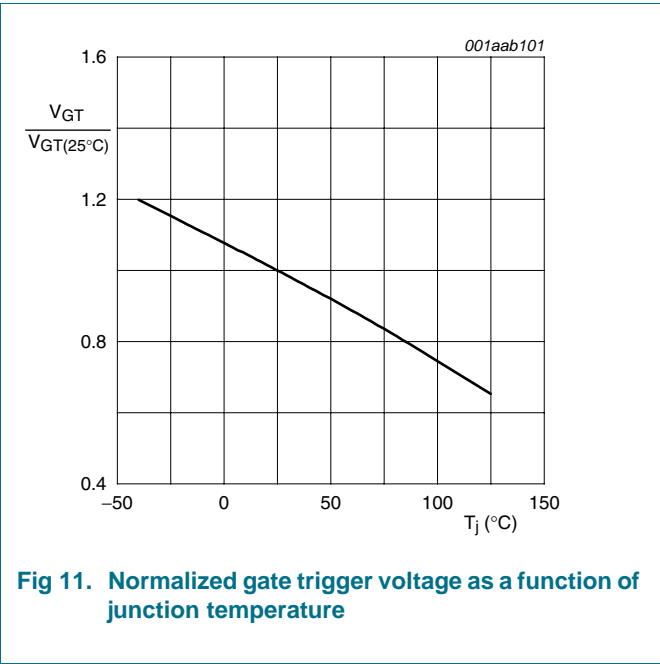


Fig 9. Normalized holding current as a function of junction temperature



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



8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 3-lead TO-220 'full pack'

SOT186A

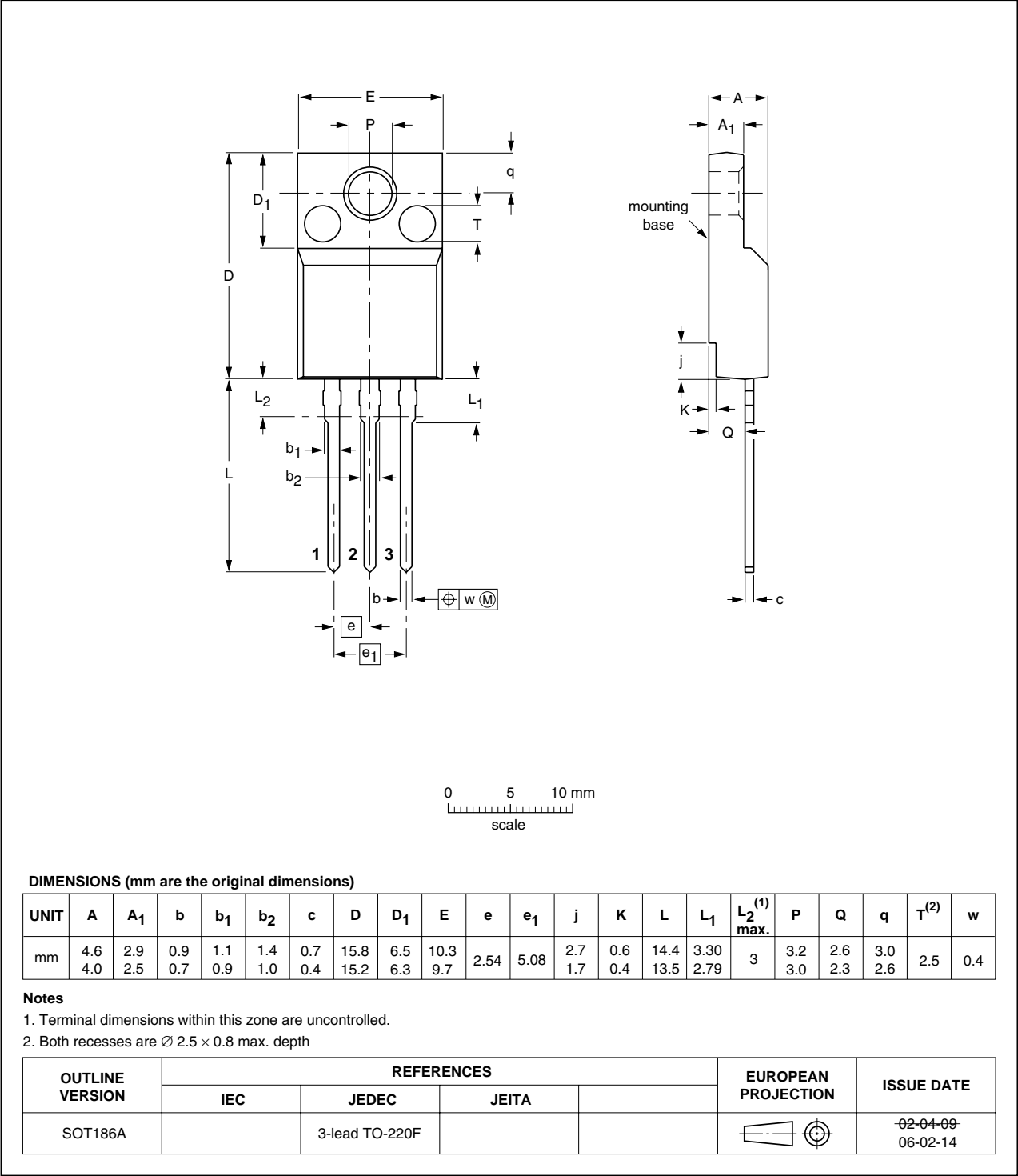


Fig 13. Package outline SOT186A (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA208X-1000C v.4	20110124	Product data sheet	-	BTA208X-1000C v.3
Modifications:	• Various changes to content.			
BTA208X-1000C v.3	20101108	Product data sheet	-	BTA208X-1000C v.2

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Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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[2] The term 'short data sheet' is explained in section "Definitions".

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