



BTA204X-1000C

3Q Hi-Com Triac

Rev. 1 — 16 June 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 e.g. window shutters, blinds and sun shades

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; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	-	25	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 92\text{ }^{\circ}\text{C}$; see Figure 1 ; see Figure 2 ; see Figure 3	-	-	4	A

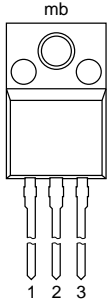



Table 1. Quick reference data ...continued

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	8	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	20	35	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	n.c.	mounting base; isolated		

SOT186A (TO-220F)

3. Ordering information

Table 3. Ordering information

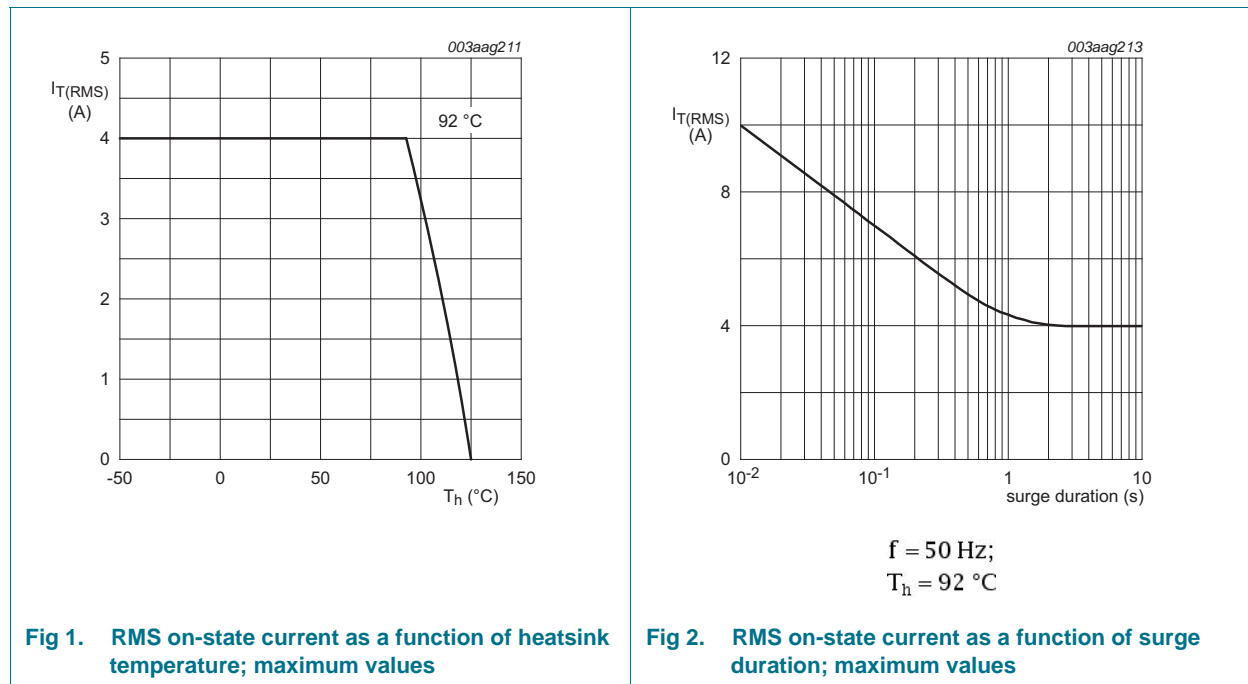
Type number	Package	Description	Version
	Name		
BTA204X-1000C	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 92\text{ °C}$; see Figure 1 ; see Figure 2 ; see Figure 3	-	4	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	25	A
		full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	27	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	3.1	A ² s
di_T/dt	rate of rise of on-state current	$I_T = 6\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	A/ μs
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



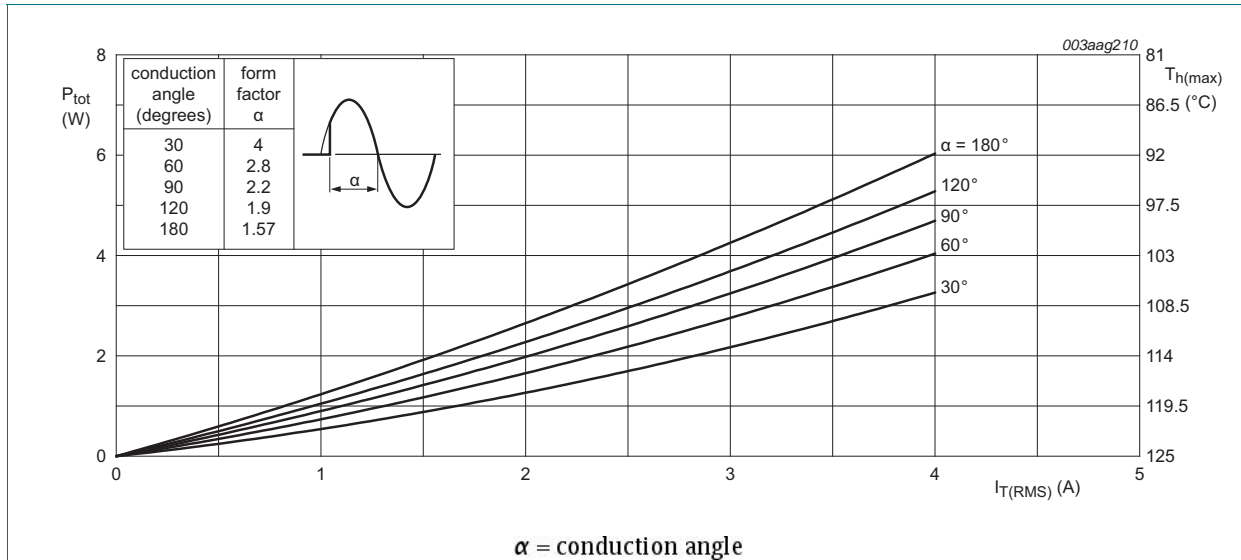


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

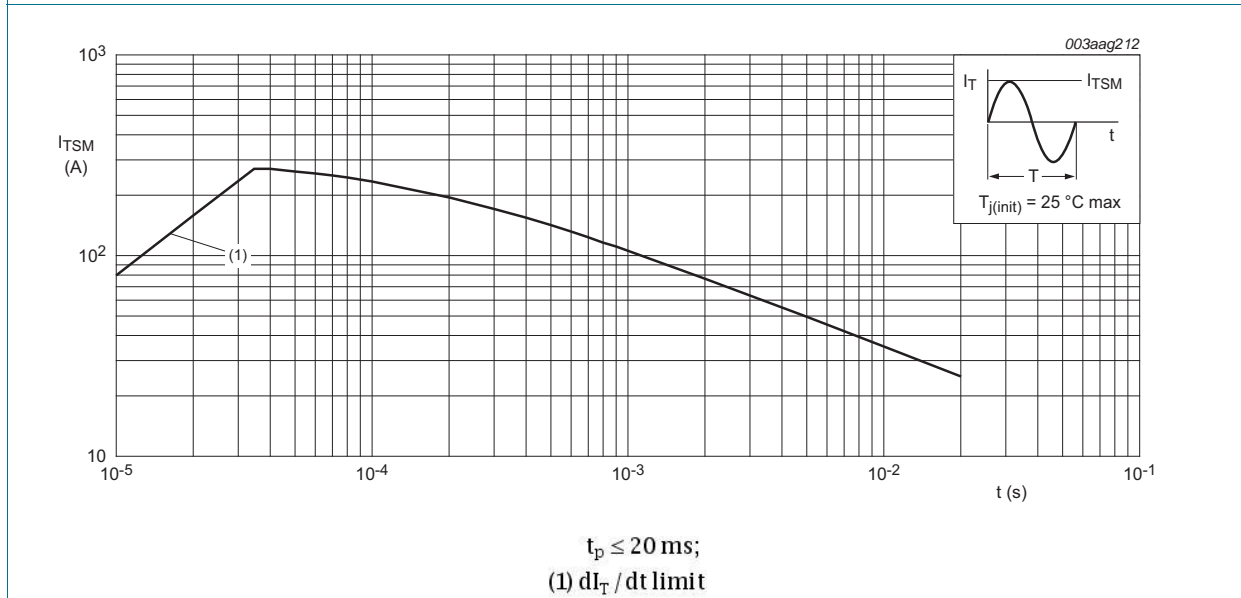


Fig 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

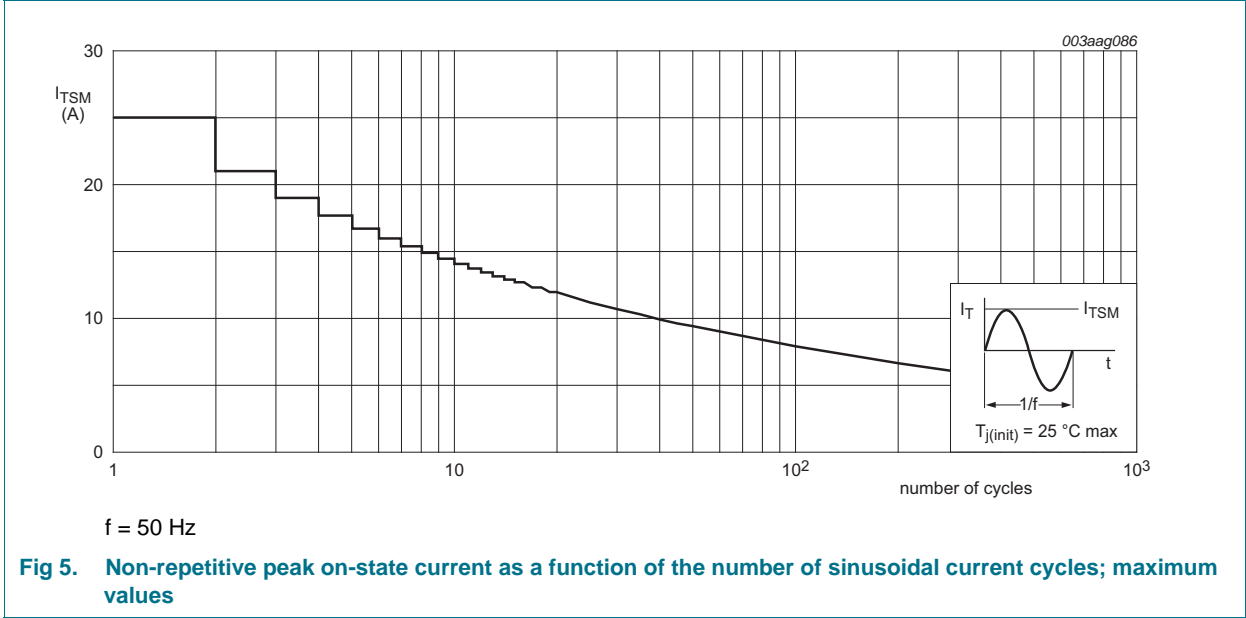
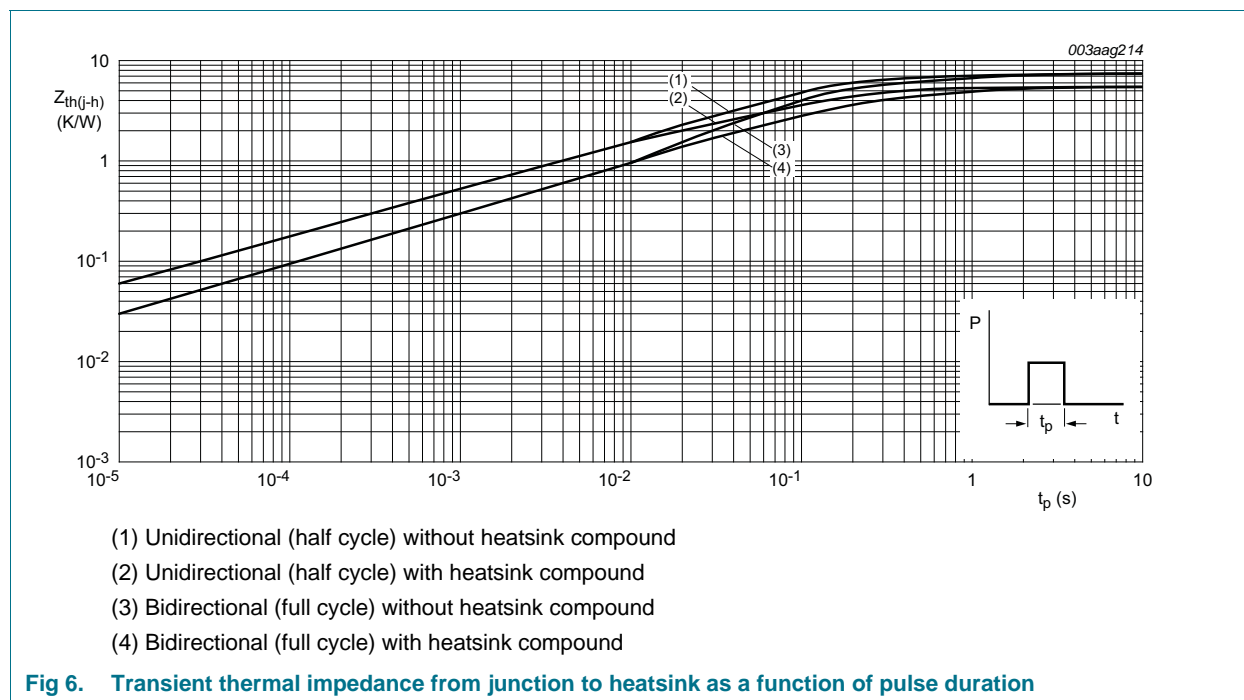


Fig 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

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	-	-	5.5	K/W
		full cycle or half cycle; without heatsink compound; see Figure 6	-	-	7.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W



6. Isolation characteristics

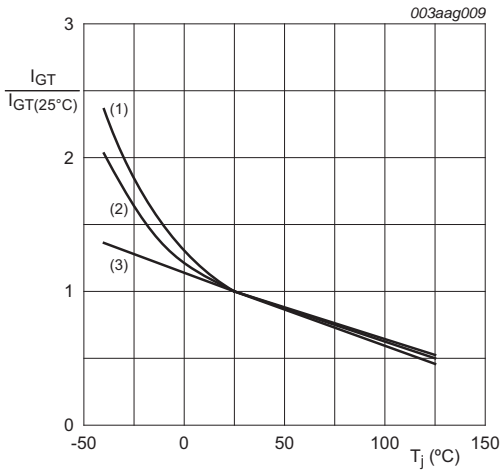
Table 6. Isolation characteristics

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+; $T_j = 25\text{ °C}$; see Figure 7	2	6	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 7	2	8	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 7	2	20	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; see Figure 8	-	-	20	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 8	-	-	30	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 8	-	-	20	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; see Figure 9	-	-	20	mA
V_T	on-state voltage	$I_T = 5\text{ A}$; $T_j = 25\text{ °C}$; see Figure 10	-	1.4	1.7	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 11	-	0.7	1.5	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$	0.25	0.4	-	V
I_D	off-state current	$V_D = 1000\text{ V}$; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 670\text{ V}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	1000	1500	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (without snubber condition); gate open circuit	3	30	-	A/ms
t_{gt}	gate-controlled turn-on time	$I_{TM} = 12\text{ A}$; $V_D = 1000\text{ V}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	μ s



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

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

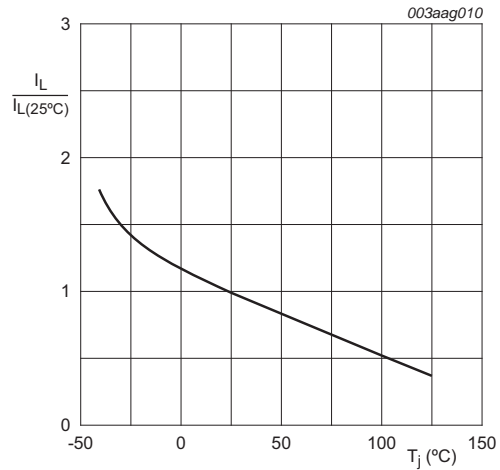


Fig 8. Normalized latching current as a function of junction temperature

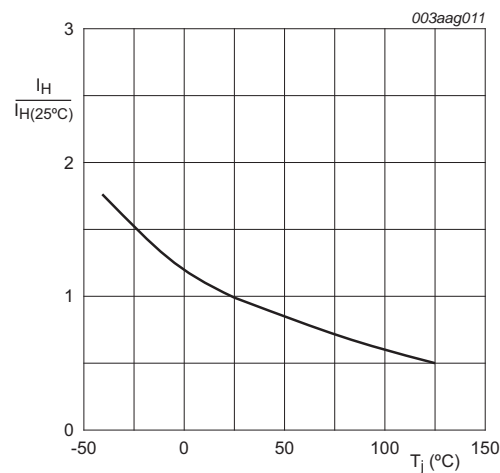
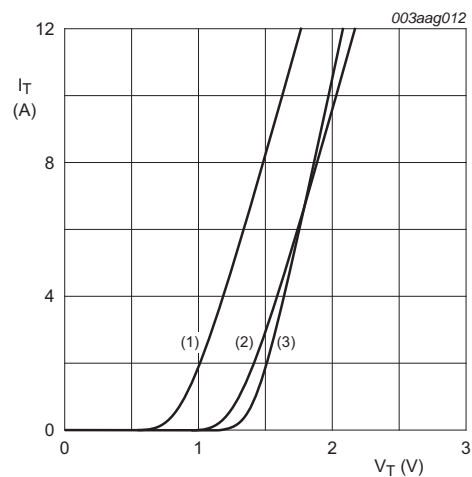


Fig 9. Normalized holding current as a function of junction temperature



- $V_o = 1.22 \text{ V}; R_s = 0.04 \Omega$
- (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 10. On-state current as a function of on-state voltage

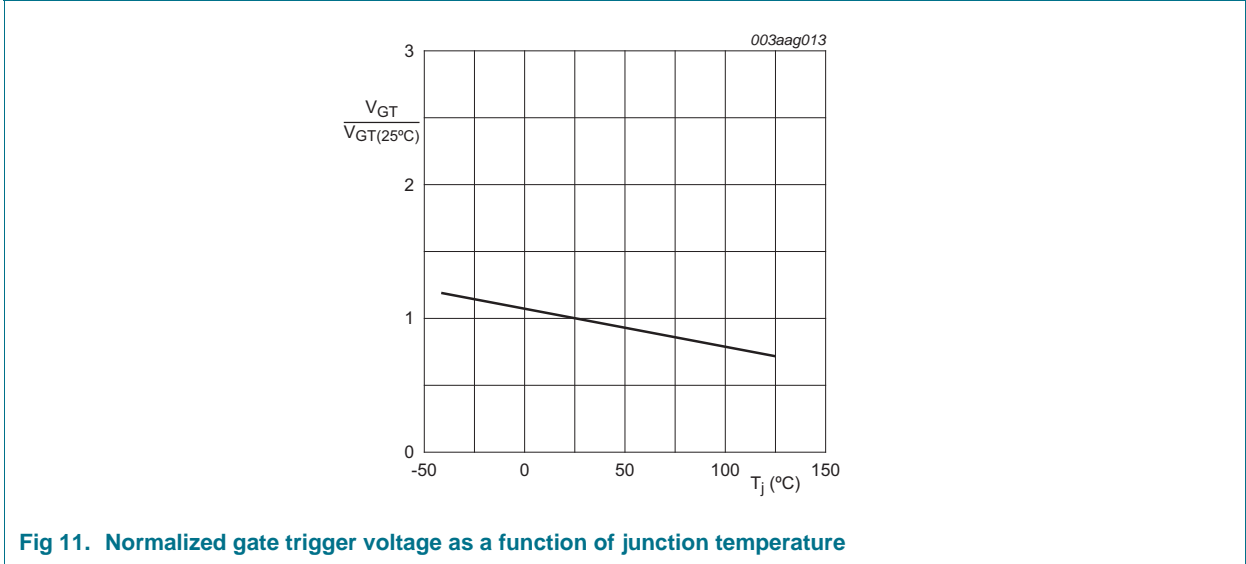


Fig 11. Normalized gate trigger voltage as a function of junction temperature

8. Package outline

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

SOT186A

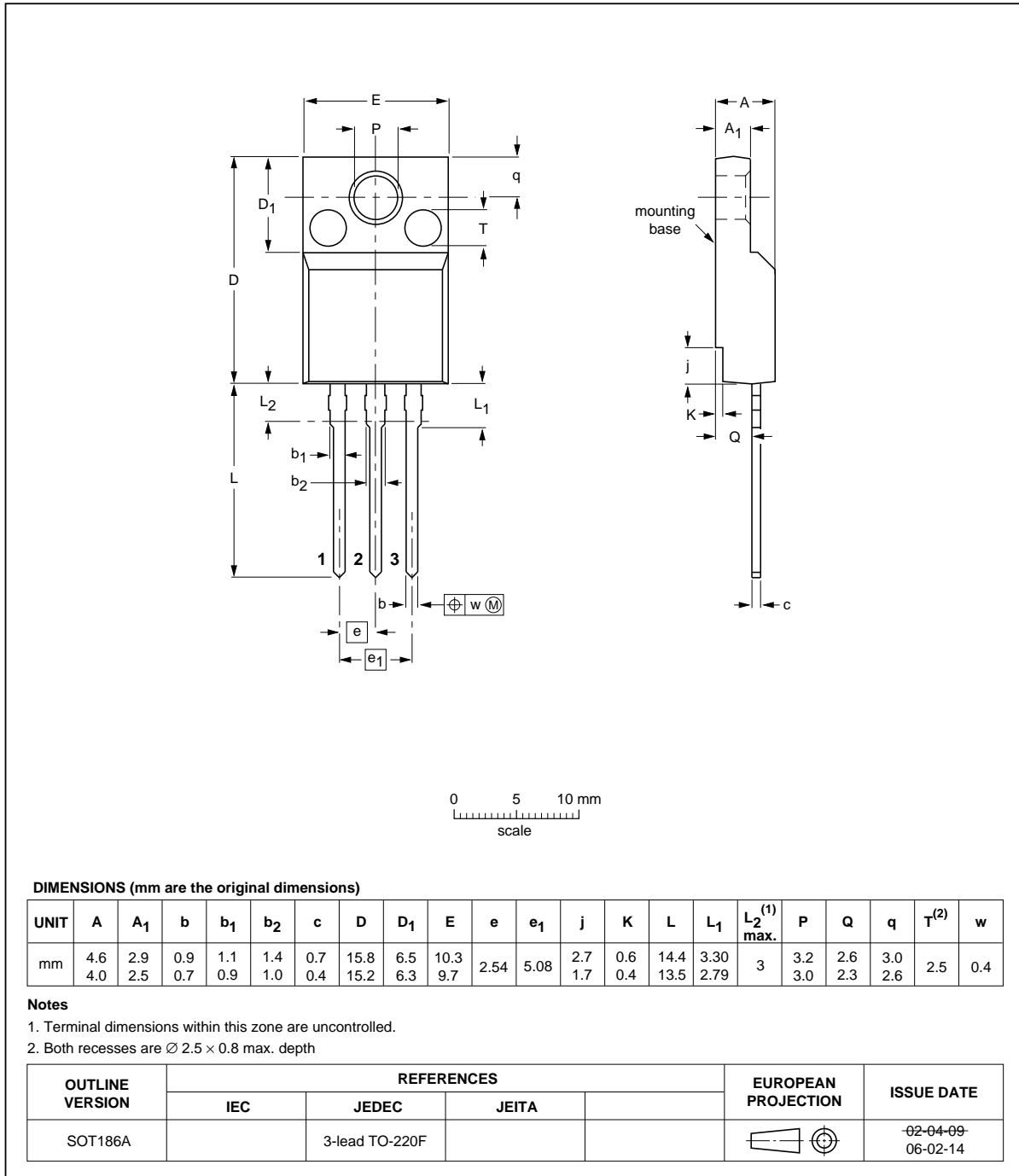


Fig 12. Package outline SOT186A (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA204X-1000C v.1	20110616	Product data sheet	-	-

10. Legal information

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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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Date of release: 16 June 2011

Document identifier: BTA204X-1000C