



IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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Thank you for your cooperation and understanding,

WeEn Semiconductors





BTA330X-800BT

3Q Hi-Com Triac
24 December 2014

Product data sheet

1. General description

Planar passivated high commutation three quadrant triac in a SOT186A (TO-220F) "full pack" plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series BT" triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$) without the aid of a snubber. It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- 3Q technology for improved noise immunity
- 2500 V RMS isolation voltage capability
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High junction operating temperature capability
- High voltage capability
- High current capability
- Isolated mounting base package
- Least sensitive gate for highest noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

3. Applications

- Applications subject to high temperature
- Heating controls
- High power motor control
- High power switching

4. Quick reference data

Table 1. Quick reference data

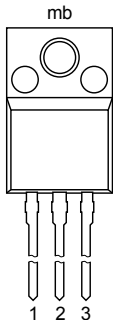
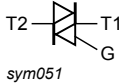
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	270	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 44\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	30	A



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; Fig. 7	-	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7	-	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7	-	-	50	mA
Dynamic characteristics						
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 536 V; T _j = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit	2000	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _j = 150 °C; I _{T(RMS)} = 30 A; dV _{com} /dt = 20 V/μs; (snubberless condition); gate open circuit	15	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 <p style="text-align: center;">TO-220F (SOT186A)</p>	 <p style="text-align: center;">sym051</p>
2	T2	main terminal 2		
3	G	gate		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA330X-800BT	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

7. Marking

Table 4. Marking codes

Type number	Marking code
BTA330X-800BT	BTA330X-800BT

8. Limiting values

Table 5. 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		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 44\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	30	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	270	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	297	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	364.5	A^2s
di_T/dt	rate of rise of on-state current	$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu s$	-	100	$A/\mu s$
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	$^{\circ}C$
T_j	junction temperature		-	150	$^{\circ}C$

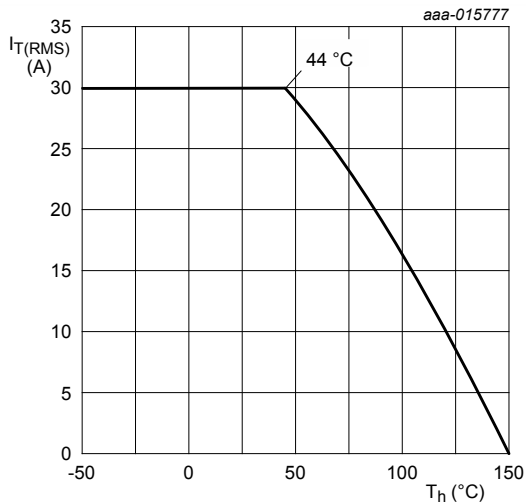
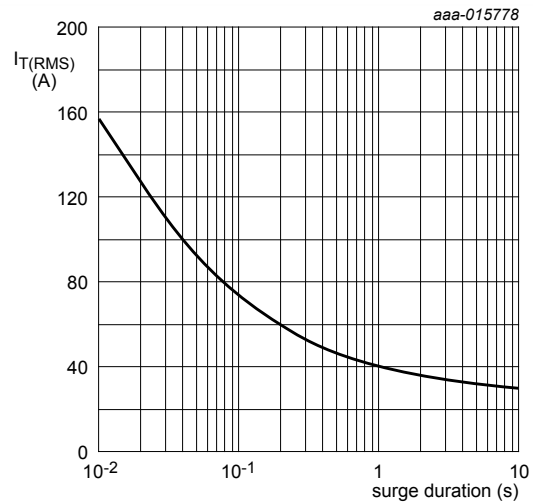


Fig. 1. RMS on-state current as a function of heatsink temperature; maximum values



$f = 50\text{ Hz}$; $T_h = 44\text{ }^{\circ}C$

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

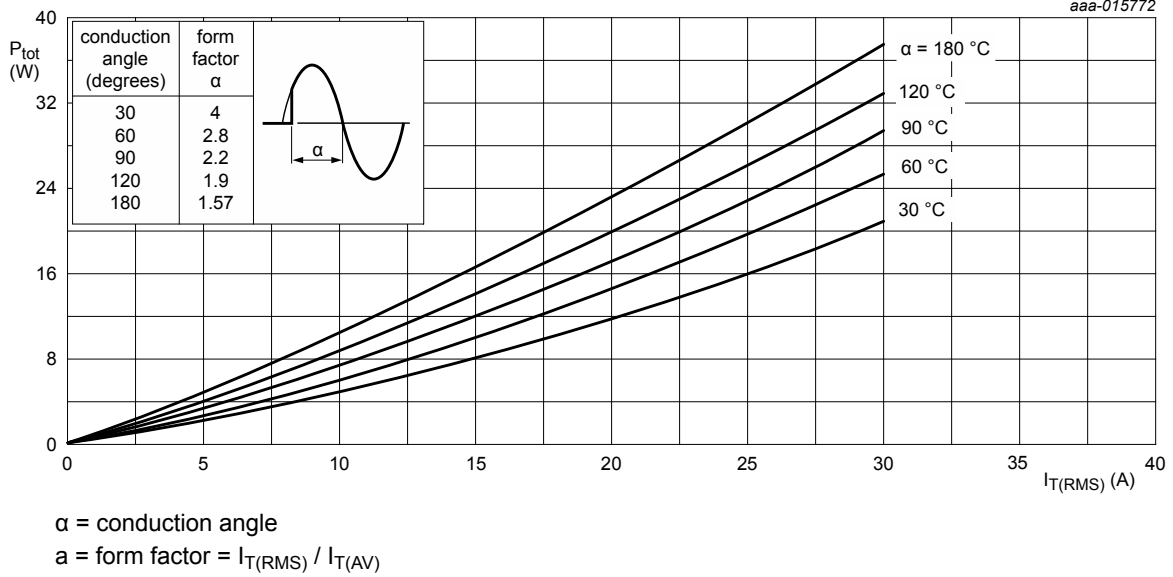


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

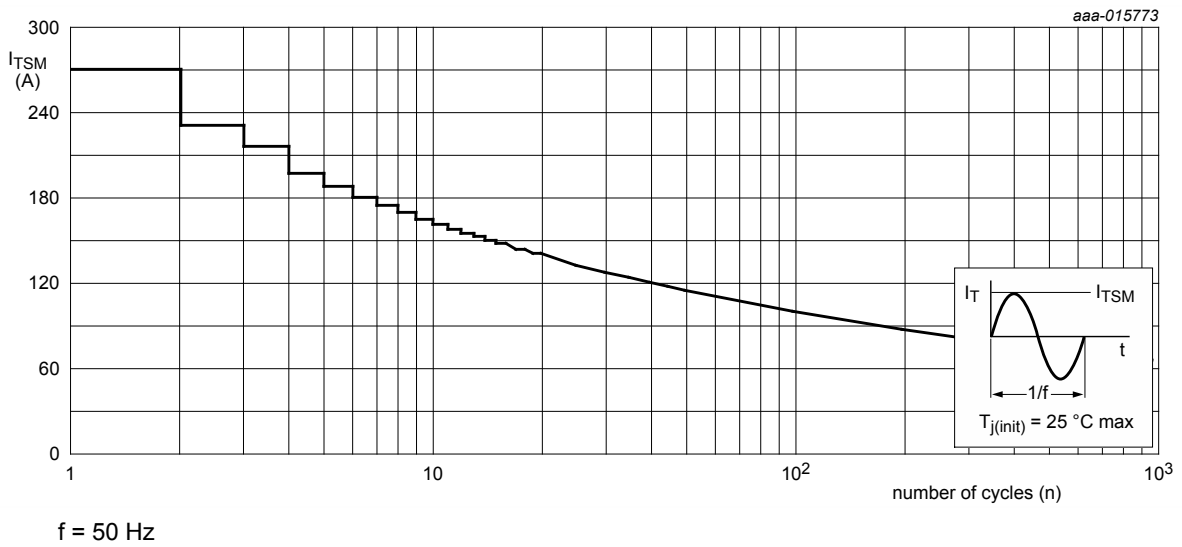
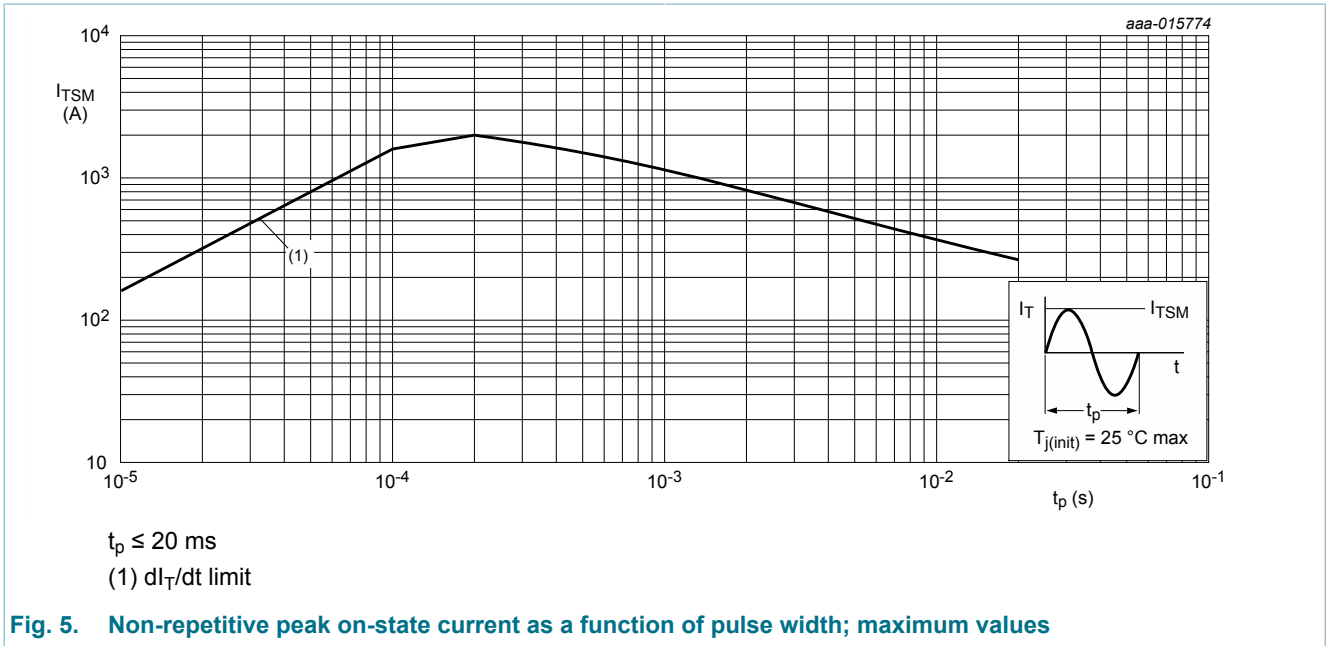


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	full cycle; with heatsink compound; Fig. 6	-	-	2.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

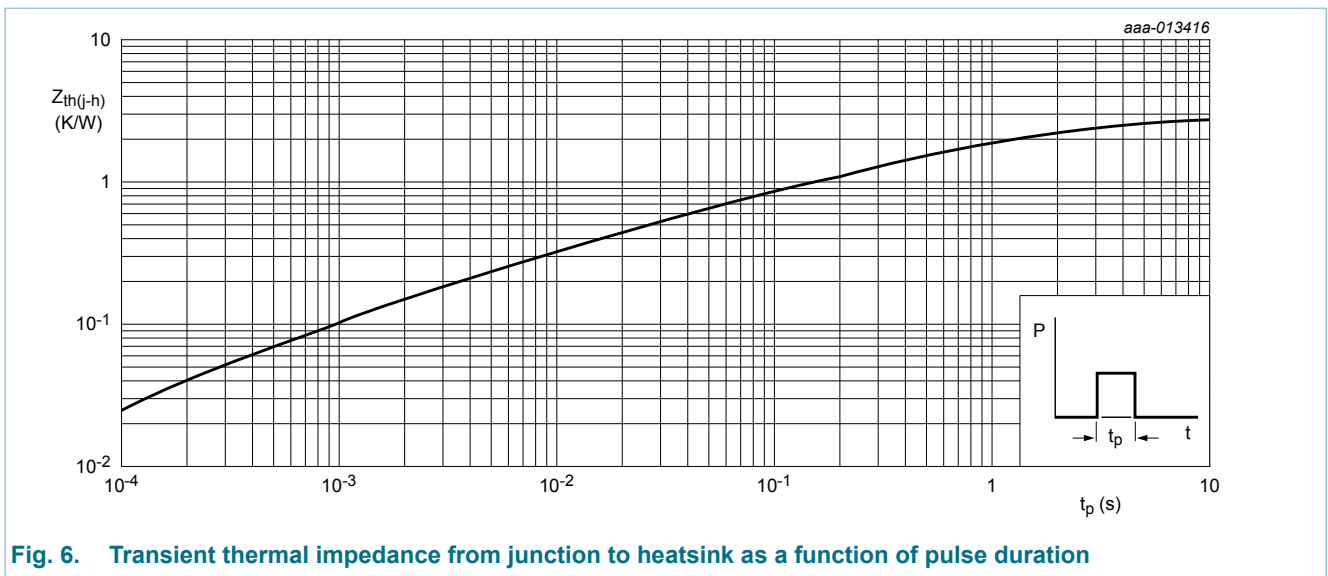


Fig. 6. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

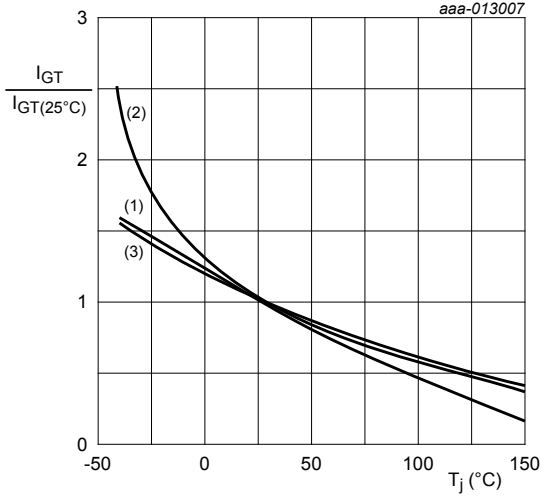
Table 7. Isolation characteristics

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; $50\text{ Hz} \leq f \leq 60\text{ Hz}$; $RH \leq 65\%$; $T_h = 25\text{ }^\circ\text{C}$	-	-	2500	V
C_{isol}	isolation capacitance	from main terminal 2 to external heatsink; $f = 1\text{ MHz}$; $T_h = 25\text{ }^\circ\text{C}$	-	10	-	pF

11. Characteristics

Table 8. 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+; $T_j = 25\text{ °C}$; Fig. 7	-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7	-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7	-	-	50	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 8	-	-	80	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 8	-	-	100	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 8	-	-	80	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9	-	-	75	mA
V_T	on-state voltage	$I_T = 42\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10	-	1.2	1.55	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11	-	0.9	1.3	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 150\text{ °C}$; Fig. 11	0.2	0.45	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_j = 25\text{ °C}$	-	0.4	10	μA
		$V_D = 800\text{ V}$; $T_j = 150\text{ °C}$	-	0.4	2	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	2000	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 150\text{ °C}$; $I_{T(RMS)} = 30\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit	15	-	-	A/ms



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

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

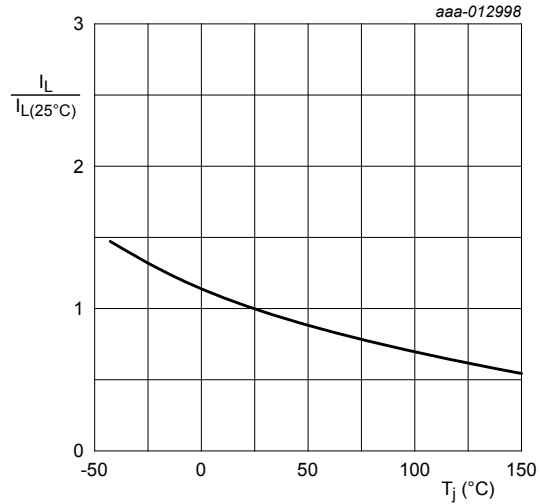


Fig. 8. Normalized latching current as a function of junction temperature

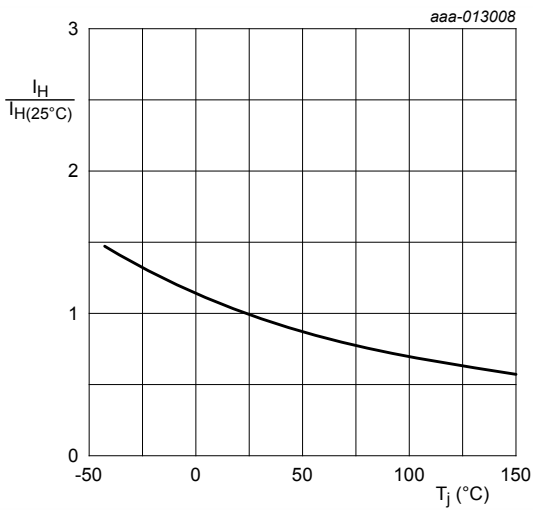
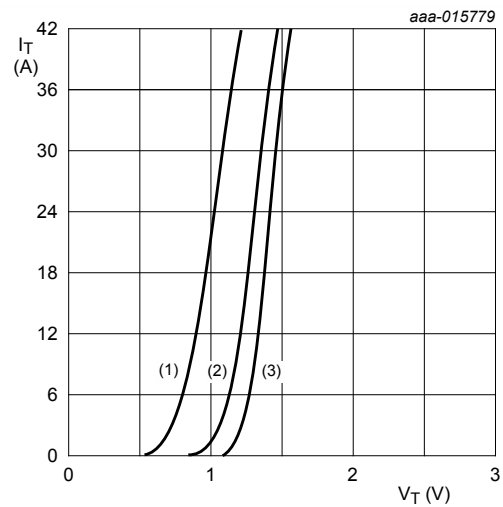


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.060\text{ V}$; $R_s = 0.01\ \Omega$

- (1) $T_j = 150^\circ\text{C}$; typical values
- (2) $T_j = 150^\circ\text{C}$; maximum values
- (3) $T_j = 25^\circ\text{C}$; maximum values

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

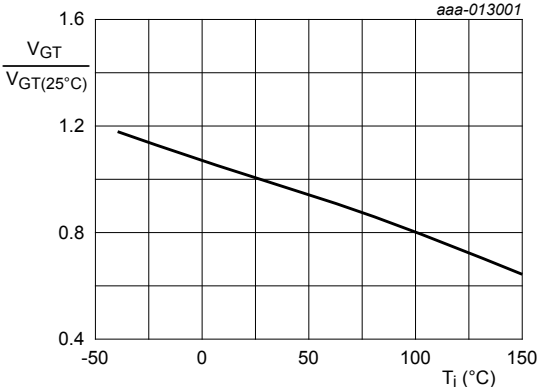


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

12. Package outline

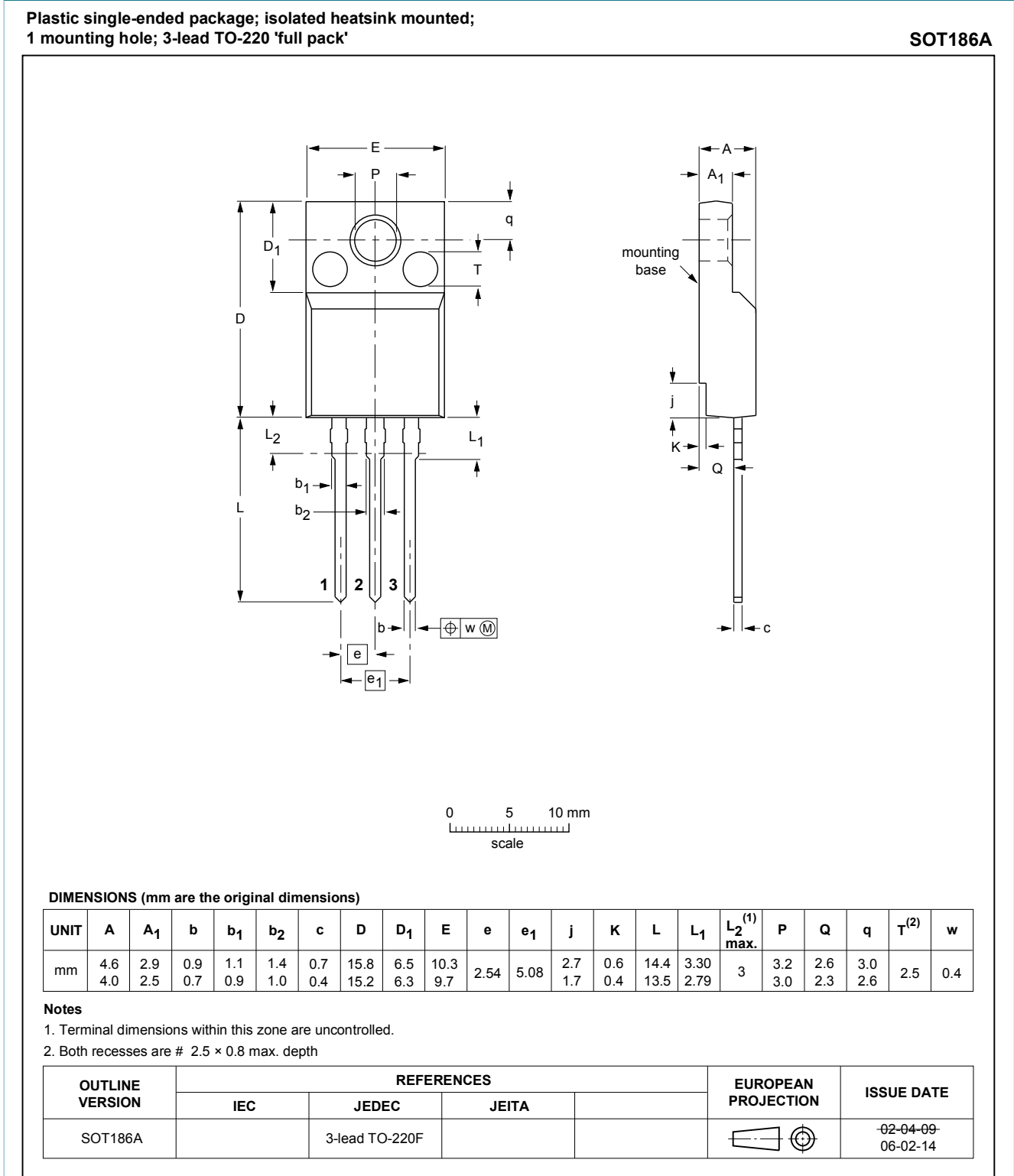


Fig. 12. Package outline TO-220F (SOT186A)

13. Legal information

13.1 Data sheet status

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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14. Contents

1	General description	1
2	Features and benefits	1
3	Applications	1
4	Quick reference data	1
5	Pinning information	2
6	Ordering information	2
7	Marking	3
8	Limiting values	4
9	Thermal characteristics	7
10	Isolation characteristics	7
11	Characteristics	8
12	Package outline	11
13	Legal information	12
13.1	Data sheet status	12
13.2	Definitions	12
13.3	Disclaimers	12
13.4	Trademarks	13

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