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

founded by NXP



BTA316X-600B

3Q Hi-Com Triac

24 September 2014 **Product data sheet**

1. General description

Planar passivated high commutation three quadrant triac in a SOT186A "full pack" plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series B" triac will commutate the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

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
- High voltage capability
- Isolated mounting base package
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

3. Applications

- Electronic thermostats
- High power motor controls e.g washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids
- Refrigeration and air conditioning compressor control

4. Quick reference data

Table 1. Quick reference data

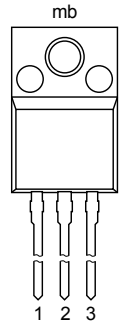
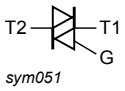
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)}$ = 25 °C; t_p = 20 ms; Fig. 4; Fig. 5		-	-	140	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 45$ °C; Fig. 1; Fig. 2; Fig. 3		-	-	16	A
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T2+ G+; T_j = 25 °C; Fig. 7		2	-	50	mA

Scan or click this QR code to view the latest information for this product

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 7		2	-	50	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; Fig. 7		2	-	50	mA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 TO-220F (SOT186A)	 sym051
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
BTA316X-600B	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A
BTA316X-600B/L01	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

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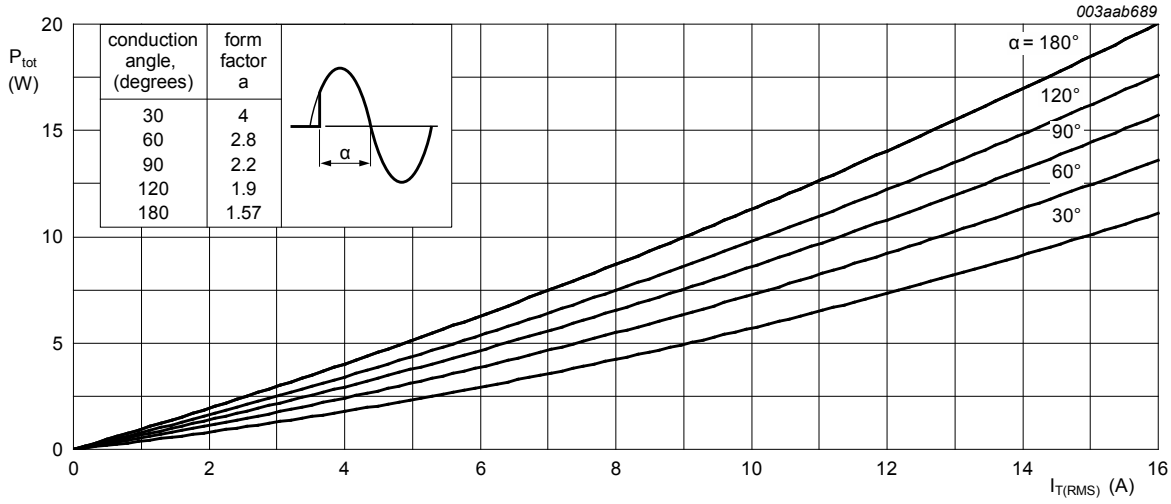
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7. Limiting values

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; $T_h \leq 45$ °C; Fig. 1; Fig. 2; Fig. 3		-	16	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; Fig. 4; Fig. 5		-	140	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms		-	150	A
I^2t	I^2t for fusing	$t_p = 10$ ms; SIN		-	98	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 20$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs		-	100	A/µs
I_{GM}	peak gate current			-	2	A
$P_{G(AV)}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	125	°C



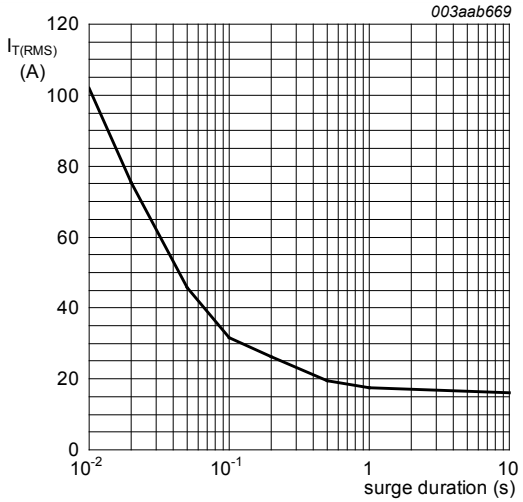
α = conduction angle

a = form factor = $I_{T(RMS)} / I_{T(AV)}$

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

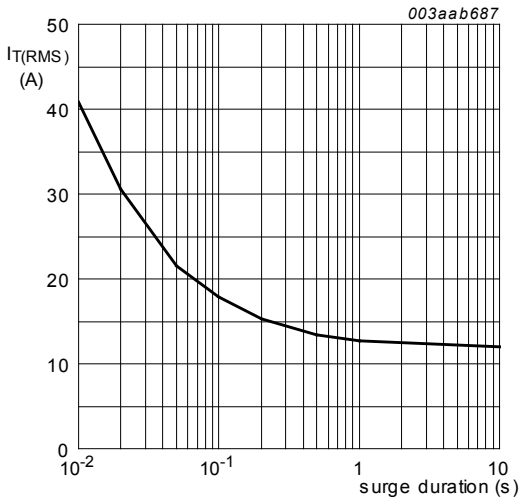
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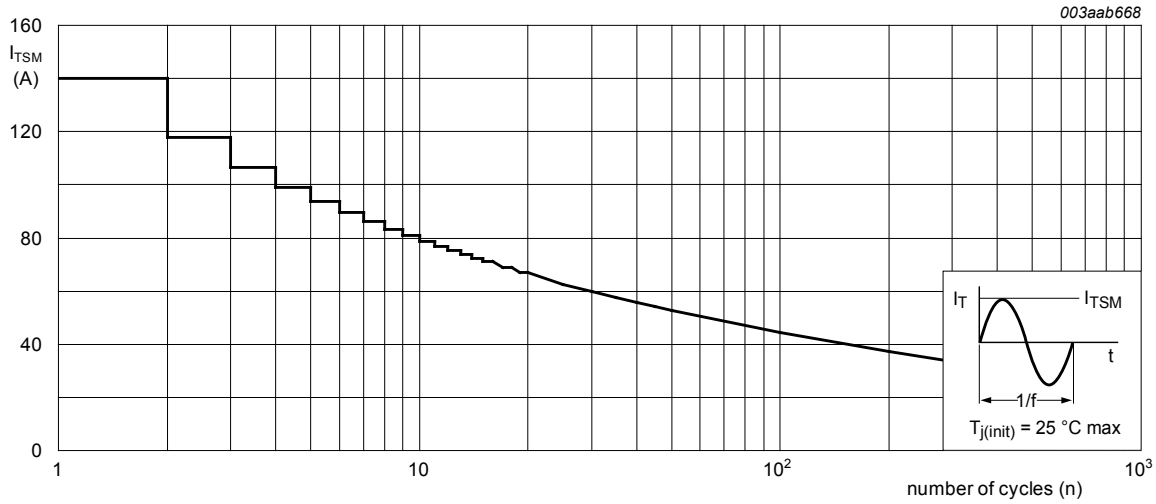
f = 50 Hz;
T_h = 45 °C

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



f = 50 Hz; T_{mb} = 100 °C

Fig. 3. RMS on-state current as a function of surge duration; maximum values

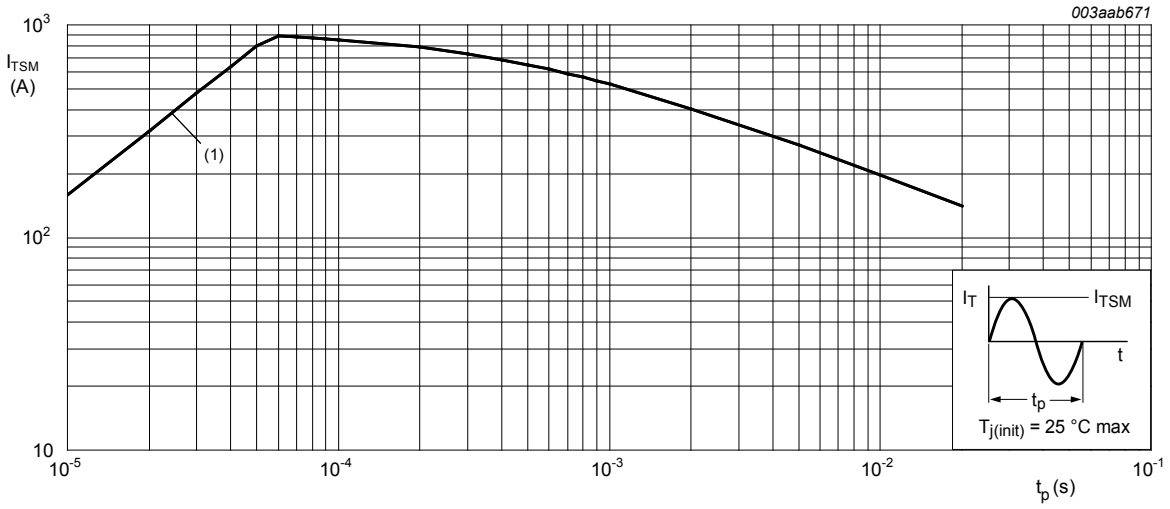


f = 50 Hz

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

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$t_p \leq 20$ ms

(1) dI_T/dt limit

Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

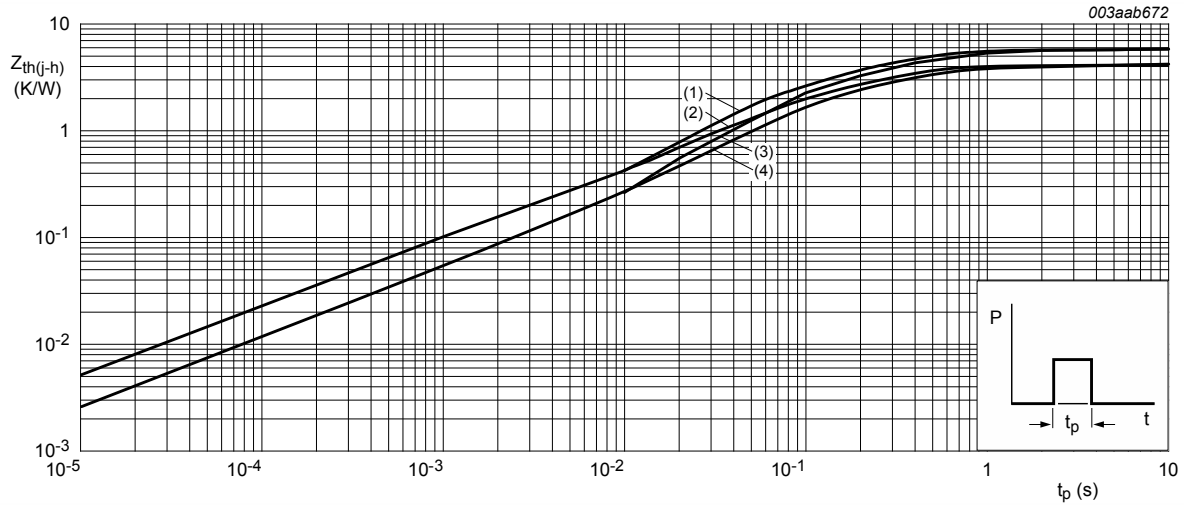
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8. Thermal characteristics

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; Fig. 6		-	-	4	K/W
		full cycle or half cycle; without heatsink compound; Fig. 6		-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	55	-	K/W



(1) Unidirectional (half cycle) without heatsink compound
(2) Unidirectional (half cycle) with heatsink compound
(3) Bidirectional (full cycle) without heatsink compound
(4) Bidirectional (full cycle) with heatsink compound

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

9. 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

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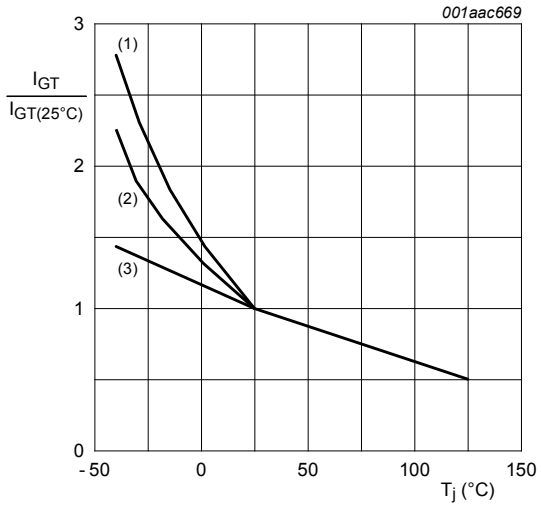
10. Characteristics

Table 7. Characteristics

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		2	-	50	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 7		2	-	50	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; Fig. 7		2	-	50	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T2+ G+; T_j = 25 °C; Fig. 8		-	-	60	mA
		V_D = 12 V; I_G = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 8		-	-	90	mA
		V_D = 12 V; I_G = 0.1 A; T2- G-; T_j = 25 °C; Fig. 8		-	-	60	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	-	60	mA
V_T	on-state voltage	I_T = 18 A; T_j = 25 °C; Fig. 10		-	1.3	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 11		-	0.8	1	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C; Fig. 11		0.25	0.4	-	V
I_D	off-state current	V_D = 600 V; T_j = 125 °C		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1000	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 16 A; dV_{com}/dt = 20 V/µs; (snubberless condition); gate open circuit		20	-	-	A/ms

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

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

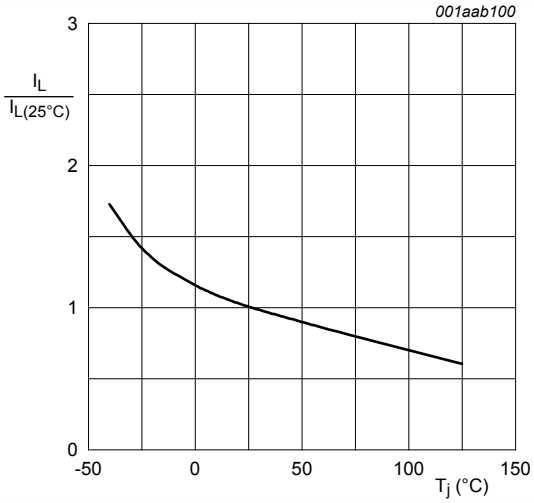


Fig. 8. Normalized latching current as a function of junction temperature

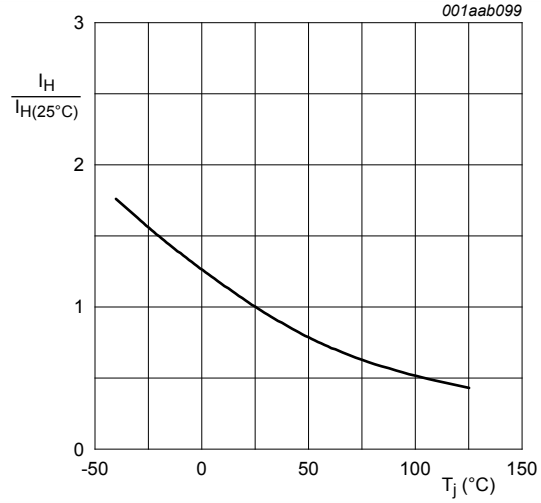
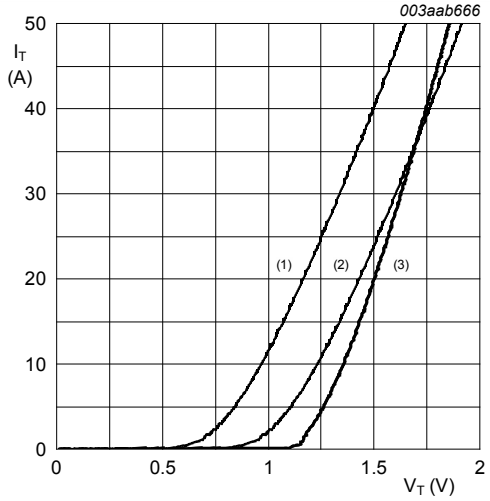


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.024 V; R_s = 0.021 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

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

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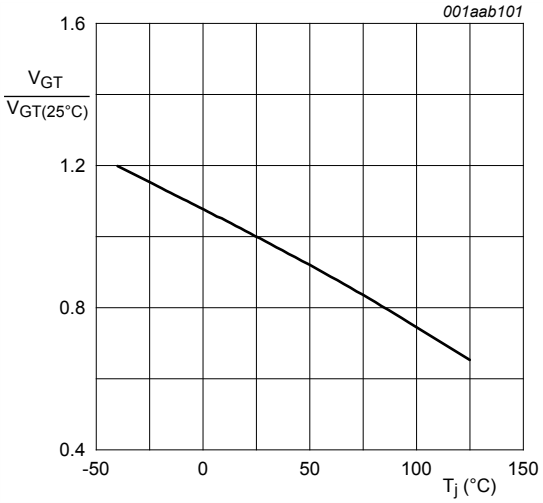


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

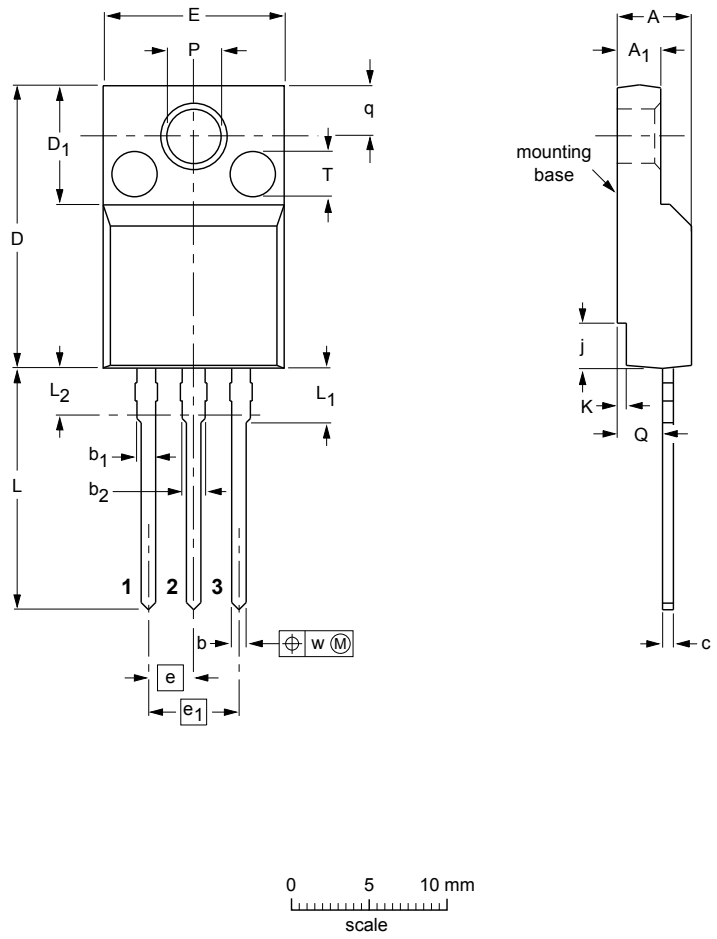
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11. Package outline

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

SOT186A



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D	D_1	E	e	e_1	j	K	L	L_1	L_2 (1) max.	P	Q	q	T (2)	w
mm	4.6 4.0	2.9 2.5	0.9 0.7	1.1 0.9	1.4 1.0	0.7 0.4	15.8 15.2	6.5 6.3	10.3 9.7	2.54	5.08	2.7 1.7	0.6 0.4	14.4 13.5	3.30 2.79	3	3.2 3.0	2.6 2.3	3.0 2.6	2.5	0.4

Notes

1. Terminal dimensions within this zone are uncontrolled.
2. Both recesses are # 2.5 × 0.8 max. depth

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT186A		3-lead TO-220F				~~02-04-09~~ 06-02-14

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

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Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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