

BTA202X-600E

3Q Hi-Com Triac
11 October 2012

Product data sheet

1. Product profile

1.1 General description

Planar passivated high commutation three quadrant triac in a SOT186A (TO-220F) "full pack" plastic package. This "series E" triac balances the requirements of commutation performance and gate sensitivity and is intended for interfacing with low power drivers including microcontrollers.

1.2 Features and benefits

- 3Q technology for improved noise immunity
- Direct interfacing with low power drivers and microcontrollers
- Good immunity to false turn-on by dV/dt
- High commutation capability with sensitive gate
- High voltage capability
- Isolated mounting base package
- Planar technology for voltage ruggedness and reliability
- Sensitive gate for easy logic level triggering
- Triggering in three quadrants only

1.3 Applications

- General purpose motor controls
- Large and small appliances (White Goods)
- Loads such as contactors, circuit breakers, valves, dispensers and door locks
- Lower-power highly inductive, resistive and safety loads

1.4 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; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	14	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_h \leq 110\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	2	A



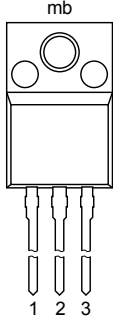

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Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 7	0.5	-	10	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7	0.5	-	10	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7	0.5	-	10	mA

2. Pinning information

Table 2. Pinning information

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

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BTA202X-600E	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

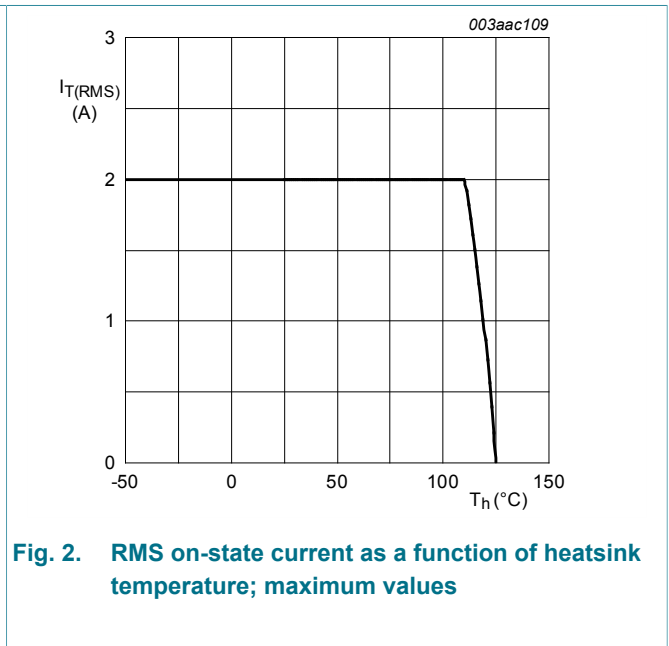
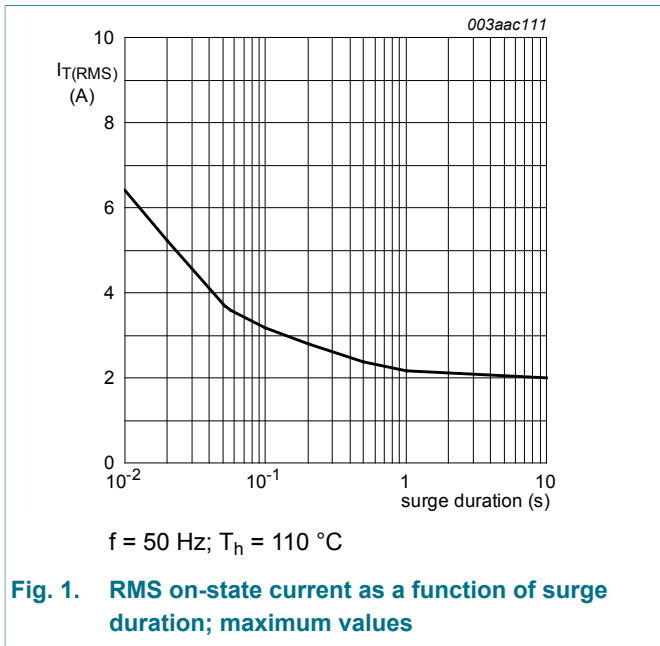
4. Limiting values

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		-	600	V
I _{T(RMS)}	RMS on-state current	full sine wave; T _h ≤ 110 °C; Fig. 1 ; Fig. 2 ; Fig. 3	-	2	A

Symbol	Parameter	Conditions	Min	Max	Unit
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	14	A
		full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 16.7\text{ ms}$	-	15.4	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	0.98	A^2s
dl_T/dt	rate of rise of on-state current	$I_T = 1.5\text{ A}$; $I_G = 0.2\text{ A}$; $dl_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$
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	$^{\circ}\text{C}$
T_j	junction temperature		-	125	$^{\circ}\text{C}$



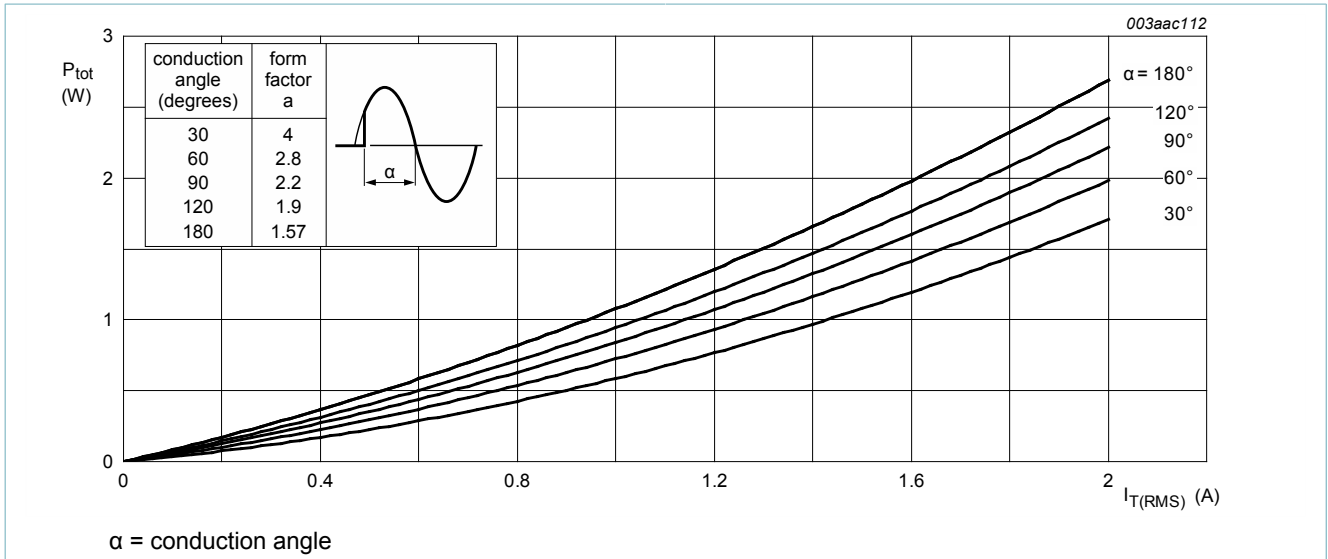


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

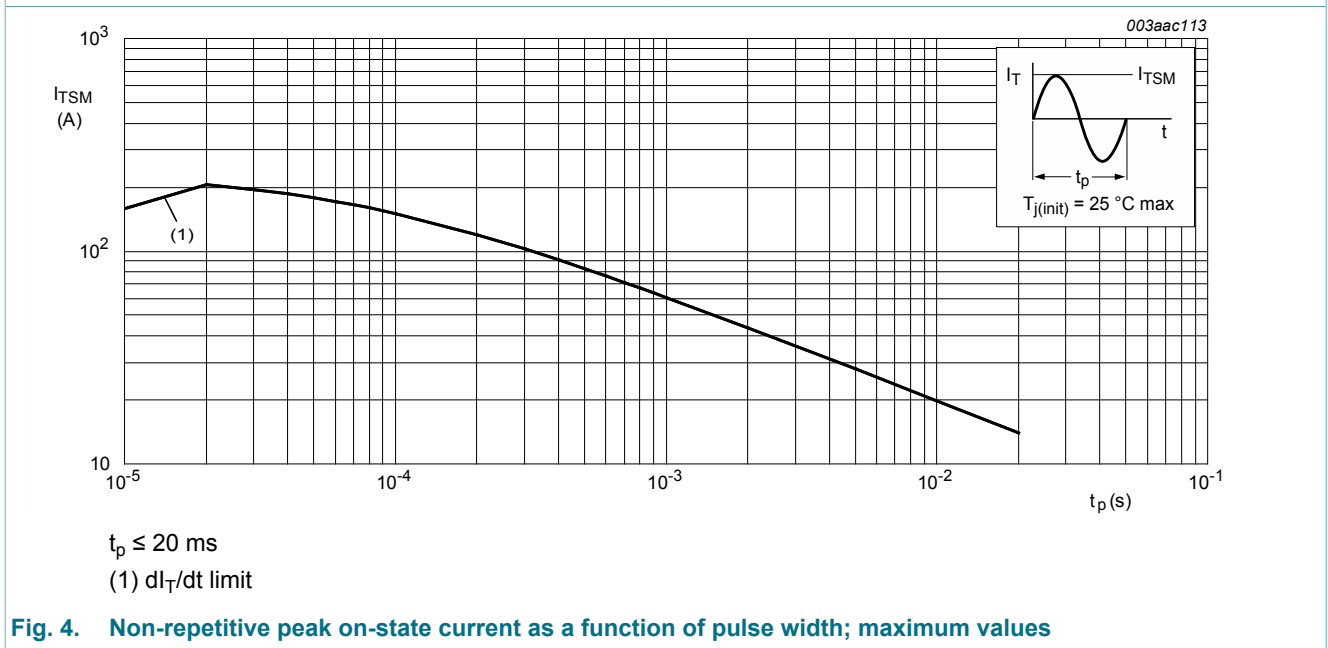
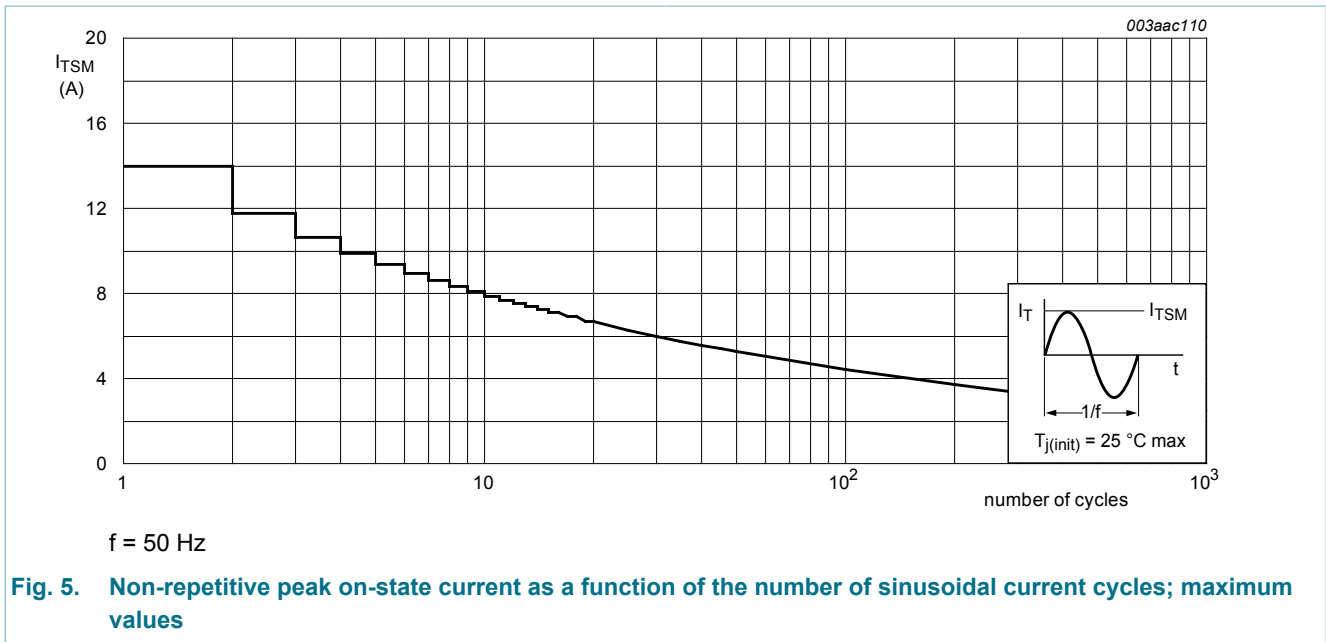


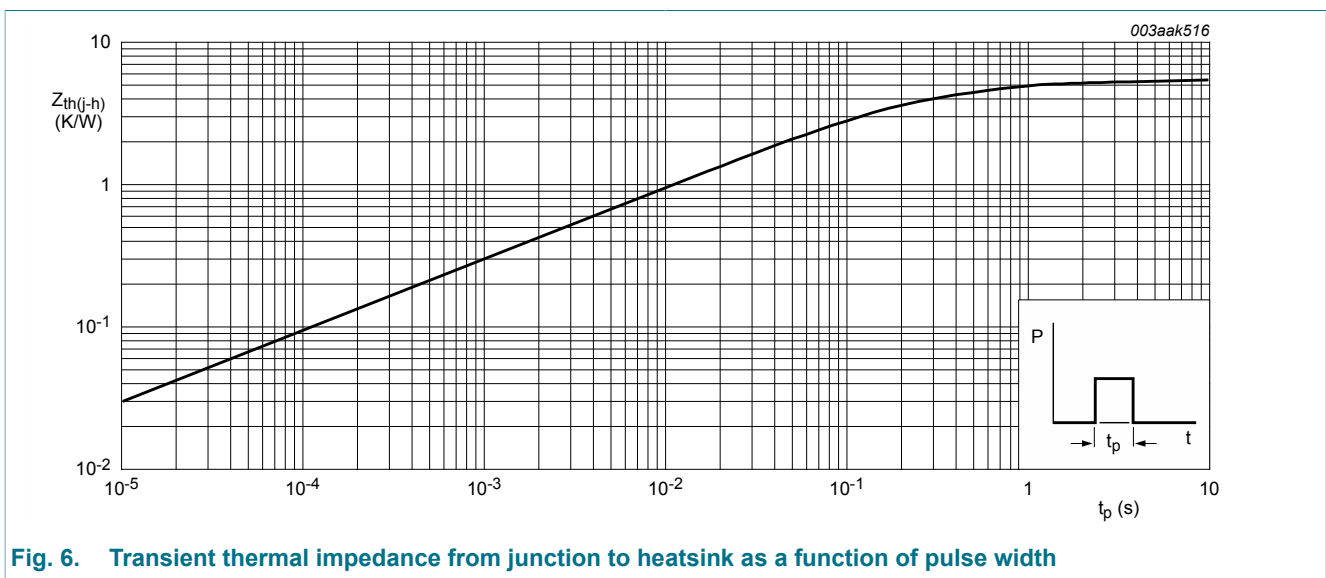
Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



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; with heatsink compound; Fig. 6	-	-	5.5	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

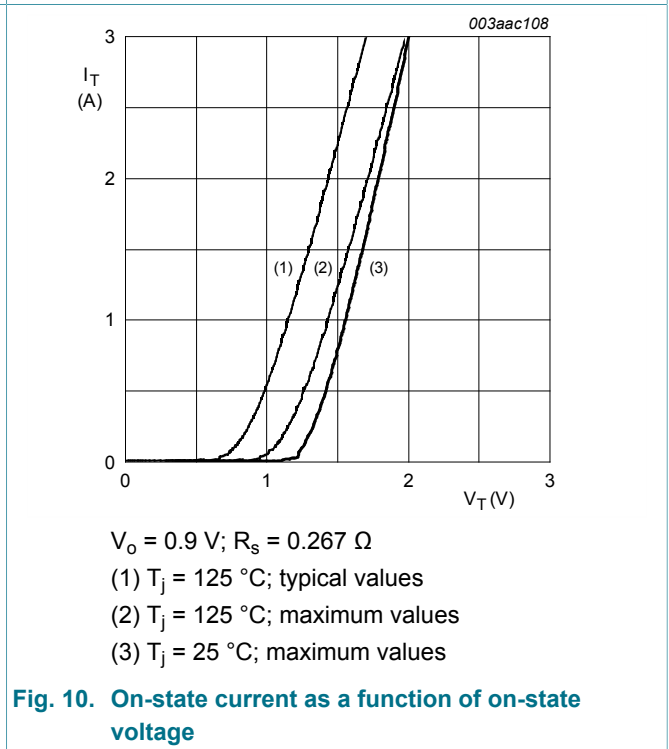
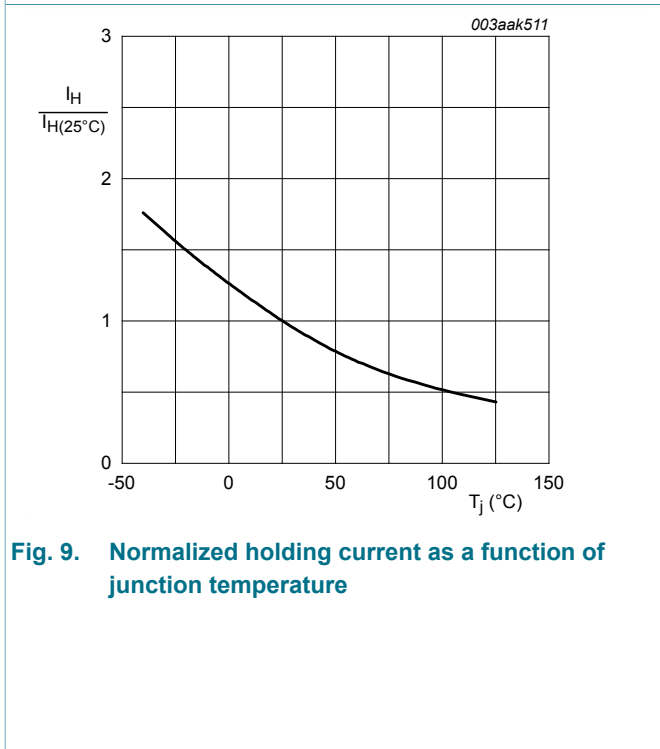
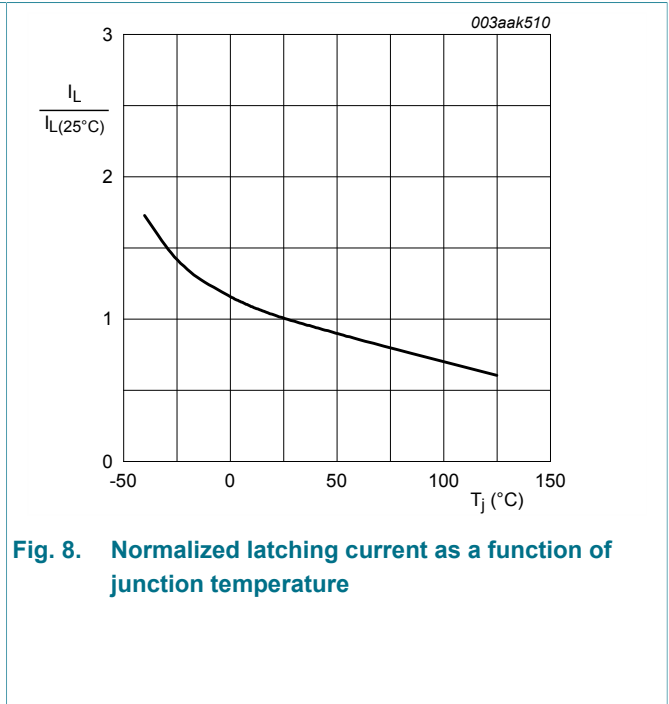
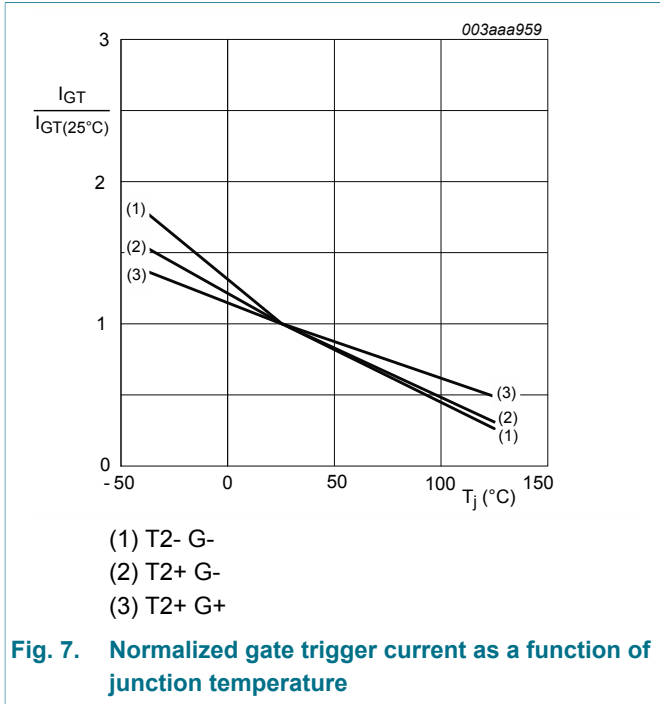
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{isol(RMS)}}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free ; $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$; $\text{RH} \leq 65 \%$; $T_h = 25 \text{ }^\circ\text{C}$	-	-	2500	V
C_{isol}	isolation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

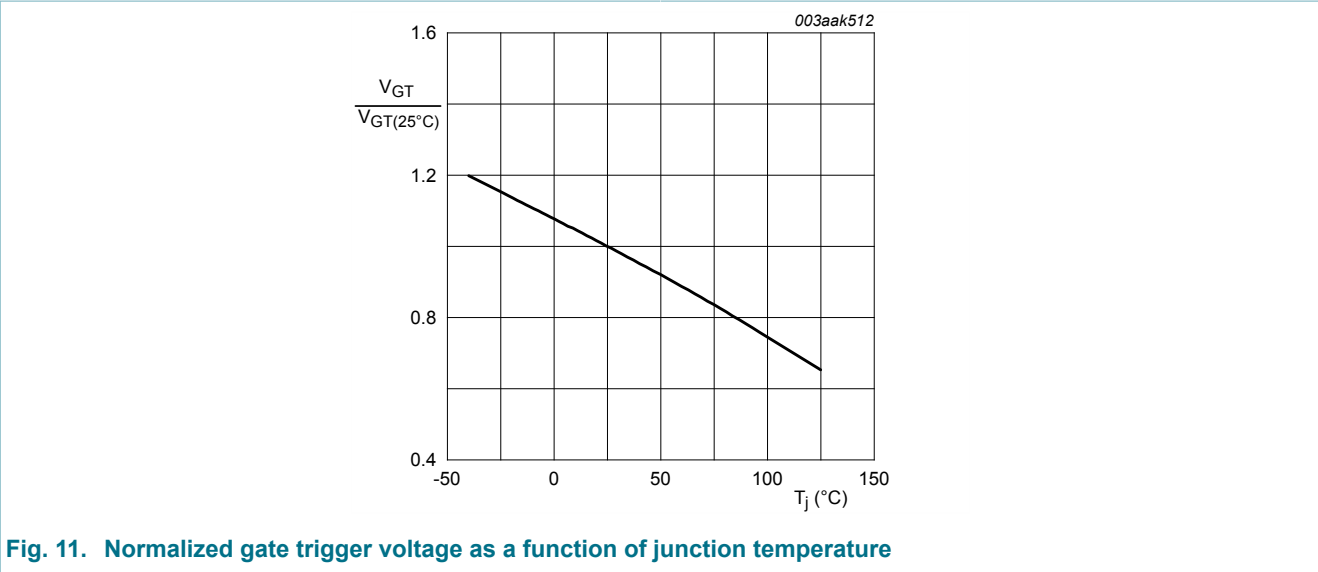
7. Characteristics

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+; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7	0.5	-	10	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2+ G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7	0.5	-	10	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2- G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7	0.5	-	10	mA
I_L	latching current	$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2+ G+; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8	-	-	12	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2+ G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8	-	-	20	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2- G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8	-	-	12	mA
I_H	holding current	$V_D = 12 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA
V_T	on-state voltage	$I_T = 3 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 10	-	1.63	2	V
V_{GT}	gate trigger voltage	$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 11	-	0.7	1.5	V
		$V_D = 400 \text{ V}$; $I_T = 0.1 \text{ A}$; $T_j = 125 \text{ }^\circ\text{C}$; Fig. 11	0.2	0.3	-	V
I_D	off-state current	$V_D = 600 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{\text{DM}} = 402 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; $R_{\text{GT1}} = 220 \text{ } \Omega$; ($V_{\text{DM}} = 67\%$ of V_{DRM}); exponential waveform	-	500	-	V/ μs

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
di_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 2\text{ A}; dV_{com}/dt = 20\text{ V}/\mu\text{s};$ (snubberless condition); gate open circuit	2	-	-	A/ms
		$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 2\text{ A}; dV_{com}/dt = 10\text{ V}/\mu\text{s};$ gate open circuit	2.3	-	-	A/ms

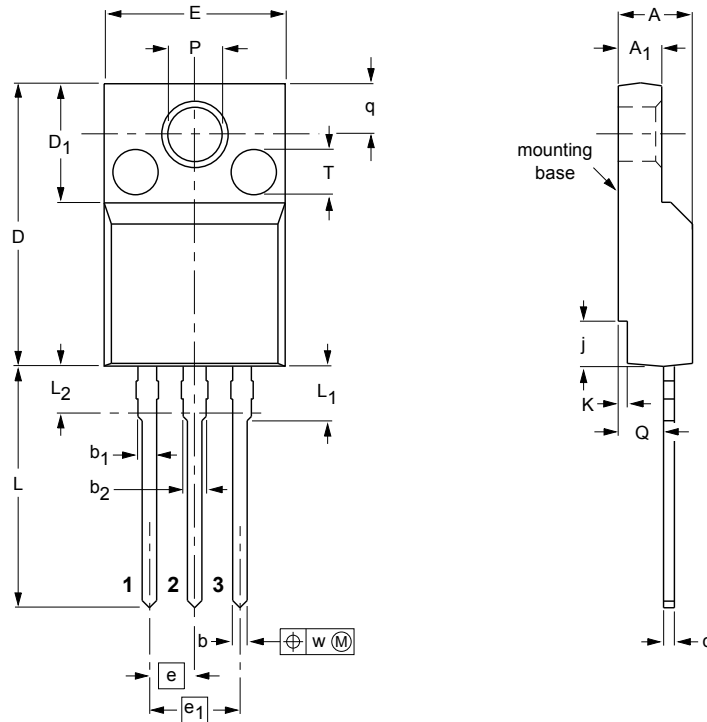




8. Package outline

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)

9. 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.
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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Date of release: 11 October 2012