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 dl/dt can occur. This "series BT" triac will commutate the full RMS current at the maximum rated junction temperature ($T_{j(max)}$ = 150 °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
- · 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
- 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	Тур	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
I _{T(RMS)}	RMS on-state current	full sine wave; T _h ≤ 50 °C; Fig. 1; Fig. 2; Fig. 3	-	-	20	Α
I _{TSM}	non-repetitive peak on- state current	full sine wave; $T_{j(init)}$ = 25 °C; t_p = 20 ms; Fig. 4; Fig. 5	-	-	200	Α
		full sine wave; $T_{j(init)} = 25 \text{ °C}$; $t_p = 16.7 \text{ ms}$	-	-	220	Α
T _j	junction temperature		-	-	150	°C

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
Static ch	aracteristics		<u> </u>		'		
I _{GT}	gate trigger current	$V_D = 12 \text{ V; } I_T = 0.1 \text{ A; } T2+ \text{ 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 _H	holding current	V _D = 12 V; T _j = 25 °C; <u>Fig. 9</u>		-	-	60	mA
V _T	on-state voltage	I _T = 24 A; T _j = 25 °C; <u>Fig. 10</u>		-	1.2	1.5	V
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		1800	-	-	V/µs
dI _{com} /dt	rate of change of commutating current	$V_D = 400 \text{ V}; T_j = 150 \text{ °C}; I_{T(RMS)} = 20 \text{ A};$ $dV_{com}/dt = 10 \text{ V}/\mu\text{s}; gate open circuit}$		25	-	-	A/ms
		$V_D = 400 \text{ V; } T_j = 150 \text{ °C; } I_{T(RMS)} = 20 \text{ A;}$ $dV_{com}/dt = 1 \text{ V/}\mu\text{s; gate open circuit}$		65	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	mb	
2	T2	main terminal 2		T2—T1
3	G	gate		Sym051
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

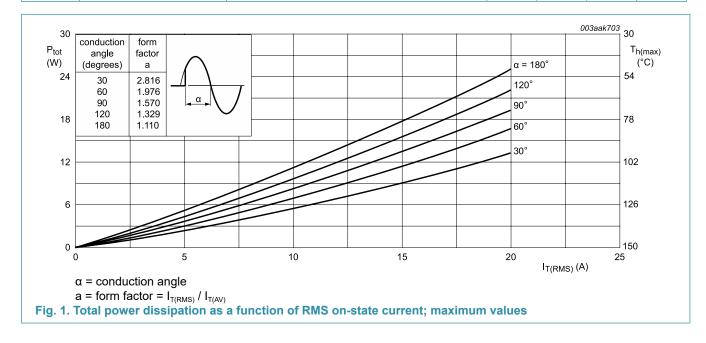
Type number	Package				
	Name	Description	Version		
BTA420X-800BT	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A		

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		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; T _n ≤ 50 °C; <u>Fig. 1; Fig. 2; Fig. 3</u>	-	20	А
I _{TSM}	non-repetitive peak on- state current	full sine wave; $T_{j(init)} = 25 ^{\circ}\text{C}$; $t_p = 20 \text{ms}$; Fig 4; Fig 5	-	200	A
		full sine wave; $T_{j(init)} = 25 \text{ °C}$; $t_p = 16.7 \text{ ms}$	-	220	Α
l ² t	I ² t for fusing	t _P = 10 ms; sine-wave pulse	-	200	A ² s
dl _⊤ /dt	rate of rise of on-state current	I _G = 100 mA	-	100	A/µs
I _{GM}	peak gate current		-	2	А
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		-	150	°C



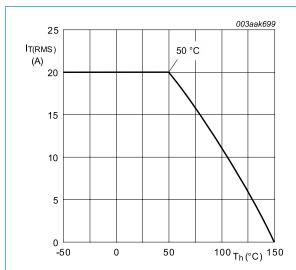


Fig. 2. RMS on-state current as a function of heatsink temperature; maximum values

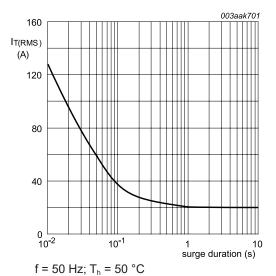


Fig. 3. RMS on-state current as a function of surge duration; maximum values

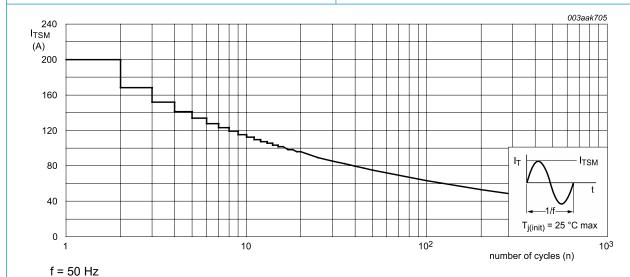
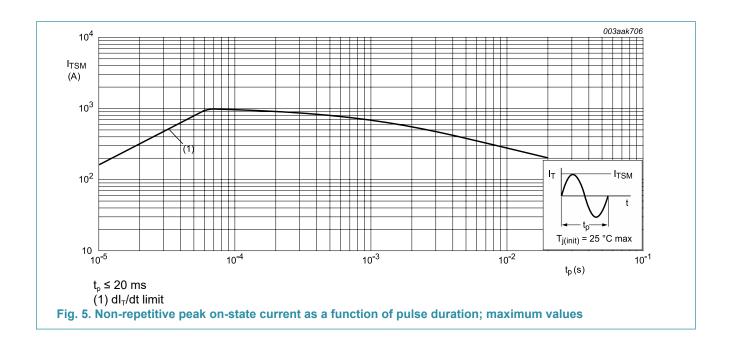


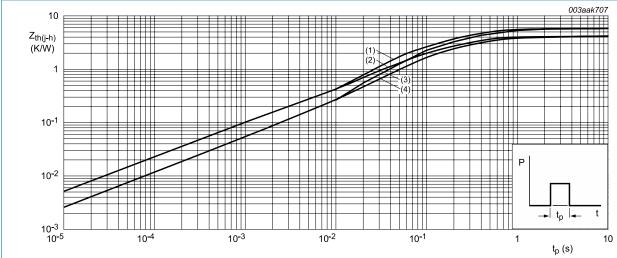
Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
R _{th(j-h)}	thermal resistance from junction to	full cycle or half cycle; with heatsink compound; Fig. 6	-	-	4	K/W
	heatsink	full cycle or half cycle; without heatsink compound; Fig. 6	-	-	5.5	K/W
R _{th(j-a)}	thermal resistance from junction to ambient free air	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	Тур	Max	Unit
V _{isol(RMS)}	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free; 50 Hz \leq f \leq 60 Hz; RH \leq 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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static ch	aracteristics					
I _{GT}	gate trigger current	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T2+ G+; T_j = 25 °C; Fig. 7$	-	-	50	mA
		$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T2+ \text{ G-};$ $T_j = 25 \text{ °C}; Fig. 7$	-	-	50	mA
		$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; \text{ T2- G-};$ $T_j = 25 \text{ °C}; \underline{\text{Fig. 7}}$	-	-	50	mA
I _L	latching current	$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; \text{T2+ G+};$ $T_j = 25 \text{ °C}; \underline{\text{Fig. 8}}$	-	-	60	mA
		$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; T2+ G-;$ $T_j = 25 \text{ °C}; Fig. 8$	-	-	90	mA
		$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; \text{ T2- G-};$ $T_j = 25 \text{ °C}; \underline{\text{Fig. 8}}$	-	-	60	mA
I _H	holding current	V _D = 12 V; T _j = 25 °C; <u>Fig. 9</u>	-	-	60	mA
V _T	on-state voltage	I _T = 24 A; T _j = 25 °C; <u>Fig. 10</u>	-	1.2	1.5	V
V_{GT}	gate trigger voltage	V _D = 12 V; T _j = 25 °C; <u>Fig. 11</u>	-	0.7	1	V
		V _D = 400 V; T _j = 150 °C; <u>Fig. 11</u>	0.2	0.4	-	V
I _D	off-state current	V _D = 800 V; T _j = 150 °C	-	0.2	1	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	1800	-	-	V/µs
dI _{com} /dt	rate of change of commutating current	$V_D = 400 \text{ V; } T_j = 150 \text{ °C; } I_{T(RMS)} = 20 \text{ A; } dV_{com}/dt = 10 \text{ V/}\mu\text{s; gate open circuit}$	25	-	-	A/ms
		$V_D = 400 \text{ V; } T_j = 150 \text{ °C; } I_{T(RMS)} = 20 \text{ A;}$ $dV_{com}/dt = 1 \text{ V/}\mu\text{s; gate open circuit}$	65	-	-	A/ms

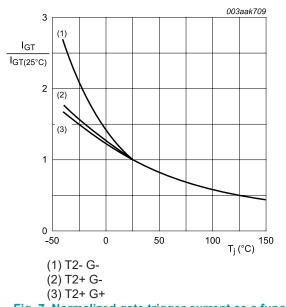


Fig. 7. Normalized gate trigger current as a function of junction temperature

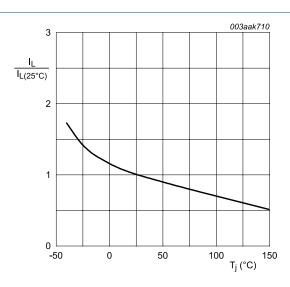


Fig. 8. Normalized latching current as a function of junction temperature

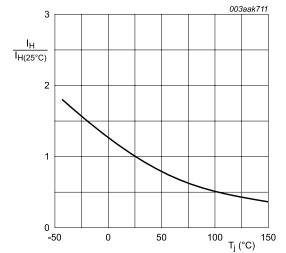
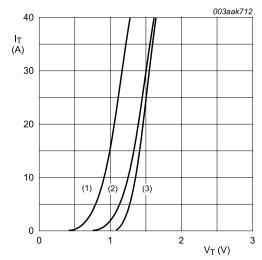


Fig. 9. Normalized holding current as a function of junction temperature



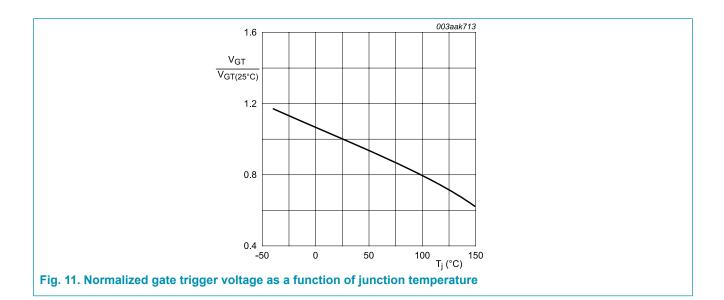
 $V_o = 1.087 \text{ V}; R_s = 0.014 \Omega$

(1) $T_i = 150$ °C; typical values

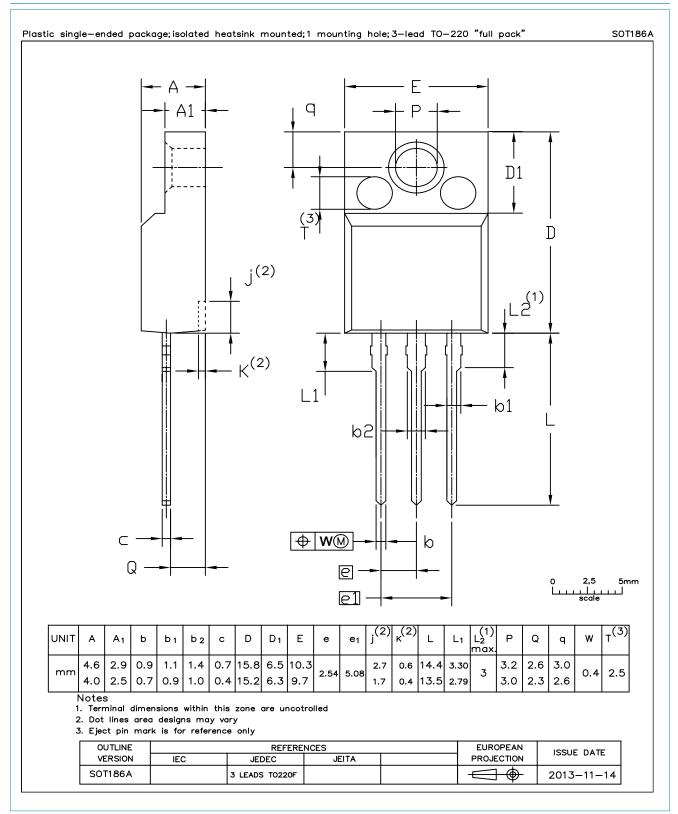
(2) T_i = 150 °C; maximum values

(3) $T_i = 25$ °C; maximum values

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



11. Package outline



12. 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: 3 August 2018

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