BTA308X-800C0

3Q Hi-Com Triac

12 May 2014 Preliminary data sheet

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 high blocking voltage, high static and dynamic dV/dt as well as high dIcom/dt can occur. This "series C0" 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
- Isolated mounting base package
- Optimized for highest noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only
- High voltage capability

3. Applications

- Compressor starting control circuits
- General purpose motor controls
- Reversing induction motor controls e.g. vertical axis washing machines

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 °C; t_p = 20 ms		-	-	60	A
$I_{T(RMS)}$	RMS on-state current	full sine wave		-	-	8	A
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T2+ G+; T_j = 25 °C; Fig. 1		5	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 1		5	-	35	mA

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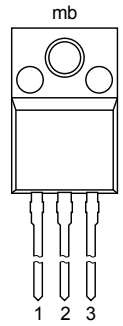
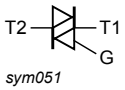
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; Fig. 1		5	-	35	mA

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
BTA308X-800C0	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		-	8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)}$ = 25 °C; t_p = 20 ms		-	60	A
		full sine wave; $T_{j(init)}$ = 25 °C; t_p = 16.7 ms		-	65	A
I^2t	I2t for fusing	t_p = 10 ms; SIN		-	18	A^2s
dI_T/dt	rate of rise of on-state current	I_T = 12 A; I_G = 0.2 A; dI_G/dt = 0.2 A/µs		-	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

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		-	-	4.5	K/W
		full cycle or half cycle; without heatsink compound		-	-	6.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	55	-	K/W

9. Isolation characteristics

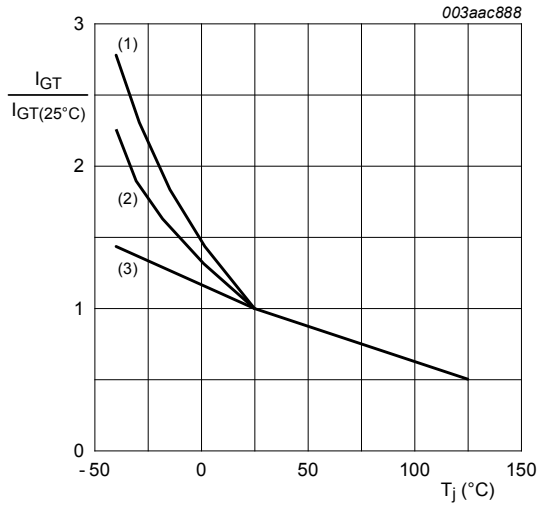
Table 6. Isolation characteristics

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

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. 1		5	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 1		5	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; Fig. 1		5	-	35	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T2+ G+; T_j = 25 °C; Fig. 2		-	-	50	mA
		V_D = 12 V; I_G = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 2		-	-	75	mA
		V_D = 12 V; I_G = 0.1 A; T2- G-; T_j = 25 °C; Fig. 2		-	-	50	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 3		-	-	50	mA
V_T	on-state voltage	I_T = 10 A; T_j = 25 °C; Fig. 4		-	1.3	1.65	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 5		-	0.7	1	V
		V_D 400 V; I_T = 0.1 A; T_j 125 °C; Fig. 5		0.2	0.45	-	V
I_D	off-state current	V_D 800 V; T_j 25 °C		-	-	10	µA
		V_D 800 V; T_j 125 °C		-	-	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1500	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 8 A; dV_{com}/dt = 20 V/µs; (snubberless condition); gate open circuit; Fig. 6		12	-	-	A/ms



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

Fig. 1. Normalized gate trigger current as a function of junction temperature

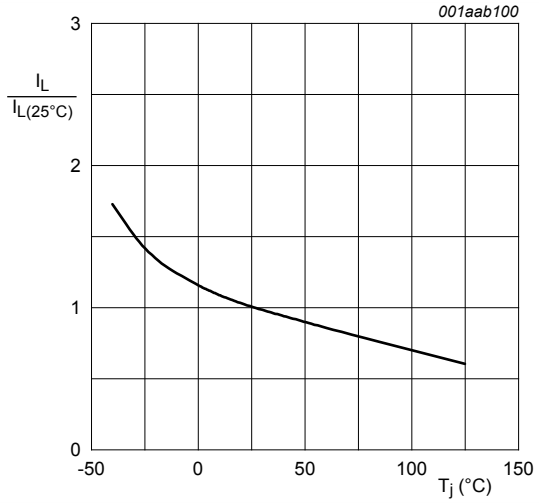


Fig. 2. Normalized latching current as a function of junction temperature

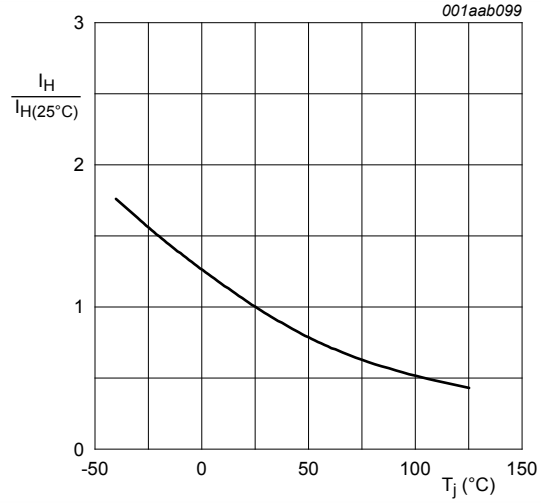
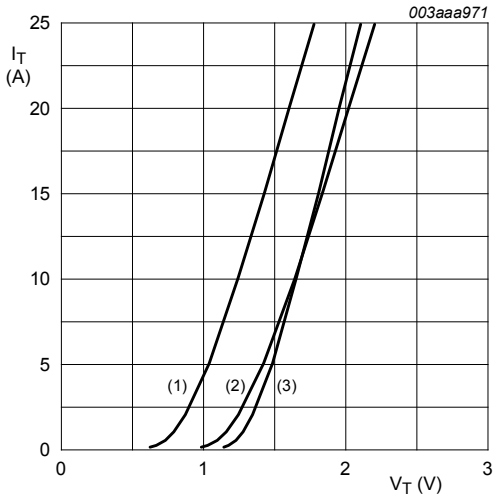


Fig. 3. Normalized holding current as a function of junction temperature



Vo = 1.264 V; Rs = 0.0378 Ω
(1) Tj = 125 °C; typical values
(2) Tj = 125 °C; maximum values
(3) Tj = 25 °C; maximum values

Fig. 4. On-state current as a function of on-state voltage

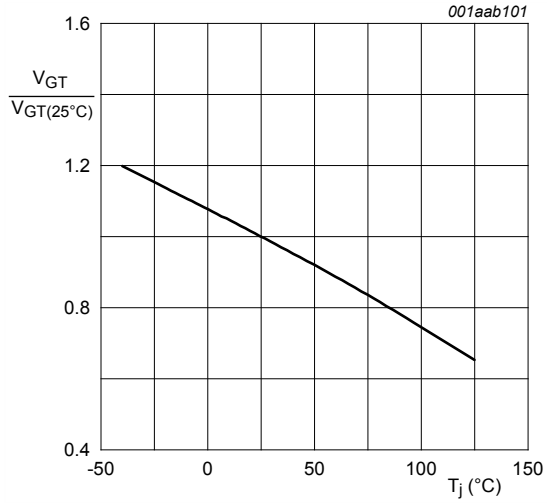


Fig. 5. Normalized gate trigger voltage as a function of junction temperature

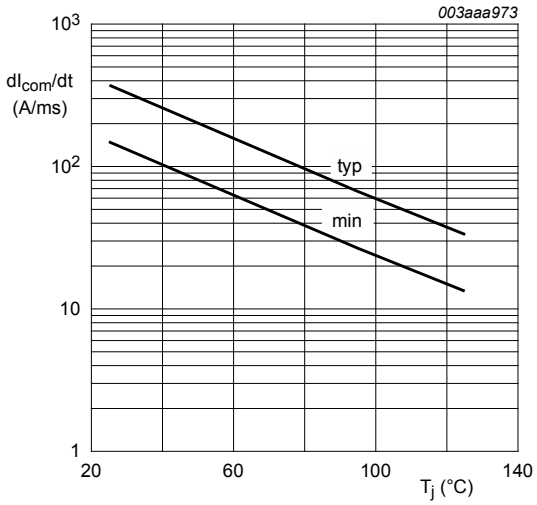
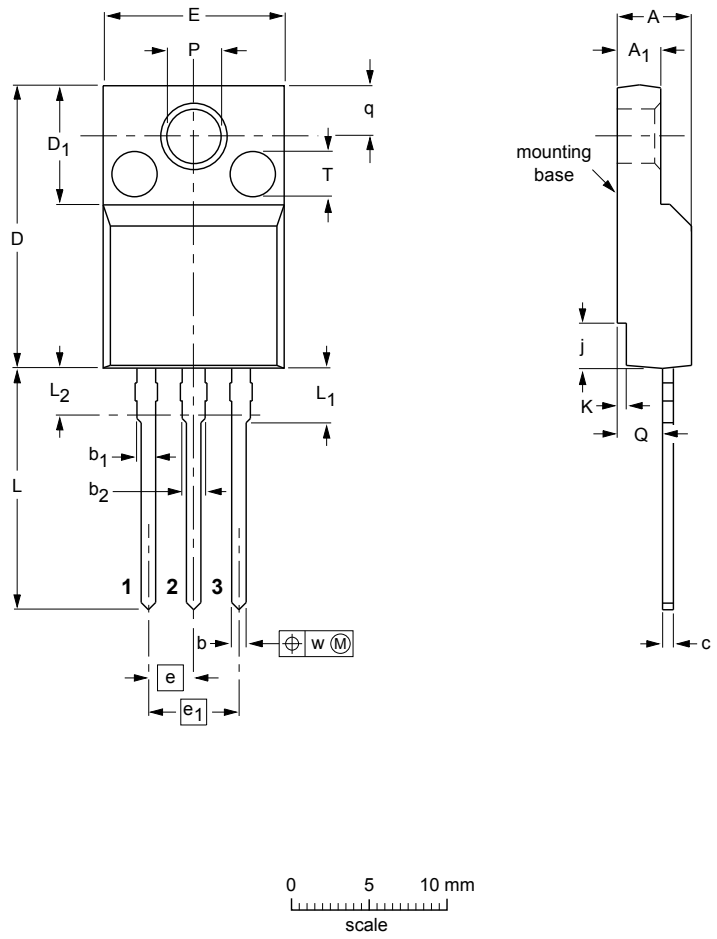


Fig. 6. Rate of change of commutating current as a function of junction temperature; typical and minimum values

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. 7. Package outline TO-220F (SOT186A)

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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