

BTA312Y series C

12 A Three-quadrant triacs high commutation insulated

Rev. 01 — 27 September 2007

Product data sheet

1. Product profile

1.1 General description

Passivated, new generation, high commutation triacs in an internally insulated TO-220 plastic package

1.2 Features

- Very high commutation performance
- Isolated mounting base
- High immunity to dV/dt
- 2500 V RMS isolation voltage

1.3 Applications

- Motor control e.g. washing machines
- Refrigeration compressors
- Non-linear rectifier-fed motor loads
- Lamp dimmers for US market

1.4 Quick reference data

- $V_{DRM} \le 600 \text{ V (BTA312Y-600C)}$
- V_{DRM} ≤ 800 V (BTA312Y-800C)
- $I_{GT} \le 35 \text{ mA}$

- $I_{T(RMS)} \le 12 A$
- $I_{TSM} \le 100 \text{ A (t = 20 ms)}$
- $I_{TSM} \le 110 \text{ A (t = 16.7 ms)}$

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)		. .
2	main terminal 2 (T2)	mb	T2—T1
3	gate (G)	/ O \	sym051
mb	mounting base; isolated		
		SOT78D (TO-220)	



3. Ordering information

Table 2. Ordering information

Type number	Package			
	Name	Description	Version	
BTA312Y-600C	TO-220	plastic single-ended package; isolated heatsink mounted; 1 mounting hole;	SOT78D	
BTA312Y-800C		3-lead TO-220		

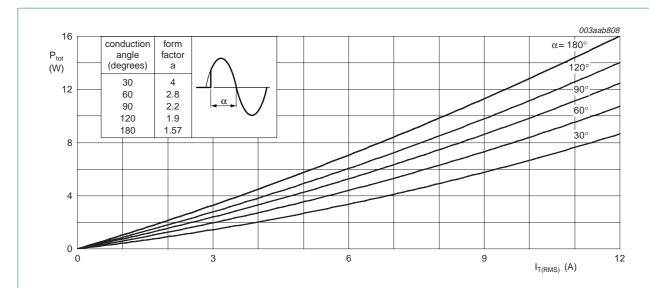
4. Limiting values

Table 3. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

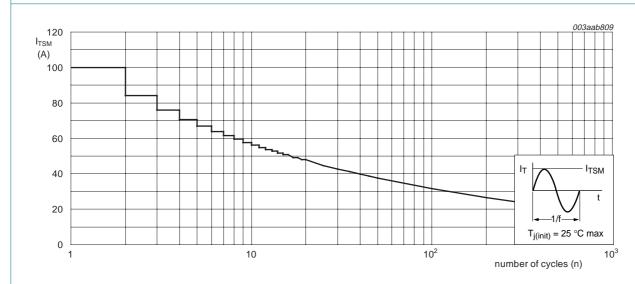
Parameter	Conditions		Min	Max	Unit
repetitive peak off-state voltage	BTA312Y-600C;	<u>[1]</u>	-	600	V
	BTA312Y-800C;		-	800	V
RMS on-state current	full sine wave; $T_{mb} \le 85$ °C; see Figure 4 and 5		-	12	Α
non-repetitive peak on-state current	full sine wave; $T_j = 25 ^{\circ}\text{C}$ prior to surge; see Figure 2 and 3				
	t = 20 ms		-	100	Α
	t = 16.7 ms		-	110	Α
I ² t for fusing	t = 10 ms		-	50	A ² s
rate of rise of on-state current	$I_{TM} = 20 \text{ A}; I_G = 0.2 \text{ A};$ $dI_G/dt = 0.2 \text{ A}/\mu\text{s}$		-	100	A/μs
peak gate current			-	2	Α
peak gate power			-	5	W
average gate power	over any 20 ms period		-	0.5	W
storage temperature			-40	+150	°C
junction temperature			-	125	°C
	repetitive peak off-state voltage RMS on-state current non-repetitive peak on-state current I²t for fusing rate of rise of on-state current peak gate current peak gate power average gate power storage temperature	repetitive peak off-state voltage $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			

^[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 15 A/µs.



 $\alpha = \text{conduction angle}$

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



f = 50 Hz

Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

 $t_p \le 20 \text{ ms}$ (1) $dl_T/dt \text{ limit}$

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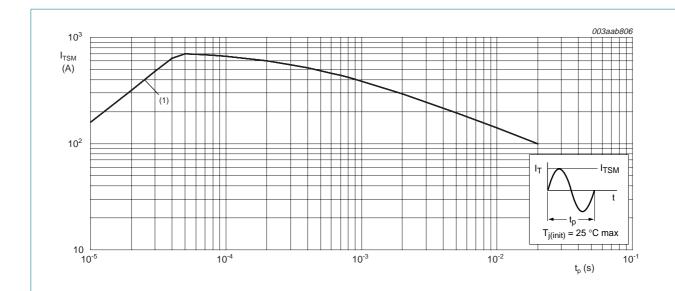


Fig 3. Non-repetitive peak on-state current as a function of pulse duration; maximum values

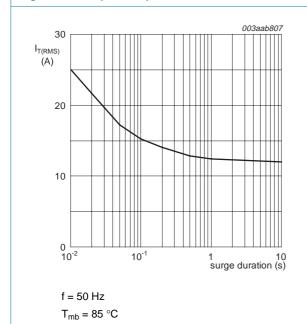


Fig 4. RMS on-state current as a function of surge duration; maximum values

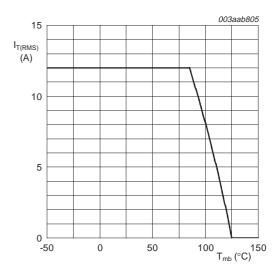


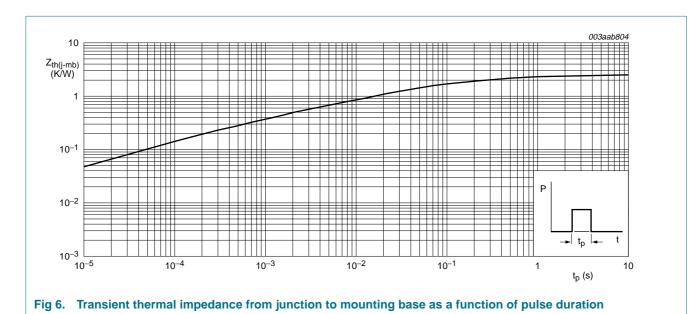
Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

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5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	full cycle; see Figure 6	-	-	2.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



6. Isolation characteristics

Table 5. Isolation limiting values and characteristics

 $T_h = 25 \,^{\circ}C$ unless otherwise specified.

- 11 —						
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{isol(RMS)}	RMS isolation voltage	from all three terminals to external heatsink; f = 50 Hz to 60 Hz; sinusoidal waveform; RH ≤ 65 %; clean and dust free	-	-	2500	V
C _{isol}	isolation capacitance	from pin 2 to external heatsink; f = 1 MHz	-	10	-	pF

7. Static characteristics

Table 6. Static characteristics

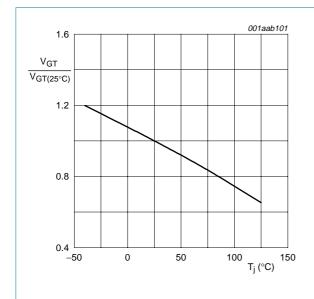
 $T_i = 25 \,^{\circ}C$ unless otherwise specified.

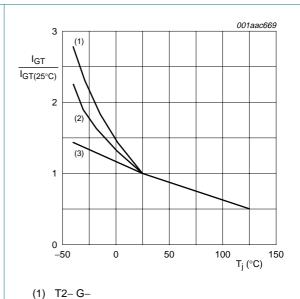
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
I _{GT}	gate trigger current	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; \text{ see } \frac{\text{Figure 8}}{}$				
		T2+ G+	2	-	35	mΑ
		T2+ G-	2	-	35	mΑ
		T2- G-	2	-	35	mΑ
IL	latching current	V _D = 12 V; I _{GT} = 0.1 A; see <u>Figure 10</u>				
		T2+ G+	-	-	50	mΑ
	T2+ G-	-	-	60	mΑ	
		T2- G-	-	-	50	mΑ
I _H	holding current	V _D = 12 V; I _{GT} = 0.1 A; see <u>Figure 11</u>	-	-	35	mΑ
V _T	on-state voltage	I _T = 15 A; see <u>Figure 9</u>	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; \text{ see } \frac{\text{Figure 7}}{}$	-	8.0	1.5	V
		$V_D = 400 \text{ V}; I_T = 0.1 \text{ A}; T_j = 125 ^{\circ}\text{C}$	0.25	0.4	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; $T_j = 125 ^{\circ}C$	-	0.1	0.5	mΑ

8. Dynamic characteristics

Table 7. Dynamic characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
dV _D /dt	rate of rise of off-state voltage	$V_{DM} = 0.67 \times V_{DRM(max)}; T_j = 125 ^{\circ}C;$ exponential waveform; gate open circuit	500	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V_{DM} = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 12 A; without snubber; gate open circuit	20	-	-	A/ms
t _{gt}	gate-controlled turn-on time	$I_{TM} = 20 \text{ A}; V_D = V_{DRM(max)}; I_G = 0.1 \text{ A}; dI_G/dt = 5 \text{ A}/\mu\text{s}$	-	2	-	μs

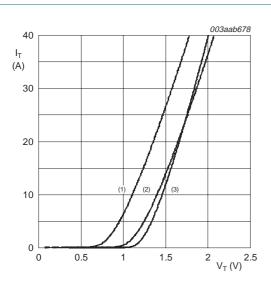




- (2) T2+ G-
- (3) T2+ G+

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

Fig 8. Normalized gate trigger current as a function of junction temperature



 $V_0 = 1.127 \text{ V}$

 $R_s = 0.027 \Omega$

- (1) $T_i = 125 \,^{\circ}C$; typical values
- (2) T_i = 125 °C; maximum values
- (3) $T_i = 25$ °C; maximum values

Fig 9. On-state current as a function of on-state voltage

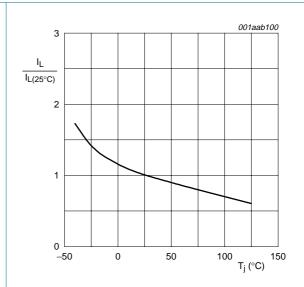


Fig 10. Normalized latching current as a function of junction temperature

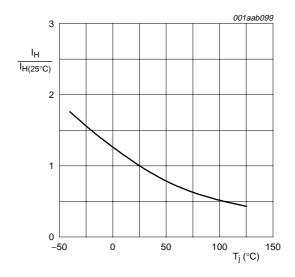


Fig 11. Normalized holding current as a function of junction temperature

9. Package outline

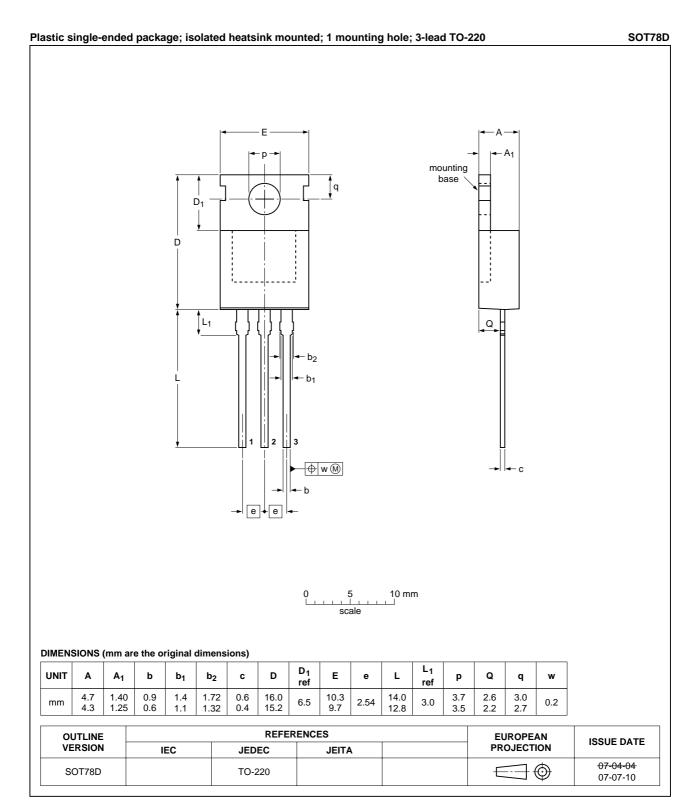


Fig 12. Package outline SOT78D (3-lead TO-220)

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10. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA312Y_SER_C_1	20070927	Product data sheet	-	-

11. Legal information

11.1 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.
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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- [2] The term 'short data sheet' is explained in section "Definitions"
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