JSMICRO SEMICONDUCTOR

BTA312-600C

1. Product profile

1.1 General description

Passivated, new generation, high commutation triacs, in a TO220 plastic package.

1.2 Features

- Very high commutation performance maximized at each gate sensitivity
- High immunity to dV/dt

1.3 Applications

- High power motor control e.g. washing machines, vacuum cleaners
- Refrigeration and air conditioning compressors
- Non-linear rectifier-fed motor loads
- Electronic thermostats

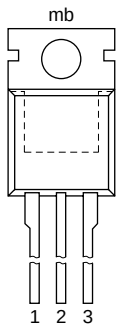
1.4 Quick reference data

- $V_{DRM} \leq 600$ V (BTA312-600B/C)
- $V_{DRM} \leq 800$ V (BTA312-800B/C)
- $I_{TSM} \leq 95$ A (t = 20 ms)
- $I_{GT} \leq 50$ mA (BTA312 series B)
- $I_{GT} \leq 35$ mA (BTA312 series C)
- $I_{T(RMS)} \leq 12$ A

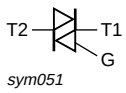
2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)		
2	main terminal 2 (T2)		
3	gate (G)		
mb	mounting base; main terminal 2 (T2)		



SOT78 (TO-220AB)



3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
BTA312-600B	SC-46	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
BTA312-600C			
BTA312-800B			
BTA312-800C			

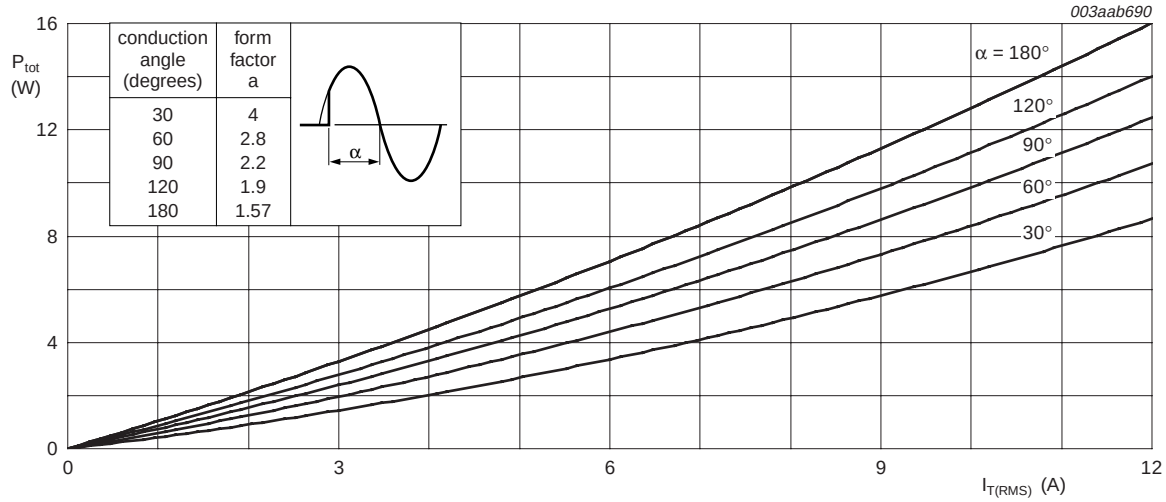
4. Limiting values

Table 3. Limiting values

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

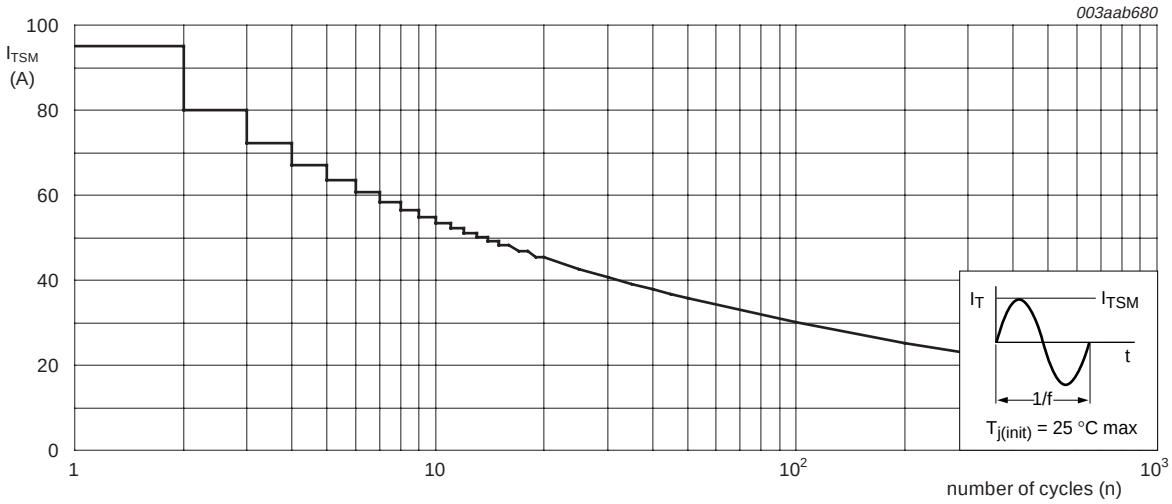
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage	BTA312-600B; BTA312-600C	[1]	-	600	V
		BTA312-800B; BTA312-800C		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 101$ °C; see Figure 4 and 5		-	12	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_j = 25$ °C prior to surge; see Figure 2 and 3				
		t = 20 ms		-	95	A
		t = 16.7 ms		-	105	A
I^2t	I^2t for fusing	t = 10 ms		-	45	A^2s
dI_T/dt	rate of rise of on-state current	$I_{TM} = 20$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs		-	100	A/µs
I_{GM}	peak gate current			-	2	A
P_{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

[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.



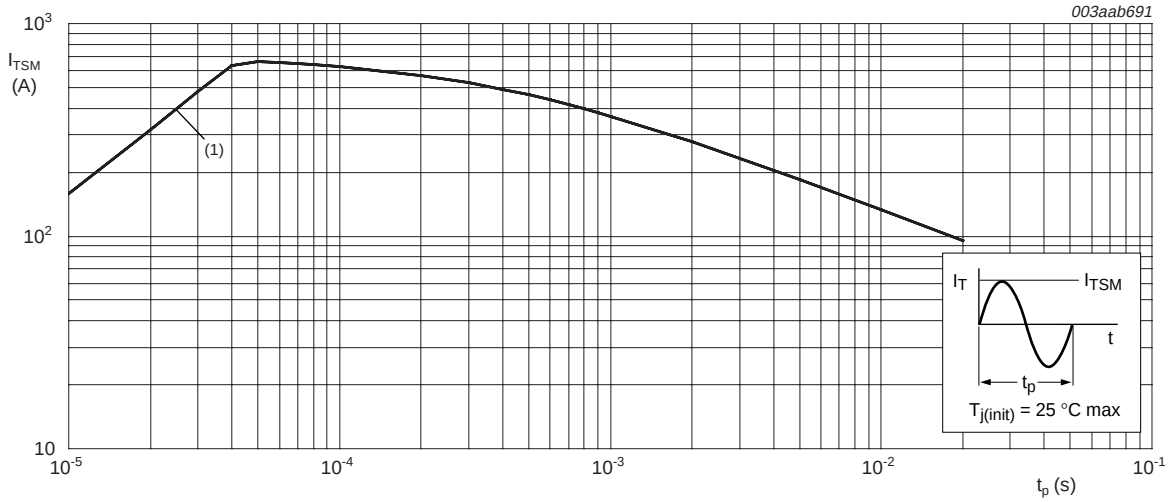
α = conduction angle

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



f = 50 Hz

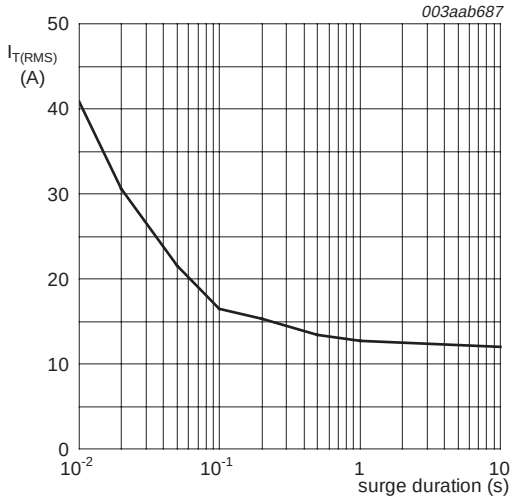
Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20$ ms

(1) dI_T/dt limit

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



f = 50 Hz

T_{mb} = 101 °C

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

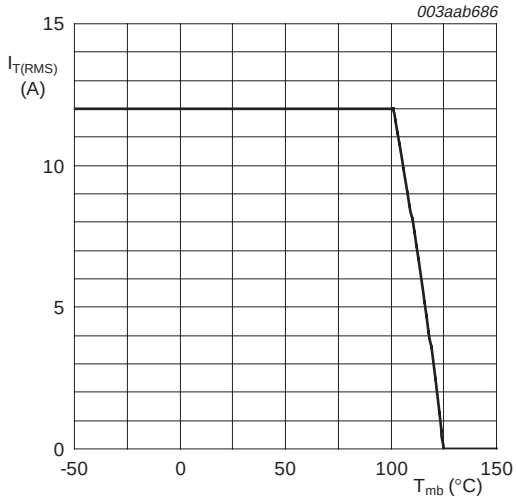
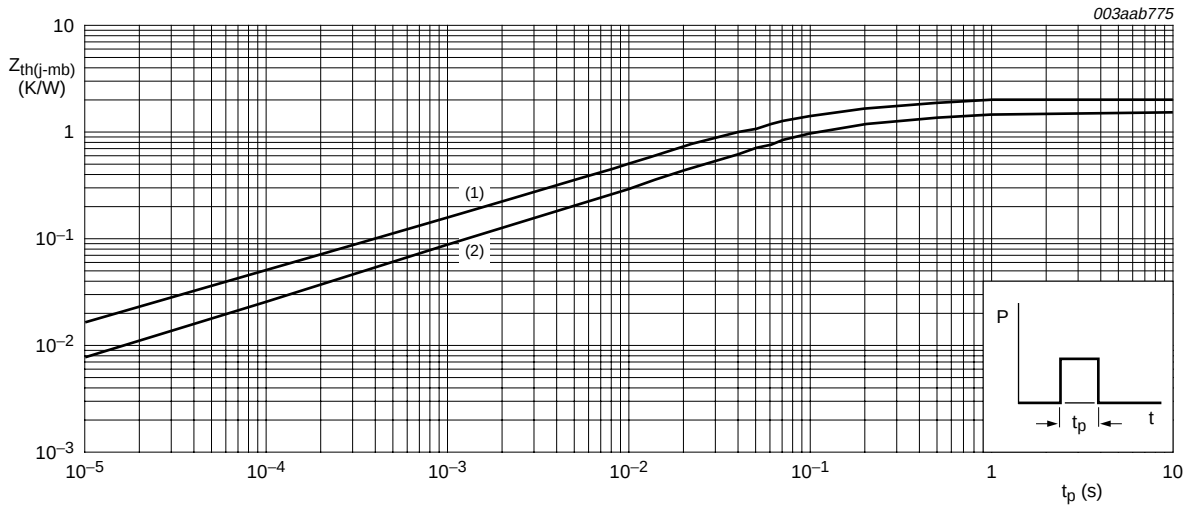


Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	half cycle; see Figure 6	-	-	2.0	K/W
		full cycle; see Figure 6	-	-	1.5	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



(1) Unidirectional (half cycle)

(2) Bidirectional (full cycle)

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

6. Static characteristics

Table 5. Static characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	BTA312-600B BTA312-800B			BTA312-600C BTA312-800C			Unit
			Min	Typ	Max	Min	Typ	Max	
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; see Figure 8							
		T2+ G+	2	-	50	2	-	35	mA
		T2+ G–	2	-	50	2	-	35	mA
		T2– G–	2	-	50	2	-	35	mA
I_L	latching current	V_D = 12 V; I_{GT} = 0.1 A; see Figure 10							
		T2+ G+	-	-	60	-	-	50	mA
		T2+ G–	-	-	90	-	-	60	mA
		T2– G–	-	-	60	-	-	50	mA
I_H	holding current	V_D = 12 V; I_{GT} = 0.1 A; see Figure 11	-	-	60	-	-	35	mA
V_T	on-state voltage	I_T = 15 A; see Figure 9	-	1.3	1.6	-	1.3	1.6	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; see Figure 7	-	0.8	1.5	-	0.8	1.5	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C	0.25	0.4	-	0.25	0.4	-	V
I_D	off-state current	V_D = $V_{DRM(max)}$; T_j = 125 °C	-	0.1	0.5	-	0.1	0.5	mA

7. Dynamic characteristics

Table 6. Dynamic characteristics

Symbol	Parameter	Conditions	BTA312-600B BTA312-800B			BTA312-600C BTA312-800C			Unit
			Min	Typ	Max	Min	Typ	Max	
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 0.67 \times V_{DRM(max)}$; $T_j = 125$ °C; exponential waveform; gate open circuit	1000	2000	-	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	30	-	-	20	-	-	A/ms
t_{gt}	gate-controlled turn-on time	$I_{TM} = 20$ A; $V_D = V_{DRM(max)}$; $I_G = 0.1$ A; $dI_G/dt = 5$ A/µs	-	2	-	-	2	-	µs

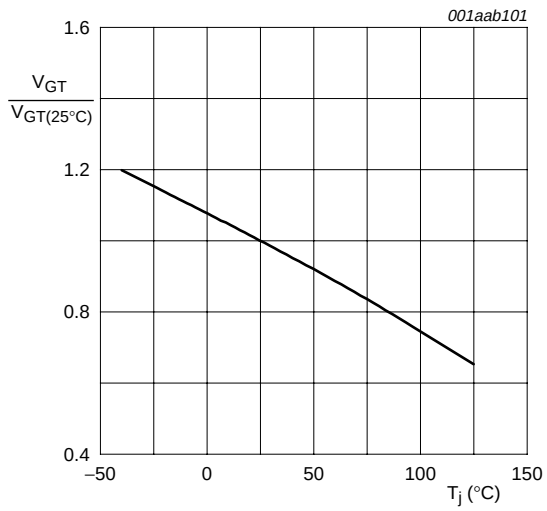
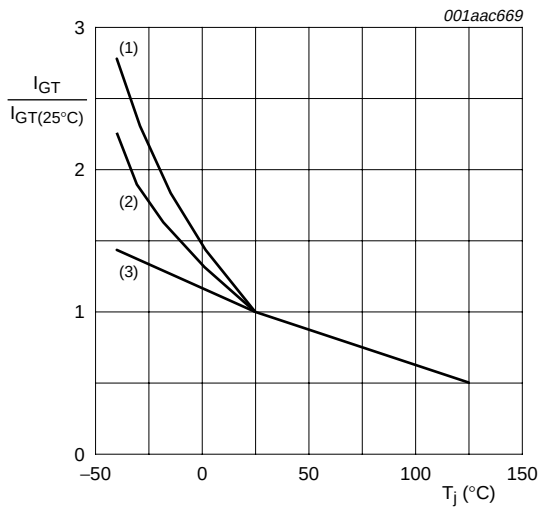
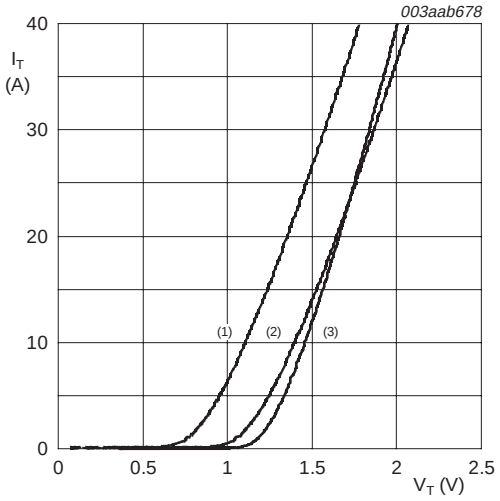


Fig 7. Normalized gate trigger voltage as a function of junction temperature



(1) T2– G–
(2) T2+ G–
(3) T2+ G+

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



V_o = 1.127 V

R_s = 0.027 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

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

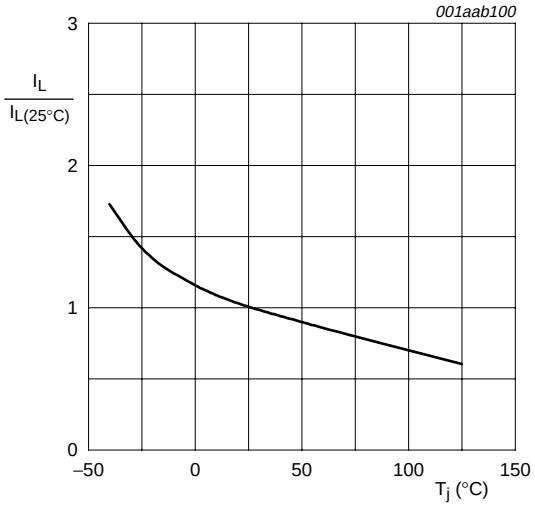


Fig 10. Normalized latching current as a function of junction temperature

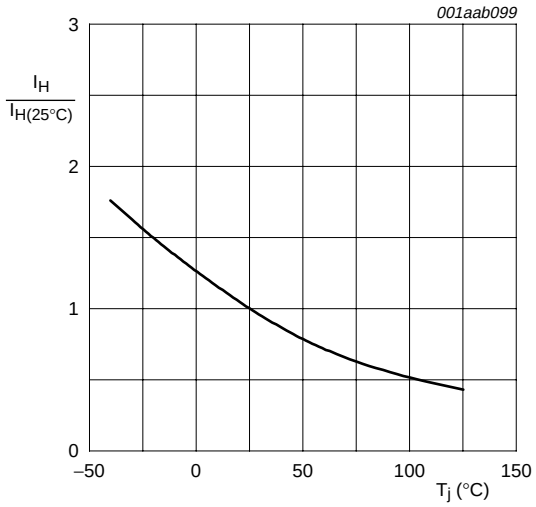
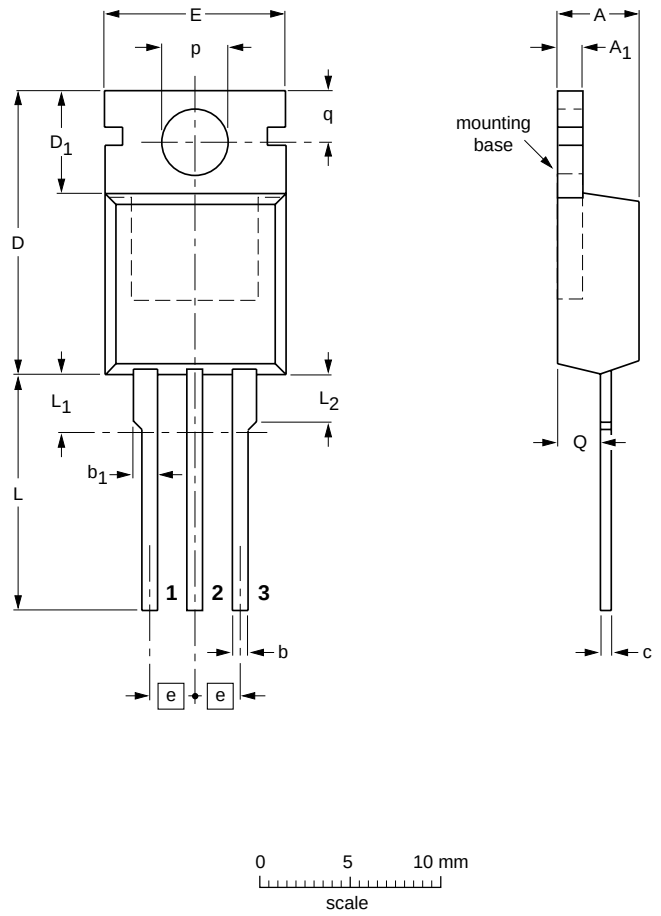


Fig 11. Normalized holding current as a function of junction temperature

8. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **TO220**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	c	D	D_1	E	e	L	L_1	L_2 max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.45 1.00	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~05-03-22~~ 05-10-25

Fig 12. Package outline SOT78 (3-lead TO-220AB)