**Product data sheet** 

## 1. General description

Planar passivated high commutation three quadrant triac in a SOT223 surface mountable plastic package intended for use in circuits where high static and dynamic dV/dt and high dl/dt can occur. This triac will commutate the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

# 2. Applications

- General purpose motor controls
- Home appliances
- · Rectifier-fed DC inductive loads e.g. DC motors and solenoids

## 3. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Miı	Тур	Max	Unit
$V_{DRM}$	repetitive peak off- state voltage		-	-	600	V
I <sub>T(RMS)</sub>	RMS on-state current	full sine wave; $T_{sp} \le 108 ^{\circ}\text{C}$ ; $\overline{\text{Fig. 1}}$ ; $\overline{\text{Fig. 2}}$ ; $\overline{\text{Fig. 3}}$	-	-	1	Α
I <sub>TSM</sub>	non-repetitive peak on- state current	full sine wave; $T_{j(init)} = 25 \text{ °C}$ ; $t_p = 16.7 \text{ ms}$	-	-	11	Α
		full sine wave; $T_{j(init)}$ = 25 °C; $t_p$ = 20 ms; Fig. 4; Fig. 5	-	-	10	Α
T <sub>j</sub>	junction temperature		-	-	125	°C
Static charact	teristics					
I <sub>GT</sub>	gate trigger current	$V_D = 12 \text{ V; } I_T = 0.1 \text{ A; } T2+ G+;$ $T_j = 25 \text{ °C; } Fig. 9$	-	-	50	mA
		$V_D = 12 \text{ V; } I_T = 0.1 \text{ A; } T2 + G-;$ $T_j = 25 \text{ °C; } Fig. 9$	-	-	50	mA
		$V_D = 12 \text{ V; } I_T = 0.1 \text{ A; } T2-\text{ G-;}$ $T_j = 25 \text{ °C; } \underline{Fig. 9}$	-	-	50	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>j</sub> = 25 °C; <u>Fig. 11</u>	-	-	30	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 2 A; T <sub>j</sub> = 25 °C; <u>Fig. 12</u>	-	1.2	1.5	V
Dynamic chai	racteristics					
dV <sub>D</sub> /dt	rate of rise of off-state voltage	$V_{DM}$ = 402 V; $T_j$ = 125 °C; (67% of $V_{DRM}$ ); exponential waveform; gate open circuit	100	00 -	-	V/µs

**3Q Hi-Com Triac** 

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
dl <sub>com</sub> /dt	rate of change of commutating current	$V_D$ = 400 V; $T_j$ = 125 °C; $I_{T(RMS)}$ = 1 A; $dV_{com}/dt$ = 20 V/ $\mu$ s; (snubberless condition); gate open circuit	6	-	-	A/ms

## 4. Pinning information

### **Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	4	T2——T1
2	T2	main terminal 2		sym051
3	G	gate		Symosi
4	mb	mounting base; connected to T2	☐1 ☐2 ☐3 SC-73 (SOT223)	

# 5. Ordering information

### **Table 3. Ordering information**

Type number	Package				
	Name	Description	Version		
BTA204W-600B	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223		

# 6. 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 <sub>T(RMS)</sub>	RMS on-state current	full sine wave; $T_{sp} \le 108$ °C; $Fig. 1$ ; $Fig. 2$ ; $Fig. 3$	-	1	А
I <sub>TSM</sub>	non-repetitive peak on-	full sine wave; T <sub>j(init)</sub> = 25 °C; t <sub>p</sub> = 16.7 ms	-	11	Α
	state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; Fig. 4; Fig. 5	-	10	А
l <sup>2</sup> t	I <sup>2</sup> t for fusing	t <sub>p</sub> = 10 ms; SIN	-	0.5	A²s
dl <sub>T</sub> /dt	rate of rise of on-state current	I <sub>G</sub> = 0.2 A	-	100	A/µs
I <sub>GM</sub>	peak gate current		-	2	Α
P <sub>GM</sub>	peak gate power		-	5	W
P <sub>G(AV)</sub>	average gate power	over any 20ms period	-	0.5	W
T <sub>stg</sub>	storage temperature		-40	150	°C
Tj	junction temperature		-	125	°C

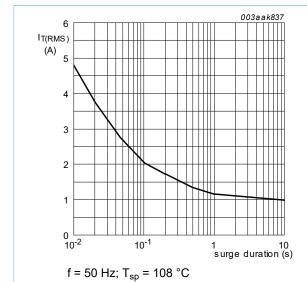


Fig. 1. RMS on-state current as a function of surge duration; maximum values

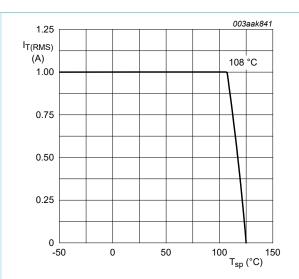


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

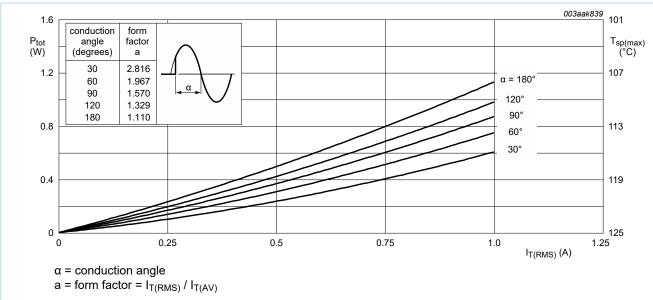


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

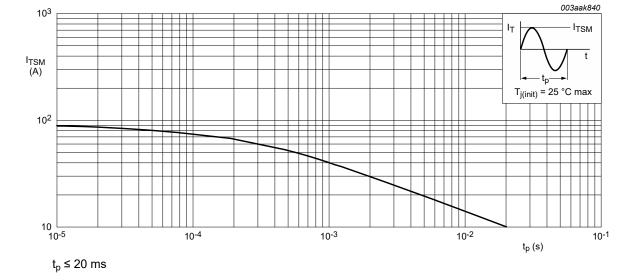


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

WeEn Semiconductors BTA204W-600B

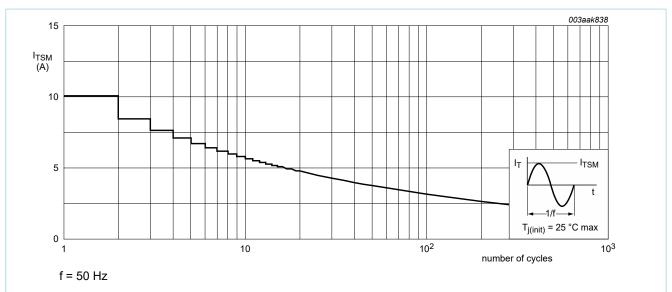


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

### 7. Thermal characteristics

**Table 5. Thermal characteristics** 

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point	full cycle and half cycle; Fig. 6	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to	printed circuit board mounted: minimum pad area; Fig. 7	-	70	-	K/W
	ambient free air	printed circuit board mounted: minimum footprint; Fig. 8	-	156	-	K/W

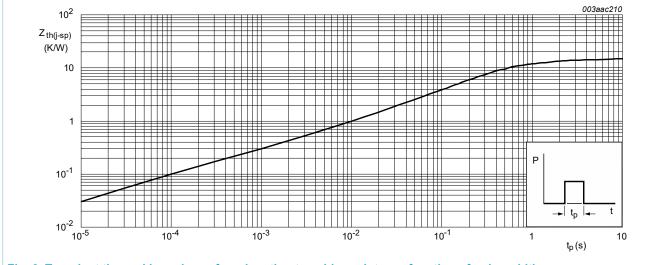
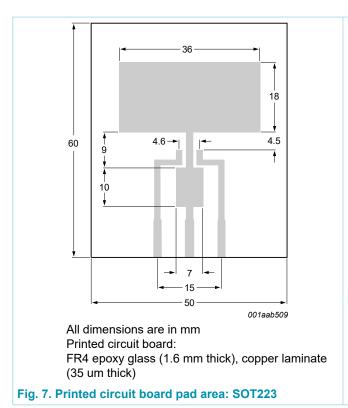


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width



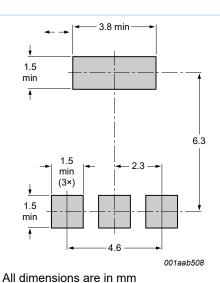


Fig. 8. Minimum footprint SOT223

## 8. Characteristics

#### **Table 6. Characteristics**

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static char	acteristics		,			
I <sub>GT</sub>	gate trigger current	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T2+ G+;$ $T_j = 25 \text{ °C}; Fig. 9$	-	-	50	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <u>Fig. 9</u>	-	-	50	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <u>Fig. 9</u>	-	-	50	mA
I <sub>L</sub>	latching current	$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; T2+ G-;$ $T_j = 25 \text{ °C}; Fig. 10$	-	-	30	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <u>Fig. 10</u>	-	-	45	mA
		$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; \text{ T2- G-};$ $T_j = 25 ^{\circ}\text{C}; \text{ Fig. 10}$	-	-	30	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>j</sub> = 25 °C; <u>Fig. 11</u>	-	-	30	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 2 A; T <sub>j</sub> = 25 °C; <u>Fig. 12</u>	-	1.2	1.5	V
$V_{GT}$	gate trigger voltage	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T_j = 25 \text{ °C};$ Fig. 13	-	0.7	1	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 125 °C; Fig. 13	0.25	0.4	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = 600 V; T <sub>j</sub> = 125 °C	-	0.1	0.5	mA
Dynamic cl	naracteristics		'			
dV <sub>D</sub> /dt	rate of rise of off-state voltage	$V_{DM}$ = 402 V; $T_j$ = 125 °C; (67% of $V_{DRM}$ ); exponential waveform; gate open circuit	1000	-	-	V/µs
dl <sub>com</sub> /dt	rate of change of commutating current	$V_D$ = 400 V; $T_j$ = 125 °C; $I_{T(RMS)}$ = 1 A; $dV_{com}/dt$ = 20 V/ $\mu$ s; (snubberless condition); gate open circuit	6	-	-	A/ms

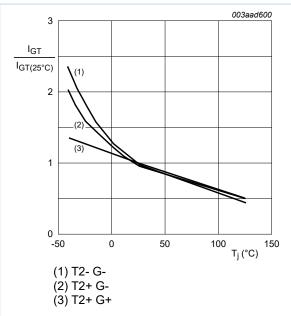


Fig. 9. Normalized gate trigger current as a function of junction temperature

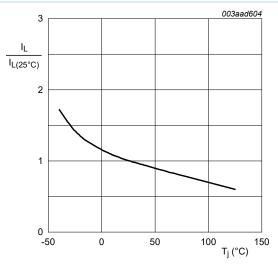


Fig. 10. Normalized latching current as a function of junction temperature

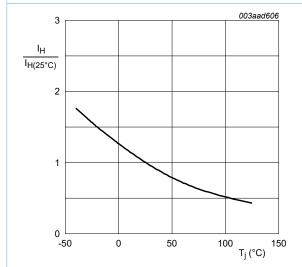
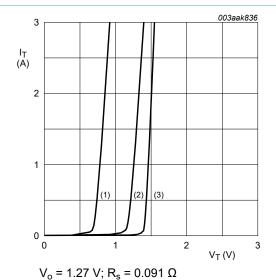
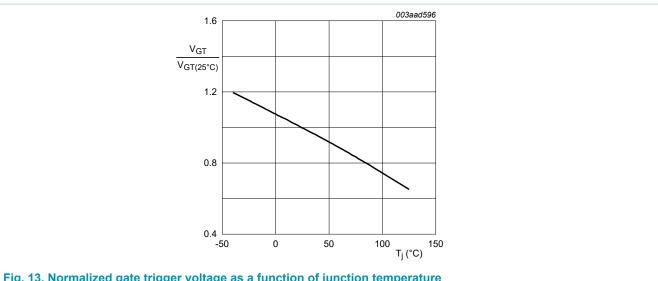


Fig. 11. Normalized holding current as a function of junction temperature



(1)  $T_j = 125$  °C; typical values (2)  $T_j = 125$  °C; maximum values (3)  $T_j = 25$  °C; maximum values

Fig. 12. On-state current as a function of on-state voltage



## 9. Package outline

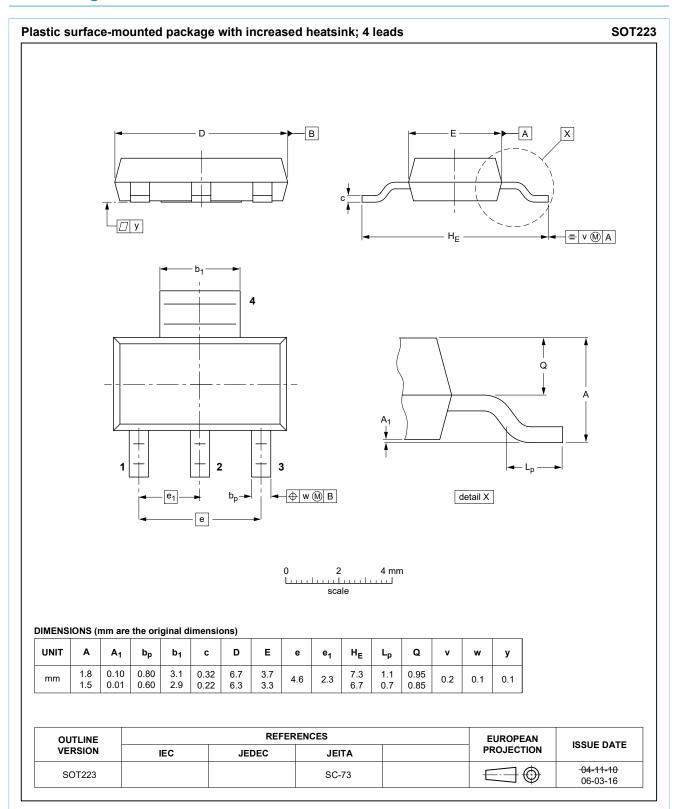


Fig. 14. Package outline SC-73 (SOT223)

## 10. Legal information

#### **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.
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BTA204W-600B

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