



# BTA204W-600E

3Q Hi-Com Triac

15 August 2014

Product data sheet

## 1. General description

Planar passivated guaranteed commutation triac in a SOT223 surface mountable plastic package for use in motor control circuits or with other highly inductive loads. This triac balances the requirements of commutation performance and gate sensitivity and is intended for interfacing with low power drivers, including micro controllers.

## 2. Features and benefits

- 3Q technology for improved noise immunity
- Direct triggering from low power drivers and logic ICs
- High commutation capability with sensitive gate
- High immunity to false turn-on by  $dV/dt$  with sensitive gate
- Planar passivated for voltage ruggedness and reliability
- Sensitive gate for easy logic level triggering
- Surface mountable package

## 3. Applications

- General purpose motor controls
- Small loads in washing machines
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	600	V
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{J(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	10	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 108\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	1	A



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>	-	-	10	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>	-	-	10	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>	-	-	10	mA

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	<p><b>SC-73 (SOT223)</b></p>	<p>sym051</p>
2	T2	main terminal 2		
3	G	gate		
4	mb	mounting base; connected to main terminal 2		

## 6. Ordering information

Table 3. Ordering information

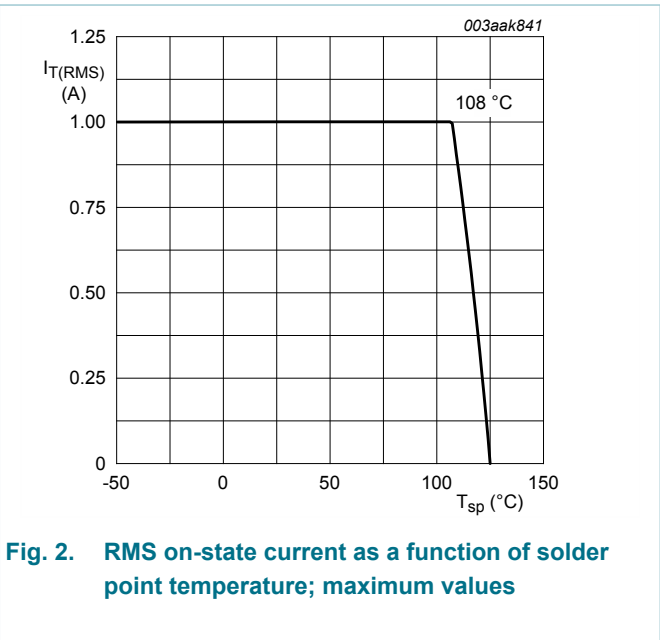
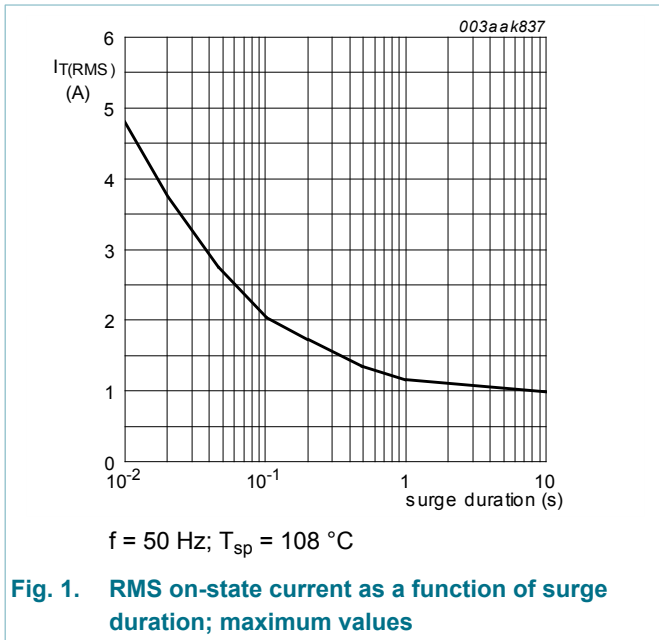
Type number	Package		
	Name	Description	Version
BTA204W-600E	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 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		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 108\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	1	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 16.7\text{ ms}$	-	11	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	10	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN	-	0.5	$A^2s$
$di_T/dt$	rate of rise of on-state current	$I_T = 1.5\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A}/\mu s$	-	100	$A/\mu s$
$I_{GM}$	peak gate current		-	2	A
$P_{GM}$	peak gate power		-	5	W
$P_{G(AV)}$	average gate power	over any 20ms period	-	0.5	W
$T_{stg}$	storage temperature		-40	150	$^{\circ}C$
$T_j$	junction temperature		-	125	$^{\circ}C$



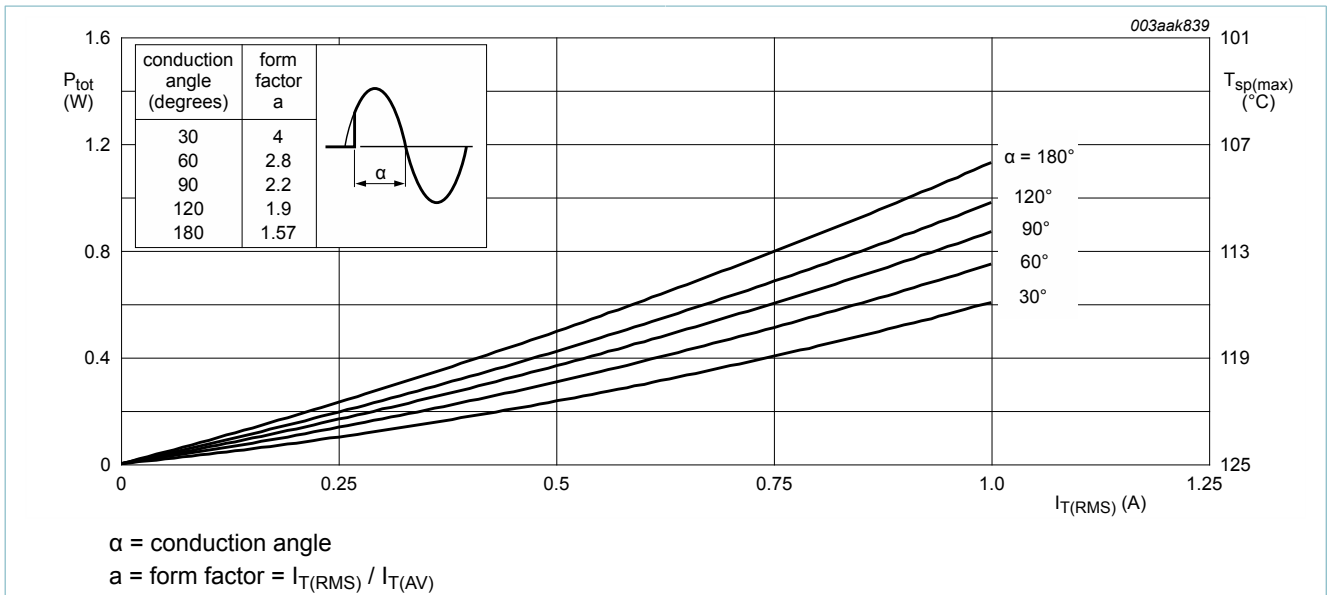


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

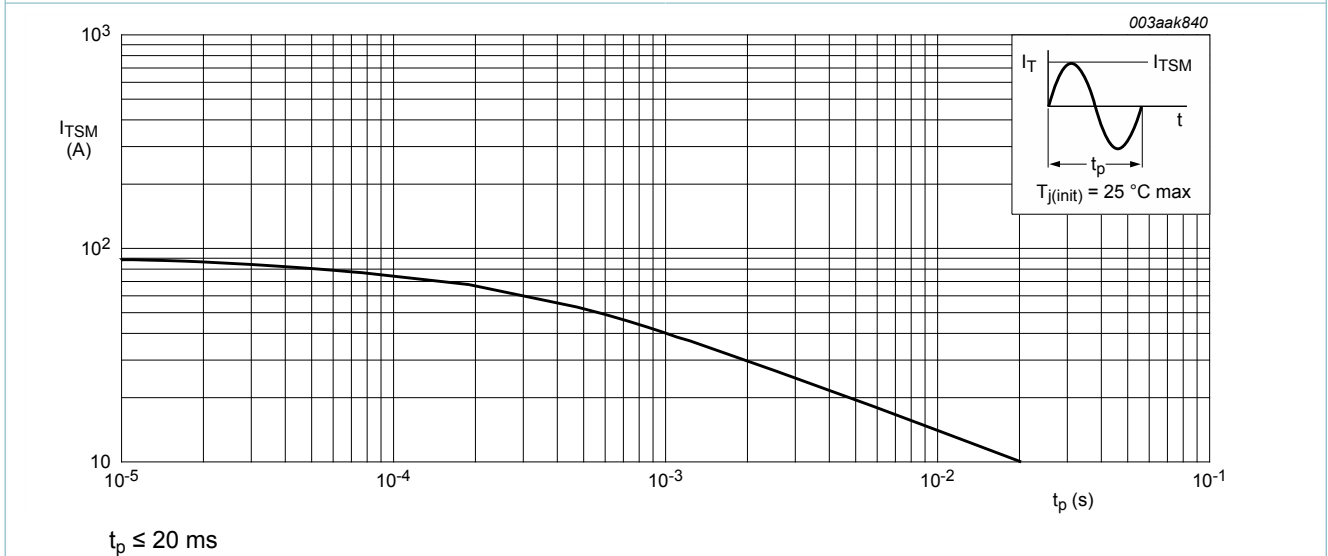
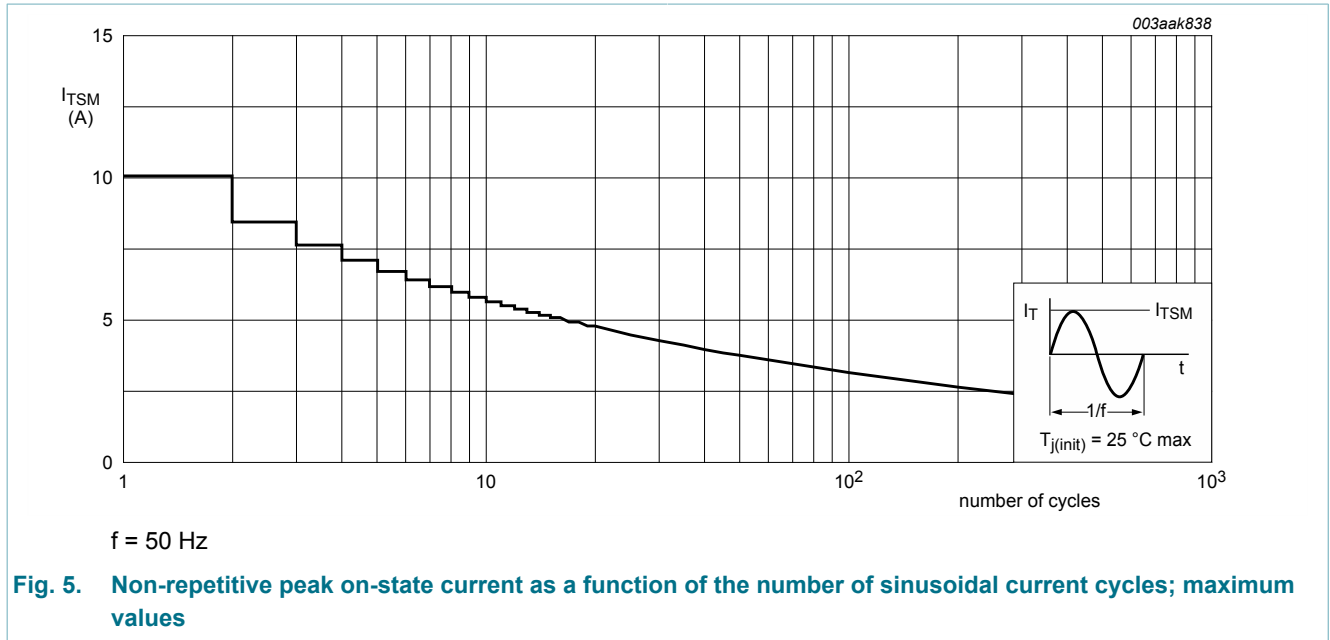


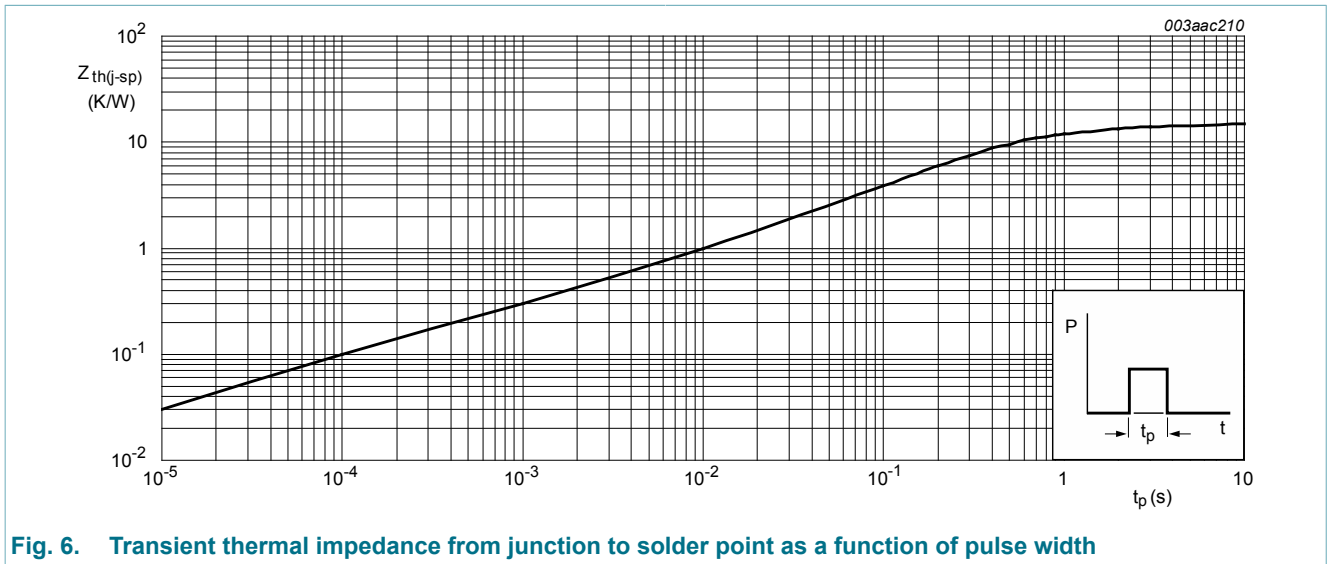
Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

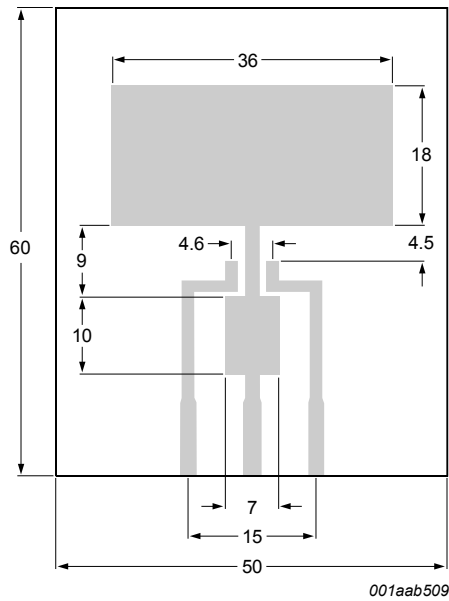


## 8. Thermal characteristics

Table 5. Thermal characteristics

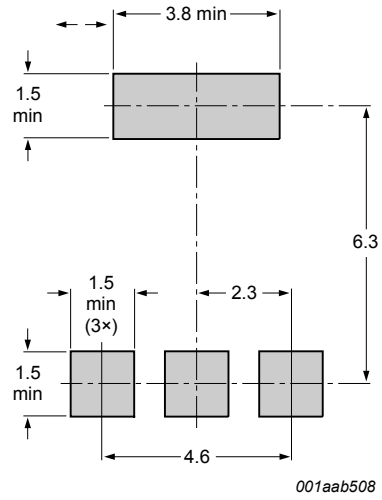
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle or half cycle; <a href="#">Fig. 6</a>	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; printed circuit board mounted: minimum pad area; <a href="#">Fig. 7</a>	-	170	-	K/W
		in free air; printed circuit board mounted: minimum footprint; <a href="#">Fig. 8</a>	-	156	-	K/W





All dimensions are in mm  
 Printed circuit board:  
 FR4 epoxy glass (1.6 mm thick), copper laminate  
 (35 µm thick)

**Fig. 7. Printed circuit board pad area: SOT223**



All dimensions are in mm

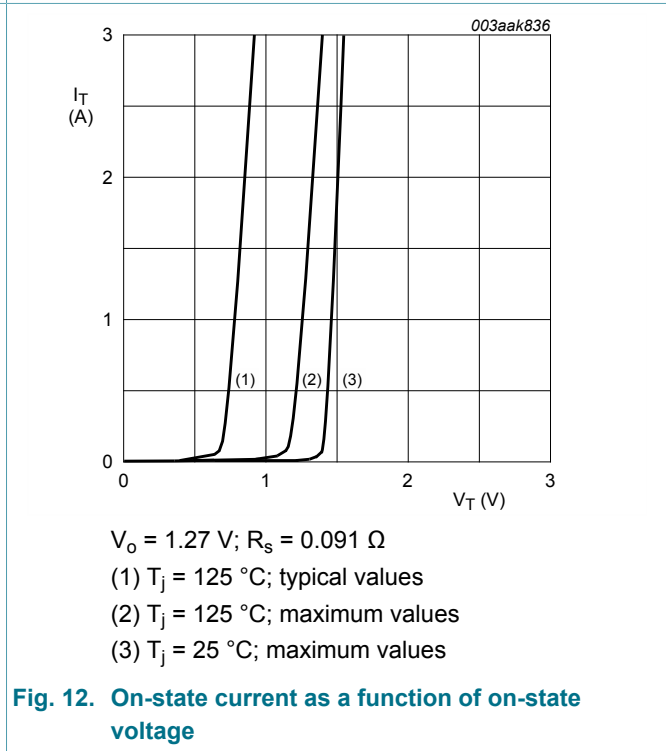
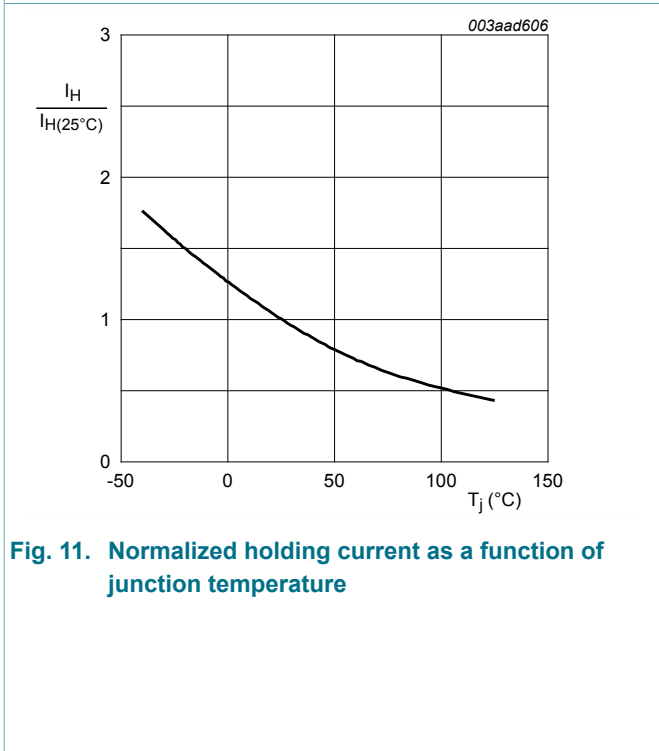
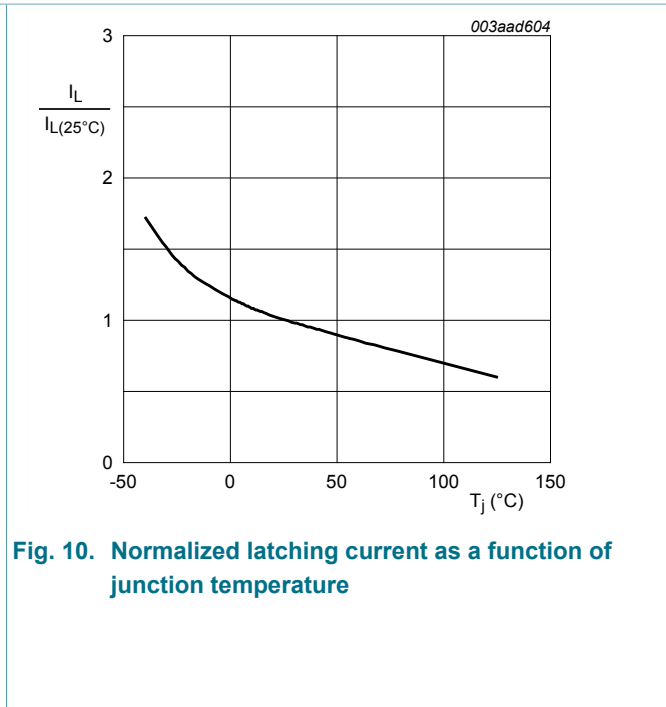
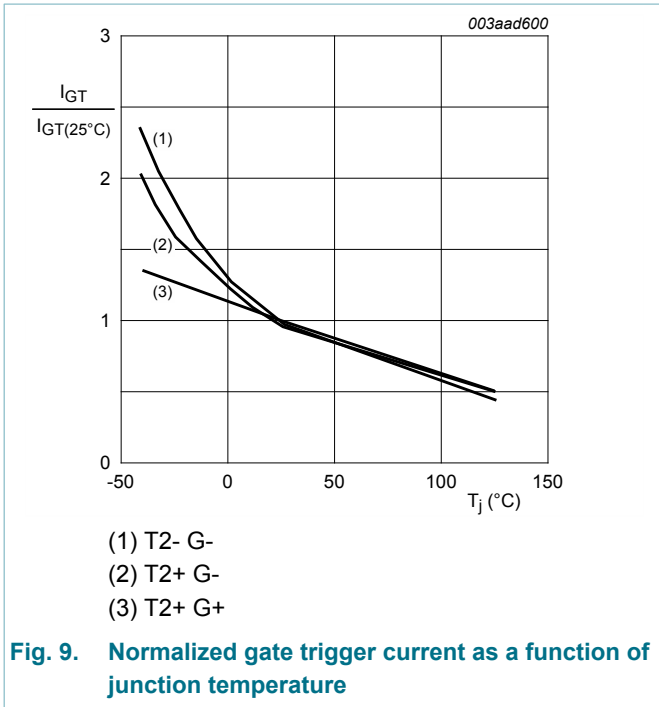
**Fig. 8. Minimum footprint SOT223**

## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	-	10	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	-	10	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	-	10	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2+ G+; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	-	12	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	-	18	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	-	12	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	-	12	mA
$V_T$	on-state voltage	$I_T = 2\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 12</a>	-	1.2	1.5	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 13</a>	-	0.7	1	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 13</a>	0.25	0.4	-	V
$I_D$	off-state current	$V_D = 600\text{ V}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 600\text{ V}$ ; $T_j = 125\text{ °C}$ ; (67% of $V_{DRM}$ ); exponential waveform; gate open circuit	30	-	-	V/ $\mu\text{s}$
$di_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{T(RMS)} = 1\text{ A}$ ; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$ ; (snubberless condition); gate open circuit	2	-	-	A/ms





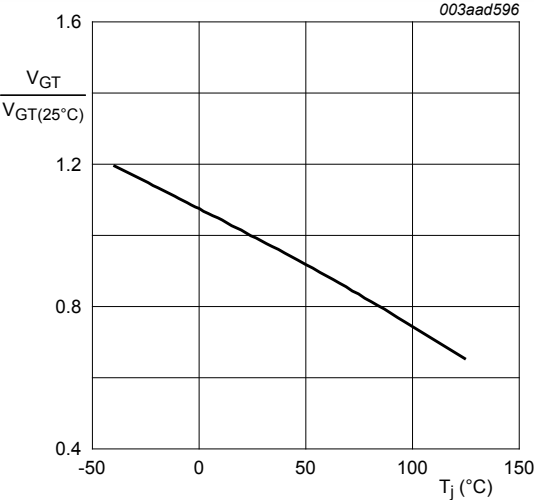


Fig. 13. Normalized gate trigger voltage as a function of junction temperature

### 10. Package outline

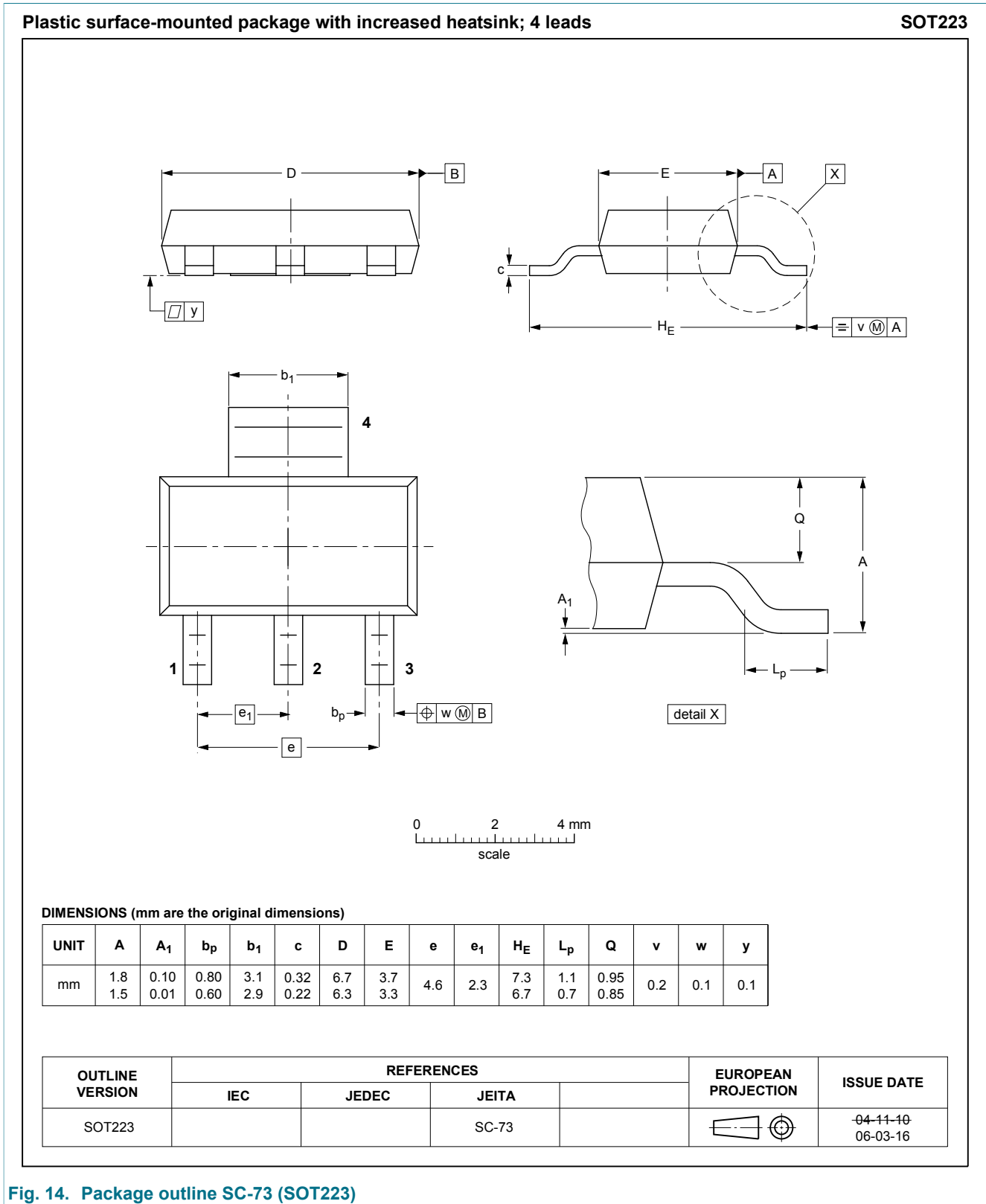


Fig. 14. Package outline SC-73 (SOT223)

### 11. Soldering

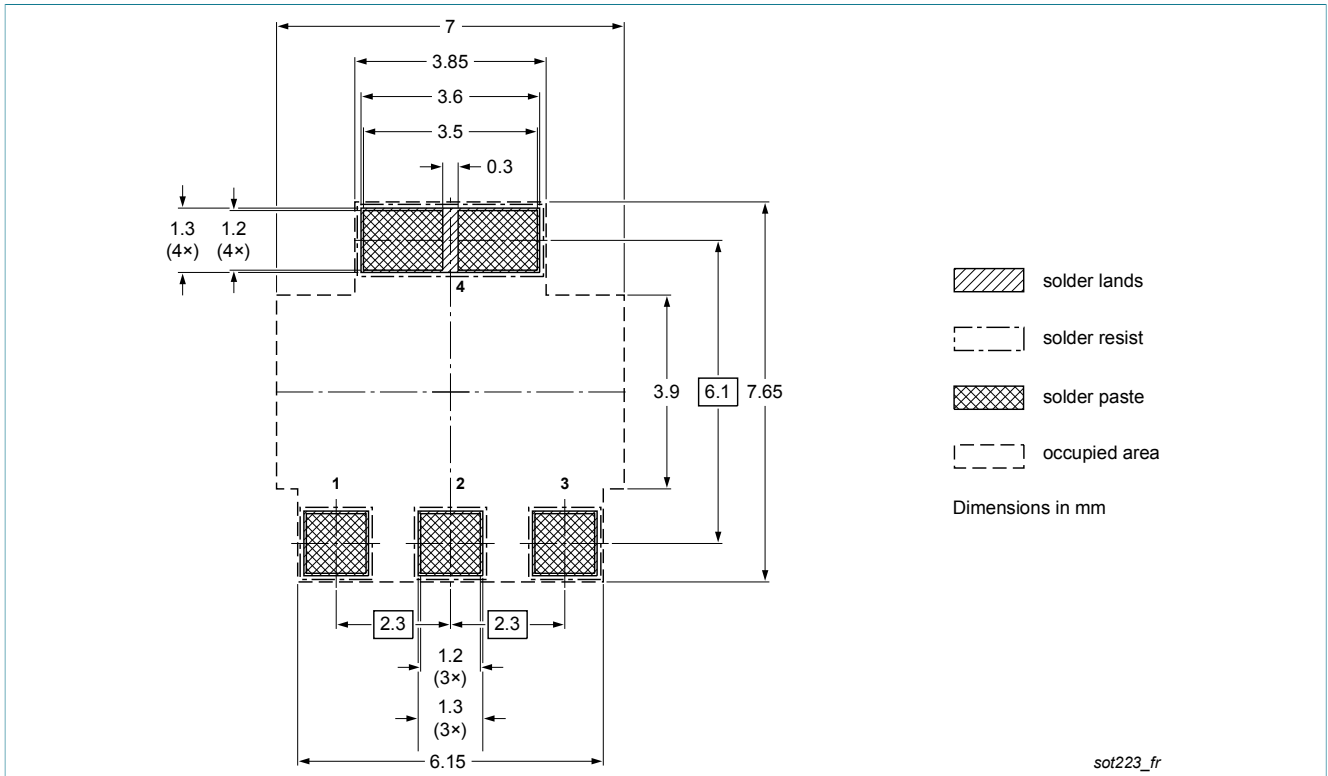


Fig. 15. Reflow soldering footprint for SC-73 (SOT223)

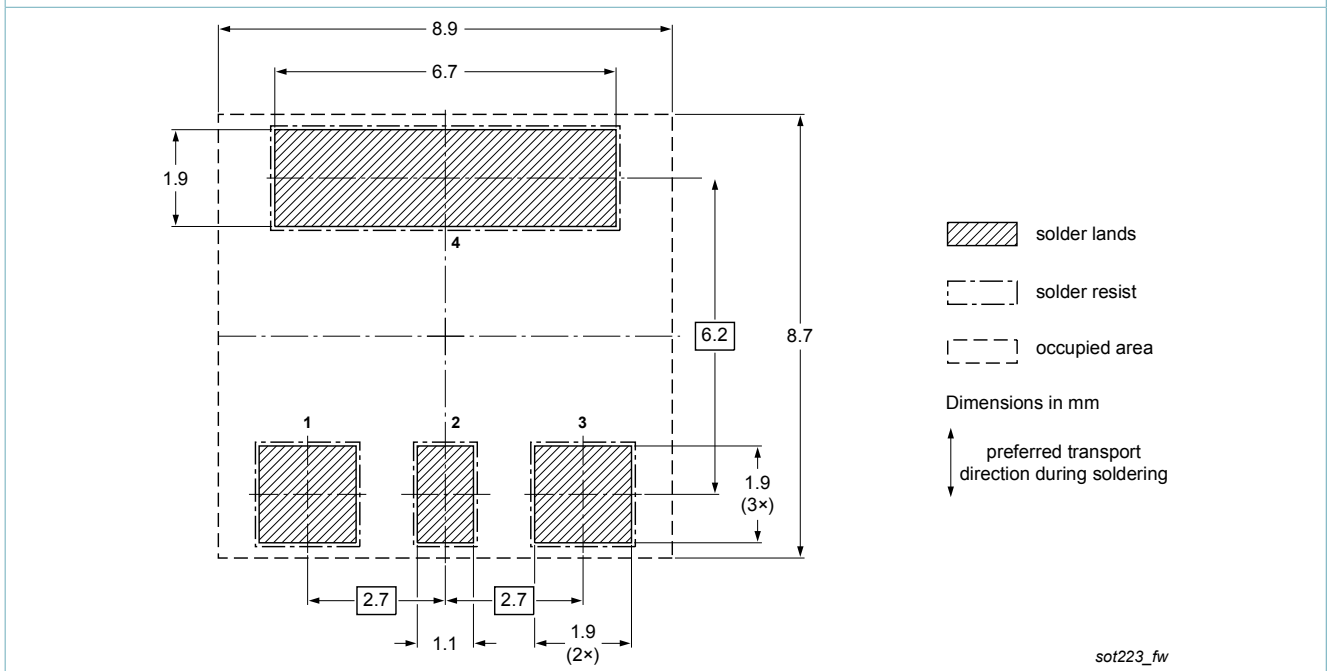


Fig. 16. Wave soldering footprint for SC-73 (SOT223)

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