



# BTA204W-600B

3Q Hi-Com Triac

15 August 2014

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 dI/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. 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
- Less sensitive gate for very high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package

## 3. Applications

- General purpose motor controls
- Home appliances
- 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; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p = 20 \text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	10	A



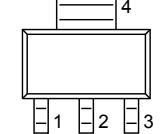
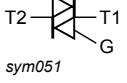
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Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 108^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		-	-	1	A
<b>Static characteristics</b>							
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	-	50	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	-	50	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	-	50	mA

## 5. Pinning information

Table 2. Pinning information

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

## 6. Ordering information

Table 3. Ordering information

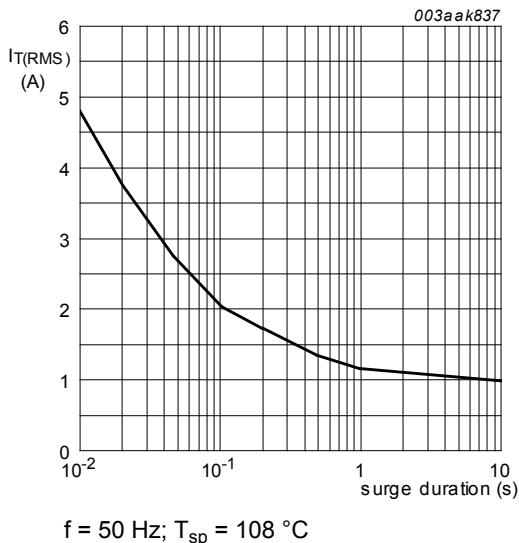
Type number	Package		
	Name	Description	Version
BTA204W-600B	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 7. Limiting values

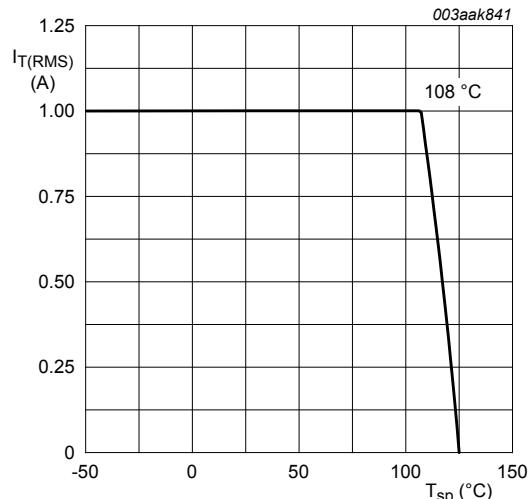
**Table 4. Limiting values**

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; $T_{sp} \leq 108^\circ\text{C}$ ; <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; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p$ 16.7 ms		-	11	A
		full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p = 20$ ms; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>		-	10	A
$I^2t$	$I^2t$ for fusing	$t_p = 10$ ms; SIN		-	0.5	$\text{A}^2\text{s}$
$dI_T/dt$	rate of rise of on-state current	$I_T = 1.5$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/ $\mu\text{s}$		-	100	$\text{A}/\mu\text{s}$
$I_{GM}$	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	$^\circ\text{C}$
$T_j$	junction temperature			-	125	$^\circ\text{C}$



**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**

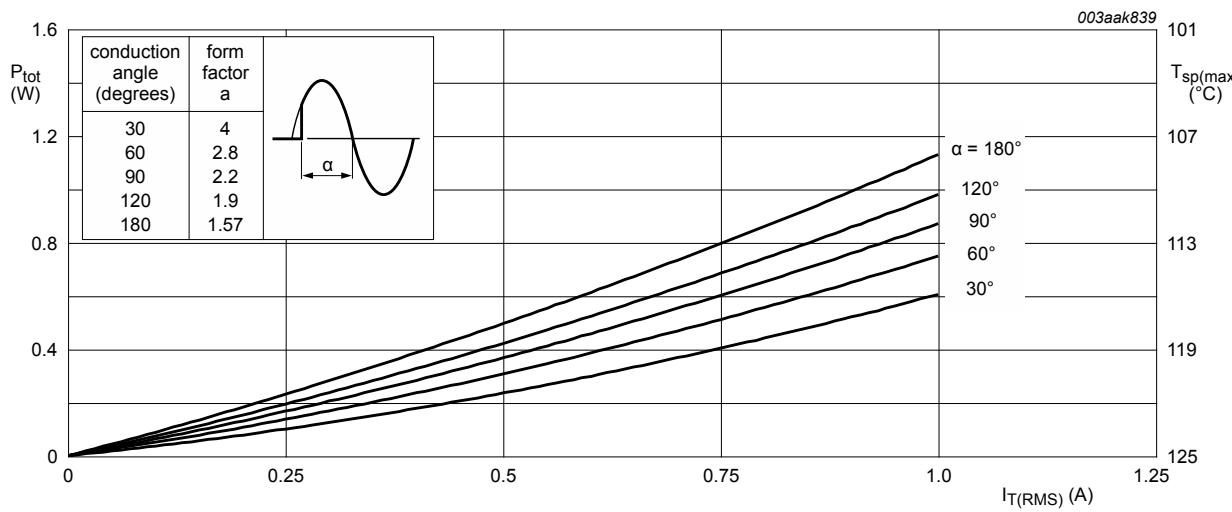


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

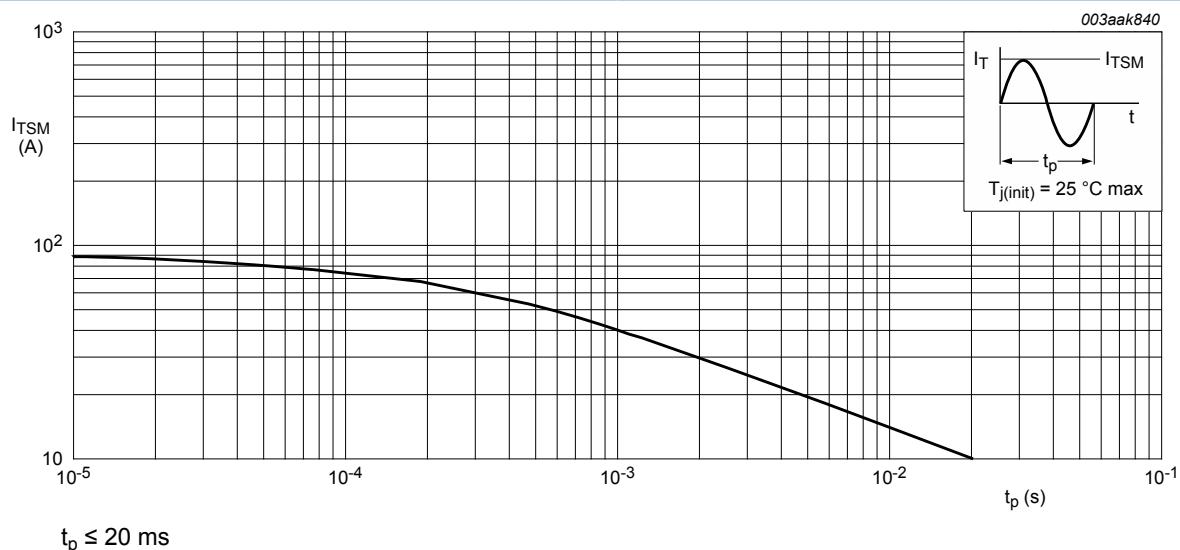
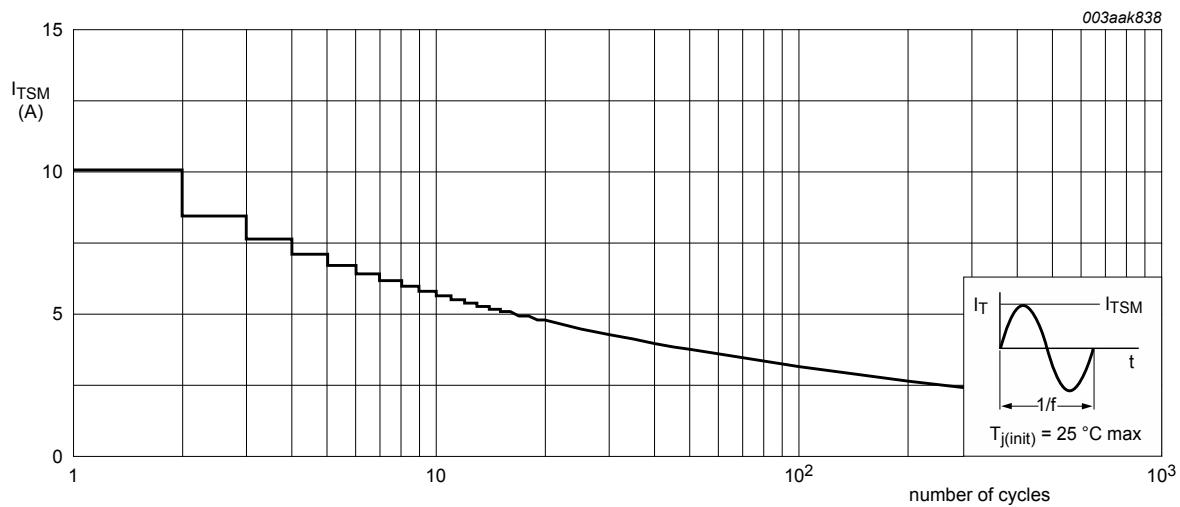


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



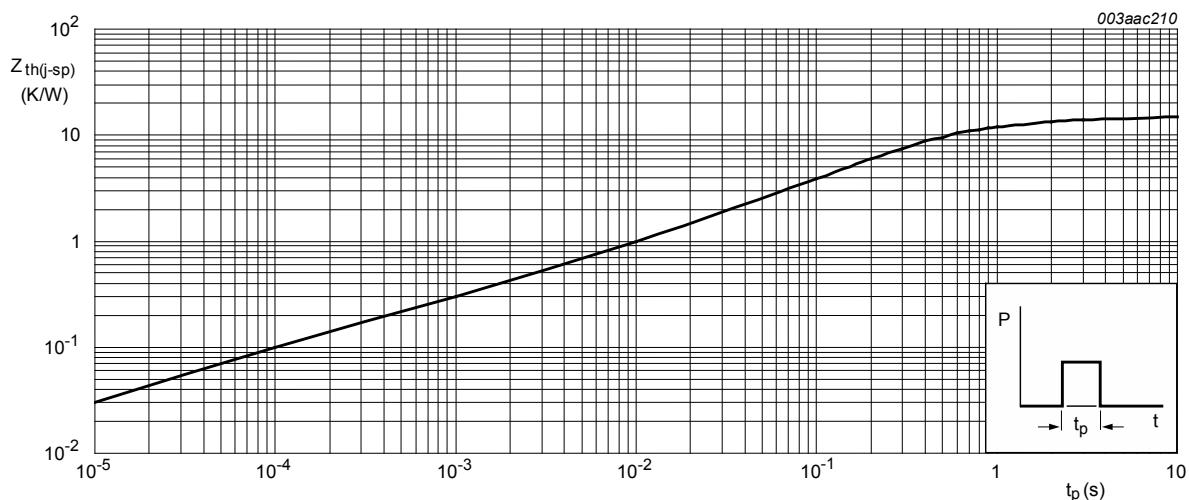
$f = 50$  Hz

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

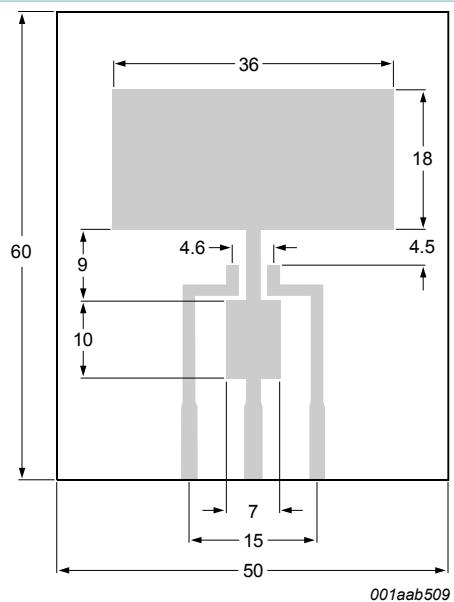
## 8. Thermal characteristics

**Table 5. Thermal characteristics**

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



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

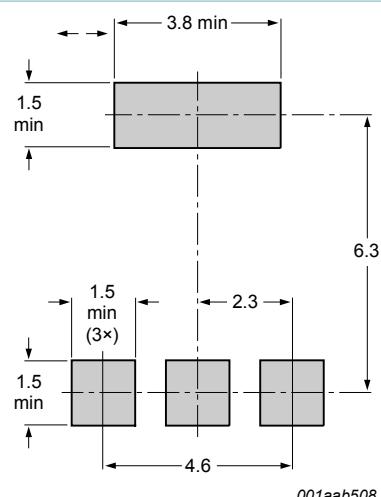


All dimensions are in mm

Printed circuit board:

FR4 epoxy glass (1.6 mm thick), copper laminate  
(35 um 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 <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>		-	-	50	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>		-	-	50	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>		-	-	50	mA
I <sub>L</sub>	latching current	V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	-	30	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	-	45	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	-	30	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 11</a>		-	-	30	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 2 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 12</a>		-	1.2	1.5	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 13</a>		-	0.7	1	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 125 °C; <a href="#">Fig. 13</a>		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
<b>Dynamic characteristics</b>							
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 402 V; T <sub>j</sub> = 125 °C; (67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit		1000	-	-	V/μs
dI <sub>com</sub> /dt	rate of change of commutating current	V <sub>D</sub> = 400 V; T <sub>j</sub> = 125 °C; I <sub>T(RMS)</sub> = 1 A; dV <sub>com</sub> /dt = 20 V/μs; (snubberless condition); gate open circuit		6	-	-	A/ms

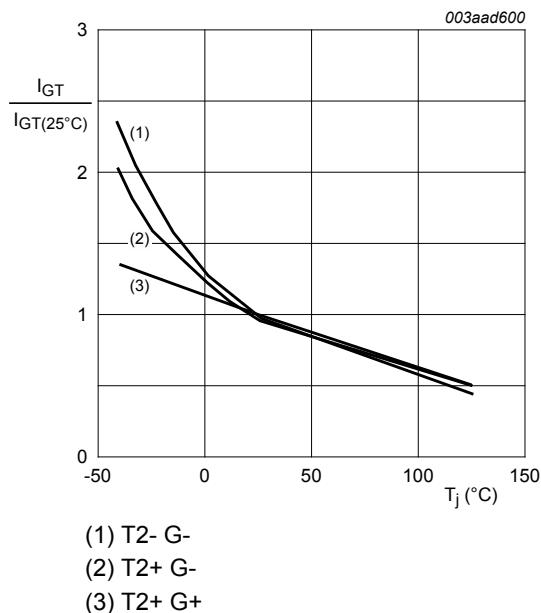


Fig. 9. Normalized gate trigger current as a function of junction temperature

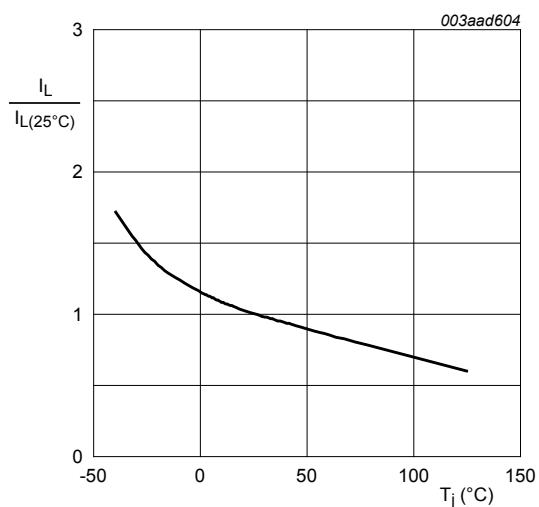


Fig. 10. Normalized latching current as a function of junction temperature

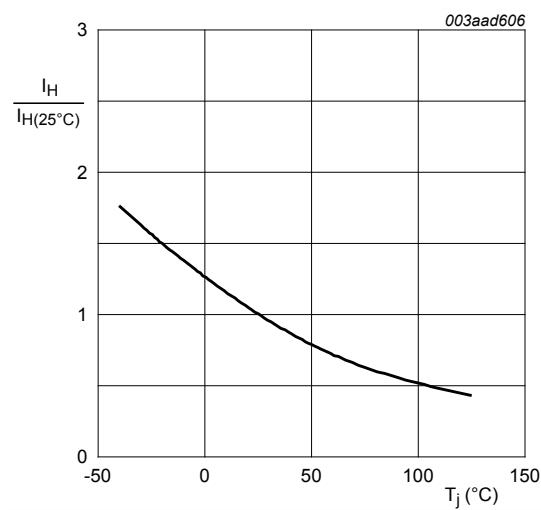


Fig. 11. Normalized holding current as a function of junction temperature

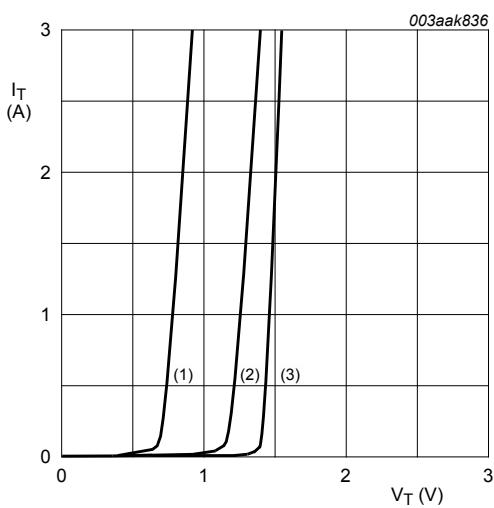


Fig. 12. On-state current as a function of on-state voltage

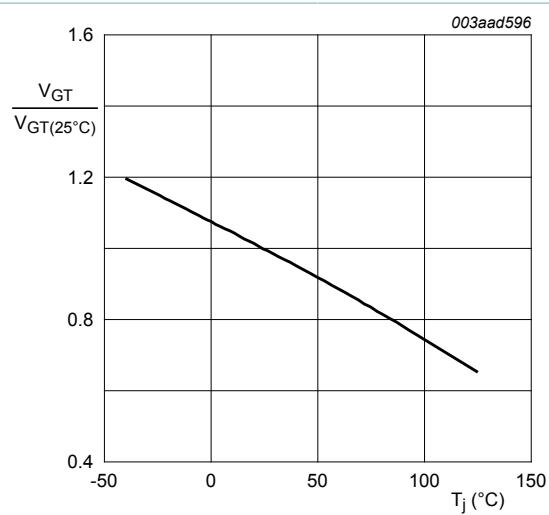


Fig. 13. Normalized gate trigger voltage as a function of junction temperature

## 10. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads

SOT223

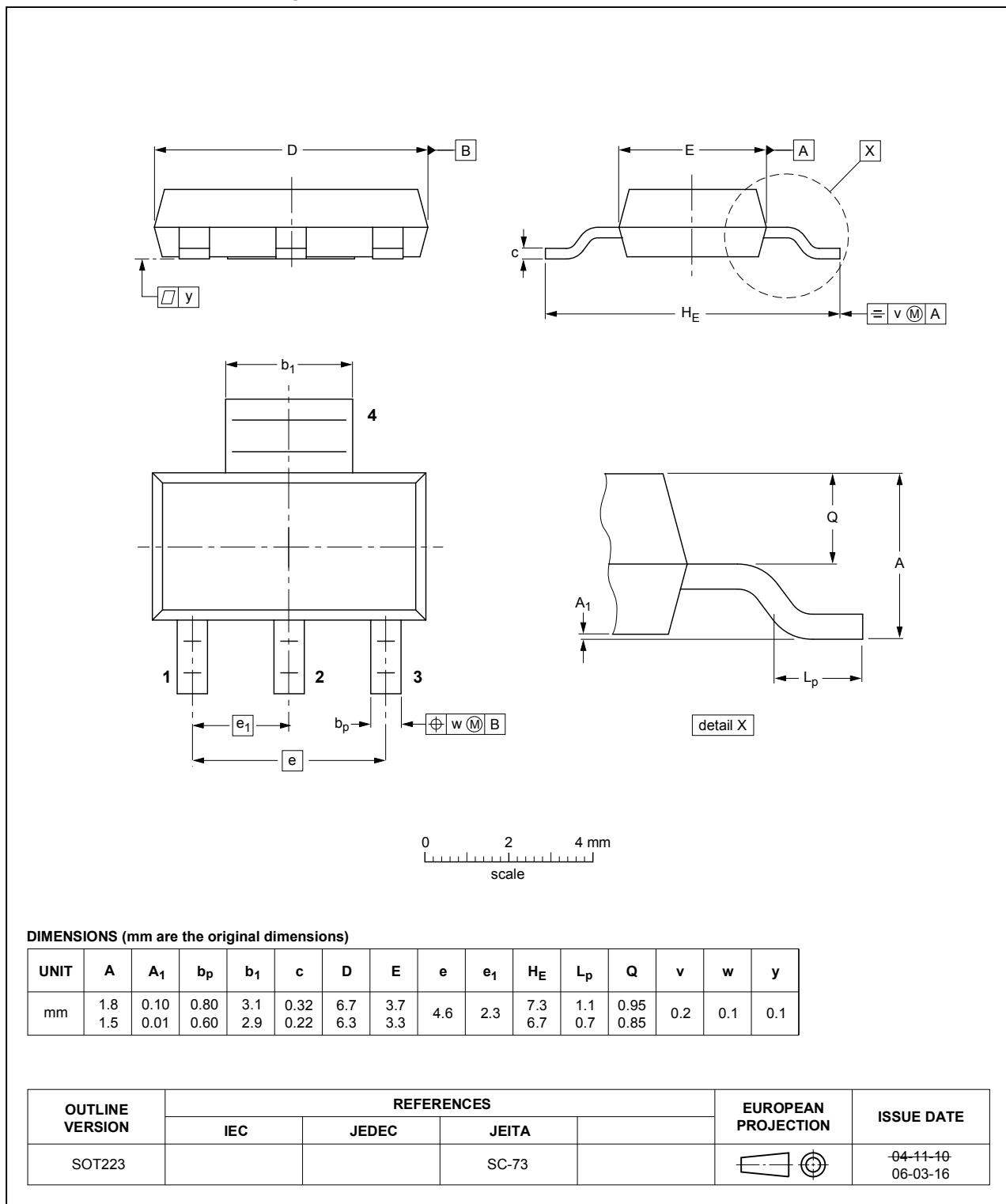


Fig. 14. Package outline SC-73 (SOT223)

## 11. Soldering

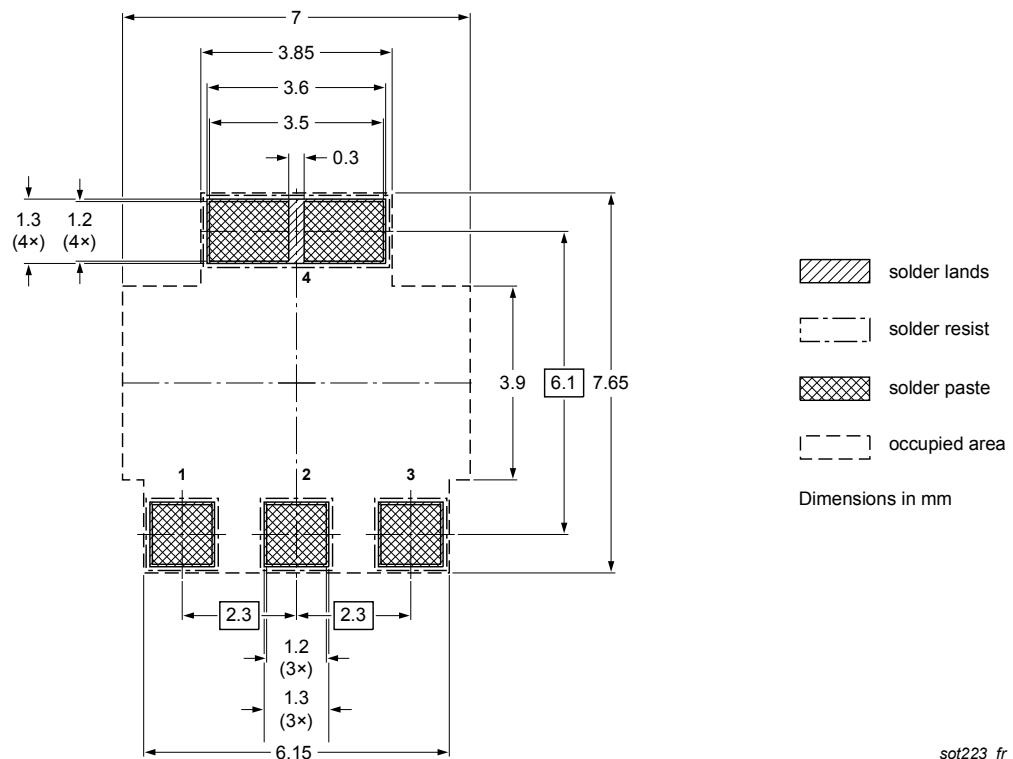


Fig. 15. Reflow soldering footprint for SC-73 (SOT223)

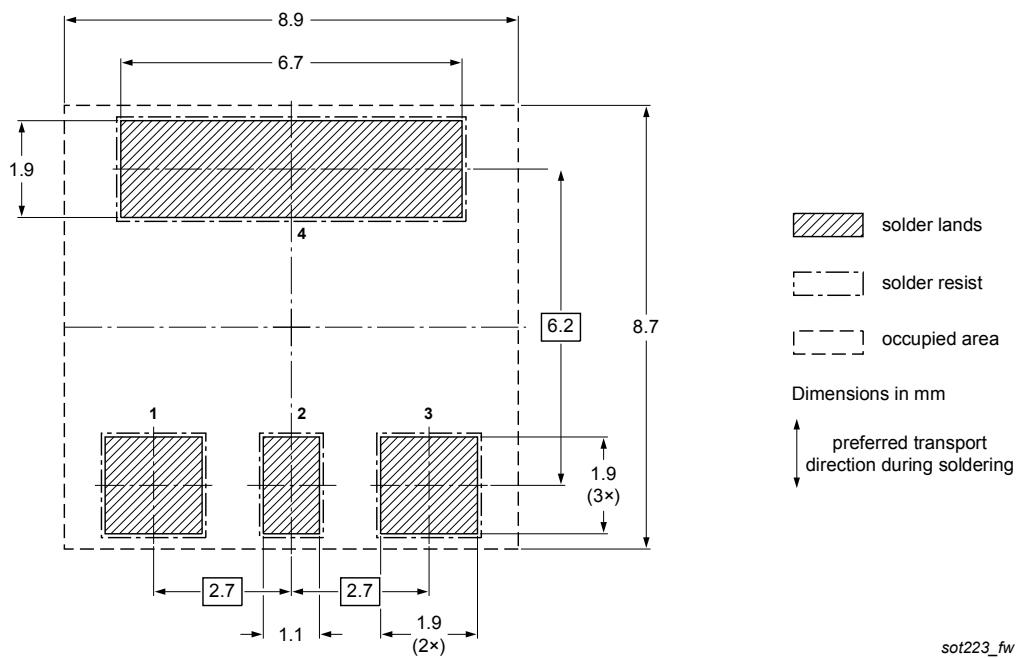


Fig. 16. Wave soldering footprint for SC-73 (SOT223)

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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## 13. Contents

1	General description .....	1
2	Features and benefits .....	1
3	Applications .....	1
4	Quick reference data .....	1
5	Pinning information .....	2
6	Ordering information .....	2
7	Limiting values .....	3
8	Thermal characteristics .....	6
9	Characteristics .....	8
10	Package outline .....	11
11	Soldering .....	12
12	Legal information .....	13
12.1	Data sheet status .....	13
12.2	Definitions .....	13
12.3	Disclaimers .....	13
12.4	Trademarks .....	14

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