



# BTA204W-800E

3Q Hi-Com Triac

28 March 2013

Product data sheet

## 1. General description

Planar passivated three quadrant 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 use with low power drivers, including microcontrollers.

## 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

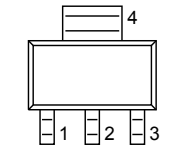
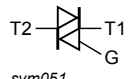
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	800	V
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{J(\text{init})} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	10	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 108\text{ °C}$ ; <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>SC-73 (SOT223)</p>	 <p>sym051</p>
2	T2	main terminal 2		
3	G	gate		
4	mb	mounting base; main terminal 2		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA204W-800E	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 <sub>DRM</sub>	repetitive peak off-state voltage		-	800	V
I <sub>T(RMS)</sub>	RMS on-state current	full sine wave; T <sub>sp</sub> ≤ 108 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	1	A
I <sub>TSM</sub>	non-repetitive peak on-state current	full sine wave; T <sub>j(init)</sub> = 25 °C; t <sub>p</sub> 16.7 ms	-	11	A
		full sine wave; T <sub>j(init)</sub> = 25 °C; t <sub>p</sub> = 20 ms; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	10	A
I <sup>2</sup> t	I <sup>2</sup> t for fusing	t <sub>p</sub> = 10 ms; SIN	-	0.5	A <sup>2</sup> s

Symbol	Parameter	Conditions	Min	Max	Unit
$di_T/dt$	rate of rise of on-state current	$I_T = 1.5 \text{ A}; I_G = 0.2 \text{ A}; di_G/dt = 0.2 \text{ A}/\mu\text{s}$	-	100	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	$^{\circ}\text{C}$

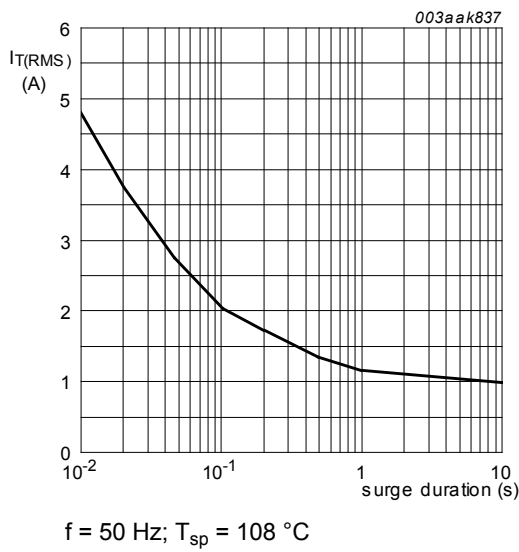


Fig. 1. RMS on-state current as a function of surge duration; maximum values

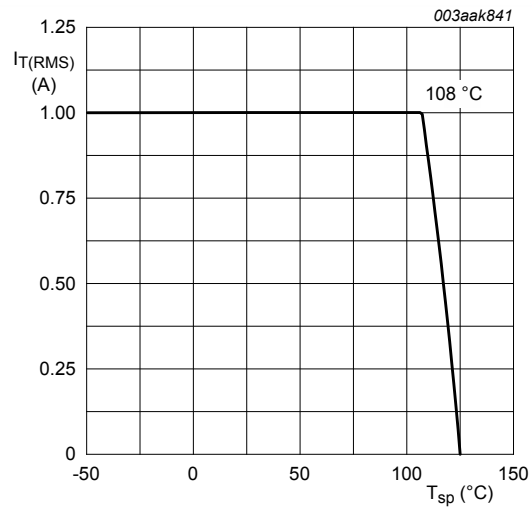


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

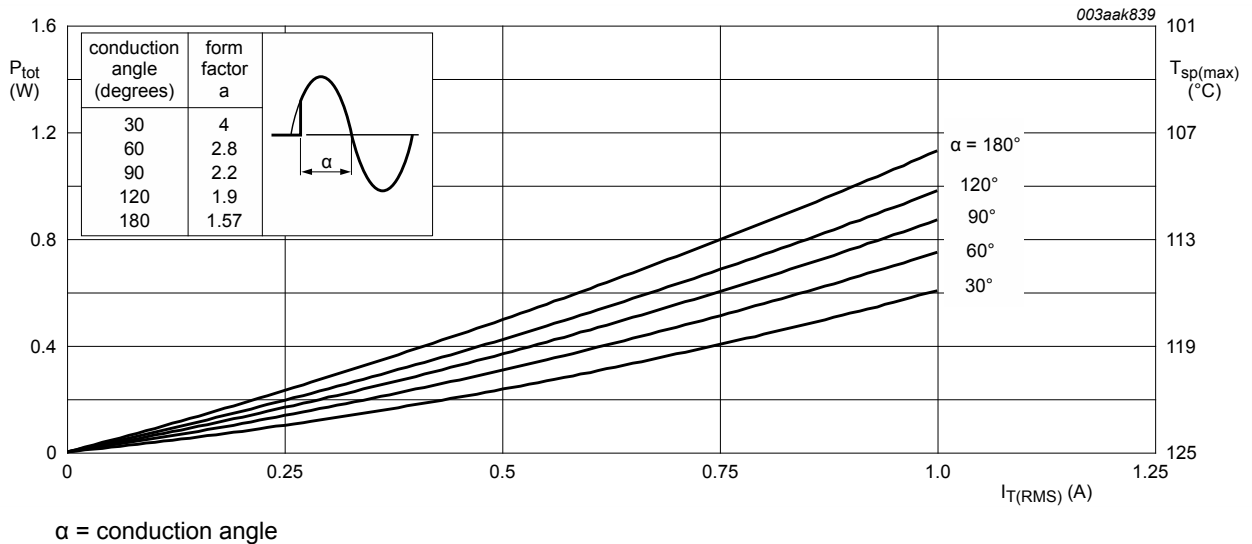


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

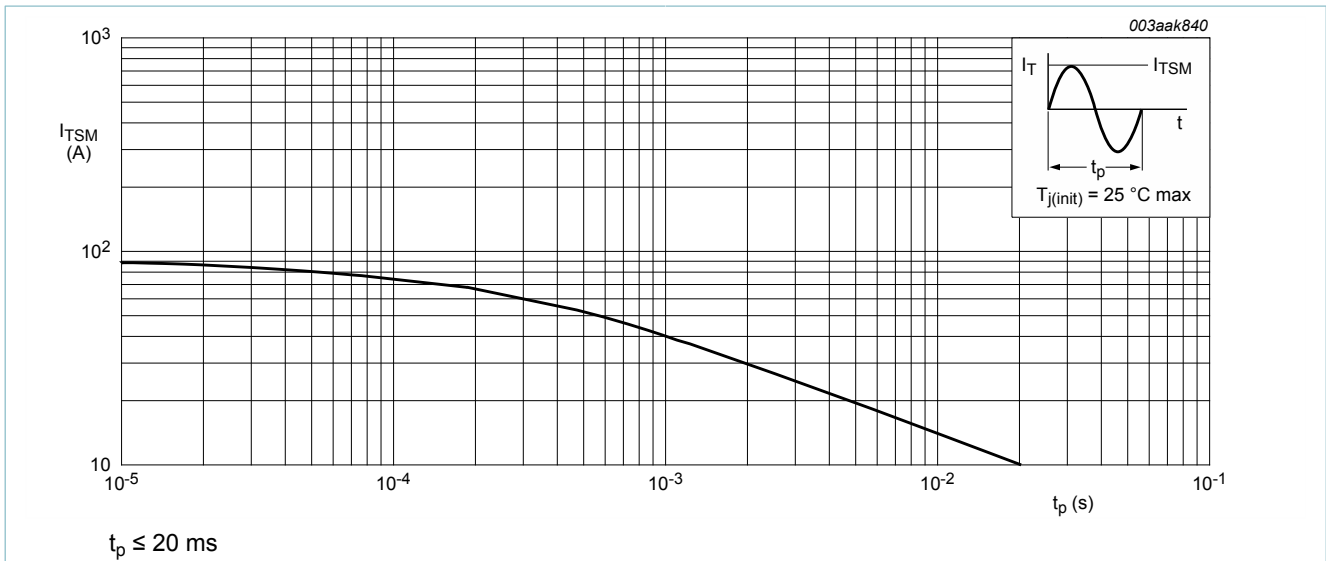


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

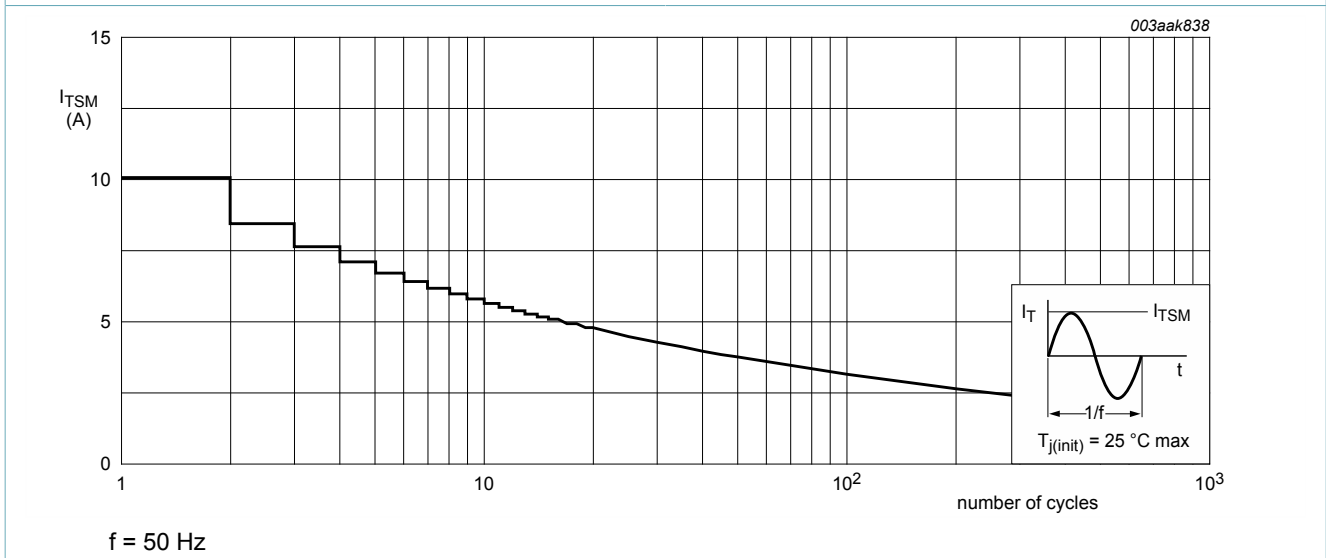
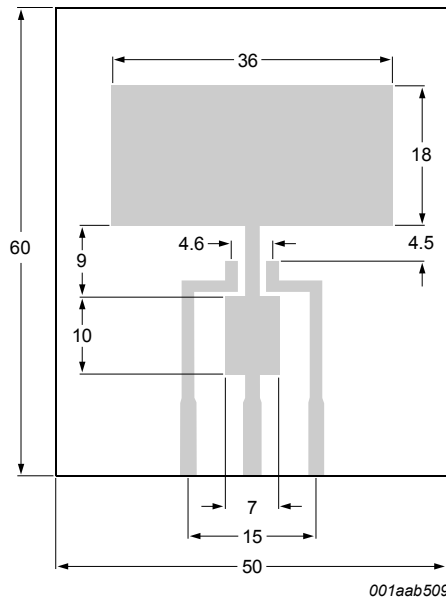


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

## 8. Thermal characteristics

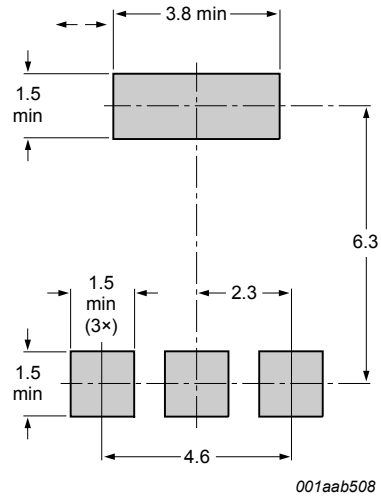
Table 5. Thermal characteristics

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



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

Fig. 6. Printed circuit board pad area: SOT223



All dimensions are in mm

Fig. 7. Minimum footprint SOT223

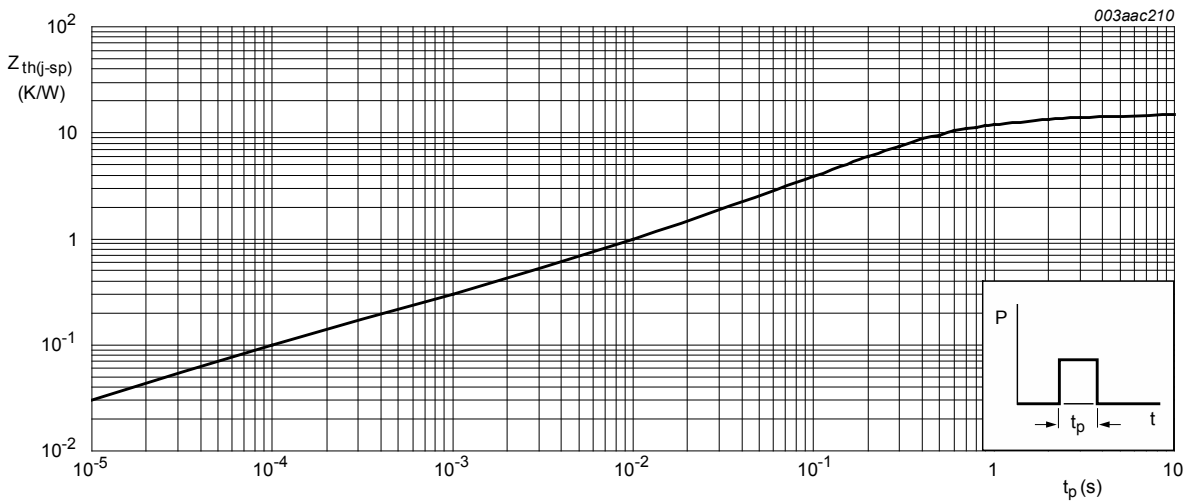


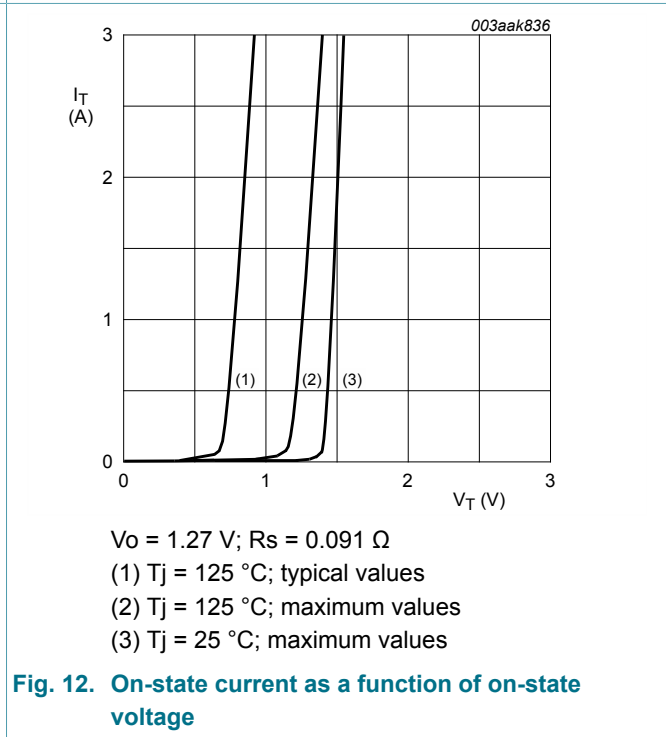
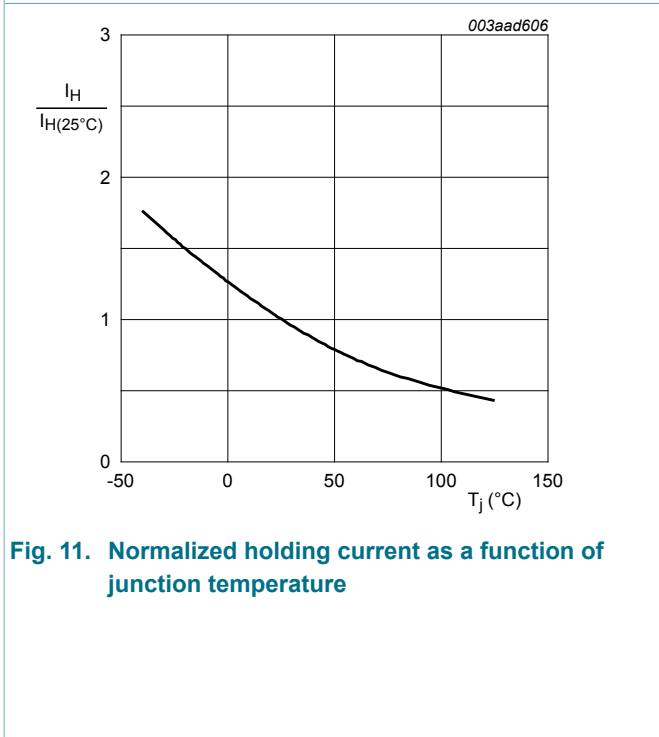
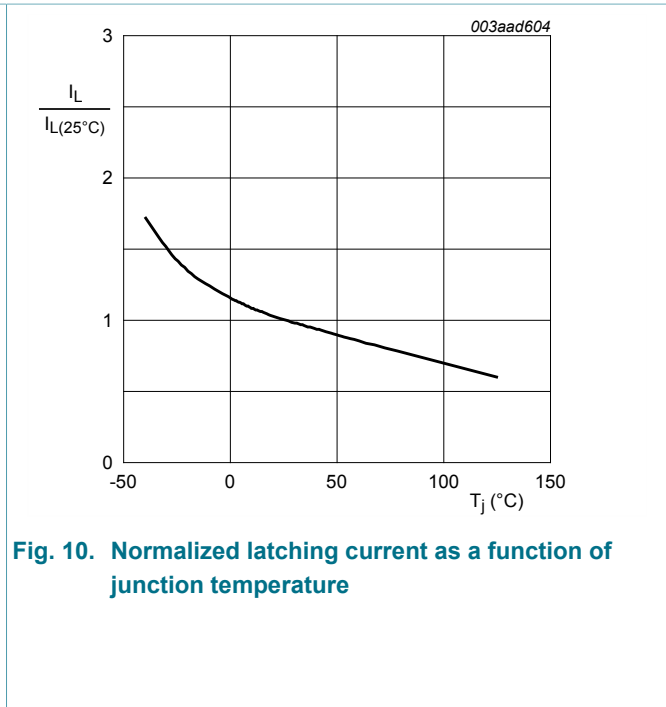
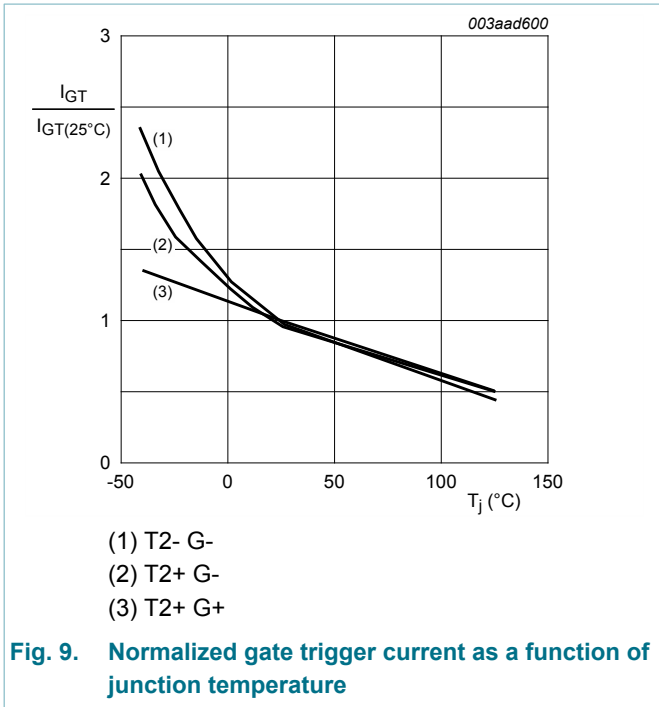
Fig. 8. Transient thermal impedance from junction to solder point as a function of pulse width

## 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+; $T_J = 25\text{ }^\circ\text{C}$ ; Fig. 9	-	-	10	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; 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>	-	0.7	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	$V_D = 800\text{ V}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_j = 125\text{ °C}$ ; (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



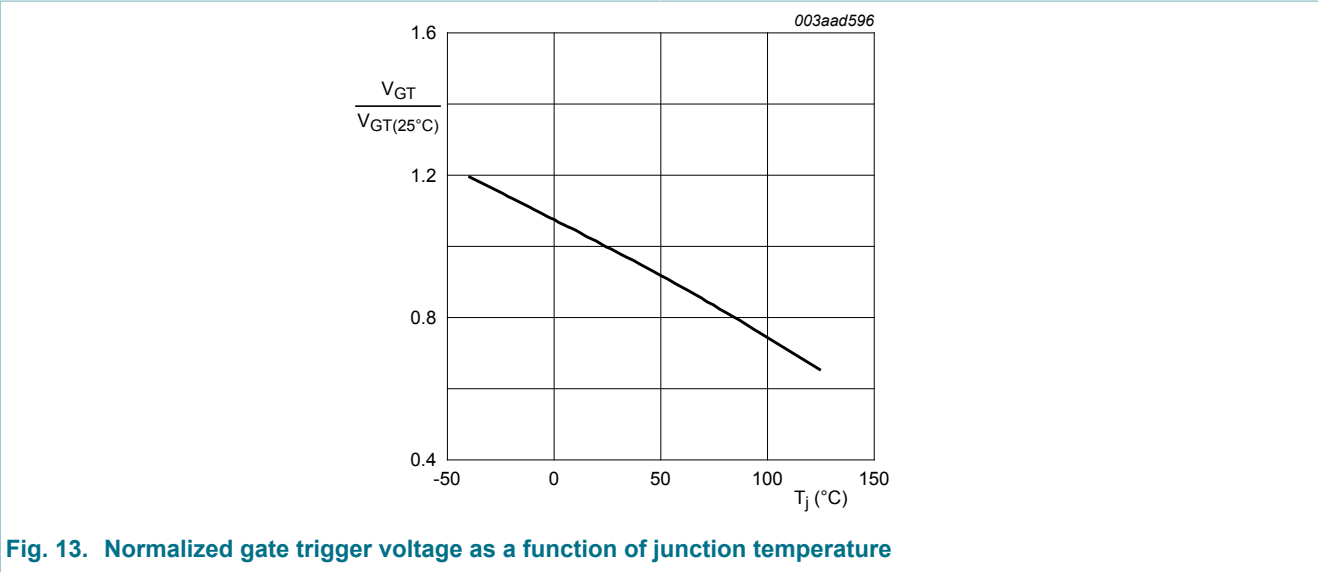


Fig. 13. Normalized gate trigger voltage as a function of junction temperature



### 10. Package outline

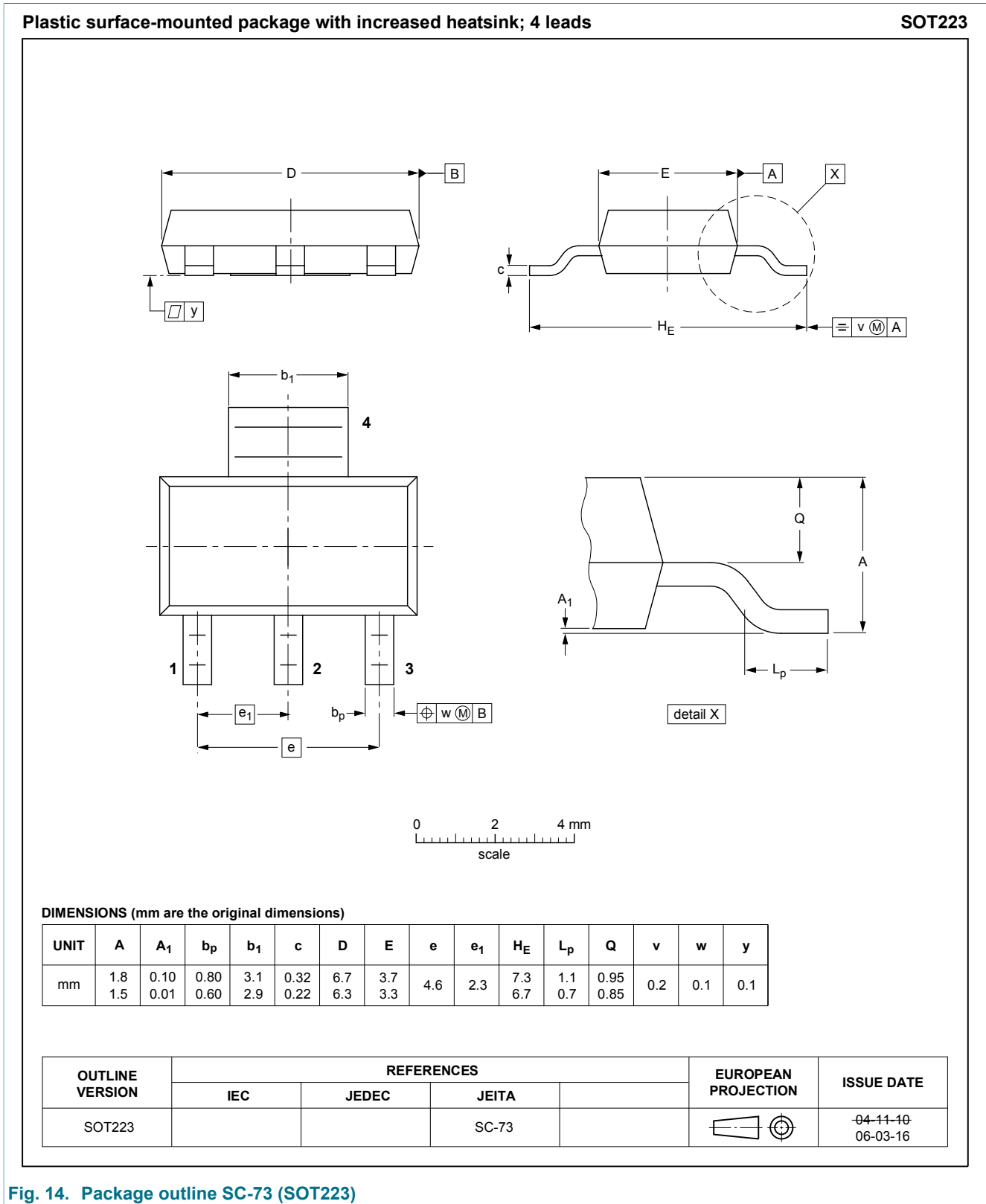


Fig. 14. Package outline SC-73 (SOT223)

### 11. Soldering

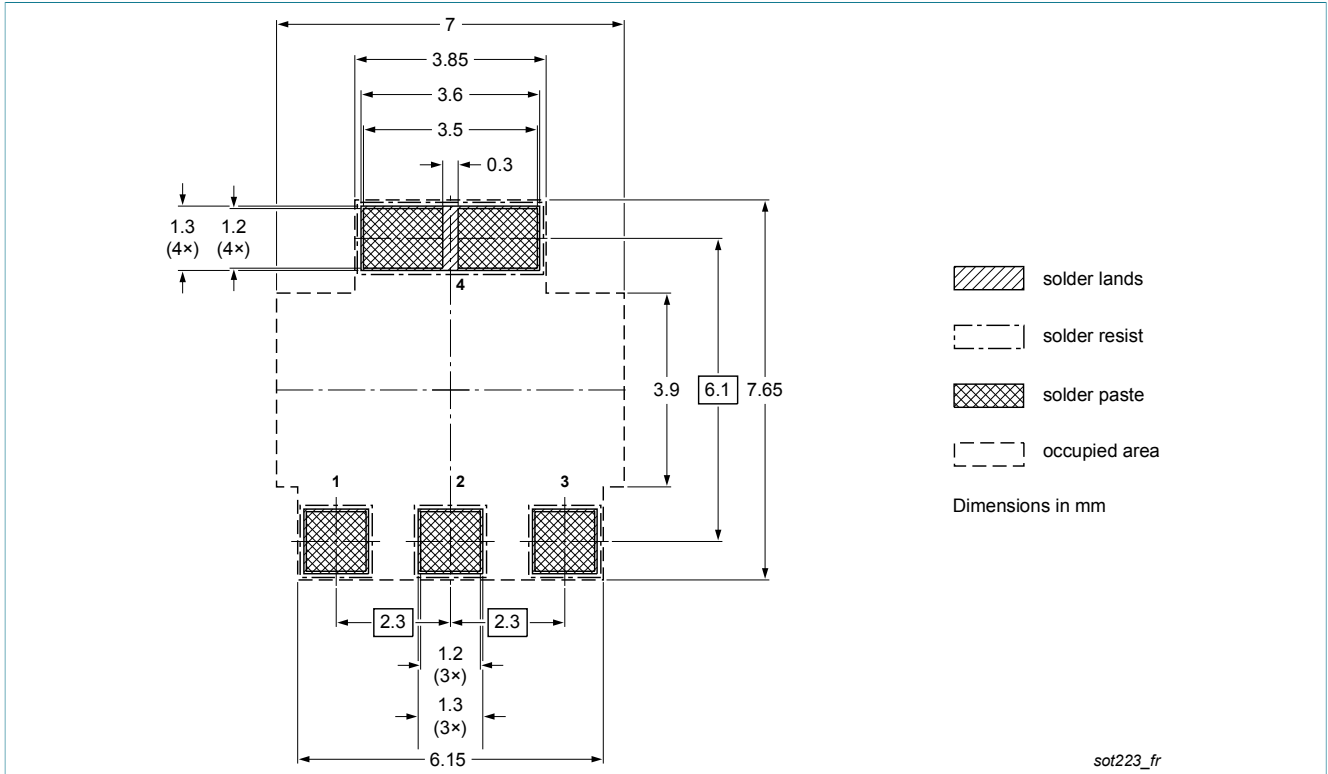


Fig. 15. Reflow soldering footprint for SC-73 (SOT223)

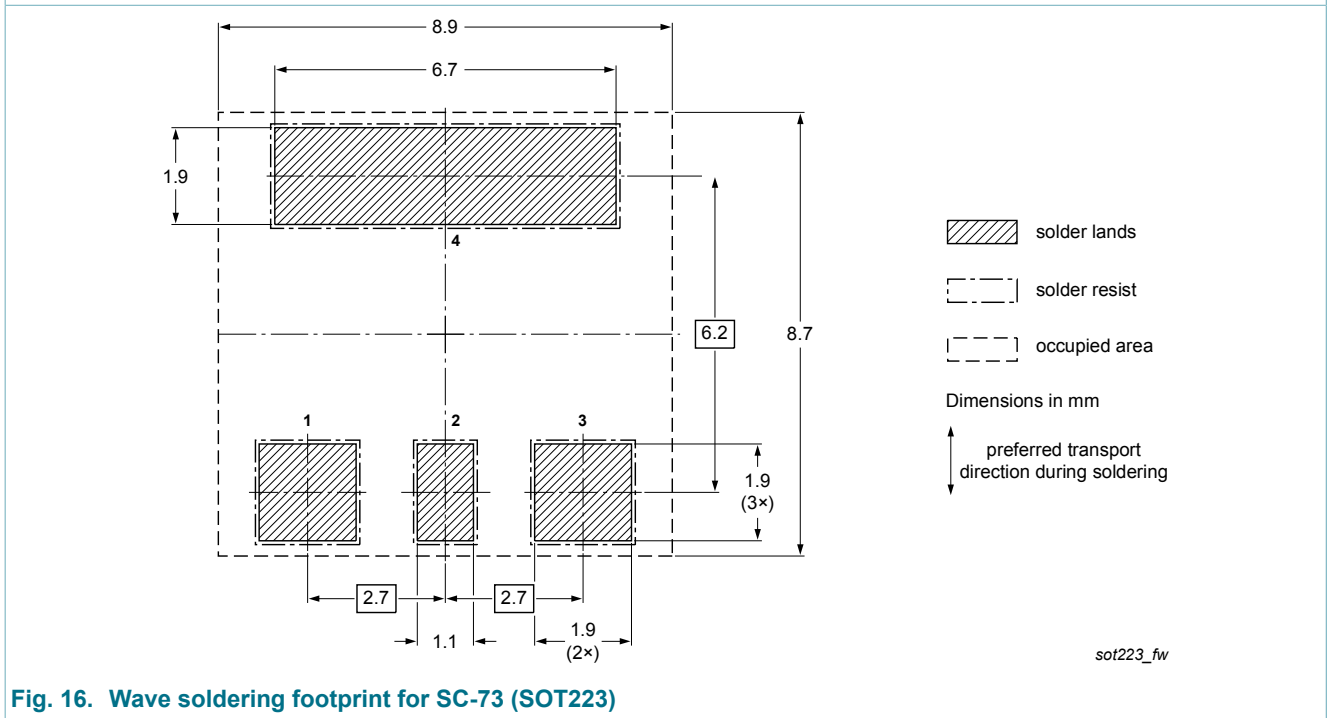


Fig. 16. Wave soldering footprint for SC-73 (SOT223)

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