

## 1. General description

Planar passivated high commutation three quadrant triac in a SOT223 surface mountable plastic package. This "series D" triac balances the requirements of commutation performance and gate sensitivity and is intended for interfacing with low power drivers and logic ICs including microcontrollers.

## 2. Features and benefits

- 3Q technology for improved noise immunity
- Direct gate triggering from low power drivers and logic ICs
- High commutation capability with sensitive gate
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package
- Triggering in three quadrants only
- Very sensitive gate for easy logic level triggering

## 3. Applications

- Low power motor controls
- Small inductive loads e.g. solenoids, door locks, water valves
- Small loads in large white goods

## 4. Quick reference data

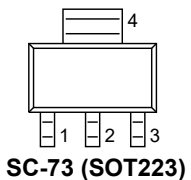
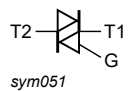
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 111\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	9	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 16.7\text{ ms}$	-	-	9.9	A
$T_j$	junction temperature		-	-	125	°C
<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>	0.25	-	5	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 9	0.25	-	5	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 9	0.25	-	5	mA
$I_H$	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 11	-	-	10	mA
$V_T$	on-state voltage	$I_T = 0.85\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 12	-	1.35	1.6	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	200	-	-	V/ $\mu$ s
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C};$ $I_{T(RMS)} = 0.8\text{ A}; dV_{com}/dt = 10\text{ V}/\mu\text{s};$ gate open circuit	0.5	-	-	A/ms

## 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; connected to main terminal 2		

## 6. Ordering information

Table 3. Ordering information

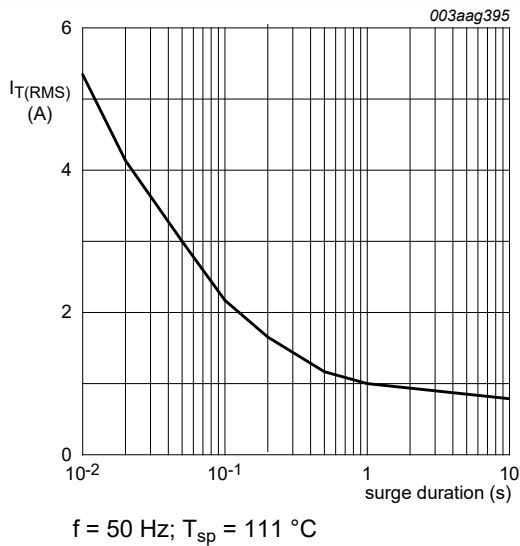
Type number	Package		
	Name	Description	Version
BTA2008W-600D	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 7. Limiting values

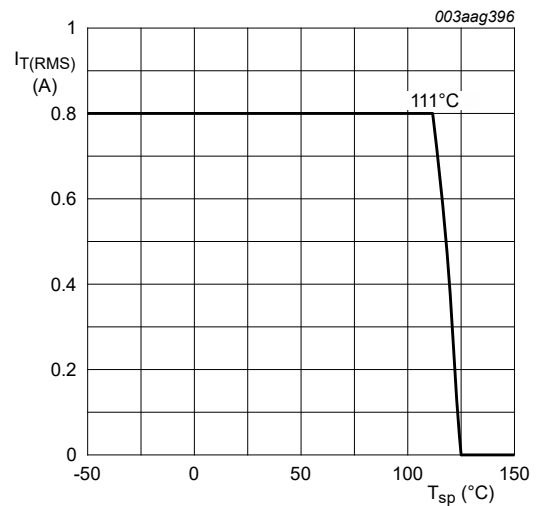
**Table 4. Limiting values**

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; $T_{sp} \leq 111\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	0.8	A
$I_{TSM}$	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>	-	9	A
		full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 16.7\text{ ms}$	-	9.9	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN	-	0.41	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_G = 20\text{ mA}$	-	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	-	0.1	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 lead temperature; maximum values**

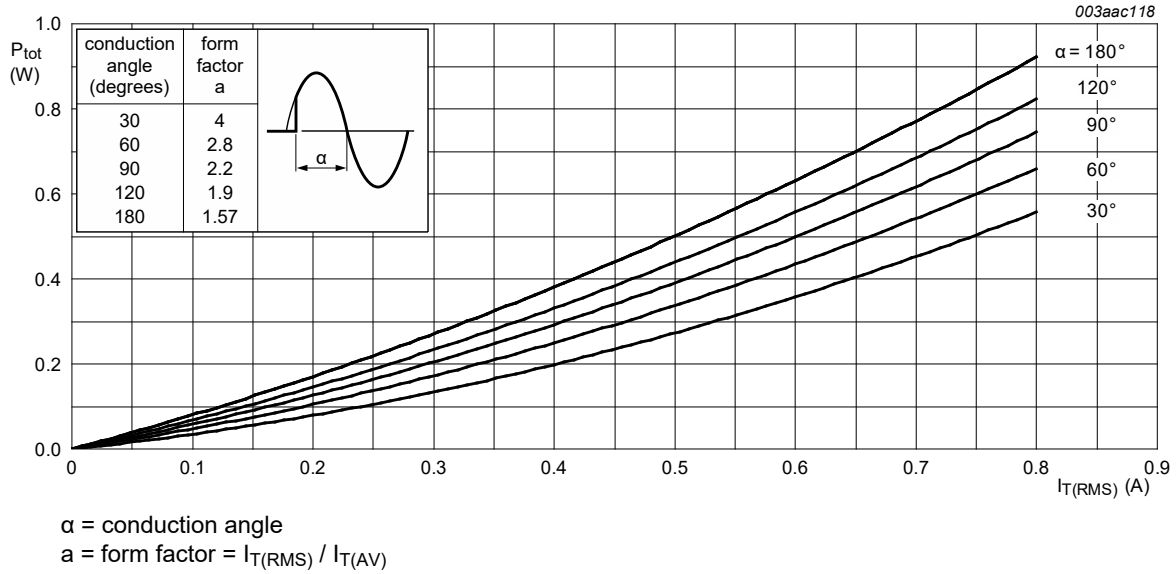


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

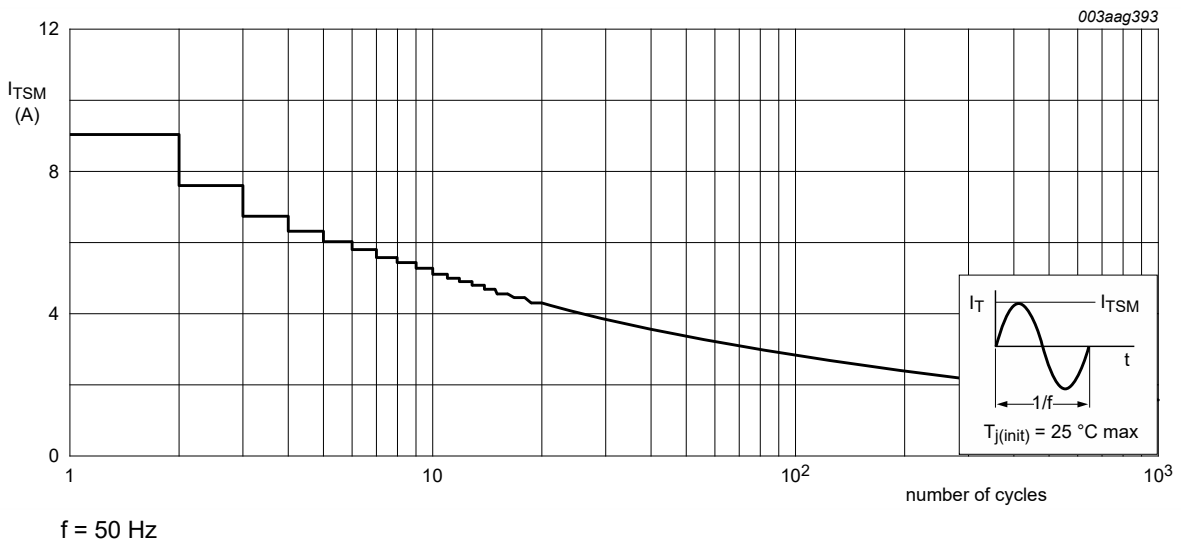
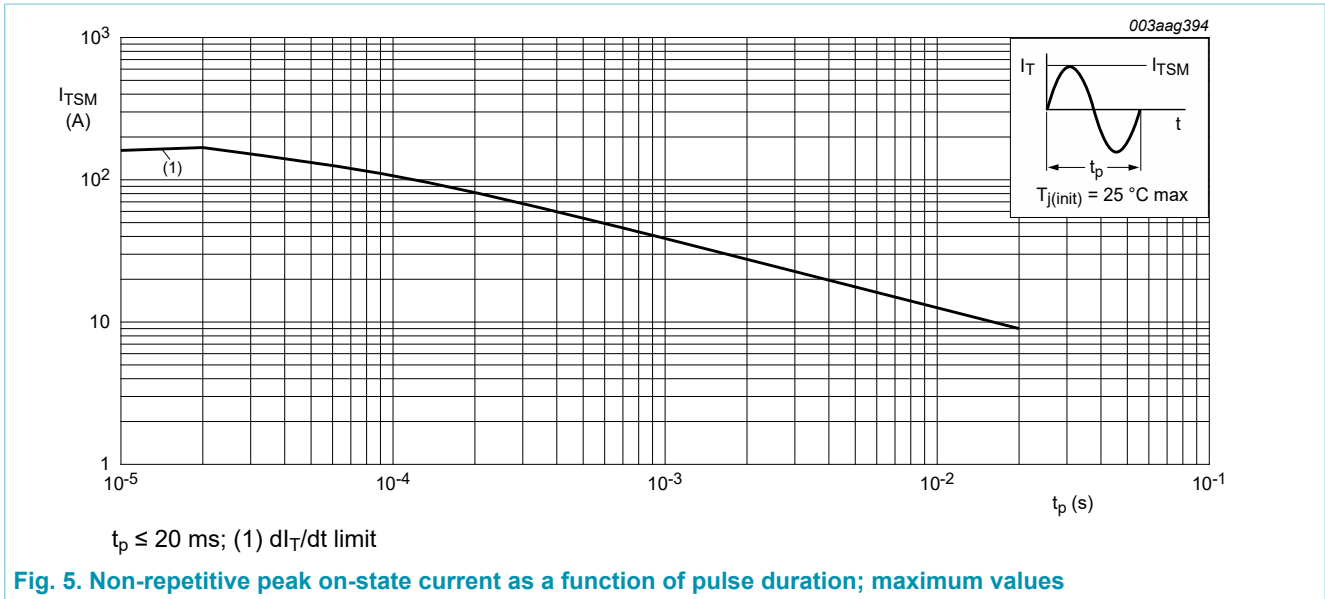


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



## 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 or half cycle; <a href="#">Fig. 6</a>	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air; printed-circuit board mounted: minimum footprint; <a href="#">Fig. 7</a>	-	156	-	K/W
		in free air; printed-circuit board mounted; pad area; <a href="#">Fig. 8</a>	-	70	-	K/W

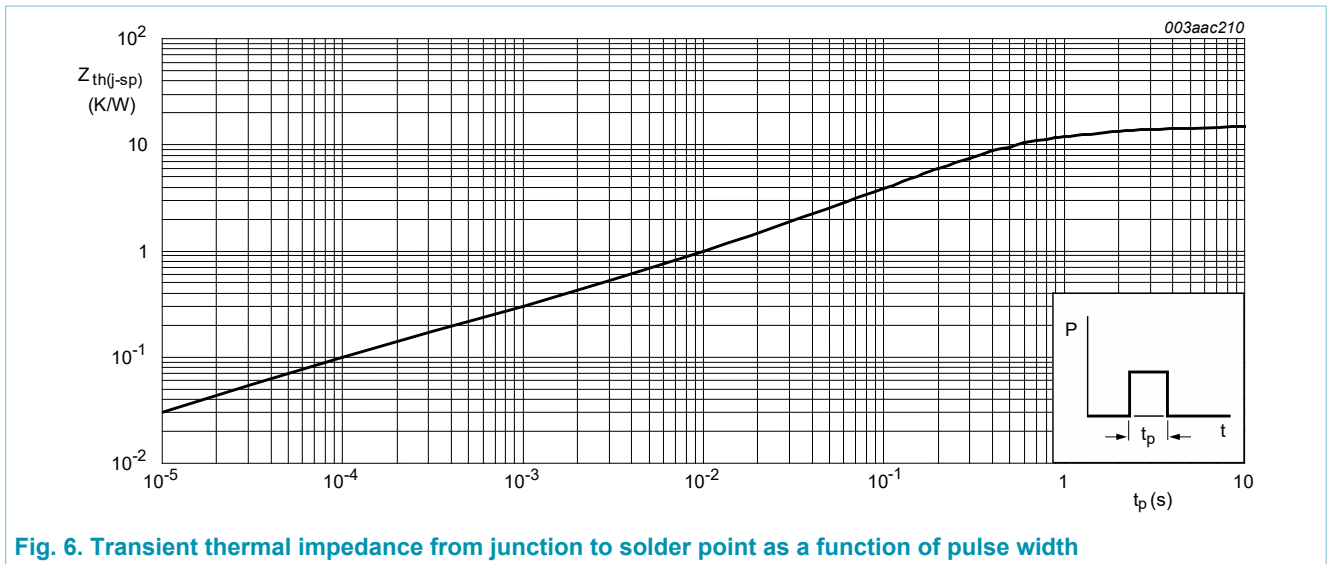


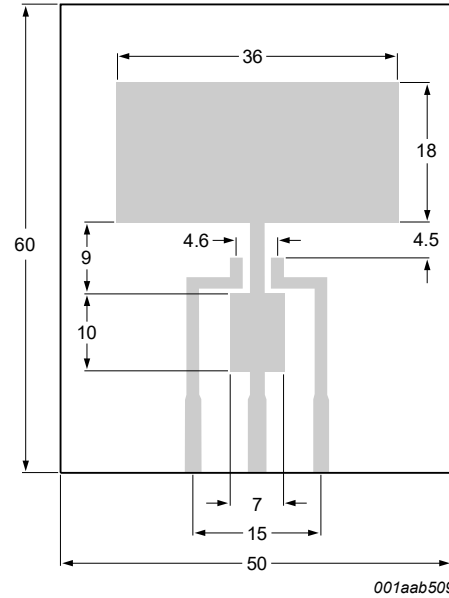
Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width



All dimensions are in mm

**Fig. 7. Minimum footprint SOT223**

001aab508



All dimensions are in mm

Printed circuit board:

FR4 epoxy glass (1.6 mm thick), copper laminate (35 um thick)

**Fig. 8. Printed circuit board pad area: SOT223**

001aab509

## 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>	0.25	-	5	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	0.25	-	5	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	0.25	-	5	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>	-	-	10	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	-	20	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	-	10	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	-	10	mA
$V_T$	on-state voltage	$I_T = 0.85\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 12</a>	-	1.35	1.6	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. 12</a>	-	0.9	1.5	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 12</a>	0.2	0.3	-	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	$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	200	-	-	V/ $\mu$ s
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{T(RMS)} = 0.8\text{ A}$ ; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$ ; gate open circuit	0.5	-	-	A/ms



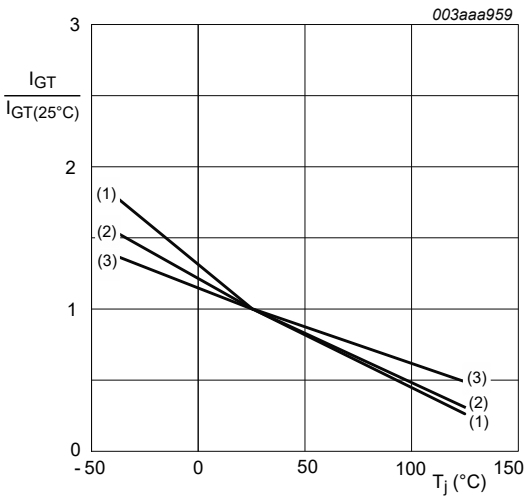


Fig. 9. Normalized gate trigger current as a function of junction temperature

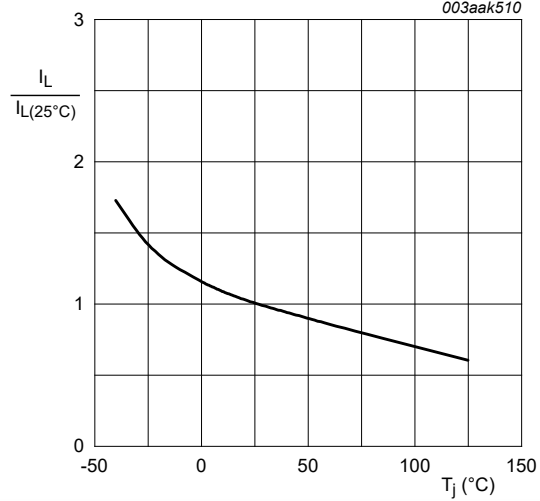


Fig. 10. Normalized latching current as a function of junction temperature

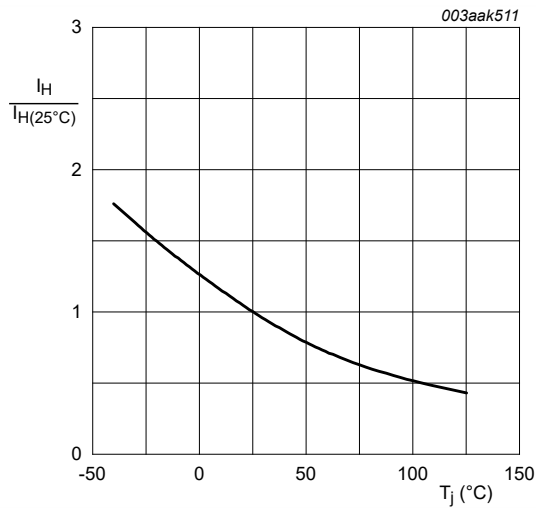
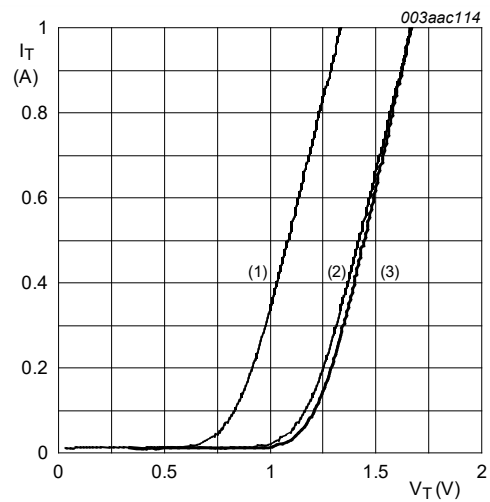


Fig. 11. Normalized holding current as a function of junction temperature



$V_o = 0.835 \text{ V}; R_s = 0.50 \Omega$

- (1)  $T_j = 125^{\circ}\text{C}$ ; typical values
- (2)  $T_j = 125^{\circ}\text{C}$ ; maximum values
- (3)  $T_j = 25^{\circ}\text{C}$ ; maximum values

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

### 10. Package outline

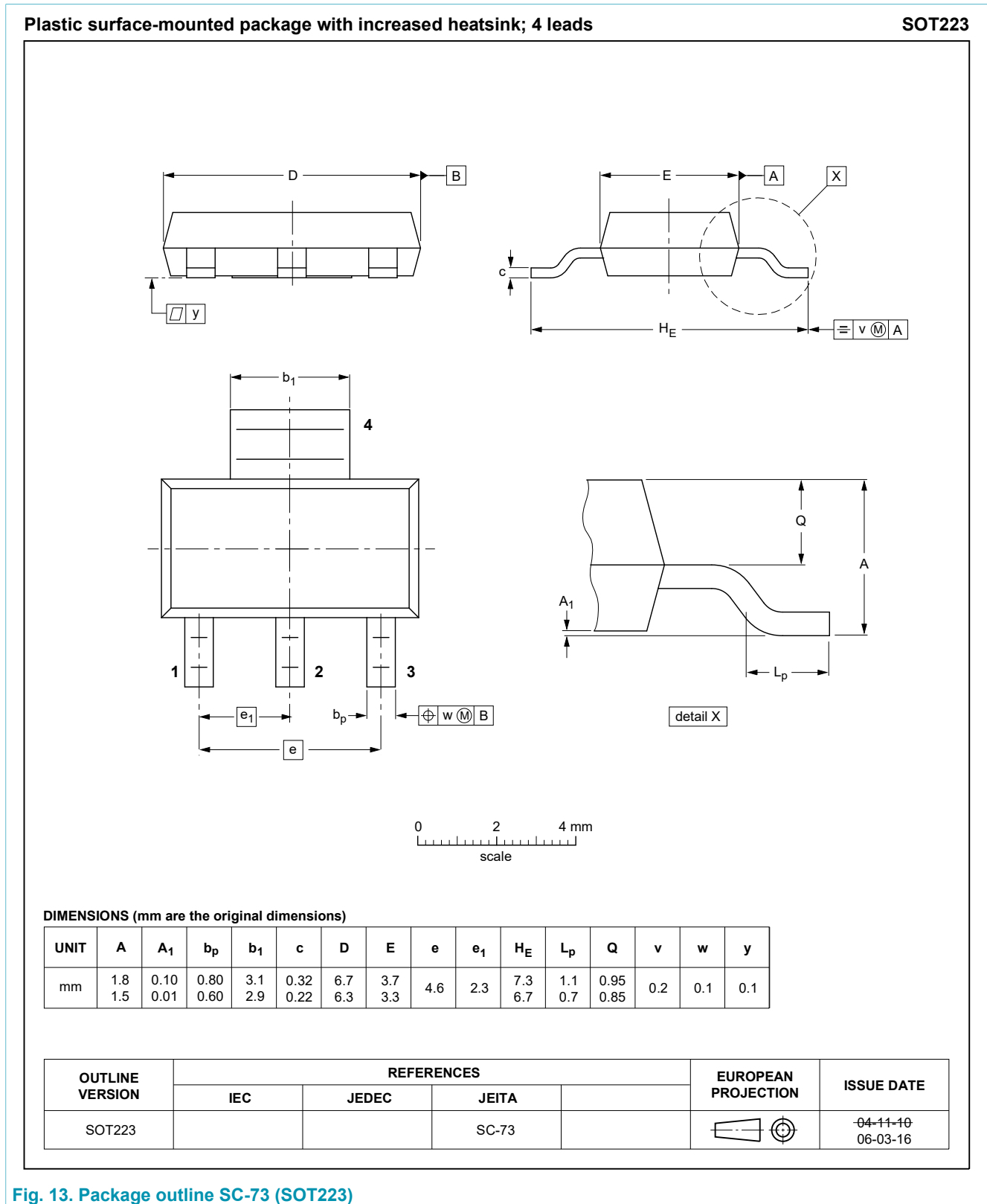


Fig. 13. Package outline SC-73 (SOT223)

### 11. Package outline (minimized)

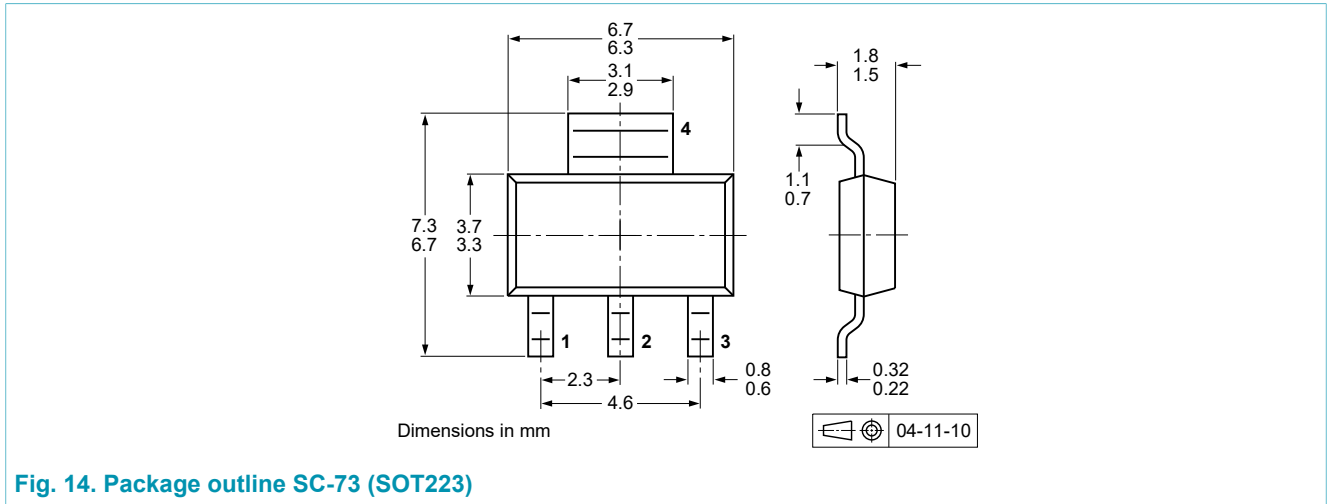


Fig. 14. Package outline SC-73 (SOT223)

### 12. Soldering

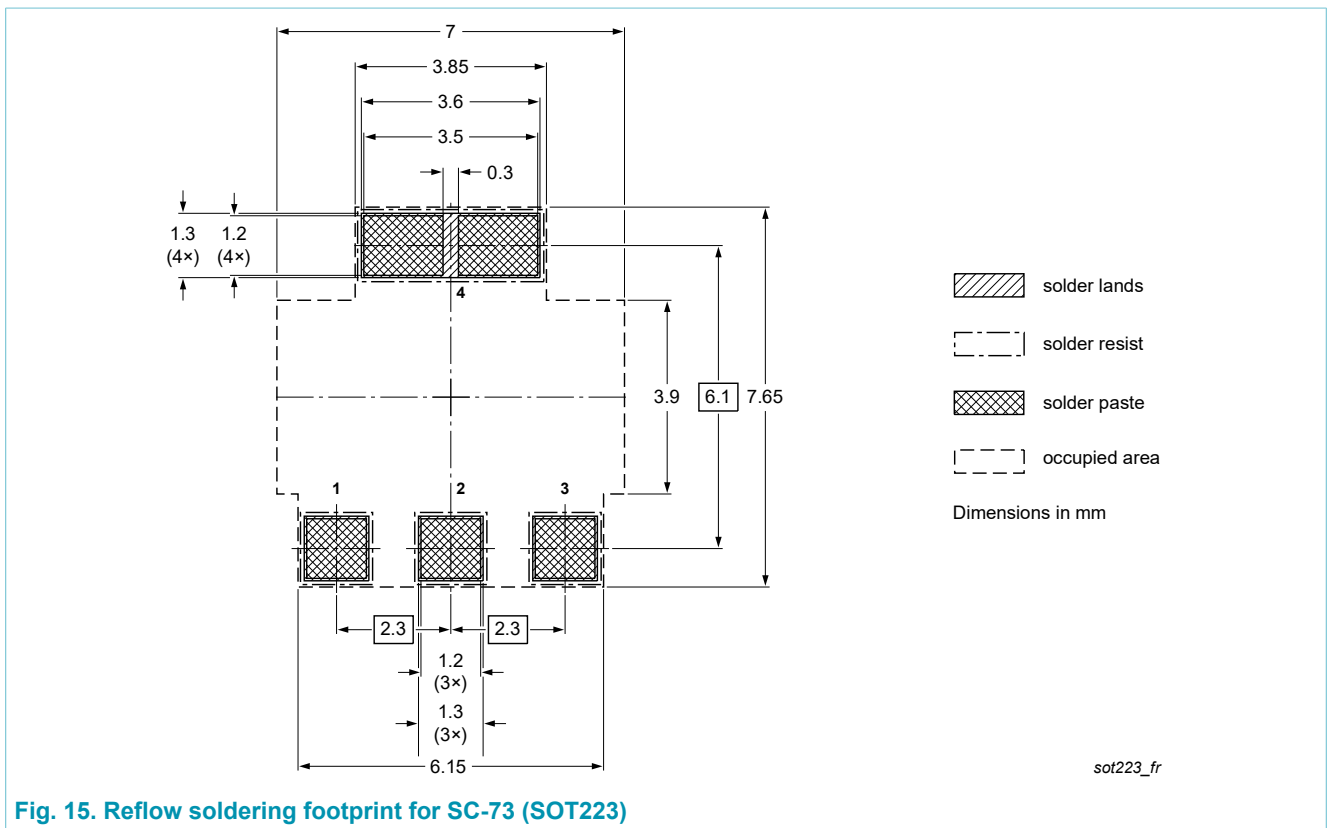


Fig. 15. Reflow soldering footprint for SC-73 (SOT223)

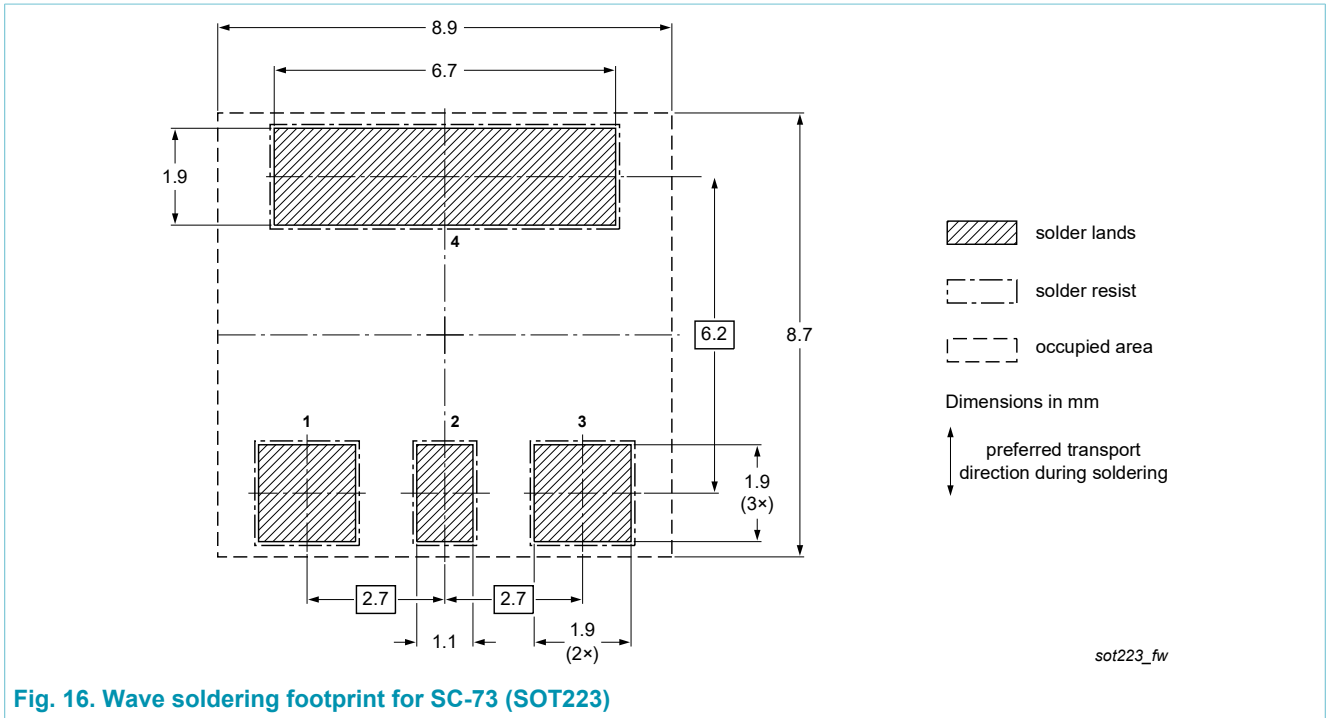


Fig. 16. Wave soldering footprint for SC-73 (SOT223)

## 13. 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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