

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

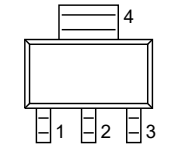
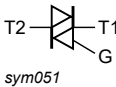
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{sp}} \leq 108\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$; $t_{\text{p}} = 16.7\text{ ms}$	-	-	11	A
		full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$; $t_{\text{p}} = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	10	A
T_{j}	junction temperature		-	-	125	°C
Static characteristics						
I_{GT}	gate trigger current	$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T_2+ G+; $T_{\text{j}} = 25\text{ °C}$; Fig. 9	-	-	10	mA
		$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T_2+ G-; $T_{\text{j}} = 25\text{ °C}$; Fig. 9	-	-	10	mA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 9		-	-	10	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 11		-	-	12	mA
V_T	on-state voltage	$I_T = 2\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 12		-	1.2	1.5	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 600\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$; (67% of V_{DRM}); exponential waveform; gate open circuit		30	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$; $I_{T(RMS)} = 1\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit		2	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 SC-73 (SOT223)	 sym051
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} ≤ 108 °C; Fig. 1; Fig. 2; Fig. 3	-	1	A
I _{TSM}	non-repetitive peak on-state current	full sine wave; T _{j(init)} = 25 °C; t _p = 16.7 ms	-	11	A
		full sine wave; T _{j(init)} = 25 °C; t _p = 20 ms; Fig. 4; Fig. 5	-	10	A
I ² t	I ² t for fusing	t _p = 10 ms; SIN	-	0.5	A ² s
di _T /dt	rate of rise of on-state current	I _G = 0.2 A	-	100	A/μs
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	°C
T _j	junction temperature		-	125	°C

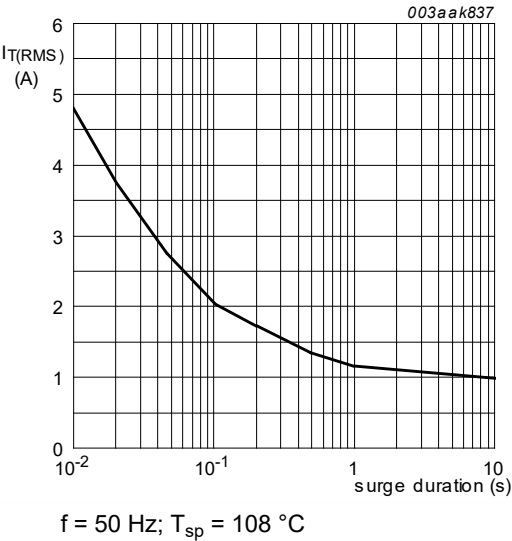


Fig. 1. RMS on-state current as a function of surge duration; maximum values

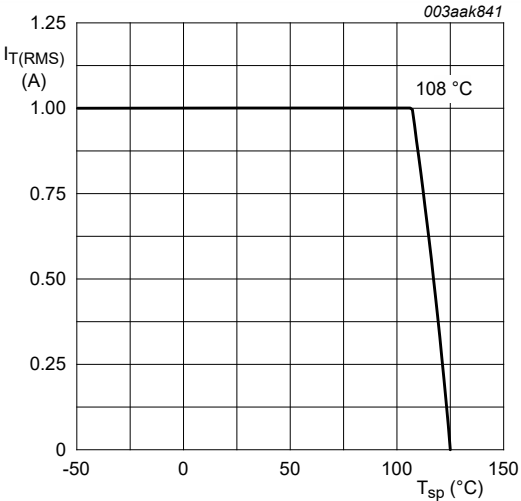
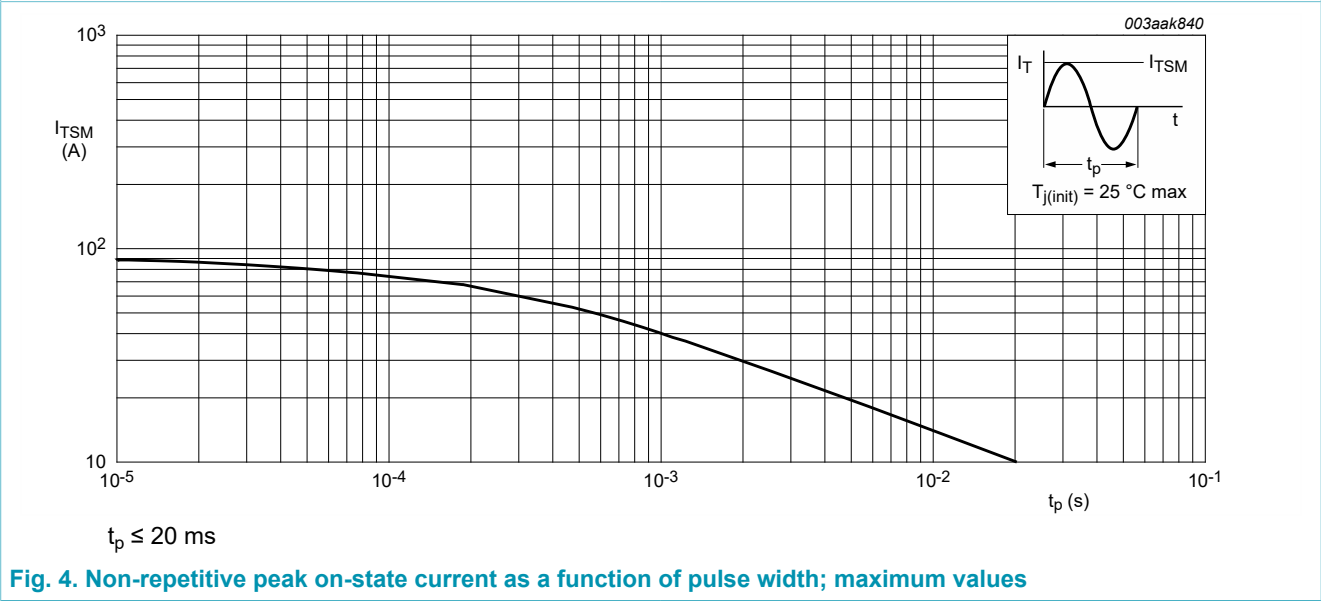
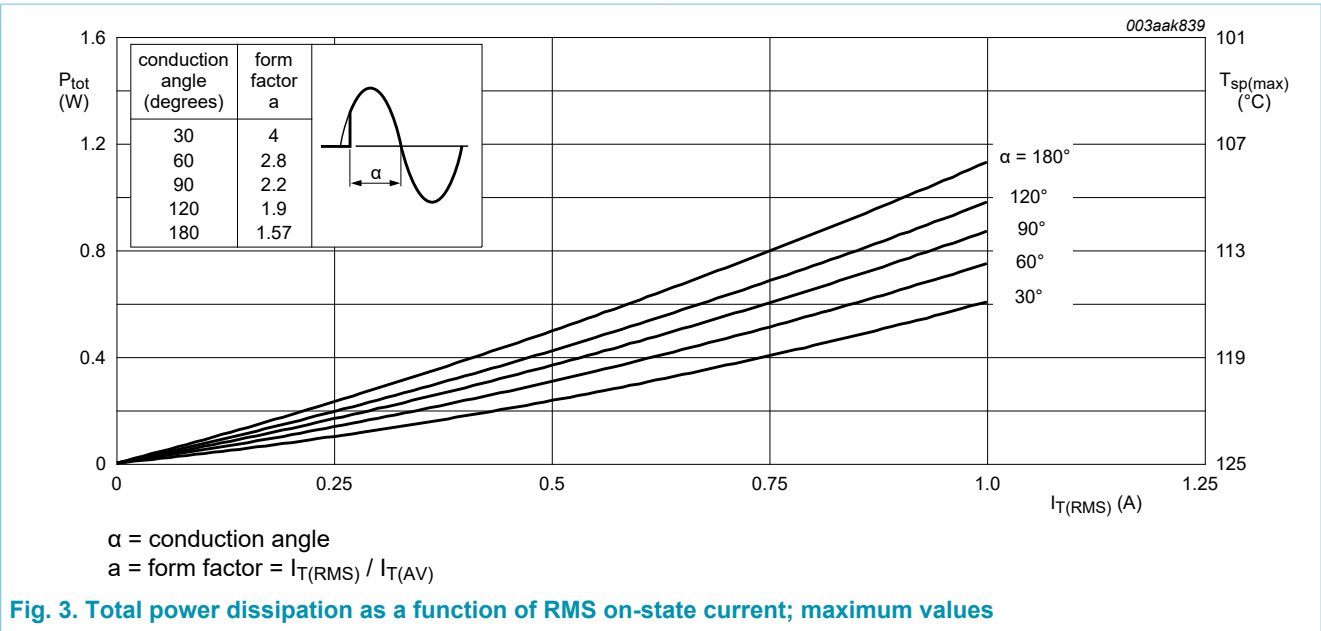
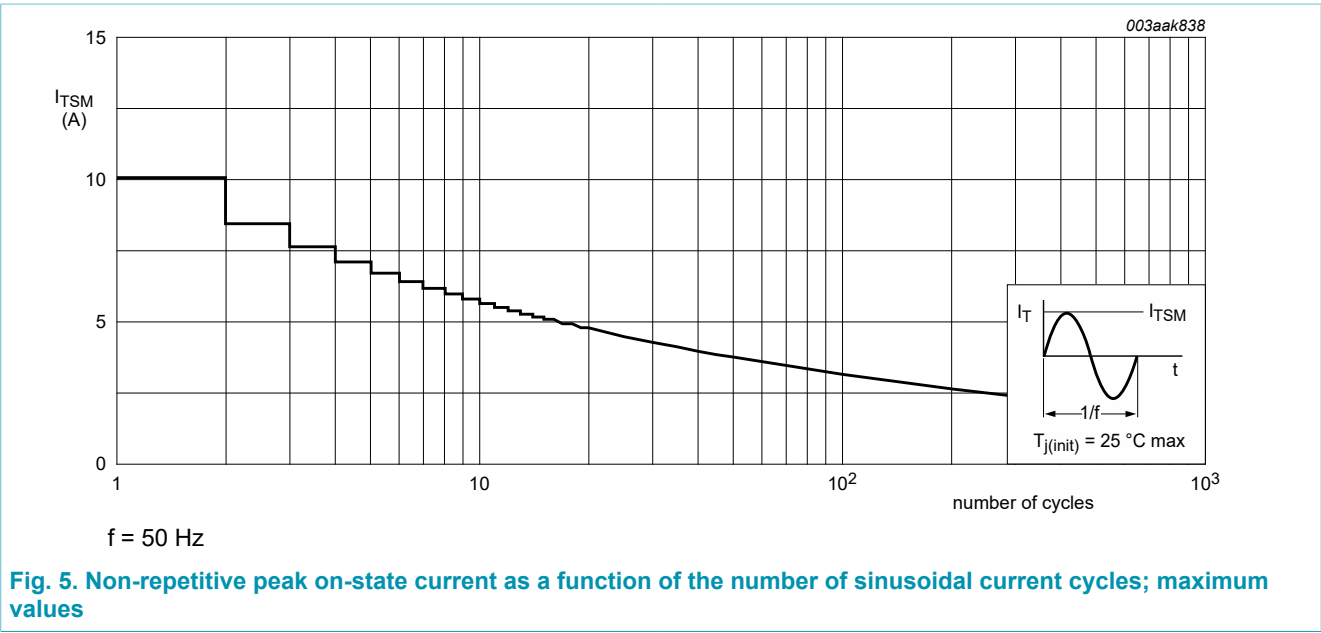


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

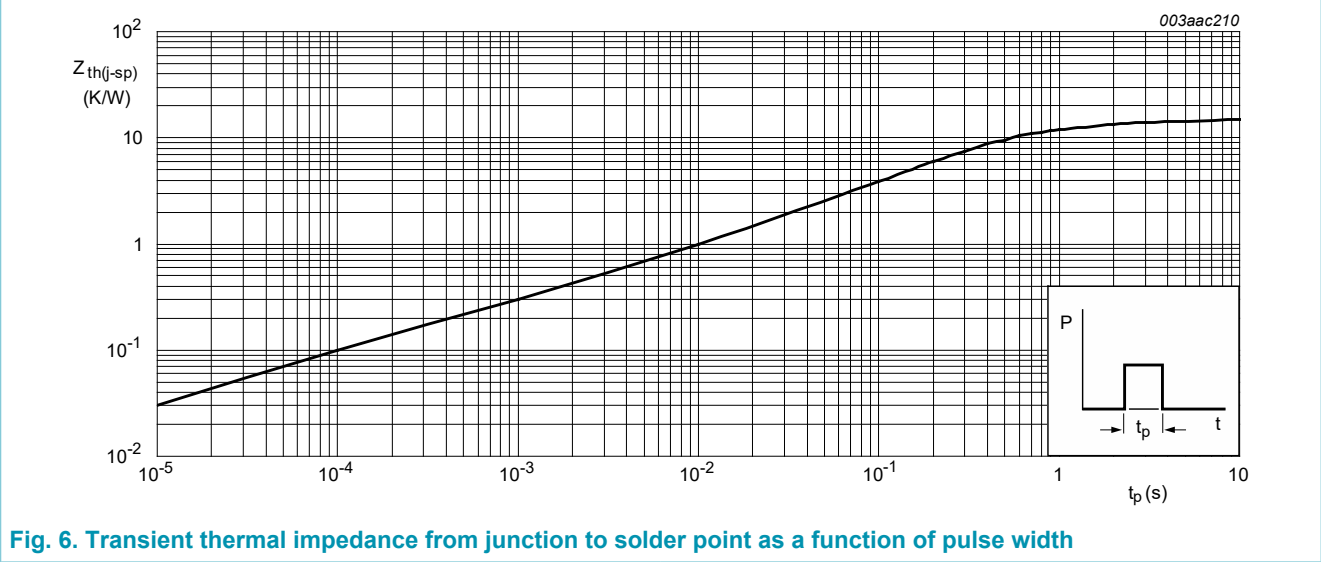


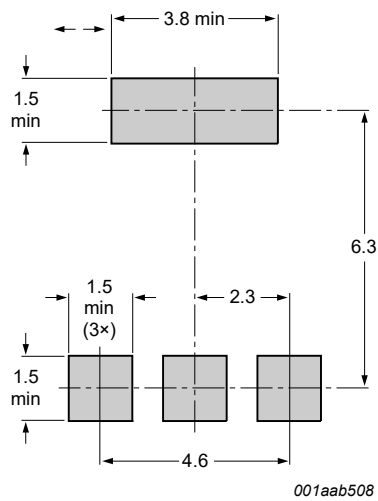


8. Thermal characteristics

Table 5. Thermal characteristics

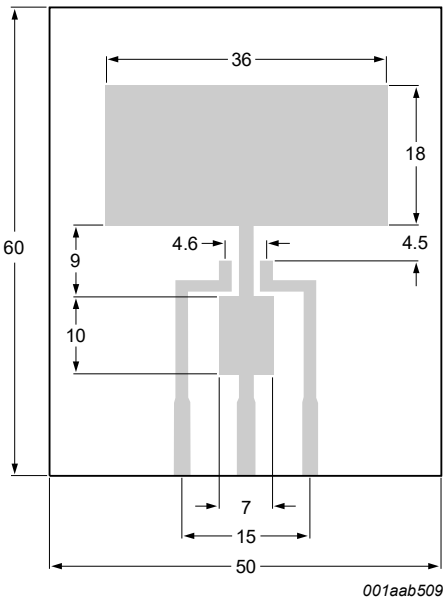
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle or half cycle; Fig. 6		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air; printed circuit board mounted; minimum footprint; Fig. 7		-	156	-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





All dimensions are in mm

Fig. 7. Minimum footprint SOT223



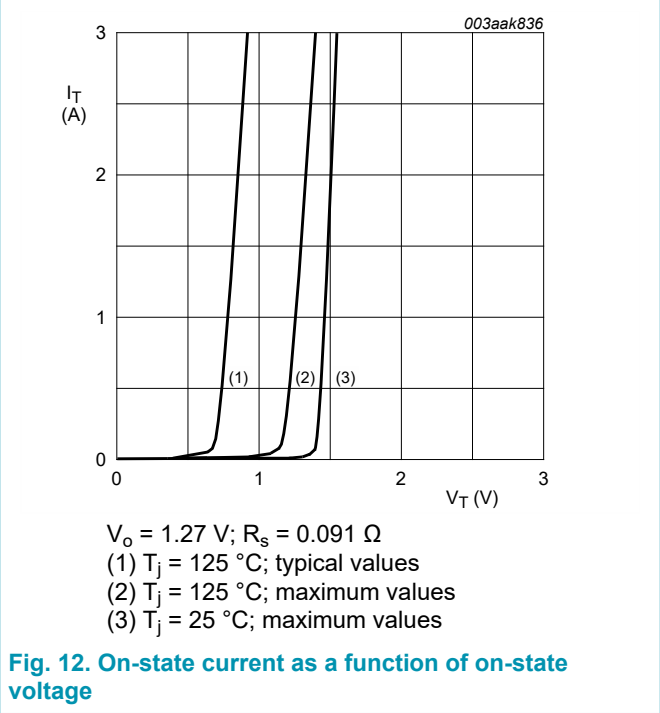
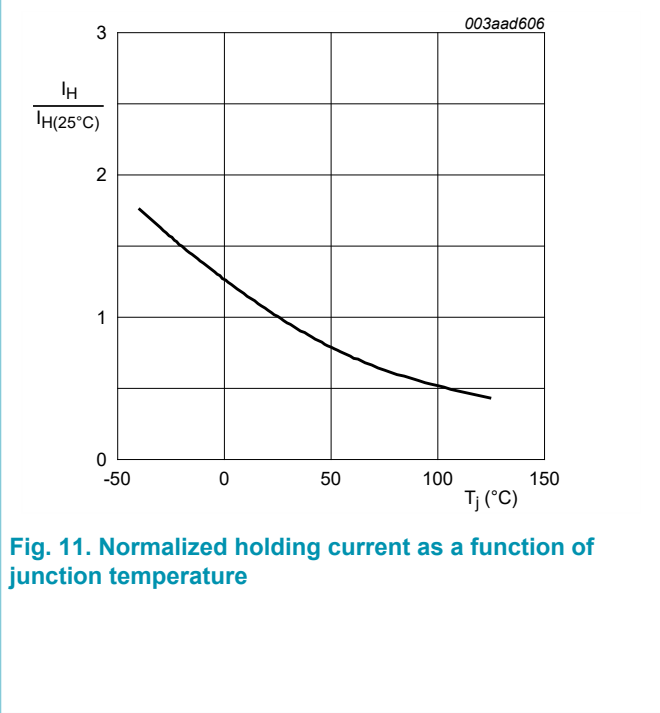
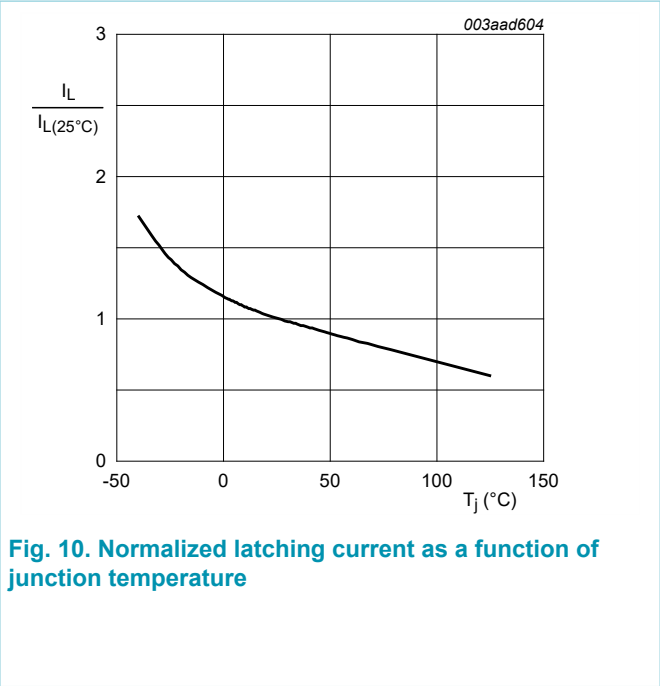
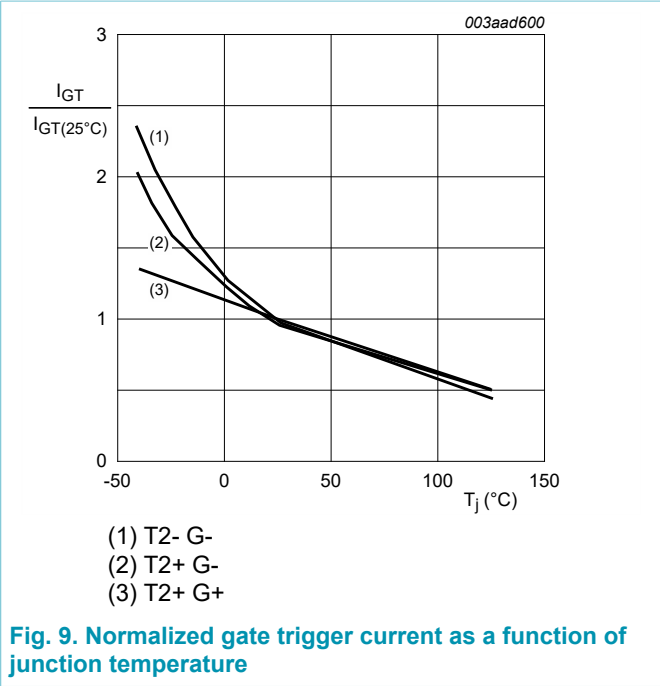
All dimensions are in mm
Printed circuit board:
FR4 epoxy glass (1.6 mm thick), copper laminate
(35 um thick)

Fig. 8. Printed circuit board pad area: SOT223

9. Characteristics

Table 6. Characteristics

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



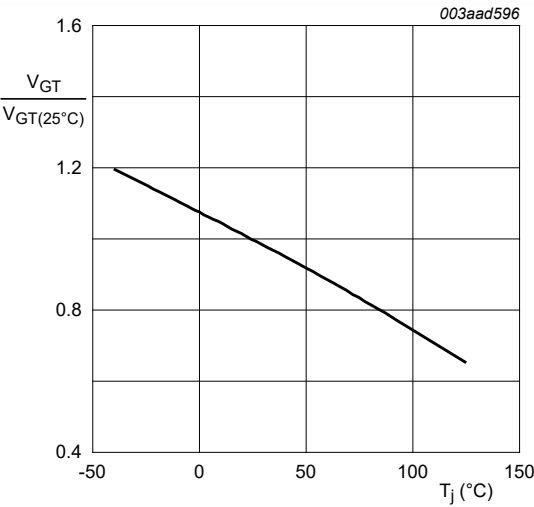


Fig. 13. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

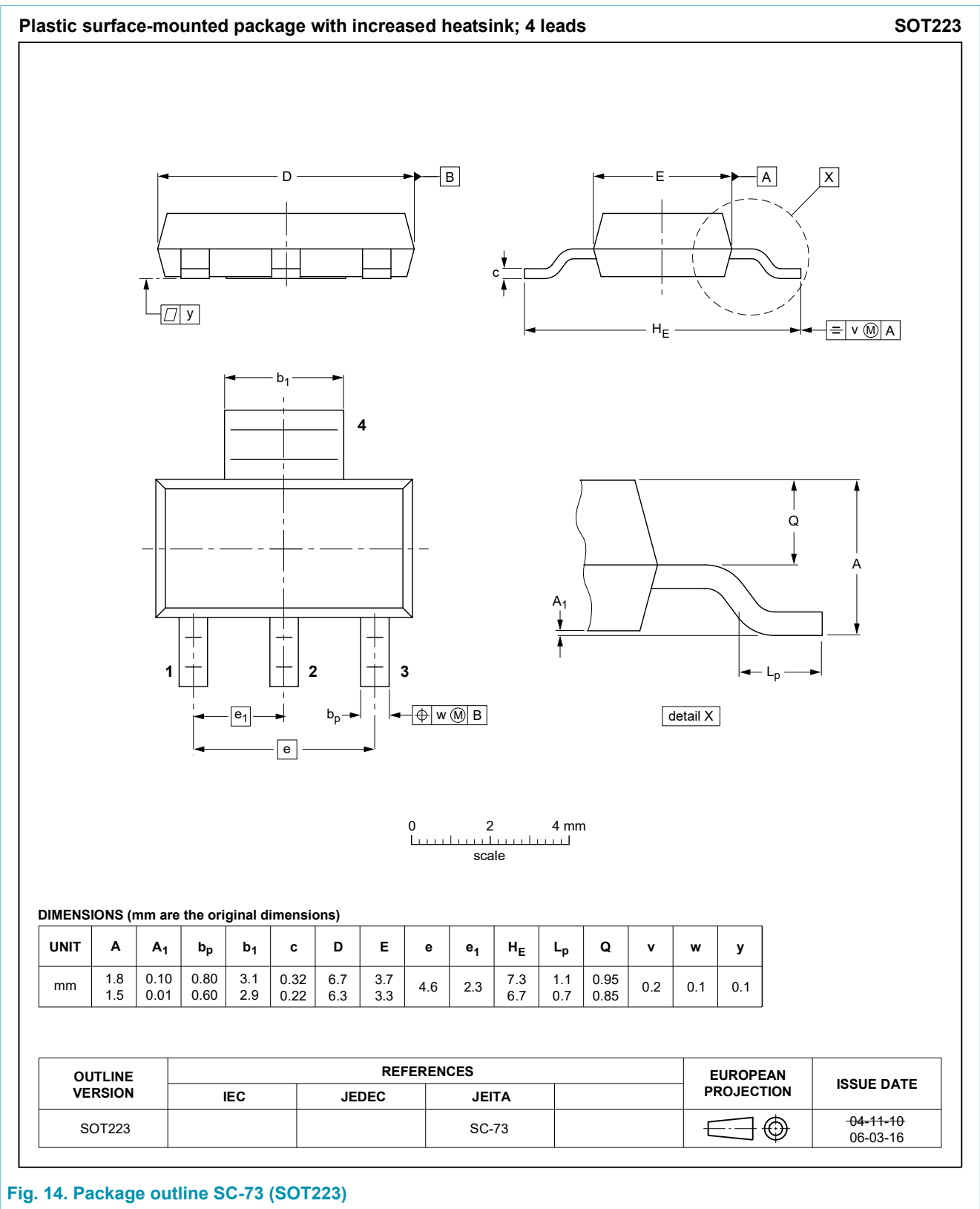
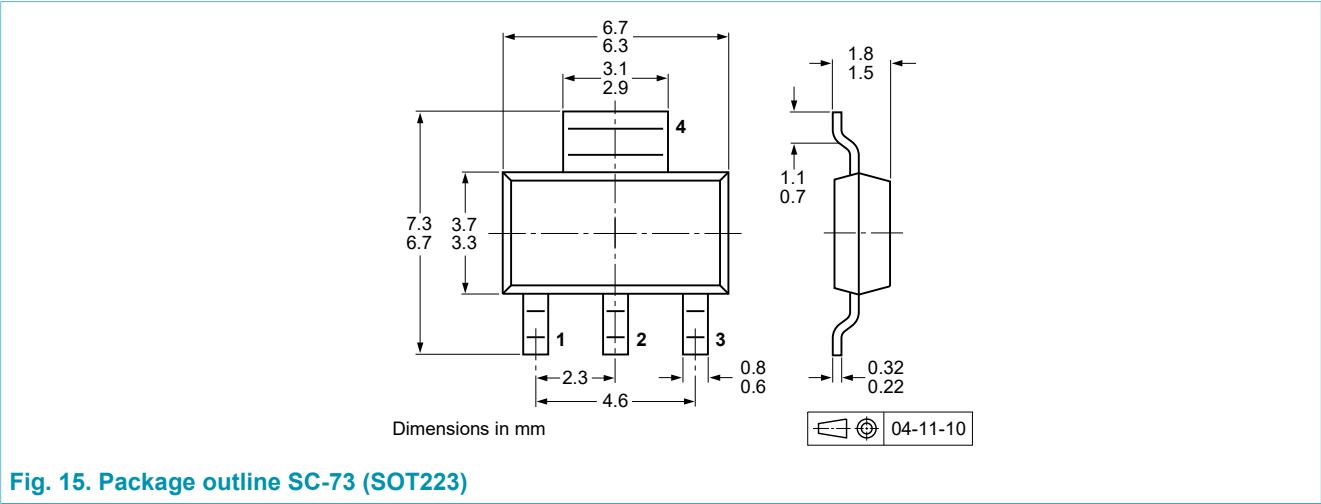
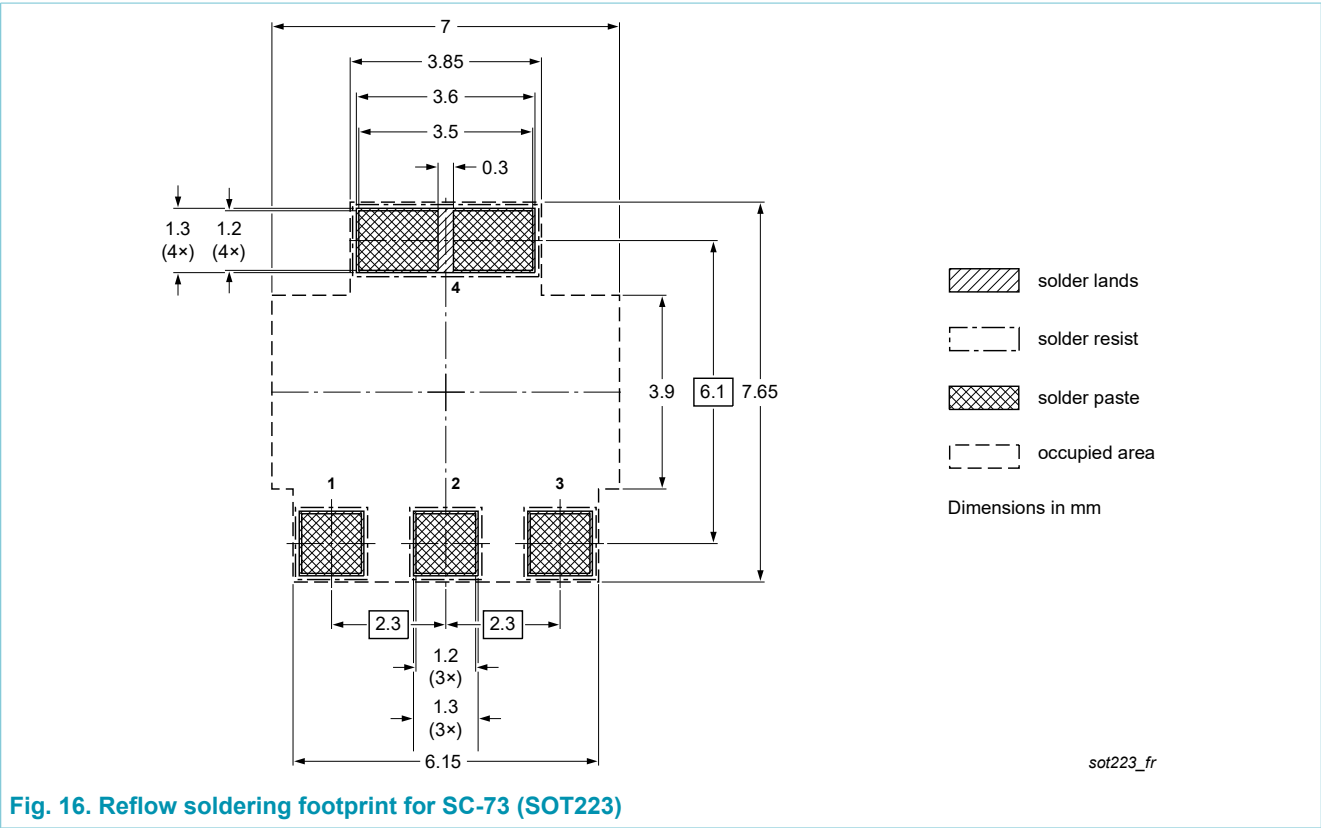


Fig. 14. Package outline SC-73 (SOT223)

11. Package outline (minimized)



12. Soldering



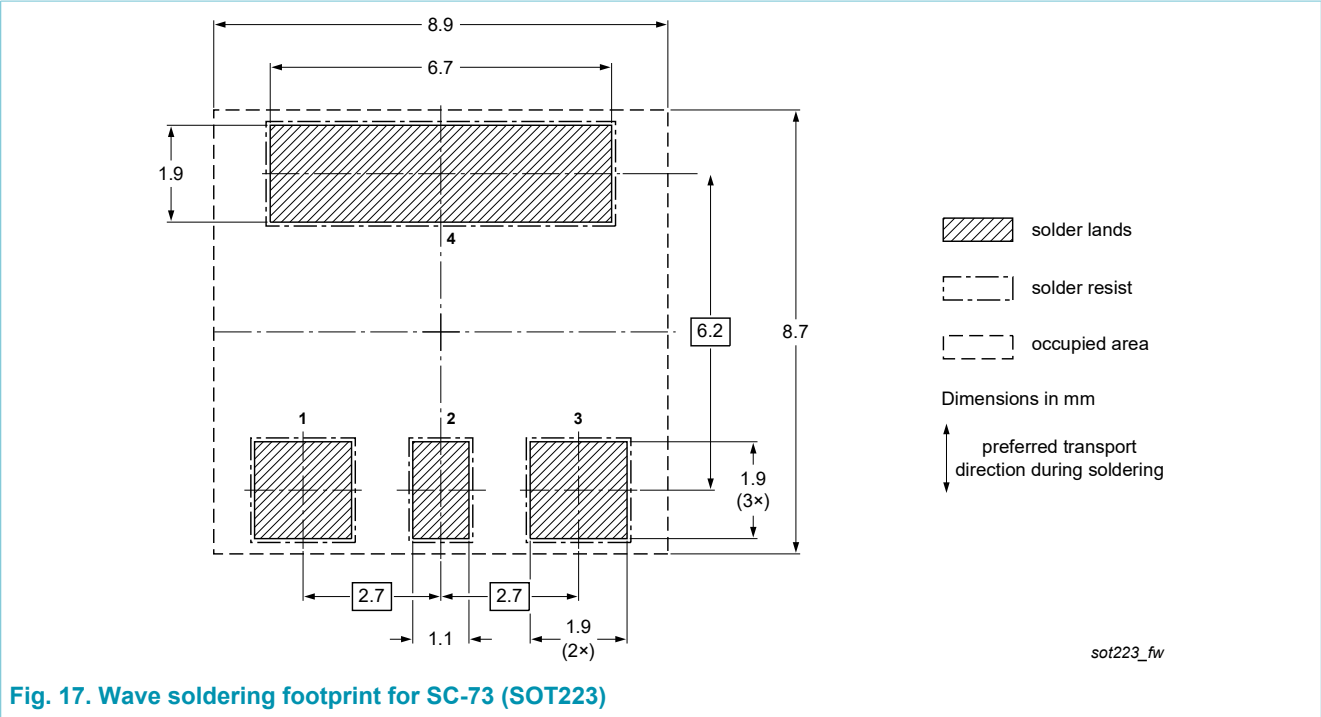


Fig. 17. Wave soldering footprint for SC-73 (SOT223)

13. Legal information

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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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- [2] The term 'short data sheet' is explained in section "Definitions".
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