

## 1. General description

Planar passivated SCR with faster switching performance and sensitive gate in a SOT223 surface mounted plastic package. This SCR with enhanced commutation performance is also designed to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

## 2. Features and benefits

- Fast commutation performance for higher frequency operation
- Full wave rectified AC applications
- Sensitive gate
- Direct triggering from microcontrollers, low power drivers and logic ICs

## 3. Applications

- Earth leakage circuit breakers (ELCB/GFI)
- Ignition circuits (gas appliances, small engines and HID lighting)

## 4. Quick reference data

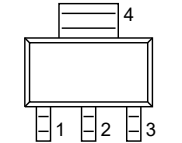

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 112\text{ °C}$ ; <a href="#">Fig. 1</a>	-	-	0.63	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 112\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	1	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	8	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$	-	-	9	A
$T_j$	junction temperature		-	-	125	°C
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	70	200	450	μA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 11</a>	350	800	-	V/μs

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit; <a href="#">Fig. 11</a>		-	25	-	V/ $\mu$ s

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SC-73 (SOT223)	
2	A	anode		
3	G	gate		
4	mb	mb; connected to anode		

6. Ordering information

Table 3. Ordering information

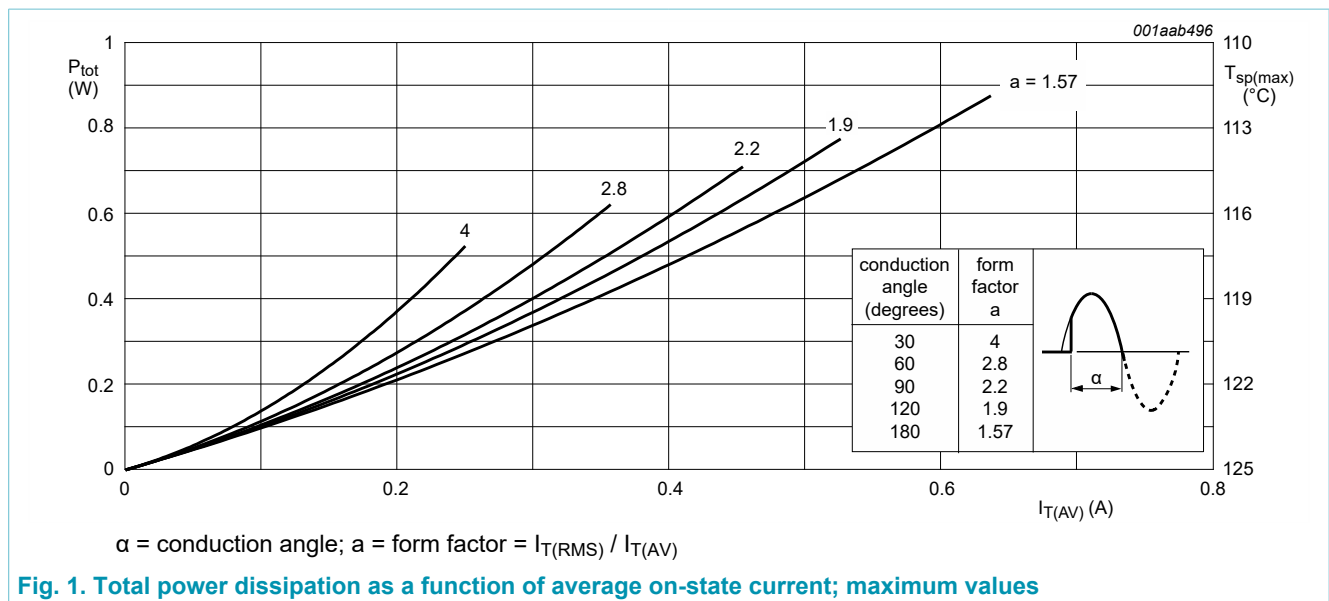
Type number	Package		
	Name	Description	Version
BT168GWF	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 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
$V_{RRM}$	repetitive peak reverse voltage		-	600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 112\text{ }^{\circ}\text{C}$ ; Fig. 1	-	0.63	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 112\text{ }^{\circ}\text{C}$ ; Fig. 2; Fig. 3	-	1	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; Fig. 4; Fig. 5	-	8	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$	-	9	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN	-	0.32	$\text{A}^2\text{s}$
$dl_T/dt$	rate of rise of on-state current	$I_T = 2\text{ A}$ ; $I_G = 10\text{ mA}$ ; $dl_G/dt = 100\text{ mA}/\mu\text{s}$	-	50	$\text{A}/\mu\text{s}$
$I_{GM}$	peak gate current		-	1	A
$V_{RGM}$	peak reverse gate voltage		-	5	V
$P_{GM}$	peak gate power		-	2	W
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.1	W
$T_{stg}$	storage temperature		-40	150	$^{\circ}\text{C}$
$T_j$	junction temperature		-	125	$^{\circ}\text{C}$



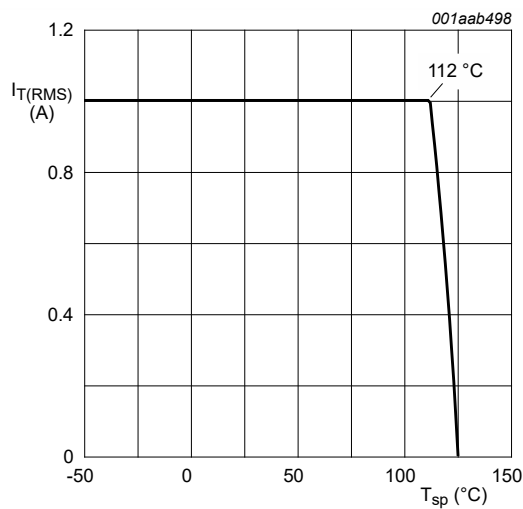


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

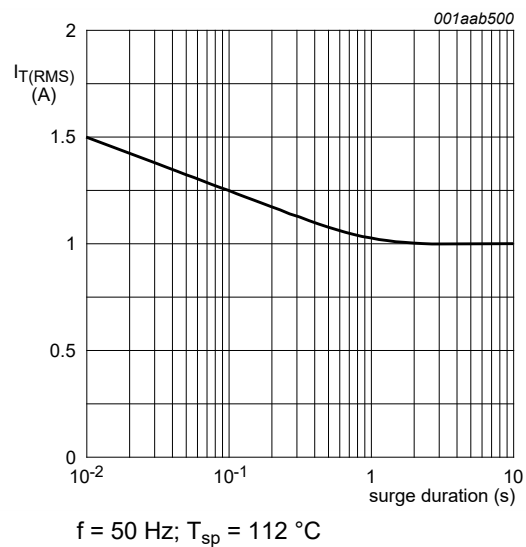


Fig. 3. RMS on-state current as a function of surge duration; maximum values

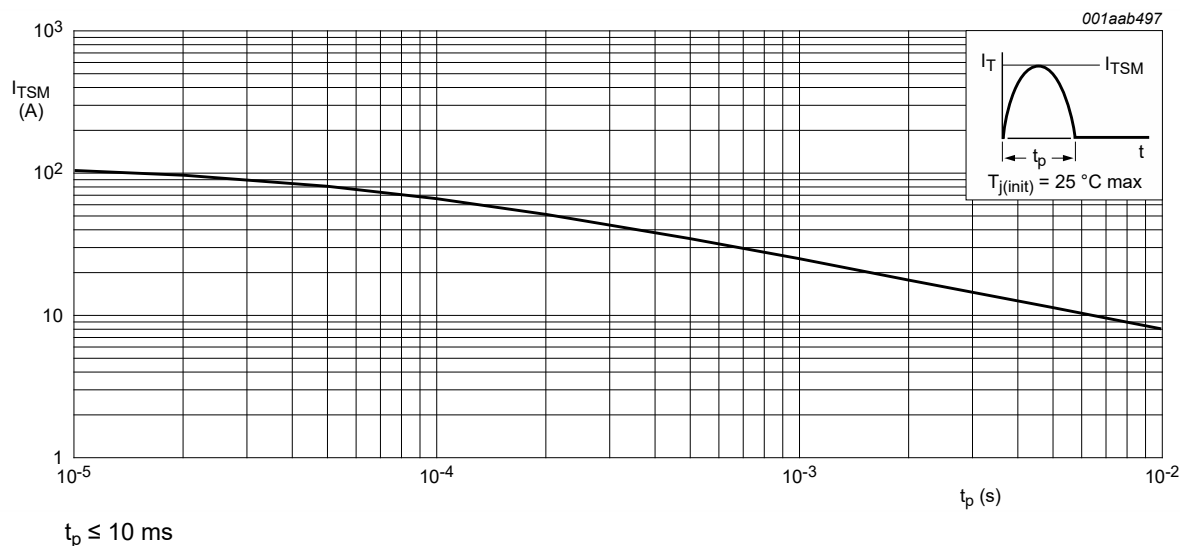
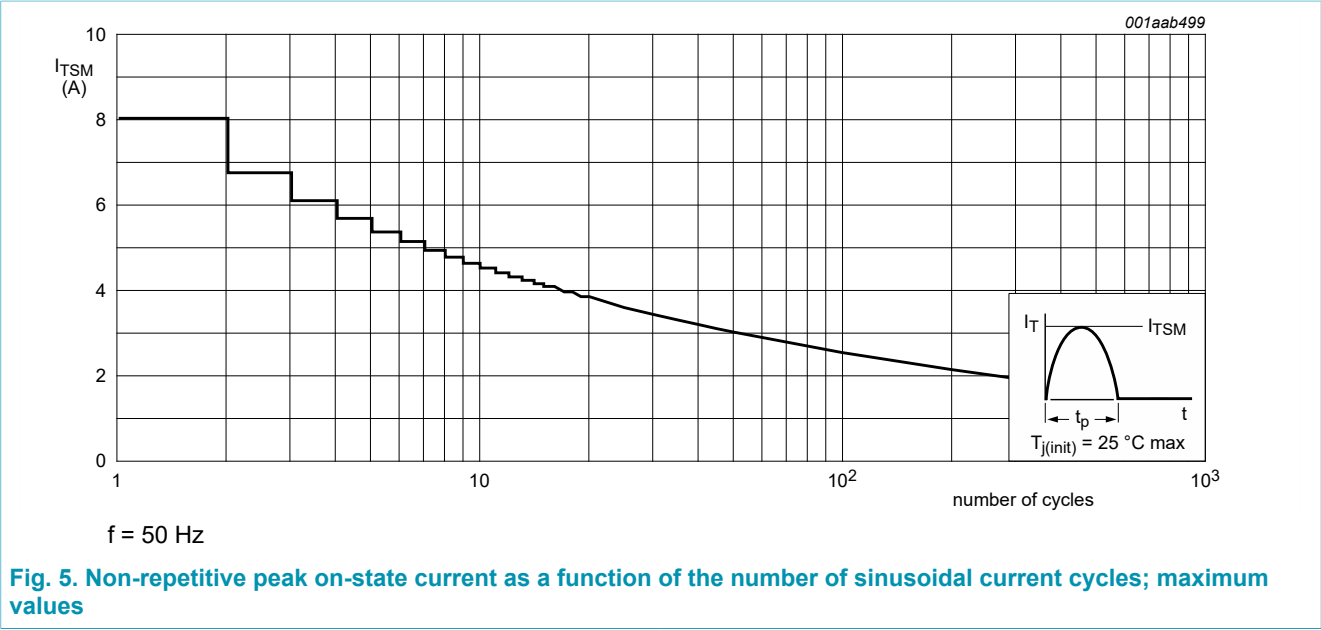


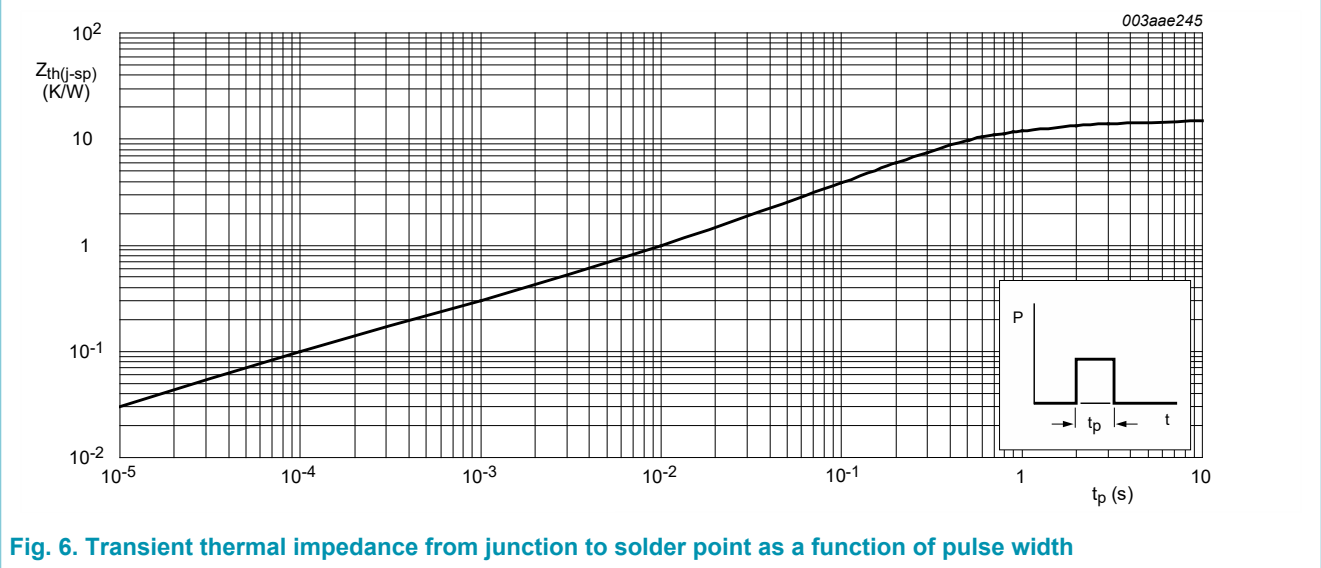
Fig. 4. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values

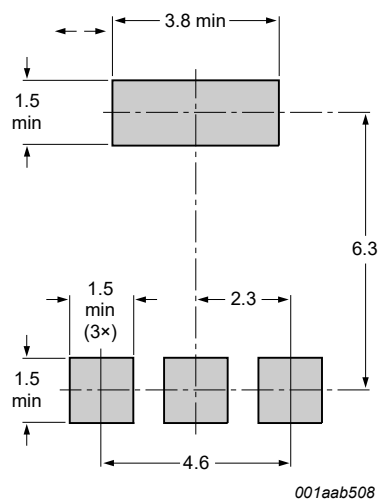


8. Thermal characteristics

Table 5. Thermal characteristics

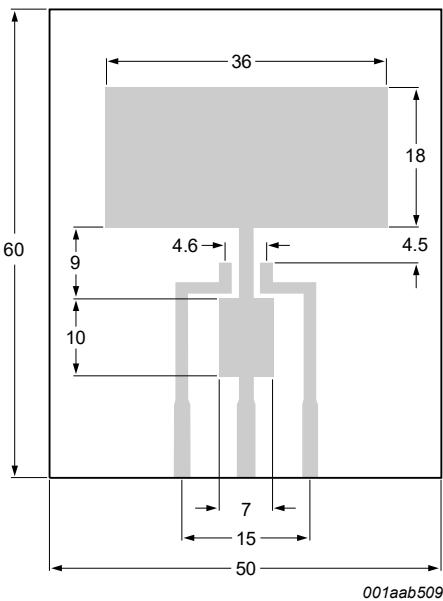
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	<a href="#">Fig. 6</a>	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	printed-circuit board mounted; minimum footprint; <a href="#">Fig. 7</a>	-	156	-	K/W
		printed-circuit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





All dimensions are in mm

Fig. 7. Minimum footprint SOT223



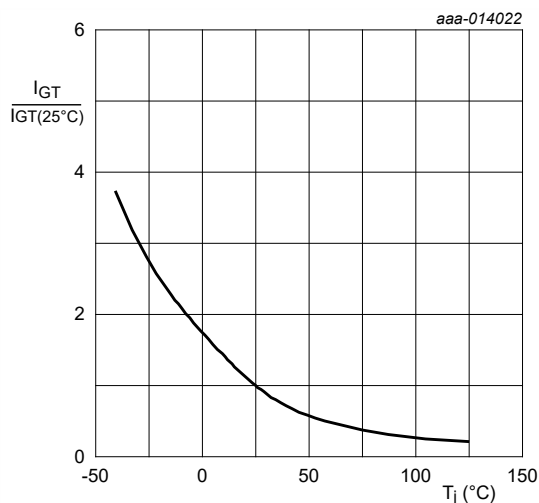
All dimensions are in mm  
Printed circuit board:  
FR4 epoxy glass (1.6 mm thick), copper laminate  
(35 um thick)

Fig. 8. Printed circuit board pad area: SOT223

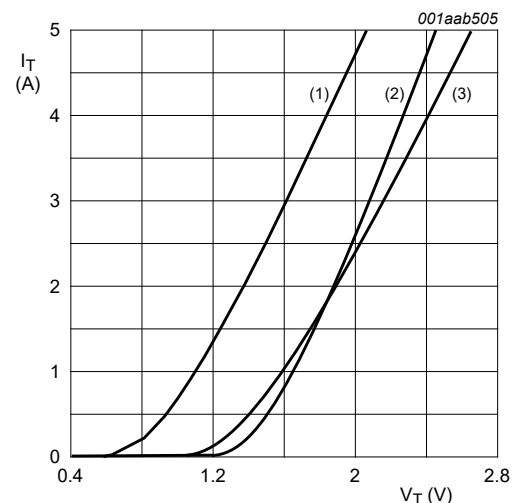
## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>	70	200	450	$\mu\text{A}$
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.5\text{ mA}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; $R_{GK(\text{ext})} = 1\text{ k}\Omega$	3	7.5	13	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; $R_{GK(\text{ext})} = 1\text{ k}\Omega$	0.5	4.1	10	mA
$V_T$	on-state voltage	$I_T = 1.2\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 10</a>	-	1.35	1.7	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 25\text{ }^\circ\text{C}$	-	0.5	0.8	V
		$V_D = 600\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 125\text{ }^\circ\text{C}$	0.2	0.3	-	V
$I_D$	off-state current	$V_D = 600\text{ V}$ ; $R_{GK(\text{ext})} = 1\text{ k}\Omega$ ; $T_j = 125\text{ }^\circ\text{C}$	-	0.05	0.1	mA
$I_R$	reverse current	$V_R = 600\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; $R_{GK(\text{ext})} = 1\text{ k}\Omega$	-	0.05	0.1	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; $R_{GK} = 1\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 11</a>	350	800	-	V/ $\mu\text{s}$
		$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit; <a href="#">Fig. 11</a>	-	25	-	V/ $\mu\text{s}$



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



$V_o = 1.0\text{ V}$ ;  $R_s = 0.27\text{ }\Omega$

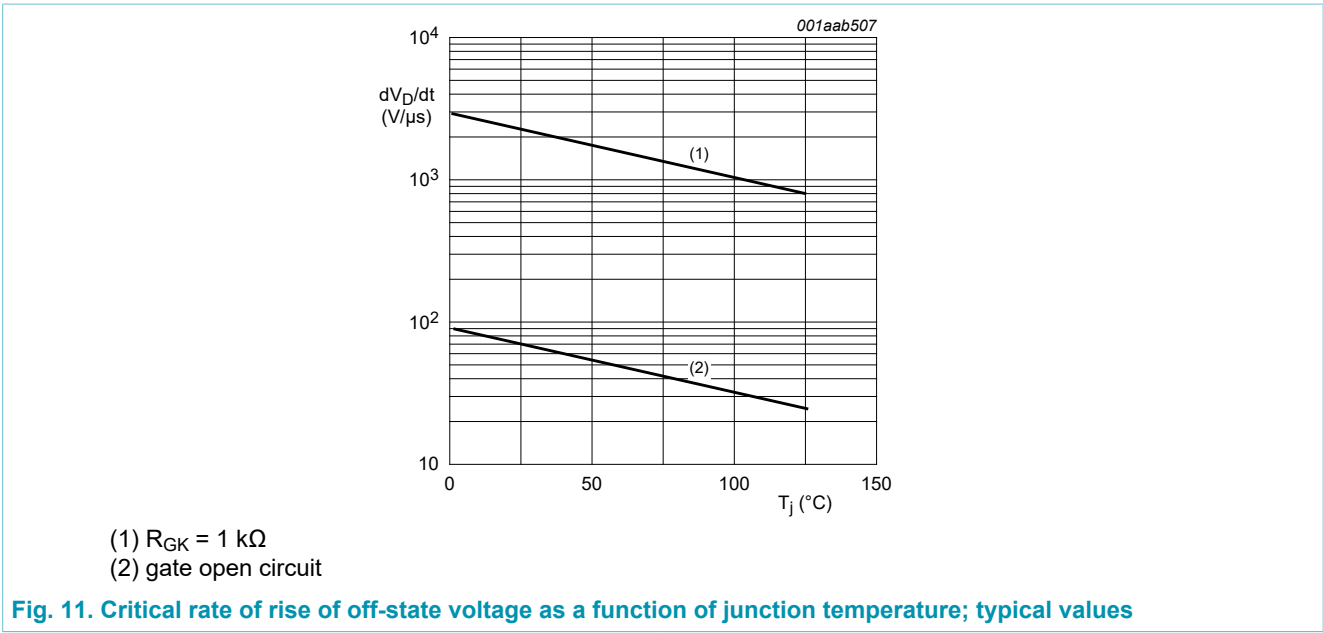
(1)  $T_j = 125\text{ }^\circ\text{C}$ ; typical values

(2)  $T_j = 125\text{ }^\circ\text{C}$ ; maximum values

(3)  $T_j = 25\text{ }^\circ\text{C}$ ; maximum values

**Fig. 10. On-state current as a function of on-state voltage**





10. Package outline

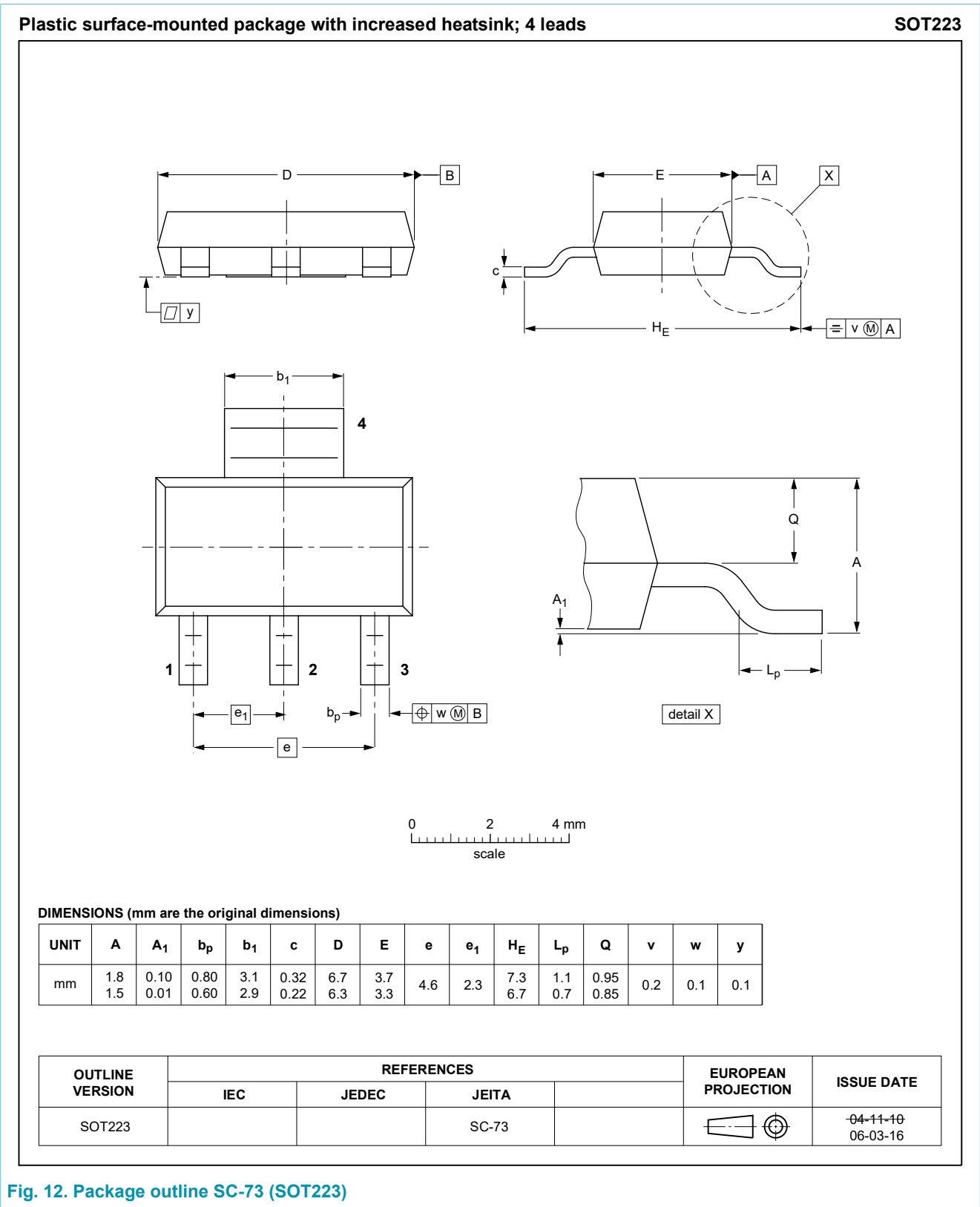
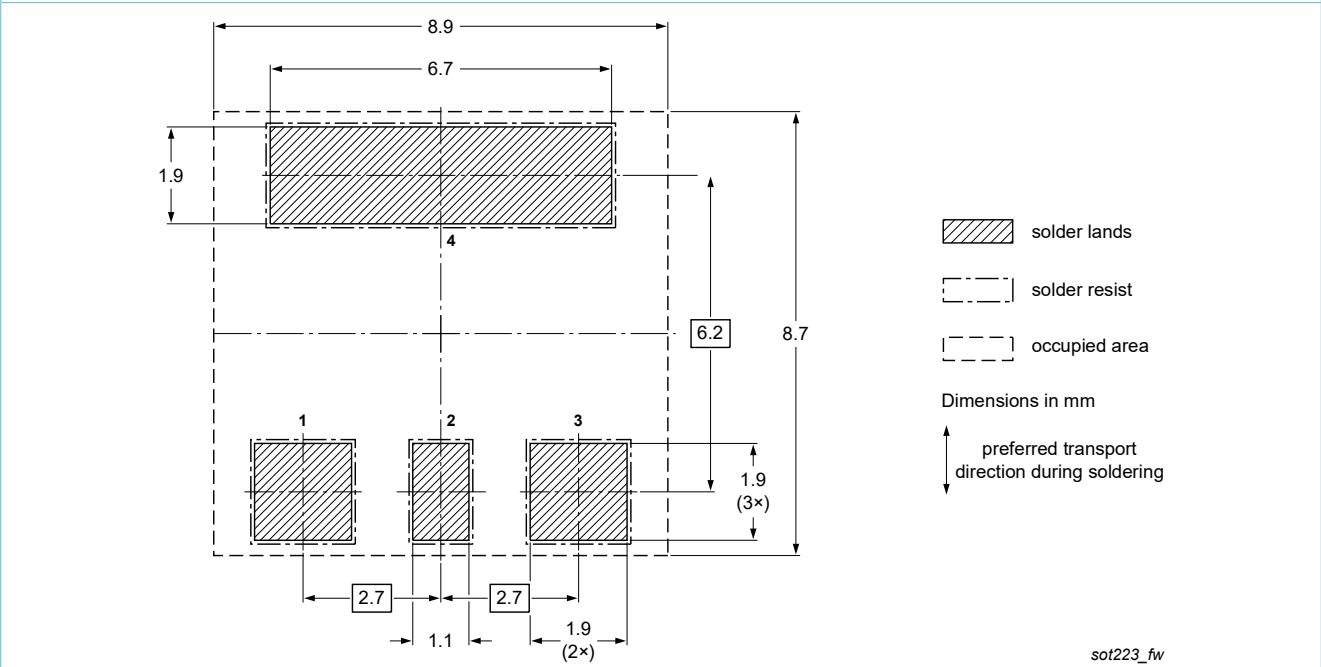
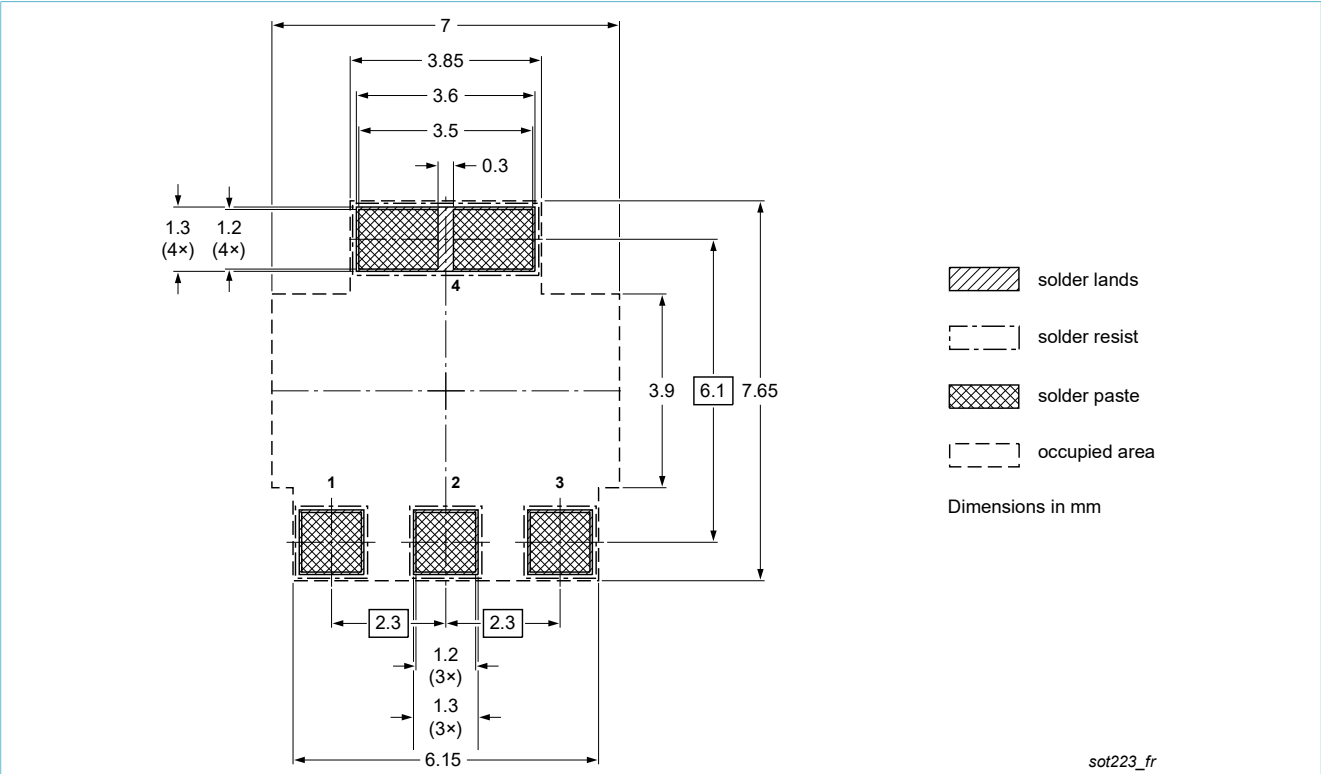


Fig. 12. Package outline SC-73 (SOT223)

11. Soldering



## 12. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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