



# EC103D1W

SCR

23 July 2014

Product data sheet

## 1. General description

Planar passivated ultra sensitive gate Silicon Controlled Rectifier in a SOT223 surface mountable plastic package.

## 2. Features and benefits

- Planar passivated for voltage ruggedness and reliability
- Ultra sensitive gate
- Surface mountable package

## 3. Applications

- Electronic ballasts
- Safety shut down and protection circuits
- Sensing circuits
- Smoke detectors
- Switched Mode Power Supplies

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	400	V
$V_{RRM}$	repetitive peak reverse voltage		-	-	400	V
$I_{TSM}$	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
$T_j$	junction temperature		-	-	125	°C
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 114\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	0.8	A
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	3	12	$\mu\text{A}$



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	-	150	-	V/ $\mu$ s

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	<p>SC-73 (SOT223)</p>	<p>sym037</p>
2	A	anode		
3	G	gate		
4	mb	mounting base; connected to anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
EC103D1W	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 7. Marking

Table 4. Marking codes

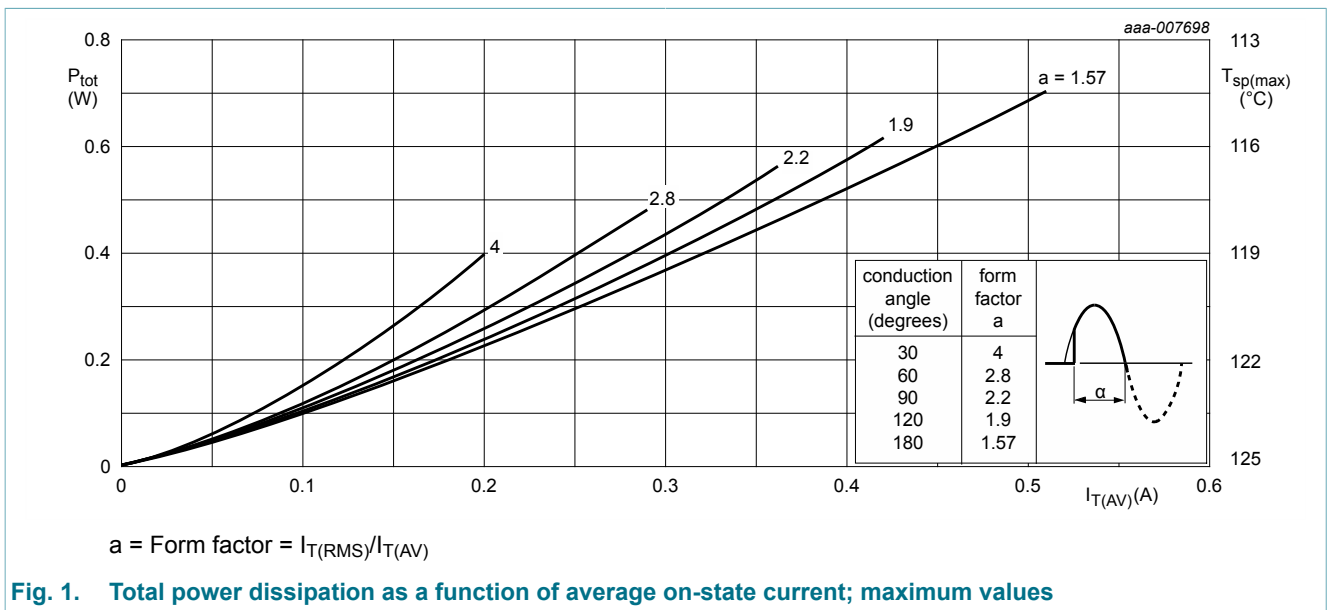
Type number	Marking code
EC103D1W	WYM-103D1W

## 8. Limiting values

**Table 5. 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		-	400	V
$V_{RRM}$	repetitive peak reverse voltage		-	400	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 114\text{ °C}$ ; <a href="#">Fig. 1</a>	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 114\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	8	A
		half sine wave; $T_{j(\text{init})} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$	-	9	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse	-	0.32	A <sup>2</sup> s
$di_T/dt$	rate of rise of on-state current	$I_T = 2\text{ A}$ ; $I_G = 0.01\text{ A}$ ; $di_G/dt = 0.1\text{ A}/\mu\text{s}$	-	50	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	°C
$T_j$	junction temperature		-	125	°C



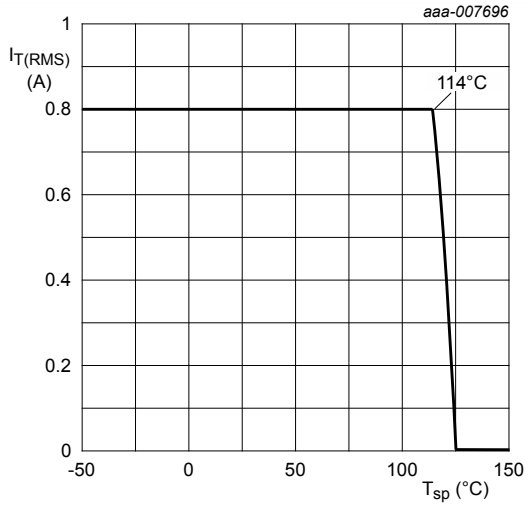
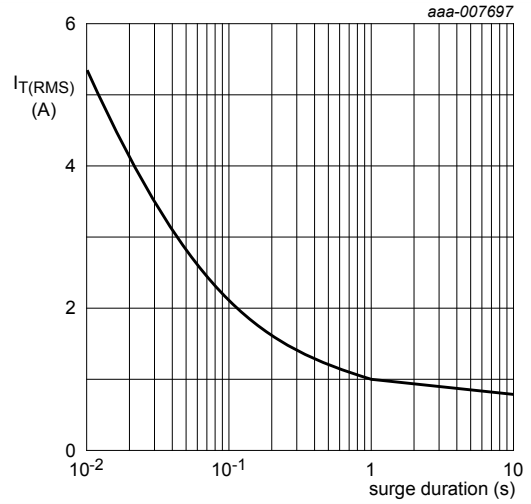
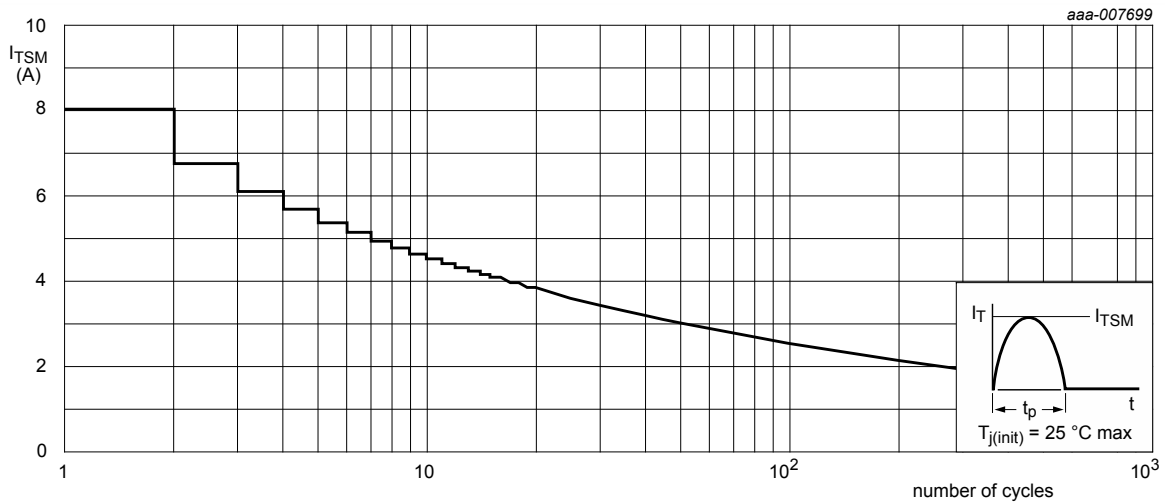


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values



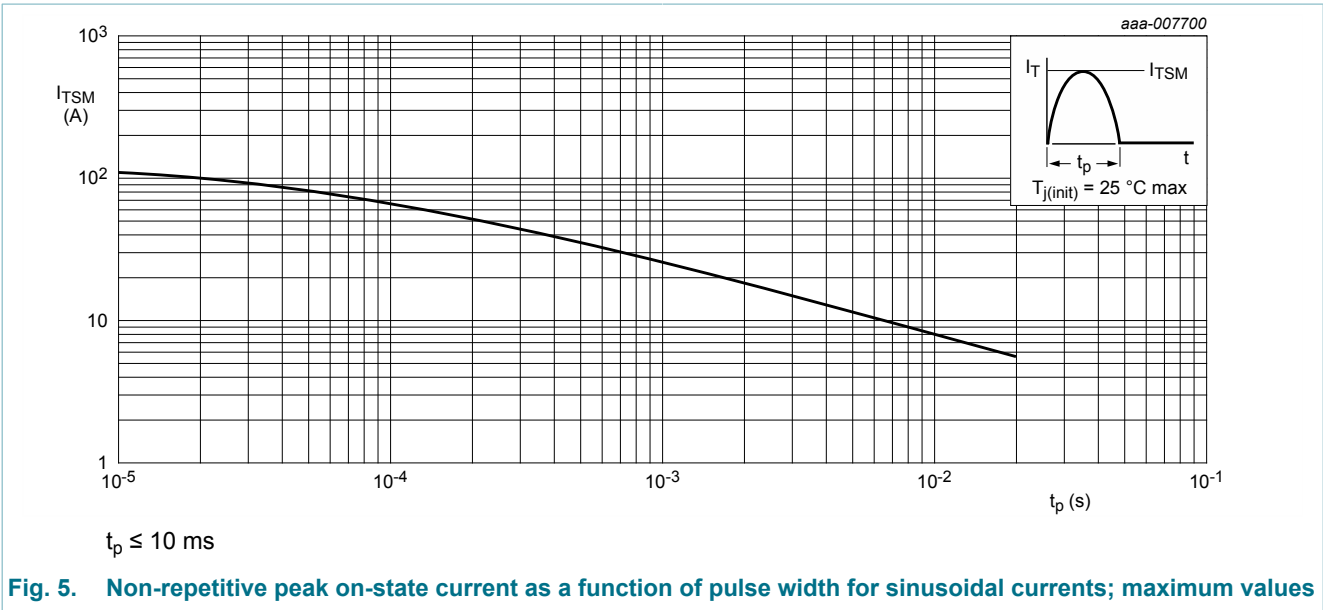
f = 50 Hz;  $T_{sp} = 114\text{ °C}$

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



f = 50 Hz

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



## 9. Thermal characteristics

Table 6. 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	printed circuit board mounted; minimum pad area; in free air; <a href="#">Fig. 7</a>	-	70	-	K/W
		printed circuit board mounted; minimum footprint; in free air; <a href="#">Fig. 8</a>	-	156	-	K/W

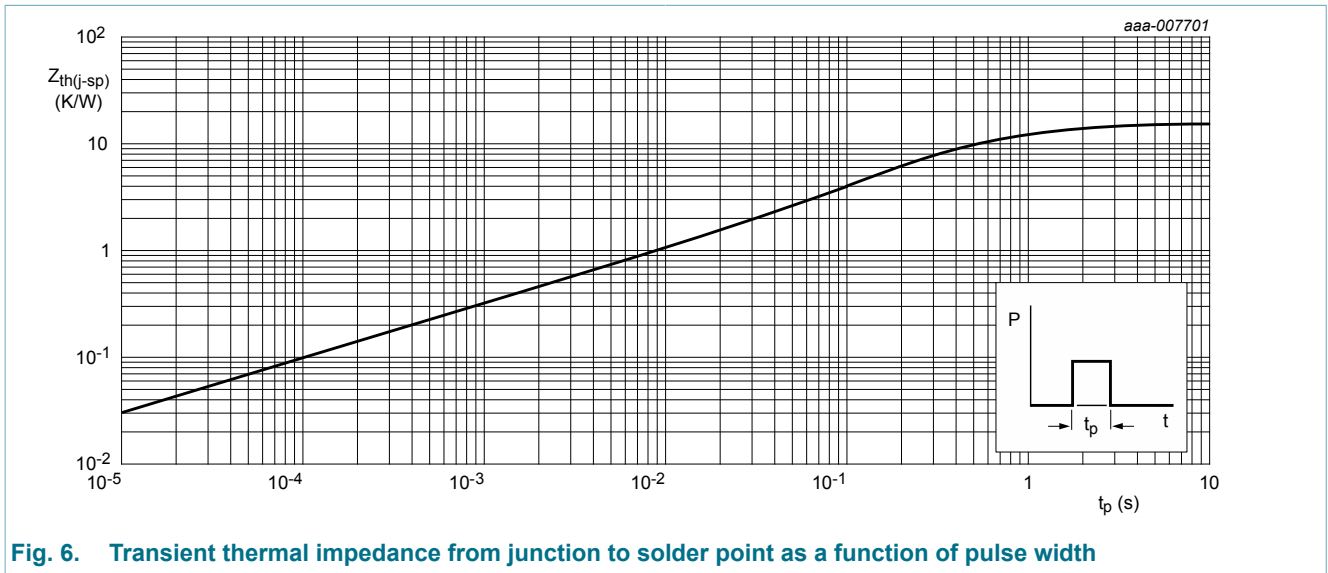
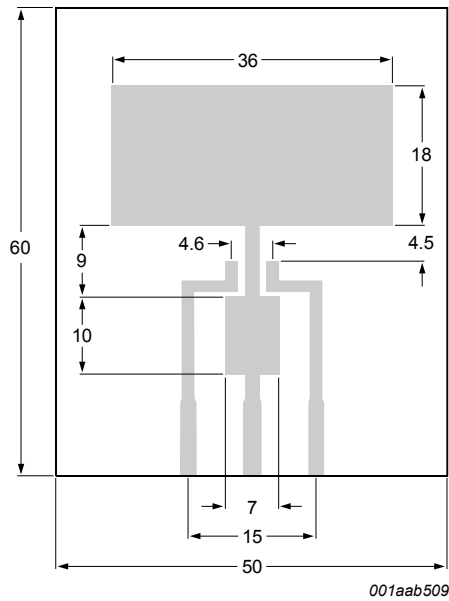
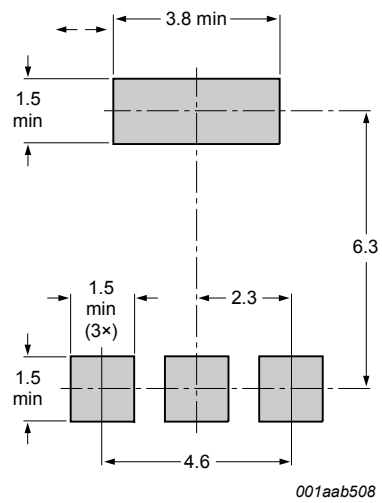


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width



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

**Fig. 7. Printed circuit board pad area: SOT223**



All dimensions are in mm

**Fig. 8. Minimum footprint SOT223**

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>	-	3	12	$\mu\text{A}$
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 10</a>	-	2	6	$\text{mA}$
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 11</a>	-	2	5	$\text{mA}$
$V_T$	on-state voltage	$I_T = 1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 12</a>	-	1.2	1.35	$\text{V}$
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 13</a>	-	0.5	0.8	$\text{V}$
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; <a href="#">Fig. 13</a>	0.2	0.3	-	$\text{V}$
$I_D$	off-state current	$V_D = 400\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$	-	0.05	0.1	$\text{mA}$
$I_R$	reverse current	$V_R = 400\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$	-	0.05	0.1	$\text{mA}$
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	-	150	-	$\text{V}/\mu\text{s}$

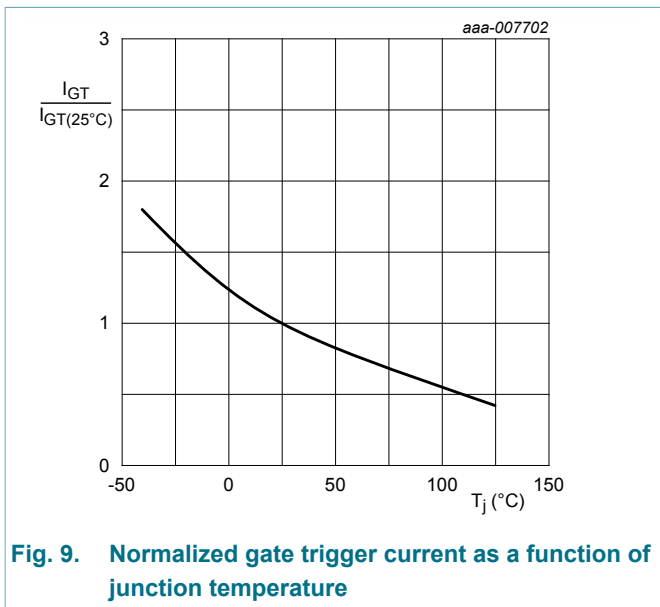


Fig. 9. Normalized gate trigger current as a function of junction temperature

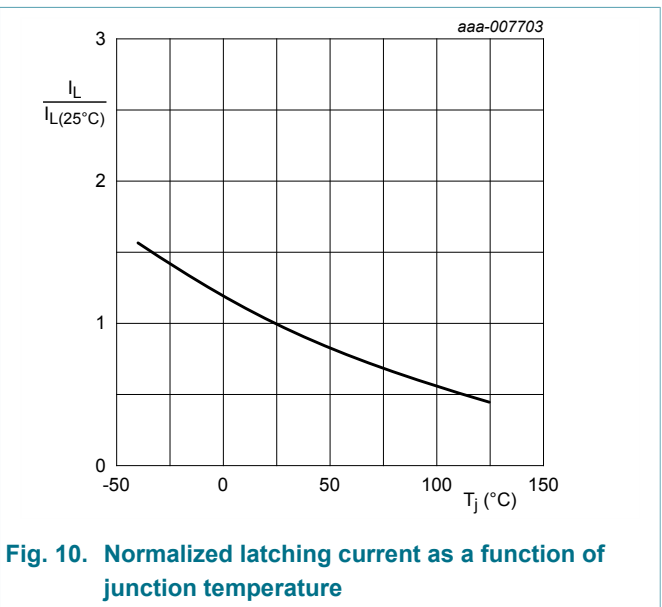
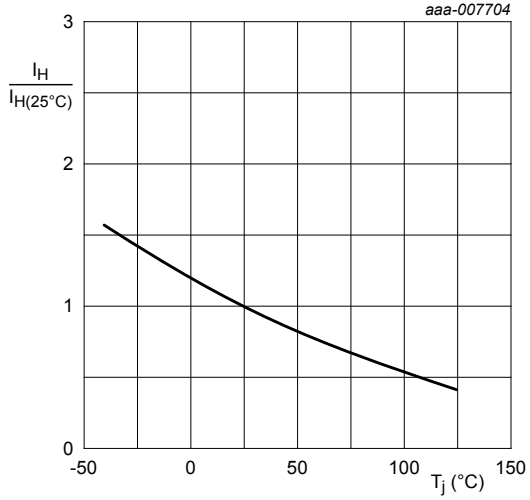
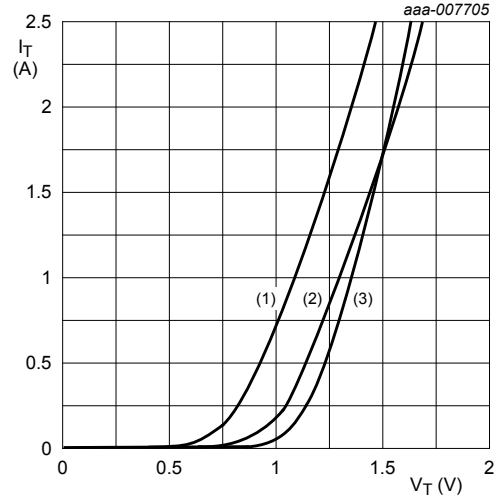


Fig. 10. Normalized latching current as a function of junction temperature





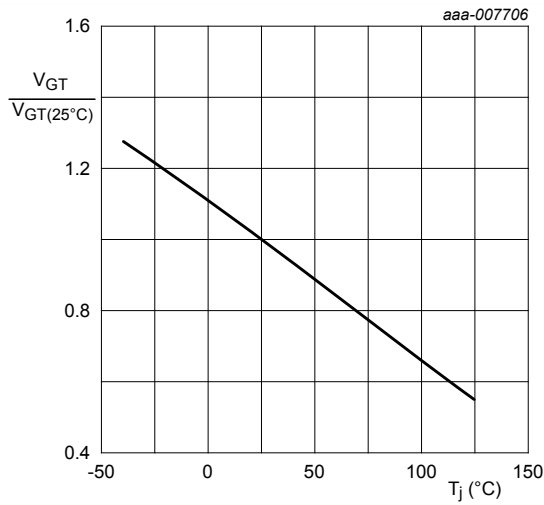
**Fig. 11. Normalized holding current as a function of junction temperature**



$V_o = 0.987 \text{ V}$ ;  $R_s = 0.3125 \ \Omega$

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



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

### 11. Package outline

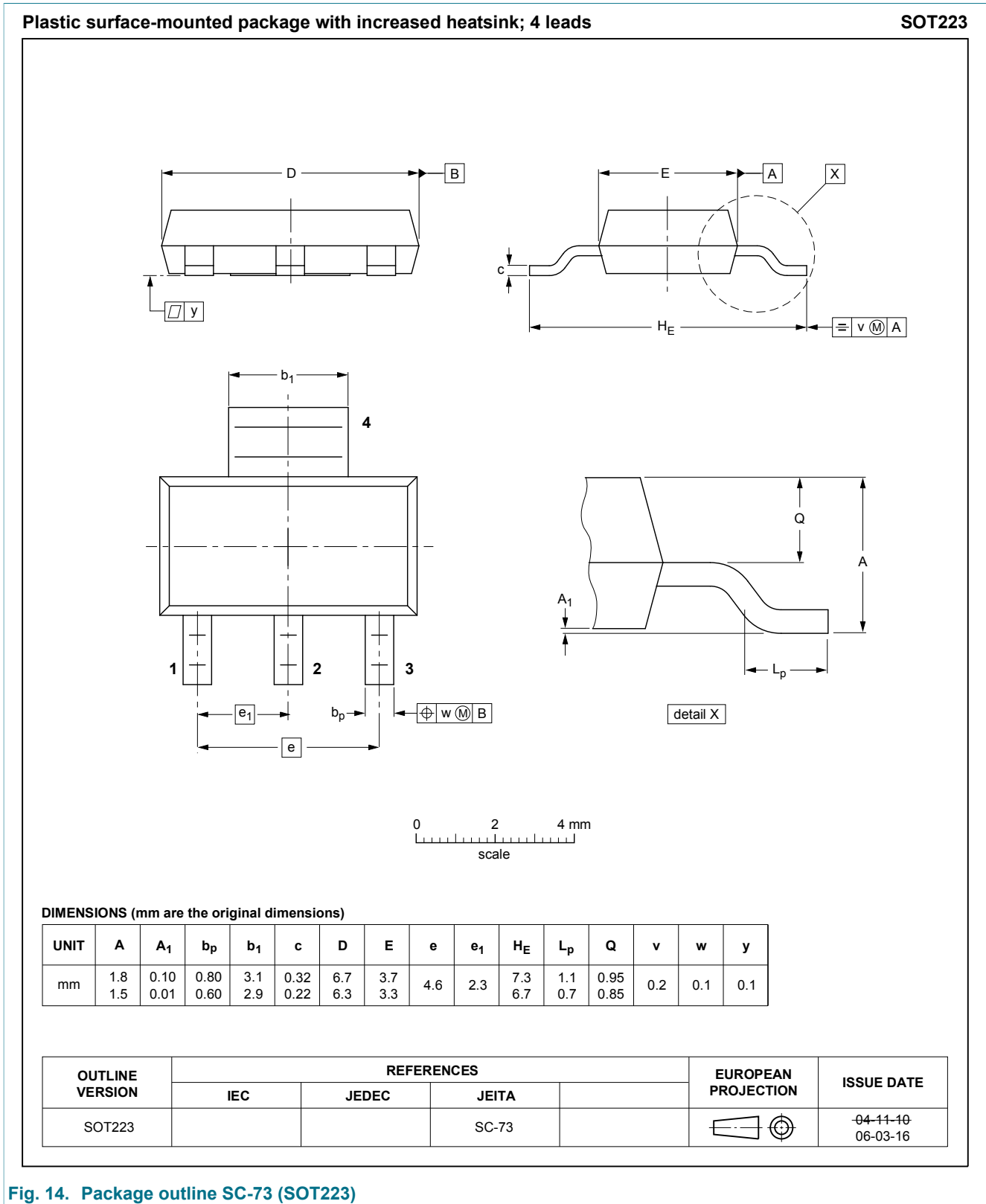


Fig. 14. Package outline SC-73 (SOT223)

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