

# OT409

## 1 A Four-quadrant triac, enhanced noise immunity

Rev. 01. — 30 July 2008

Product data sheet

## 1. Product profile

### 1.1 General description

Passivated sensitive gate triac in a SOT223 surface-mountable plastic package

### 1.2 Features

- Sensitive gate
- Direct interfacing to logic level ICs
- Enhanced immunity to voltage transients and noise
- Gate triggering in four quadrants
- Direct interfacing to low power gate drive circuits
- Blocking Voltage of 600 V

### 1.3 Applications

- Home appliances
- Low power AC fan speed controllers
- Low power motor control
- Low power loads in industrial process control

### 1.4 Quick reference data

- $V_{DRM} \leq 600$  V
- $I_{TSM} \leq 12.5$  A ( $t = 20$  ms)
- $I_{T(RMS)} \leq 1$  A
- $I_{GT} \leq 10$  mA
- $I_{GT} \leq 10$  mA (T2– G+)

## 2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	main terminal 1 (T1)	<p>SOT223</p>	<p>sym051</p>
2	main terminal 2 (T2)		
3	gate (G)		
4	mounting base; main terminal 2 (T2)		

### 3. Ordering information

**Table 2. Ordering information**

Type number	Package		Version
	Name	Description	
OT409	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

### 4. Limiting values

**Table 3. 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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 103\text{ °C}$ ; see <a href="#">Figure 4</a> and <a href="#">5</a>	-	1	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge; see <a href="#">Figure 2</a> and <a href="#">3</a>			
		$t = 20\text{ ms}$	-	12.5	A
		$t = 16.7\text{ ms}$	-	13.8	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$	-	0.78	A <sup>2</sup> s
$di_T/dt$	rate of rise of on-state current	$I_{TM} = 1\text{ A}$ ; $I_G = 20\text{ mA}$ ; $di_G/dt = 0.2\text{ A}/\mu\text{s}$			
		T2+ G+	-	50	A/ $\mu\text{s}$
		T2+ G-	-	50	A/ $\mu\text{s}$
		T2- G-	-	50	A/ $\mu\text{s}$
		T2- G+	-	10	A/ $\mu\text{s}$
$I_{GM}$	peak gate current		-	1	A
$P_{GM}$	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

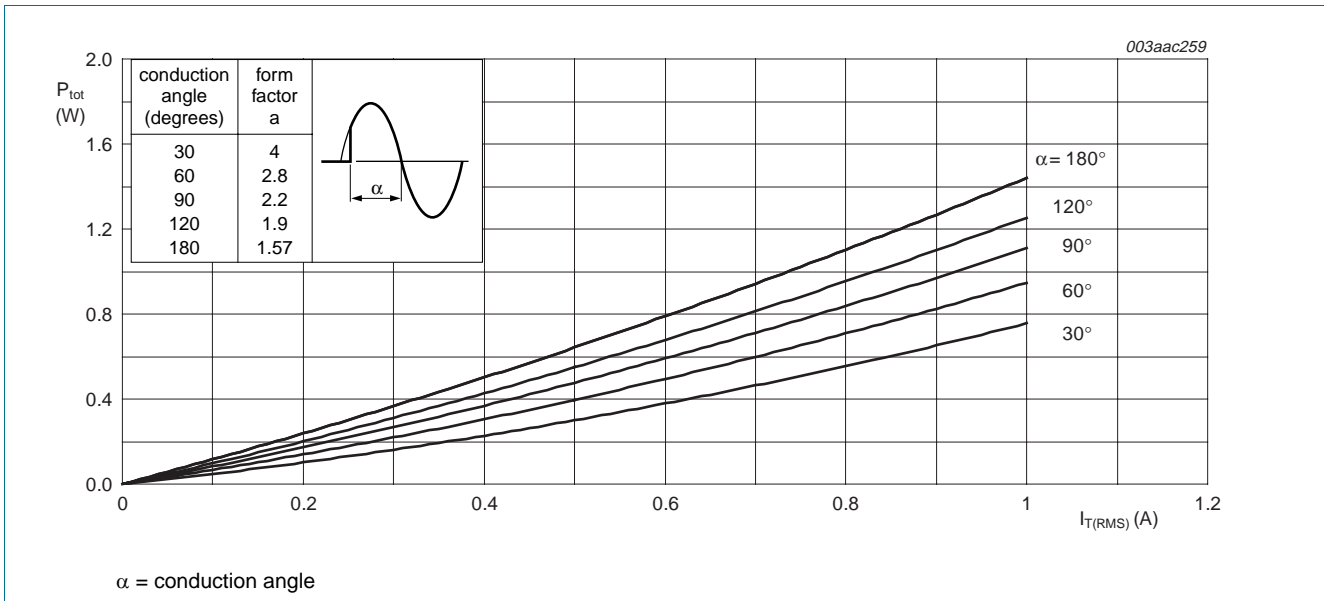


Fig 1. Total power dissipation as a function of RMS on-state current; maximum values

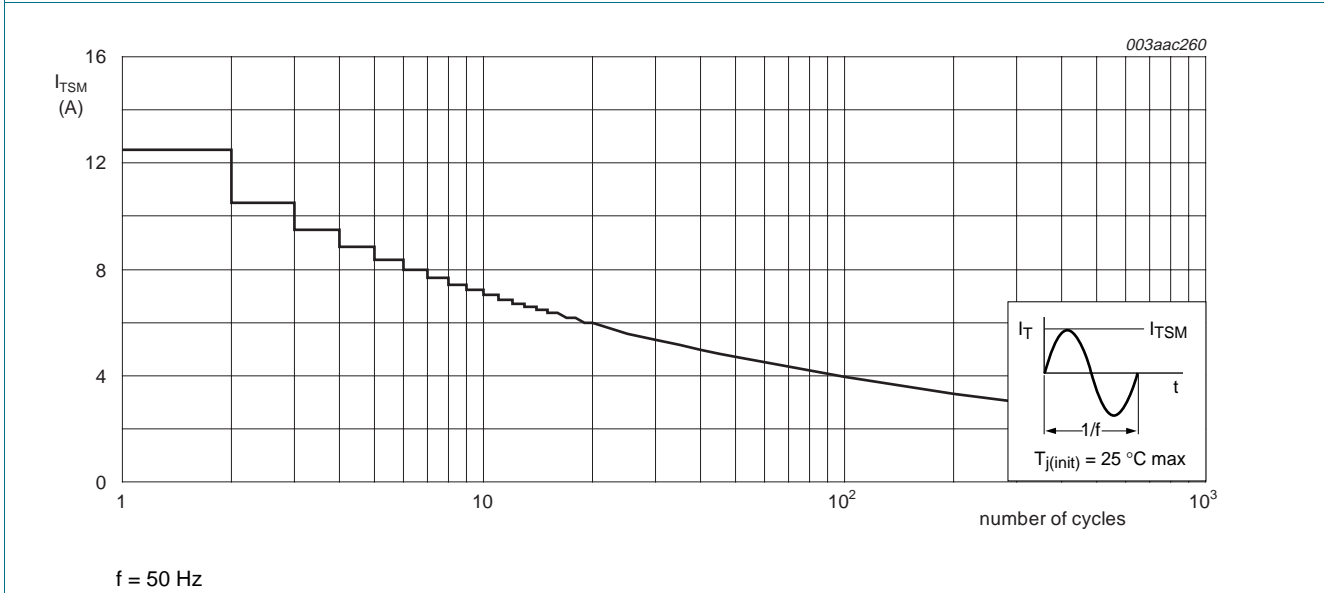
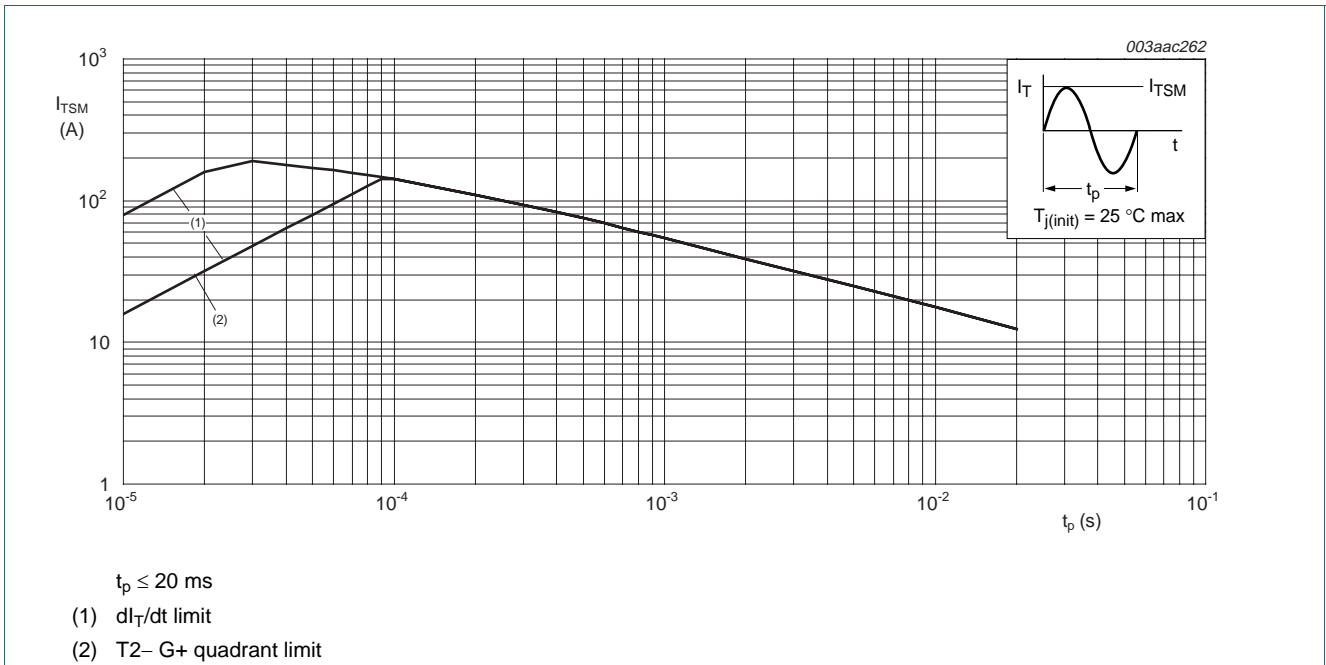
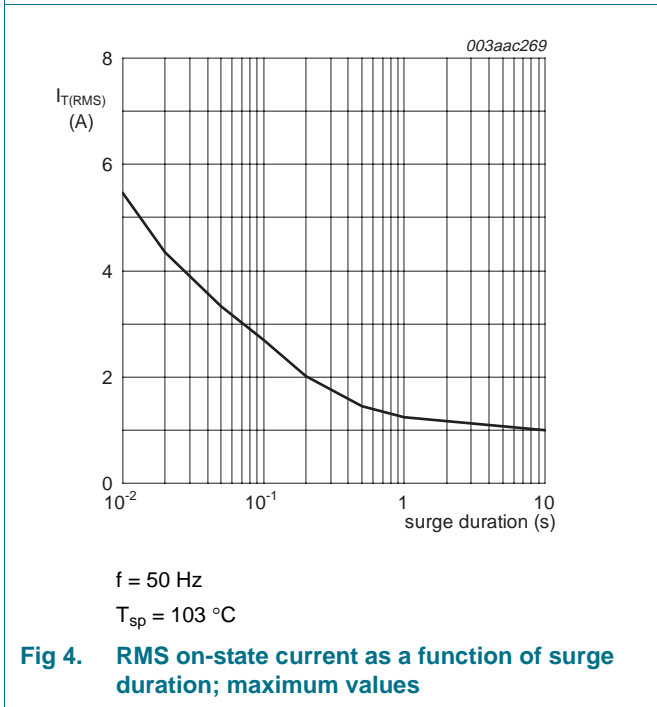


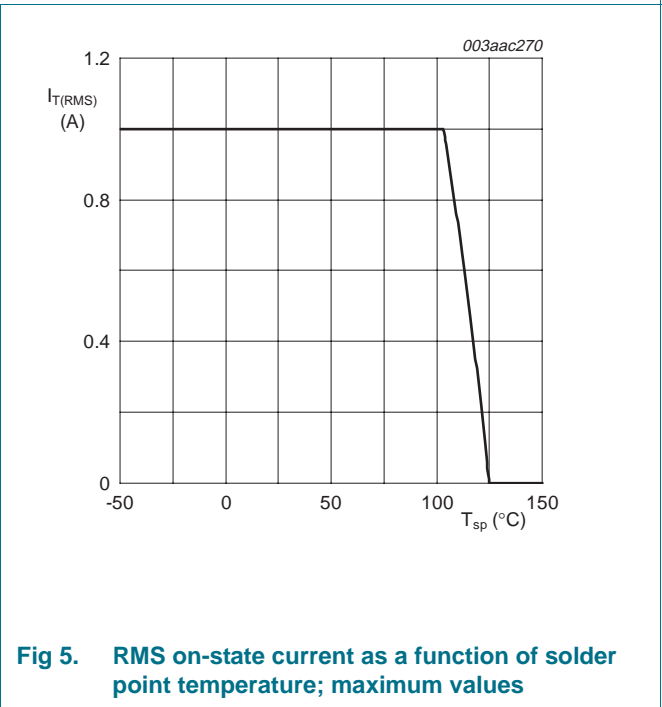
Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



**Fig 3. Non-repetitive peak on-state current as a function of pulse width; maximum values**



**Fig 4. RMS on-state current as a function of surge duration; maximum values**

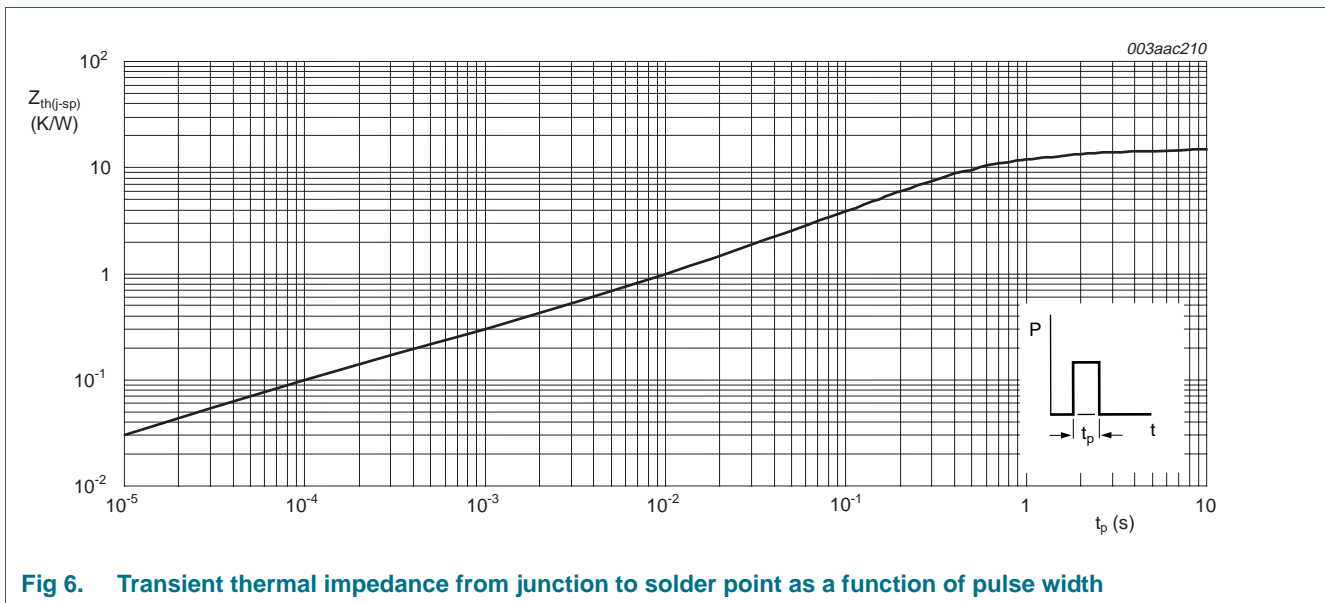


**Fig 5. RMS on-state current as a function of solder point temperature; maximum values**

## 5. Thermal characteristics

**Table 4. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle; see <a href="#">Figure 6</a>	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	full cycle				
		for minimum footprint see <a href="#">Figure 13</a>	-	156	-	K/W
		for pad area see <a href="#">Figure 14</a>	-	70	-	K/W



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

## 6. Static characteristics

**Table 5. Static characteristics**

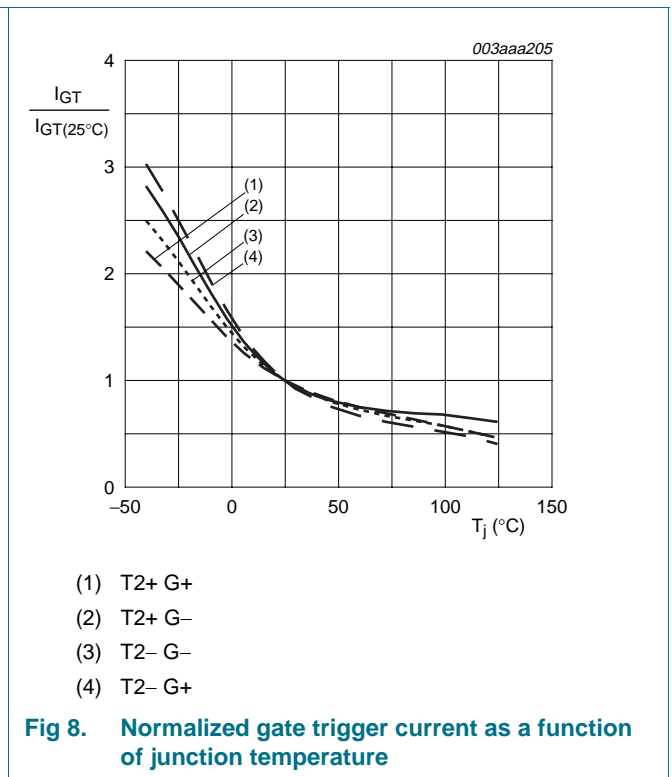
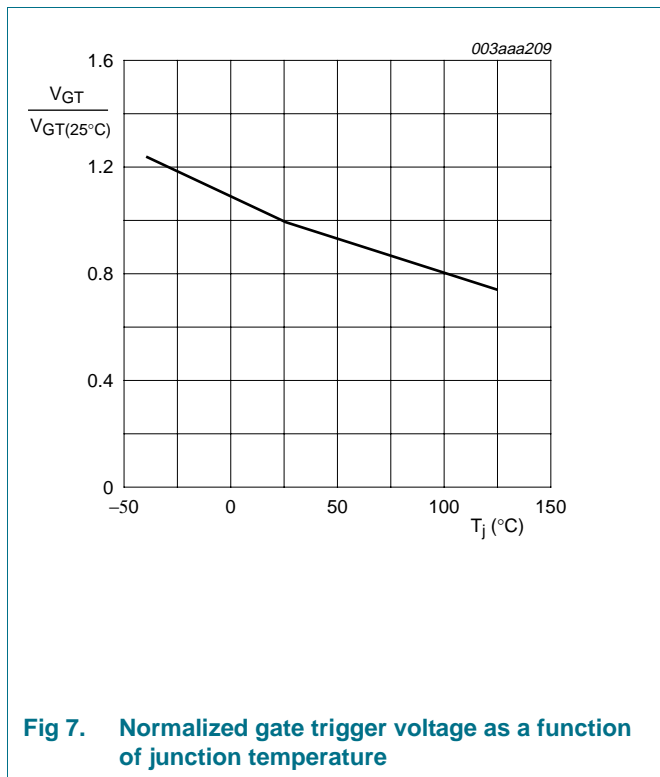
$T_j = 25\text{ °C}$  unless otherwise specified.

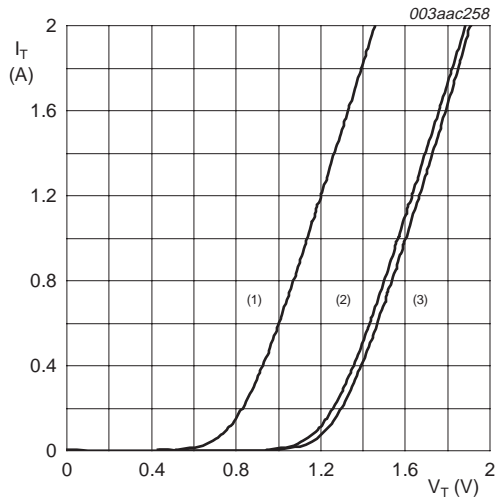
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; see <a href="#">Figure 8</a>				
		T2+ G+	-	-	10	mA
		T2+ G-	-	-	10	mA
		T2- G-	-	-	10	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; see <a href="#">Figure 10</a>				
		T2+ G+	-	-	15	mA
		T2+ G-	-	-	30	mA
		T2- G-	-	-	15	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; see <a href="#">Figure 11</a>	-	-	10	mA
		T2- G+	-	-	15	mA
$V_T$	on-state voltage	$I_T = 1\text{ A}$ ; see <a href="#">Figure 9</a>	-	1.3	1.6	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; see <a href="#">Figure 7</a>	-	-	1.3	V
		$V_D = V_{DRM}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$	0.2	-	-	V
$I_D$	off-state current	$V_D = V_{DRM(max)}$ ; $T_j = 125\text{ °C}$	-	-	0.5	mA

## 7. Dynamic characteristics

**Table 6. Dynamic characteristics**

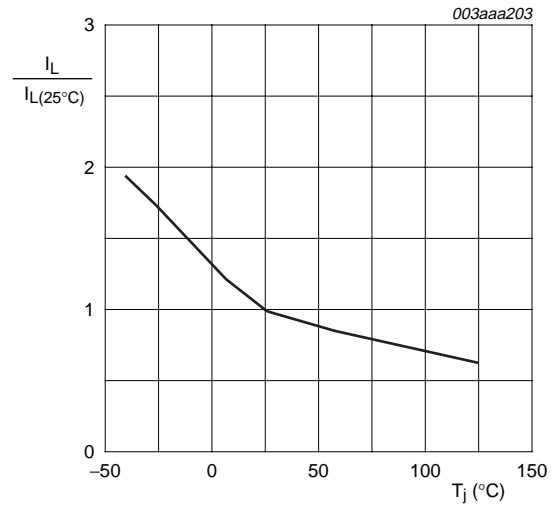
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 0.67V_{DRM(max)}$ ; $T_j = 110\text{ }^\circ\text{C}$ ; exponential waveform; gate open circuit	100	-	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_{DM} = 400\text{ V}$ ; $T_j = 110\text{ }^\circ\text{C}$ ; $I_{T(RMS)} = 1\text{ A}$ ; $dV_{com}/dt = 1\text{ V}/\mu\text{s}$	4	-	-	A/ms



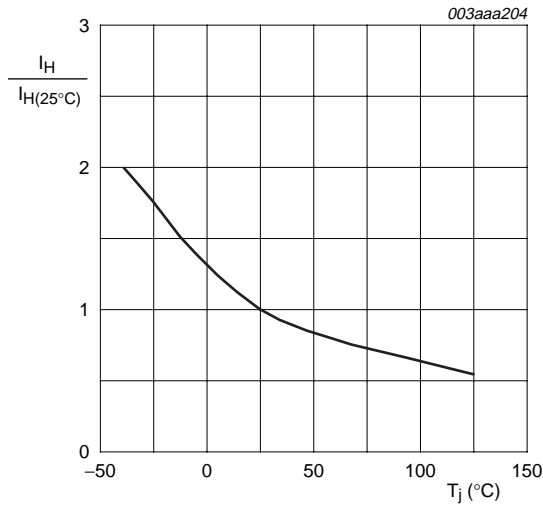


$V_o = 1.254 \text{ V}; R_s = 0.31 \Omega$   
 (1)  $T_j = 125 \text{ }^\circ\text{C}$ ; typical values  
 (2)  $T_j = 125 \text{ }^\circ\text{C}$ ; maximum values  
 (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

**Fig 9. On-state current as a function of on-state voltage**



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



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



8. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads

SOT223

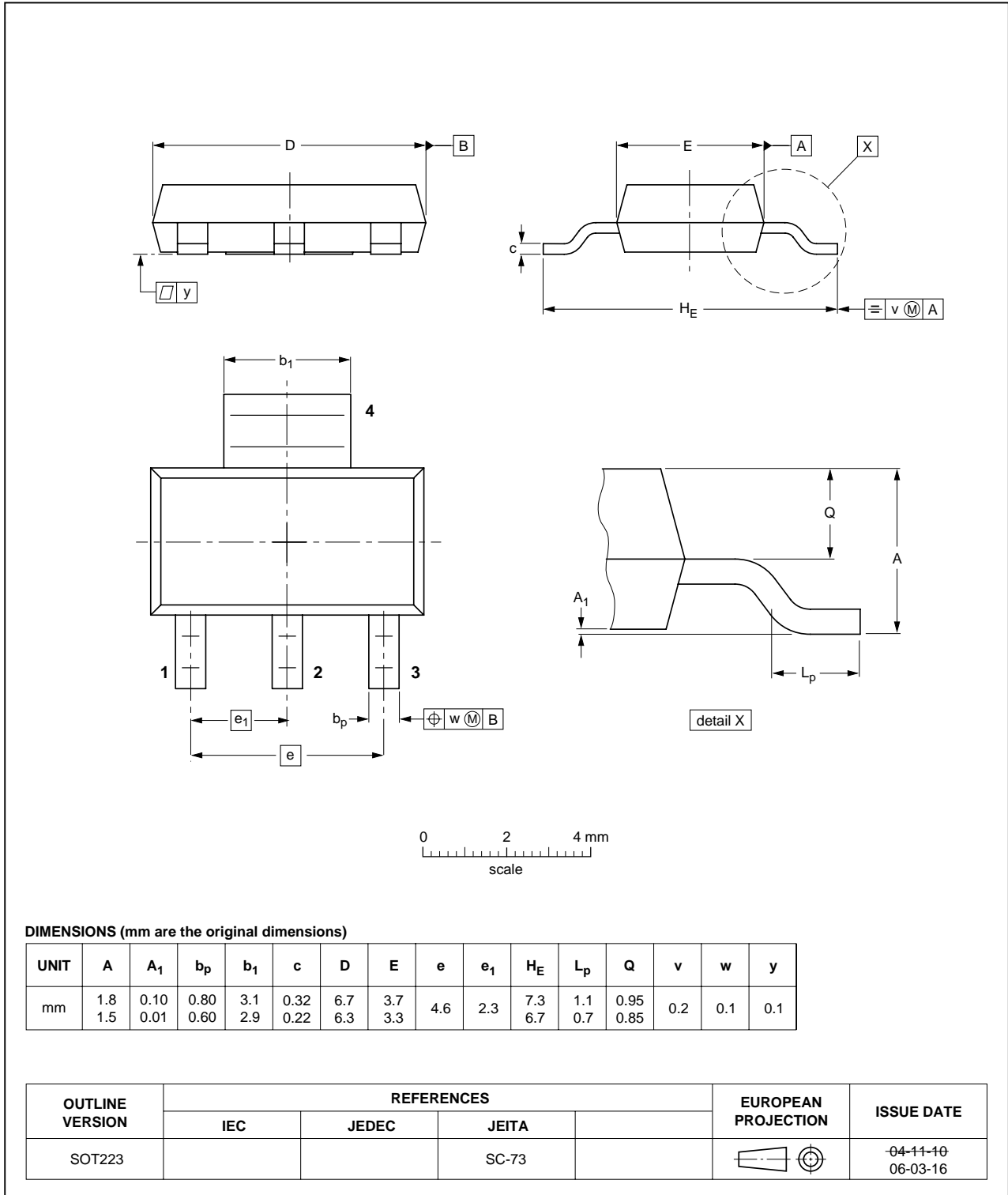
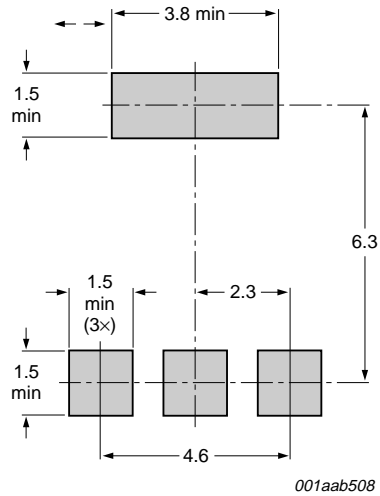


Fig 12. Package outline SOT223 (SC-73)

## 9. Mounting

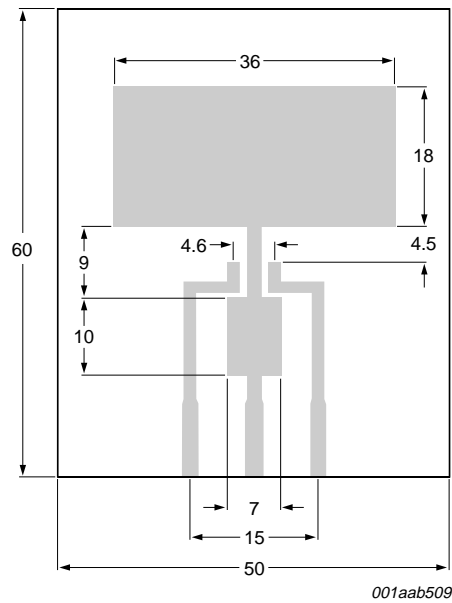
### 9.1 Mounting instructions



All dimensions are in mm

**Fig 13. Minimum footprint SOT223**

### 9.2 Printed-circuit board



All dimensions are in mm

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

**Fig 14. Printed-circuit board pad area SOT223**

## 10. Revision history

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**Table 7.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
OT409_1	20080730	Product data sheet	-	-

## 11. Legal information

### 11.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.

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

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