OT406
Four-quadrant triac, enhanced noise immunity

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 to 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

- $I_{GT} \leq 3$ mA
- $I_{GT} \leq 5$ mA (T2– G+)

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	main terminal 1 (T1)		
2	main terminal 2 (T2)		
3	gate (G)		
4	mounting base; main terminal 2 (T2)		

SOT223

sym051

3. Ordering information

Table 2.   Ordering information

Type number	Package			
	Name	**Description**		**Version**
OT406	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; $T_{sp} \leq 103$ °C; see Figure 4 and 5	-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_j = 25$ °C prior to surge; see Figure 2 and 3			
		t = 20 ms	-	12.5	A
		t = 16.7 ms	-	13.8	A
I^2t	I^2t for fusing	$t_p = 10$ ms	-	1.28	A^2s
dI_T/dt	rate of rise of on-state current	$I_{TM} = 1$ A; $I_G = 20$ mA; $dI_G/dt = 0.2$ A/µs			
		T2+ G+	-	50	A/µs
		T2+ G−	-	50	A/µs
		T2− G−	-	50	A/µs
		T2− G+	-	10	A/µs
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

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Product data sheet

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α = conduction angle
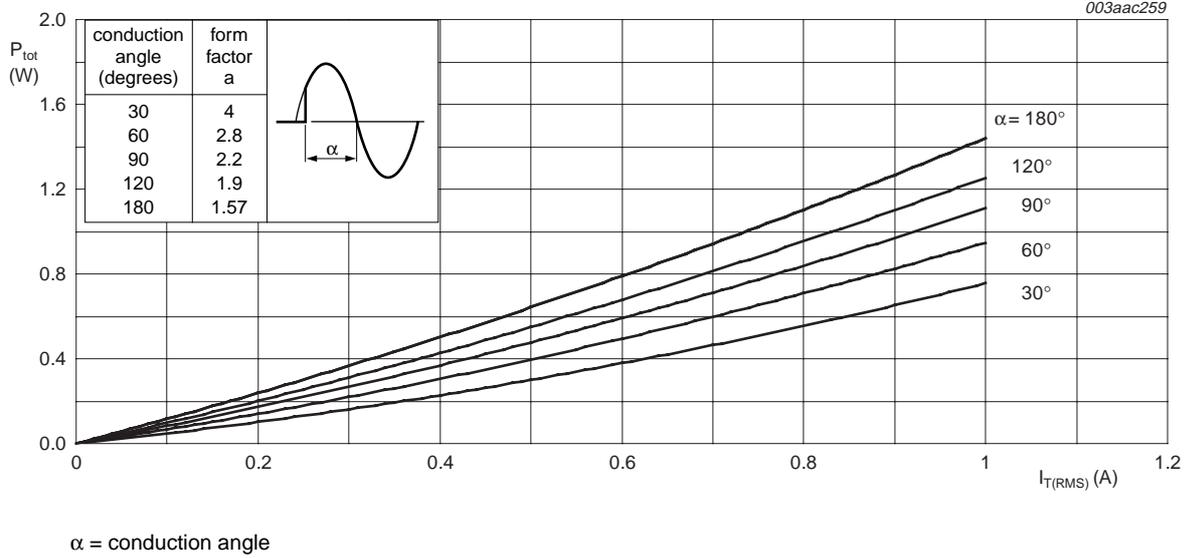
**Fig 1. Total power dissipation as a function of RMS on-state current; maximum values**

f = 50 Hz
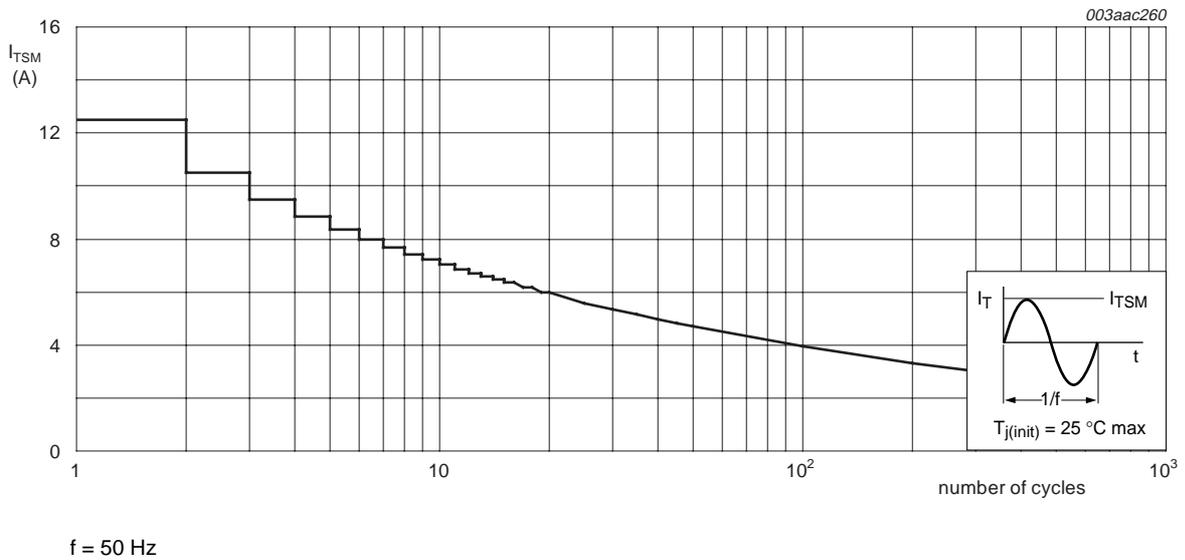
**Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values**

$t_p \leq 20$ ms

(1) dI_T/dt limit

(2) T2– G+ quadrant limit
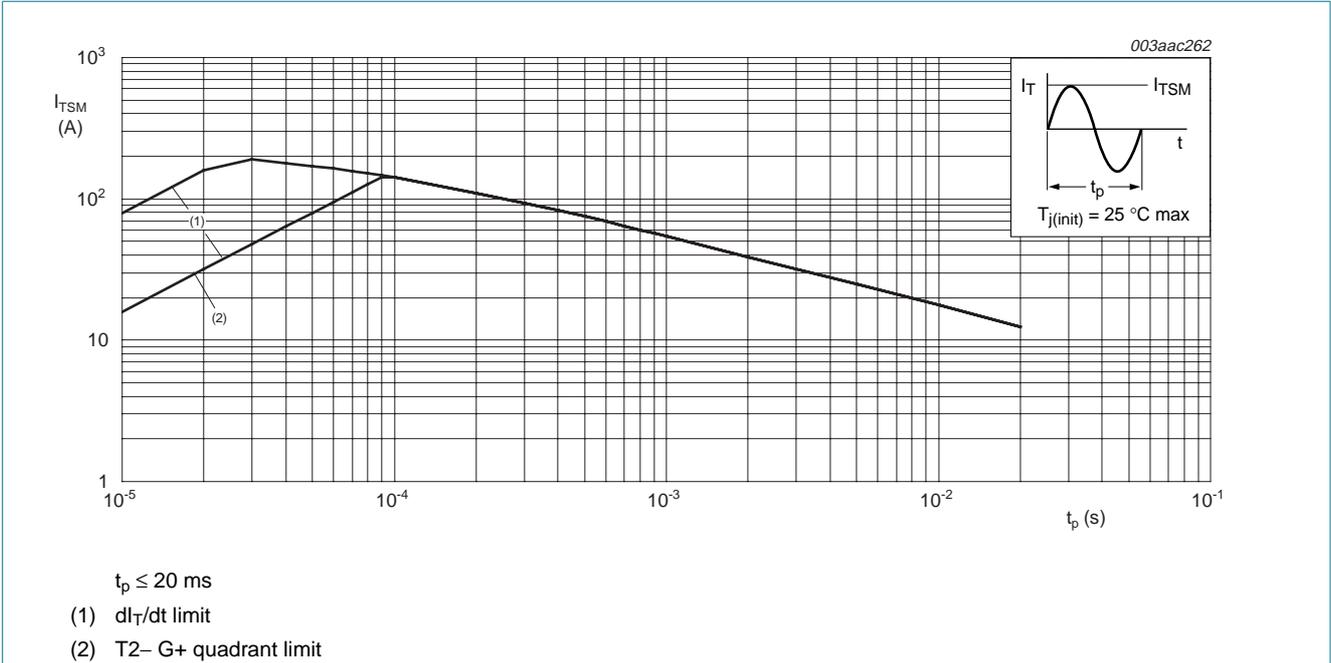
**Fig 3.** Non-repetitive peak on-state current as a function of pulse width; maximum values

$f = 50$ Hz

$T_{sp} = 103\ ^\circ C$
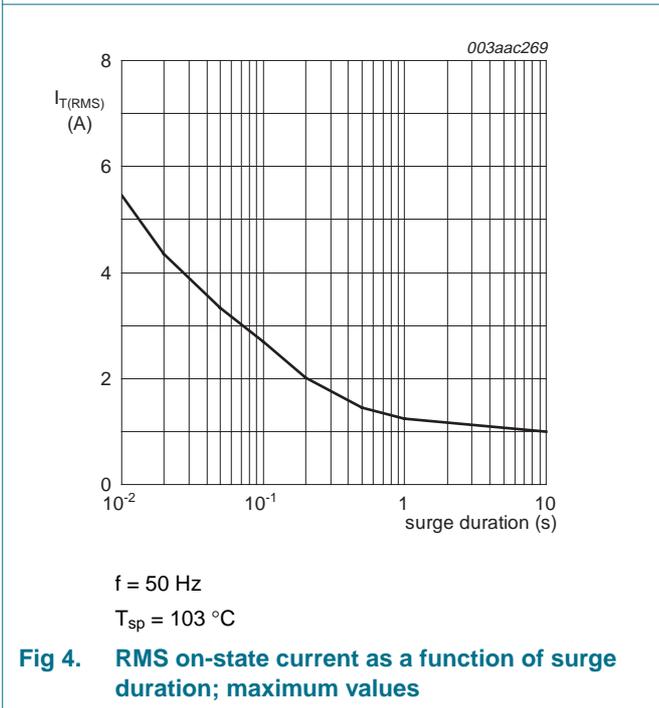
Fig 4. RMS on-state current as a function of surge duration; maximum values
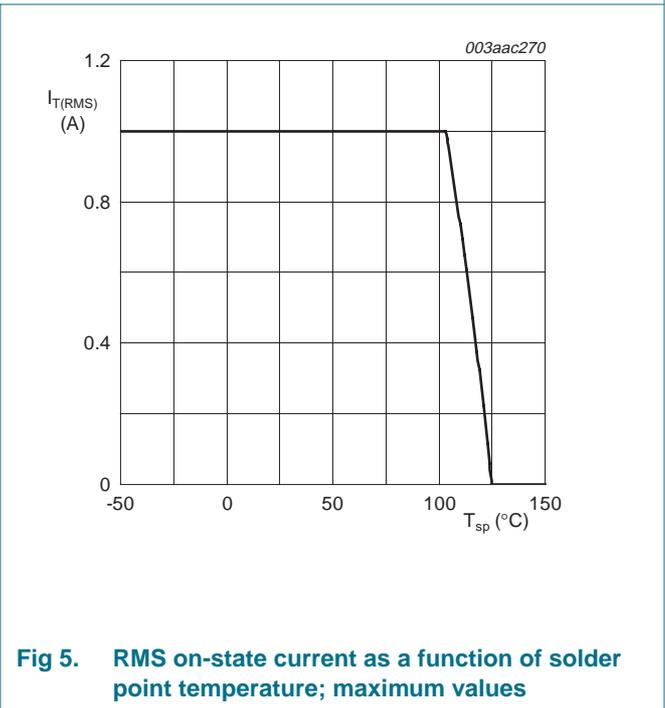
Fig 5. RMS on-state current as a function of solder point temperature; maximum values

5. Thermal characteristics

Table 4. **Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}sp)}$	thermal resistance from junction to solder point	full cycle; see Figure 6	-	-	15	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	full cycle				
		for minimum footprint see Figure 13	-	156	-	K/W
		for pad area see Figure 14	-	70	-	K/W
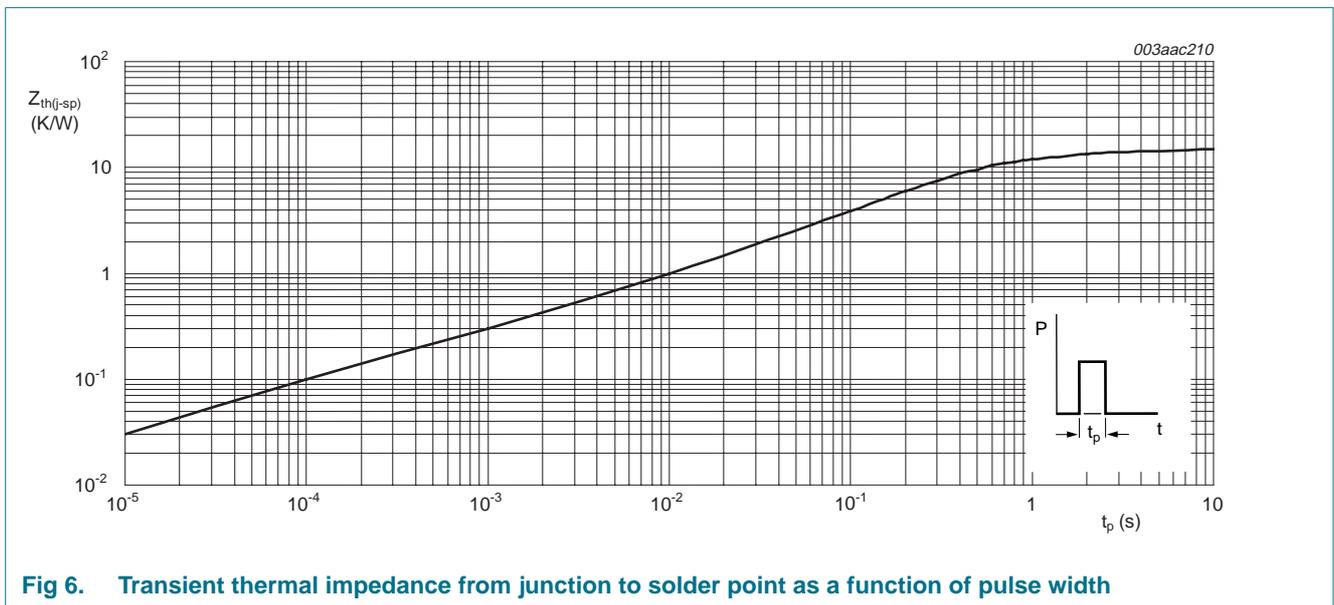
Fig 6. **Transient thermal impedance from junction to solder point as a function of pulse width**

6. Static characteristics

Table 5. **Static characteristics**
$T_j = 25\,^\circ C$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GT}	gate trigger current	$V_D = 12$ V; $I_T = 0.1$ A; see Figure 8				
		T2+ G+	-	-	3	mA
		T2+ G−	-	-	3	mA
		T2− G−	-	-	3	mA
		T2− G+	-	-	5	mA
I_L	latching current	$V_D = 12$ V; $I_G = 0.1$ A; see Figure 10				
		T2+ G+	-	-	7	mA
		T2+ G−	-	-	20	mA
		T2− G−	-	-	7	mA
		T2− G+	-	-	7	mA
I_H	holding current	$V_D = 12$ V; $I_G = 0.1$ A; see Figure 11	-	-	7	mA
V_T	on-state voltage	$I_T = 1$ A; see Figure 9	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12$ V; $I_T = 0.1$ A; see Figure 7	-	-	1.3	V
		$V_D = V_{DRM}$; $I_T = 0.1$ A; $T_j = 125\,^\circ C$	0.2	-	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; $T_j = 125\,^\circ C$	-	-	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	$V_{DM} = 0.67V_{DRM(max)}$; $T_j = 110\ °C$; exponential waveform; gate open circuit	10	-	-	V/μs
dV_{com}/dt	rate of change of commutating voltage	$V_{DM} = 400\ V$; $T_j = 110\ °C$; $I_{TM} = 1\ A$; $dI_{com}/dt = 0.44\ A/ms$	0.5	-	-	V/μs

Fig 7.   Normalized gate trigger voltage as a function of junction temperature

(1)   T2+ G+

(2)   T2+ G−

(3)   T2− G−

(4)   T2− G+

Fig 8.   Normalized gate trigger current as a function of junction temperature
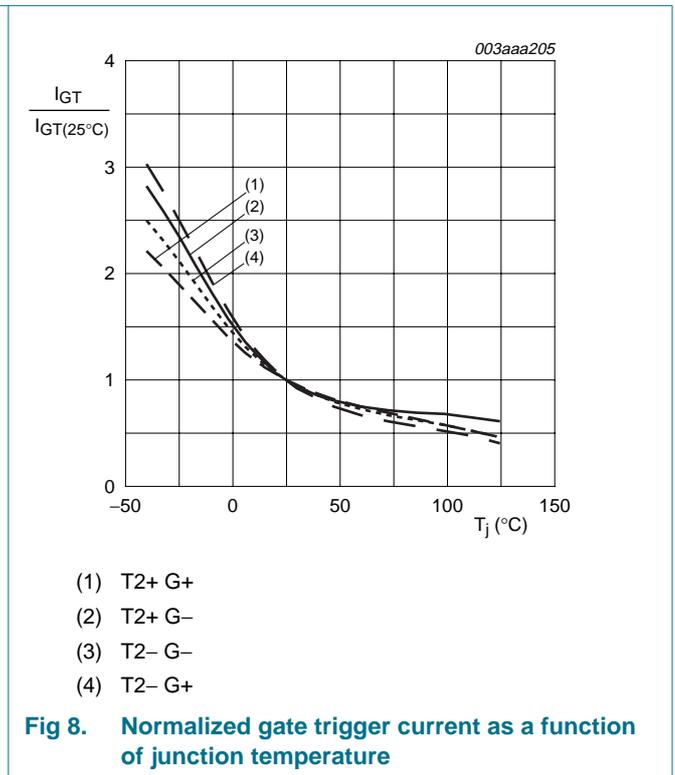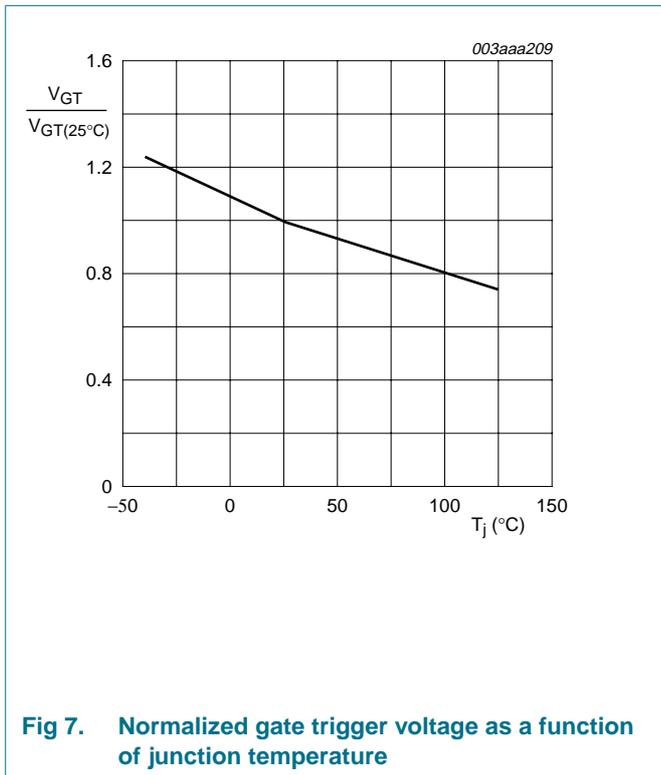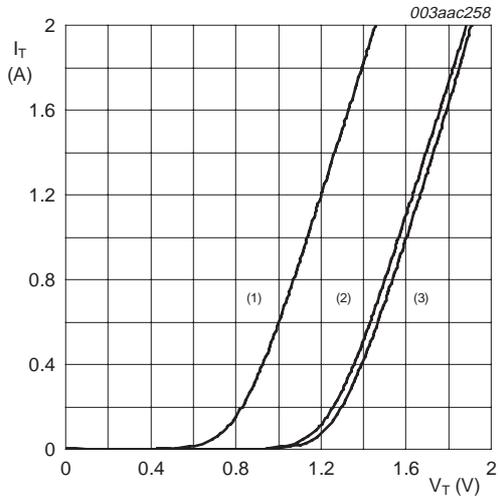
V_o = 1.254 V; R_s = 0.31 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

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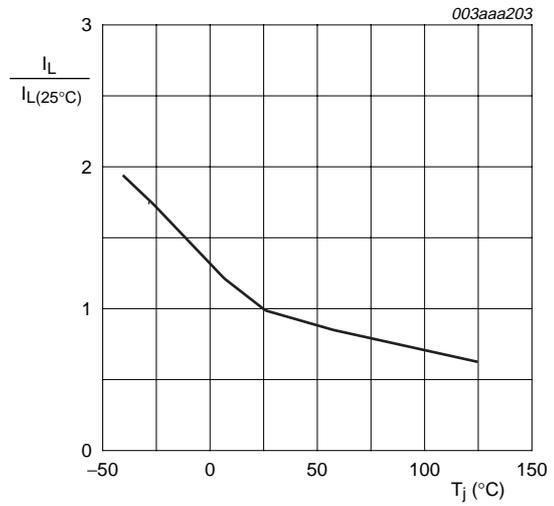

**Fig 10. Normalized latching current as a function of junction temperature**
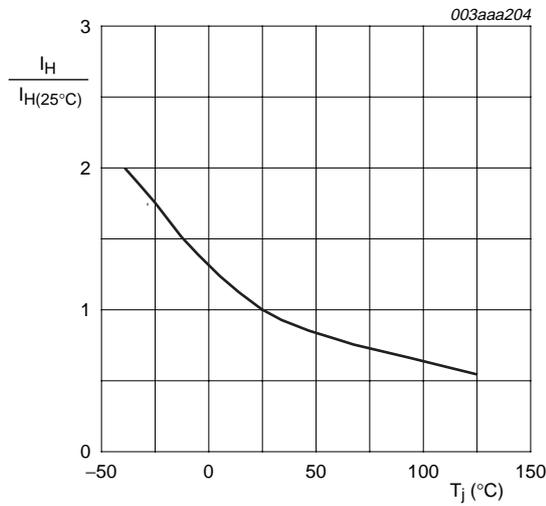
Fig 11. Normalized holding current as a function of junction temperature

8. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**

DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16
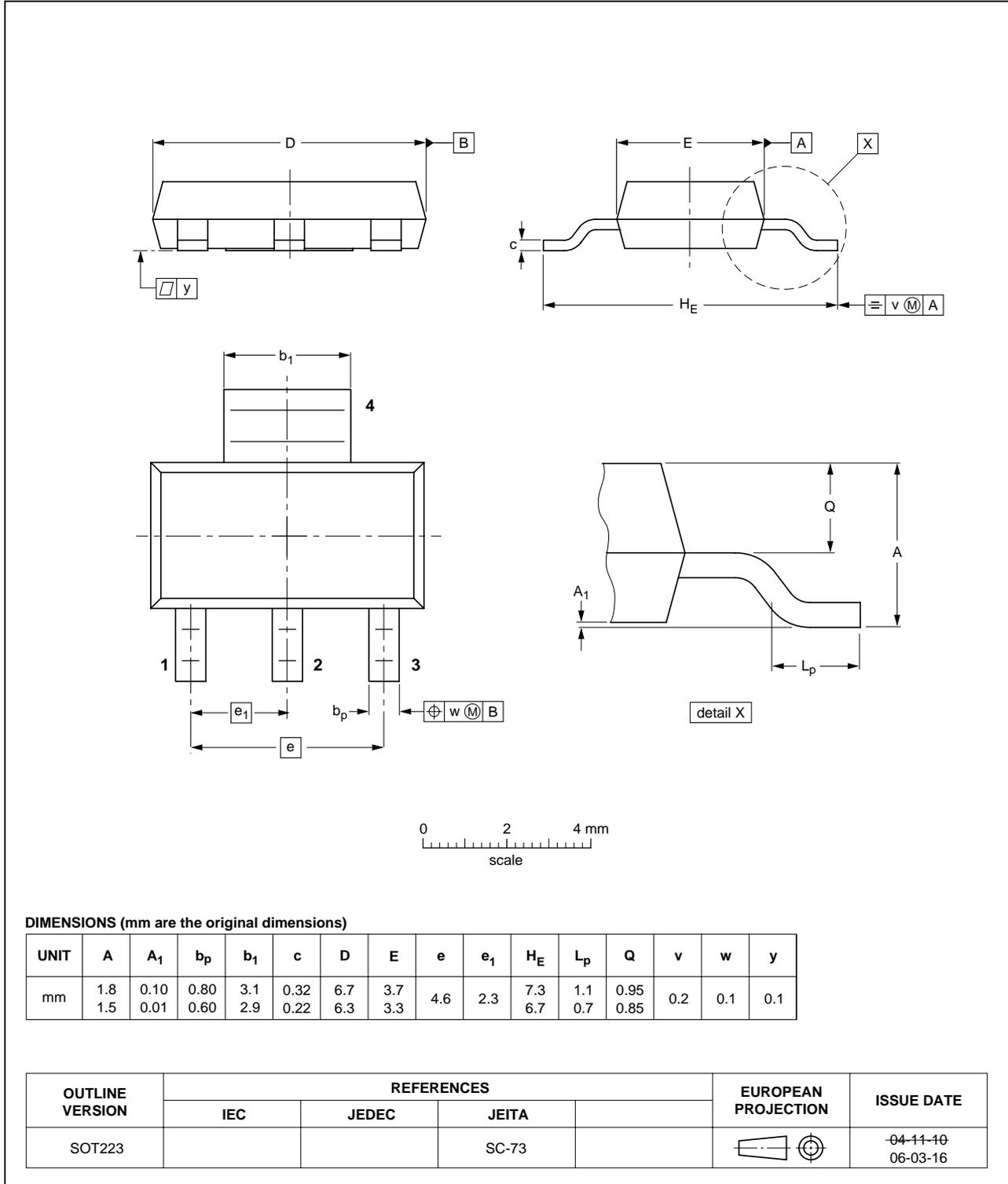
Fig 12. Package outline SOT223 (SC-73)

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9. Mounting

9.1 Mounting instructions
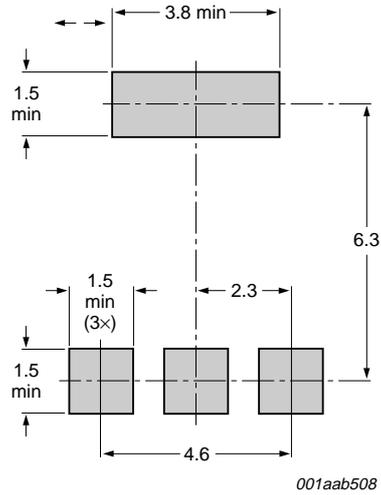
All dimensions are in mm

Fig 13. Minimum footprint SOT223

9.2 Printed-circuit board
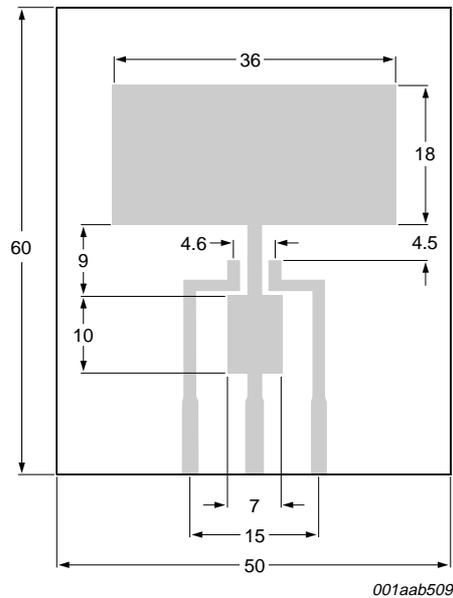
All dimensions are in mm

Printed-circuit board: FR4 epoxy glass (1.6 mm thick), copper laminate (35 μm thick)

Fig 14. Printed-circuit board pad area SOT223

10. Revision history

Table 7. **Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
OT406_1	20080519	Product data sheet	-	-

11. Legal information

11.1 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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