

# OT407

## Four-quadrant triac, enhanced noise immunity

Rev. 01 — 19 May 2008

Product data sheet

## 1. Product profile

### 1.1 General description

Passivated sensitive gate triac in a SOT54A (wide pitch) 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
- High blocking voltage to 800 V

### 1.3 Applications

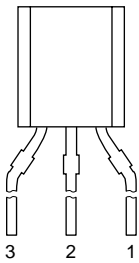
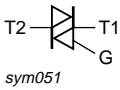
- Home appliances
- Low power AC fan speed controllers
- Low power motor control
- Low power loads in industrial process control

### 1.4 Quick reference data

- $V_{DRM} \leq 800$  V
- $I_{TSM} \leq 12.5$  A ( $t = 20$  ms)
- $I_{T(RMS)} \leq 1$  A
- $I_{GT} \leq 5$  mA
- $I_{GT} \leq 7$  mA (T2– G+)

## 2. Pinning information

Table 1. Pinning

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

### 3. Ordering information

**Table 2. Ordering information**

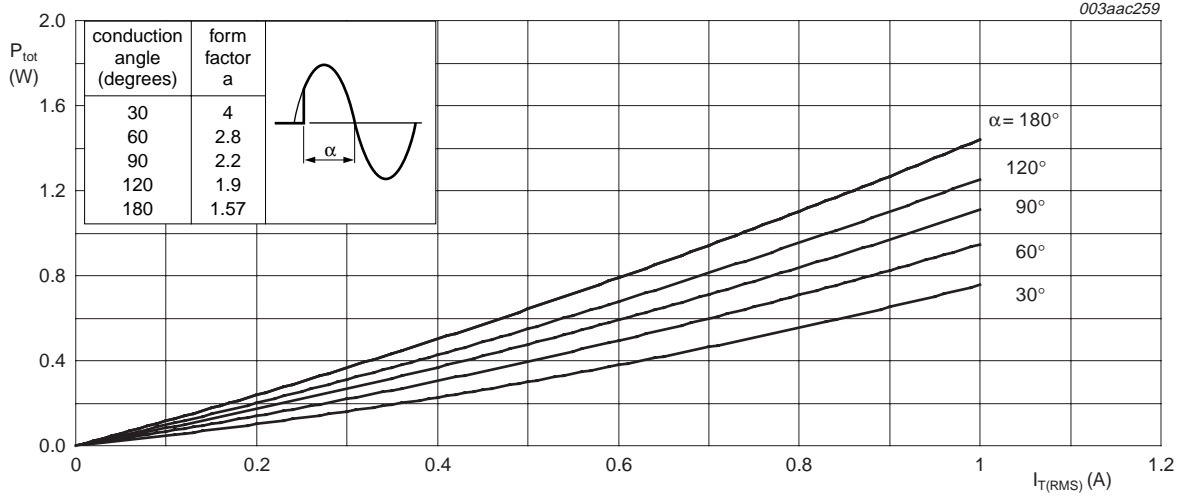
Type number	Package		Version
	Name	Description	
OT407	-	plastic single-ended leaded (through hole) package; 3 leads (wide pitch)	SOT54A

### 4. Limiting values

**Table 3. Limiting values**

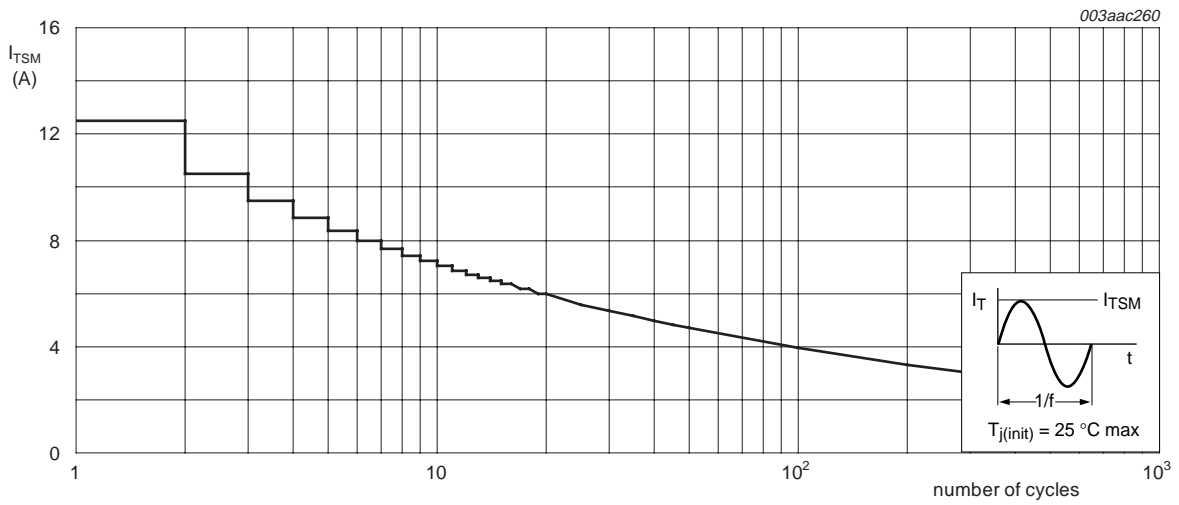
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	800	V
$V_{RRM}$	repetitive peak reverse voltage		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq 38\text{ °C}$ ; 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	$t_p = 10\text{ ms}$	-	1.28	$A^2s$
$di_T/dt$	rate of rise of on-state current	$I_{TM} = 1\text{ A}$ ; $I_G = 20\text{ mA}$ ; $di_G/dt = 0.2\text{ A}/\mu s$			
		T2+ G+	-	50	$A/\mu s$
		T2+ G-	-	50	$A/\mu s$
		T2- G-	-	50	$A/\mu s$
		T2- G+	-	10	$A/\mu s$
$I_{GM}$	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	$^{\circ}C$
$T_j$	junction temperature		-	125	$^{\circ}C$



$\alpha$  = 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

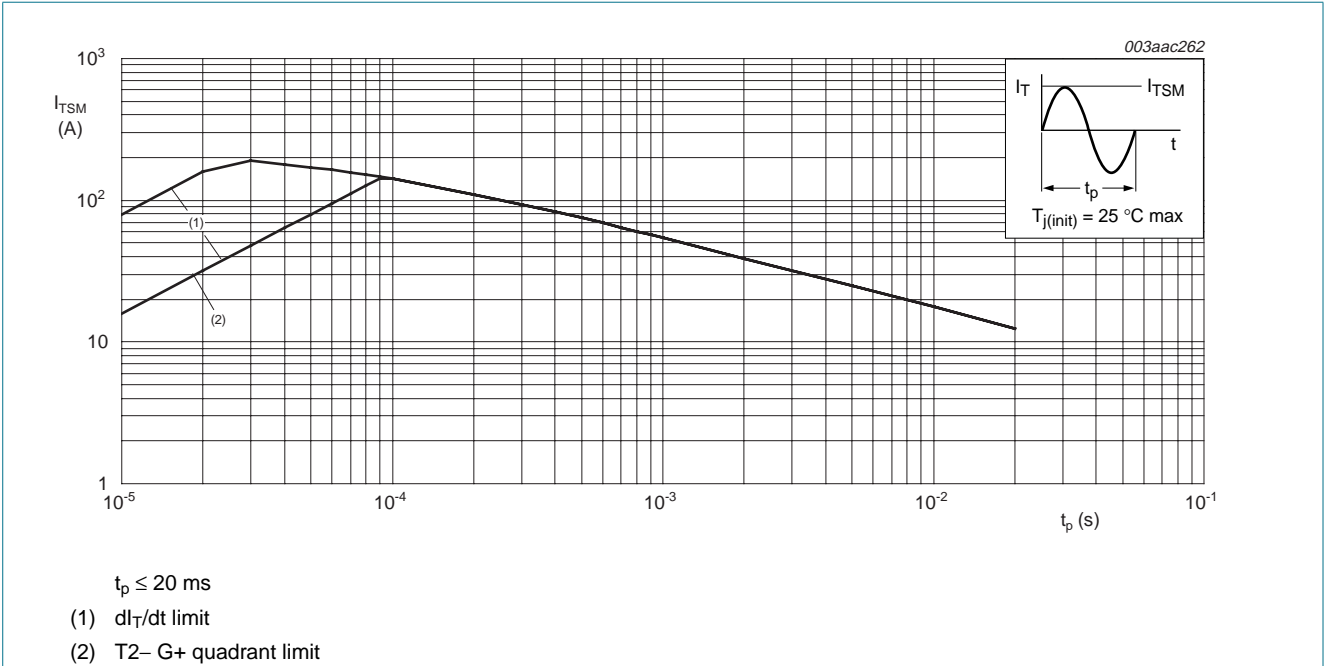


Fig 3. Non-repetitive peak on-state current as a function of pulse width; maximum values

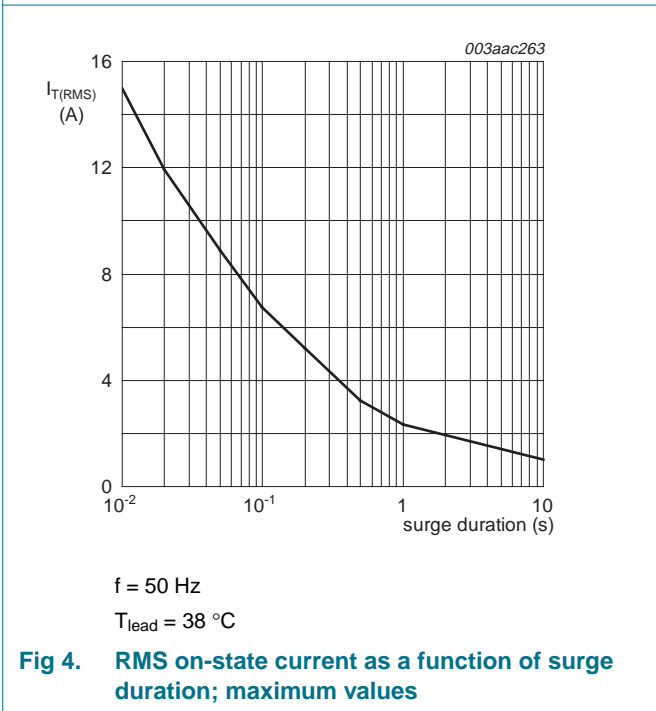


Fig 4. RMS on-state current as a function of surge duration; maximum values

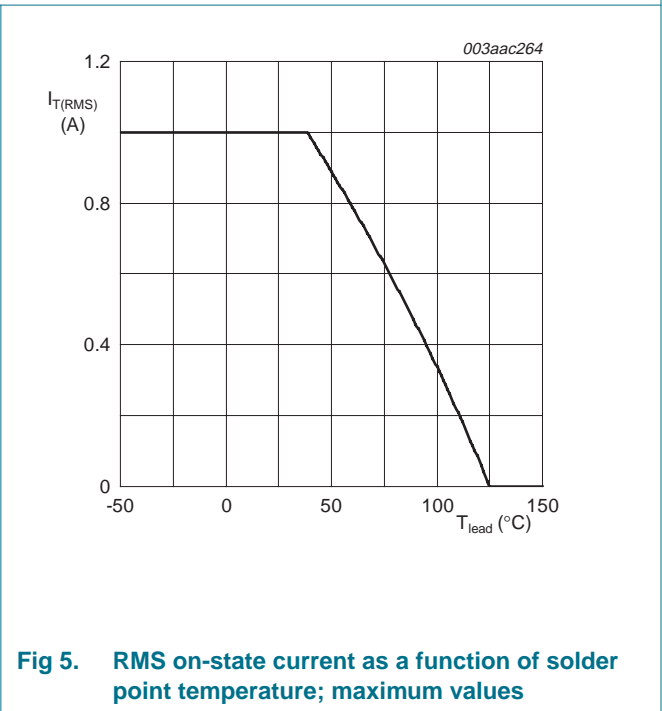
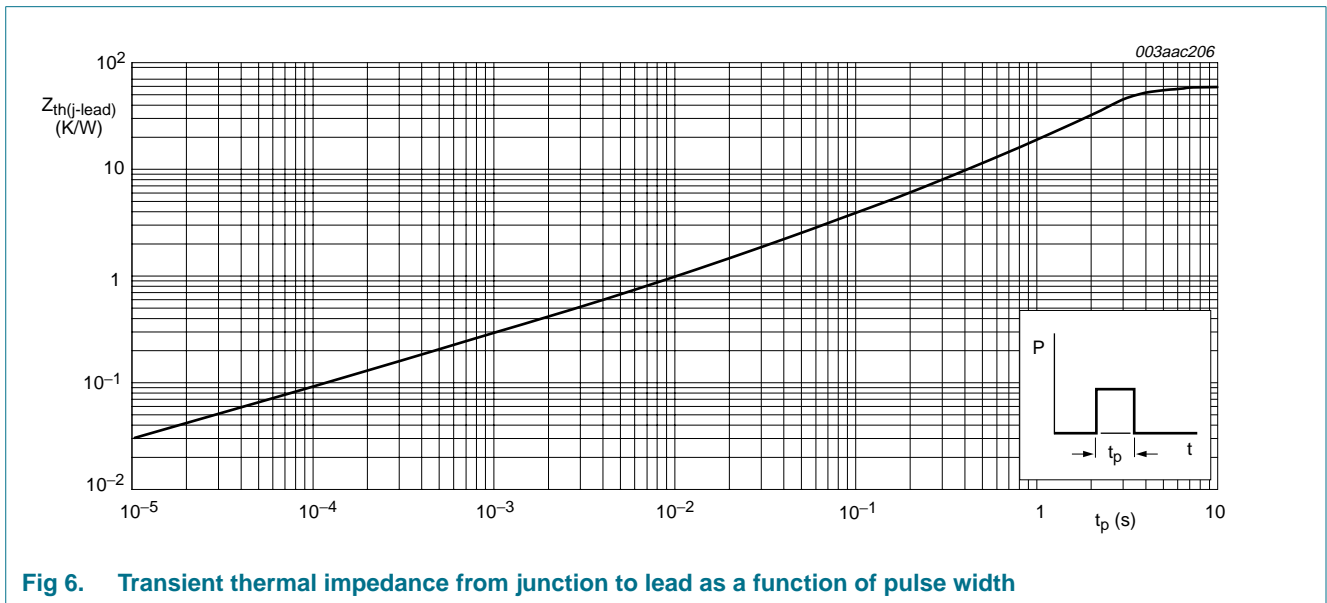


Fig 5. RMS on-state current as a function of solder point temperature; maximum values

### 5. Thermal characteristics

**Table 4. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-lead)}$	thermal resistance from junction to lead	full cycle; see <a href="#">Figure 6</a>	-	-	60	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	full cycle; printed-circuit board mounted; lead length = 4 mm	-	150	-	K/W



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

## 6. Static characteristics

**Table 5. Static characteristics**

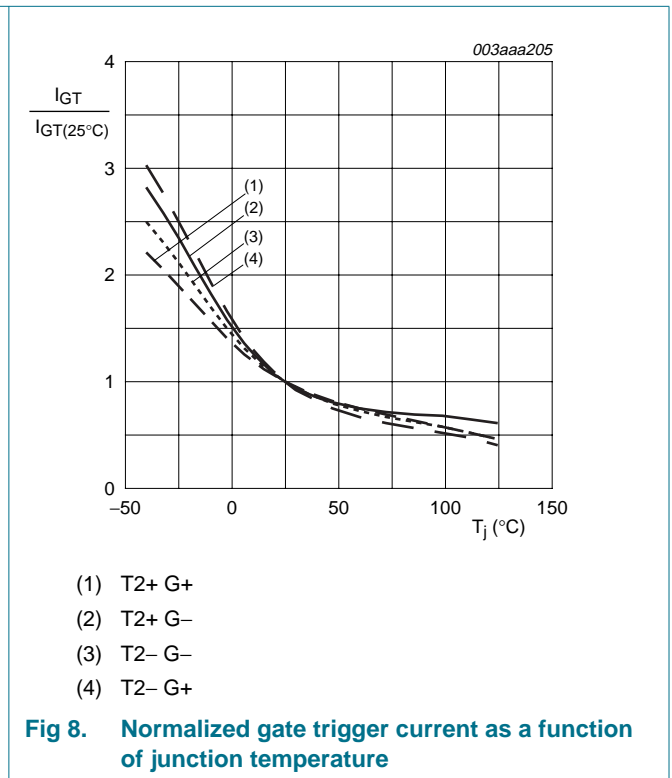
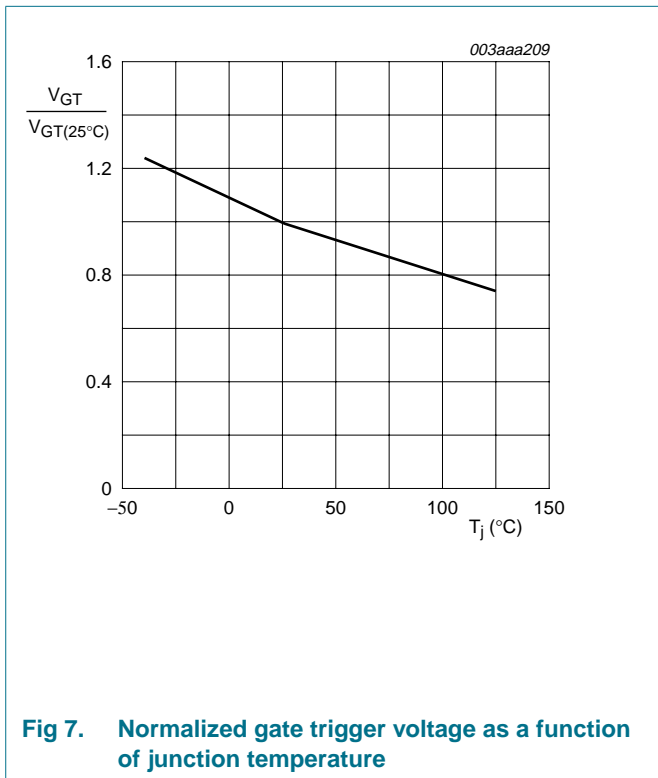
$T_j = 25\text{ °C}$  unless otherwise specified.

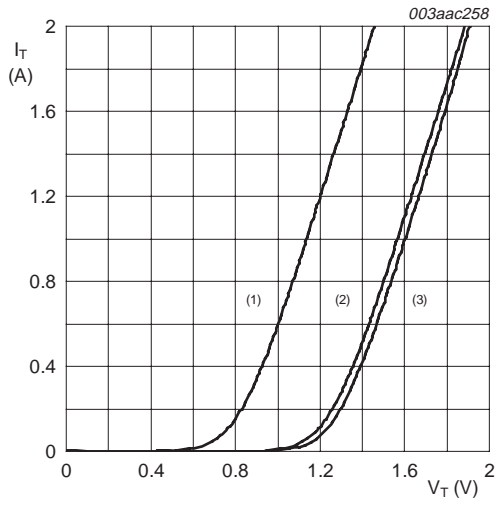
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; see <a href="#">Figure 8</a>				
		T2+ G+	0.25	-	5	mA
		T2+ G-	0.25	-	5	mA
		T2- G-	0.25	-	5	mA
		T2- G+	0.35	-	7	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; see <a href="#">Figure 10</a>				
		T2+ G+	-	-	10	mA
		T2+ G-	-	-	25	mA
		T2- G-	-	-	10	mA
		T2- G+	-	-	10	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; see <a href="#">Figure 11</a>	-	-	10	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

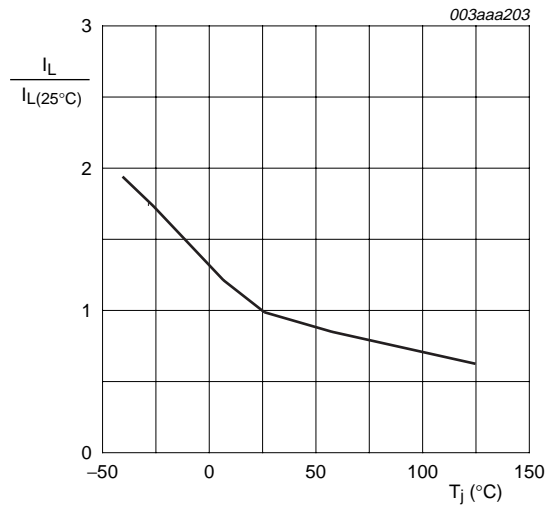
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 0.67V_{DRM(max)}$ ; $T_j = 110\text{ }^\circ\text{C}$ ; exponential waveform; gate open circuit	20	-	-	V/ $\mu\text{s}$
$dV_{com}/dt$	rate of change of commutating voltage	$V_{DM} = 400\text{ V}$ ; $T_j = 110\text{ }^\circ\text{C}$ ; $I_{TM} = 1\text{ A}$ ; $di_{com}/dt = 0.44\text{ A/ms}$	1	-	-	V/ $\mu\text{s}$



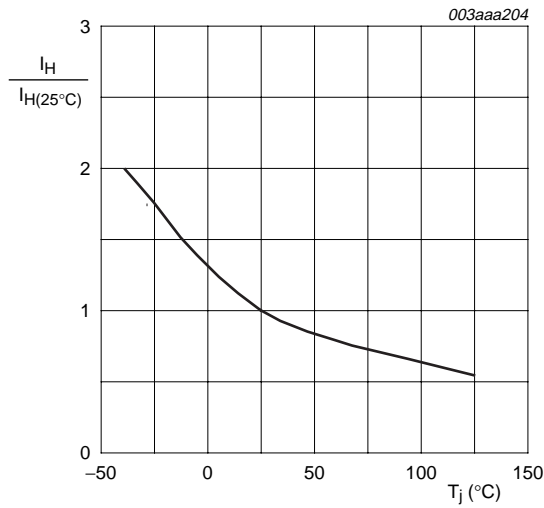


- $V_o = 1.254 \text{ V}; R_s = 0.31 \Omega$
- (1)  $T_j = 125 \text{ }^\circ\text{C}$ ; typical values
  - (2)  $T_j = 125 \text{ }^\circ\text{C}$ ; maximum values
  - (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

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



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



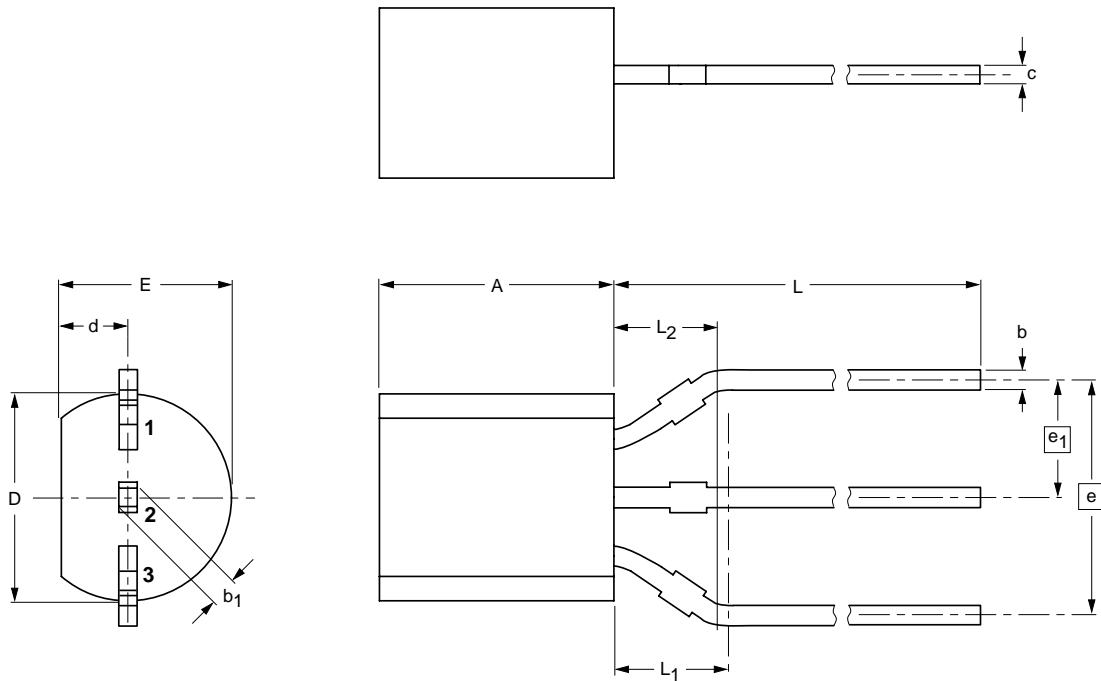
**Fig 11. Normalized holding current as a function of junction temperature**



8. Package outline

Plastic single-ended leaded (through hole) package; 3 leads (wide pitch) SOT54A

SOT54A



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b <sub>1</sub>	c	D	d	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup> max.	L <sub>2</sub>
mm	5.2	0.48	0.66	0.45	4.8	1.7	4.2	5.08	2.54	14.5	3	3
	5.0	0.40	0.55	0.38	4.4	1.4	3.6			12.7		2

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT54A					97-05-13- 04-06-28

Fig 12. Package outline SOT54A

## 9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
OT407_1	20080519	Product data sheet	-	-

## 10. Legal information

### 10.1 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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## 12. Contents

<b>1</b>	<b>Product profile</b> .....	<b>1</b>
1.1	General description .....	1
1.2	Features .....	1
1.3	Applications .....	1
1.4	Quick reference data .....	1
<b>2</b>	<b>Pinning information</b> .....	<b>1</b>
<b>3</b>	<b>Ordering information</b> .....	<b>2</b>
<b>4</b>	<b>Limiting values</b> .....	<b>2</b>
<b>5</b>	<b>Thermal characteristics</b> .....	<b>5</b>
<b>6</b>	<b>Static characteristics</b> .....	<b>6</b>
<b>7</b>	<b>Dynamic characteristics</b> .....	<b>7</b>
<b>8</b>	<b>Package outline</b> .....	<b>9</b>
<b>9</b>	<b>Revision history</b> .....	<b>10</b>
<b>10</b>	<b>Legal information</b> .....	<b>11</b>
10.1	Data sheet status .....	11
10.2	Definitions .....	11
10.3	Disclaimers .....	11
10.4	Trademarks .....	11
<b>11</b>	<b>Contact information</b> .....	<b>11</b>
<b>12</b>	<b>Contents</b> .....	<b>12</b>

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