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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

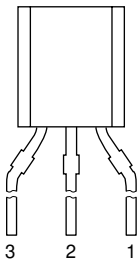
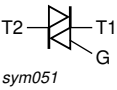
- Home appliances
- Low power AC fan speed controllers
- Low power motor control
- Low power loads in industrial process control

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)	 SOT54A	 sym051
2	gate (G)		
3	main terminal 1 (T1)		

3. Ordering information

Table 2. Ordering information

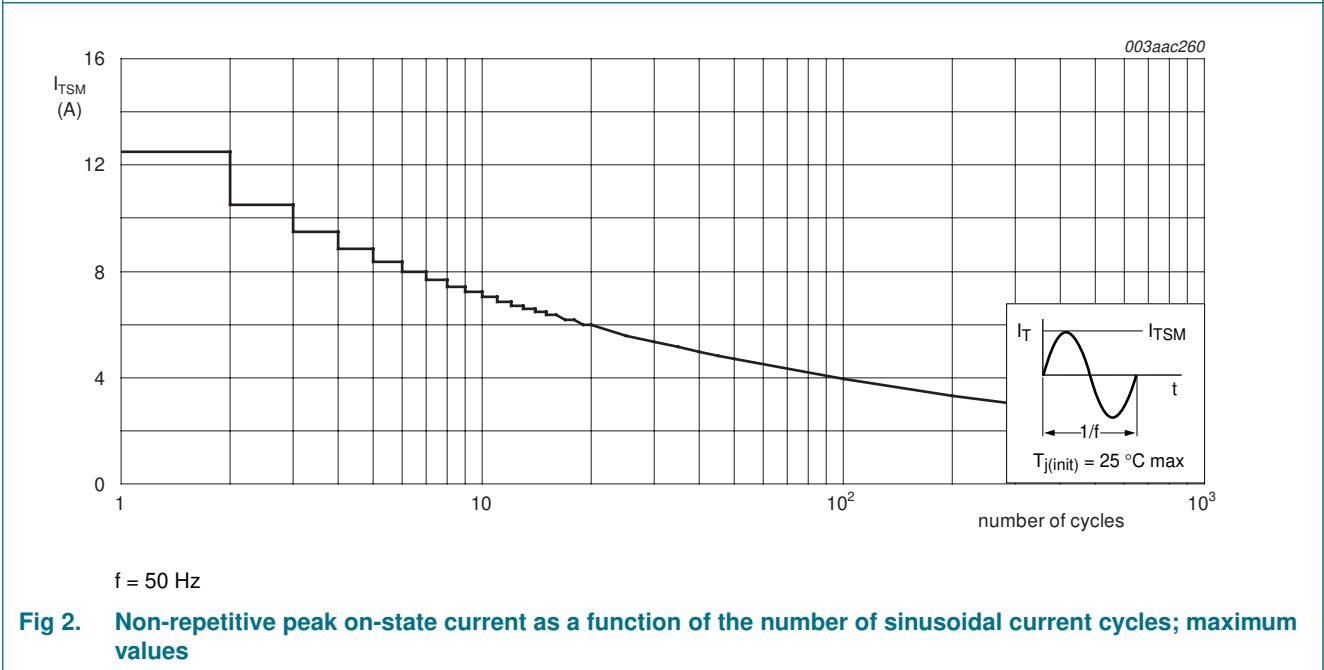
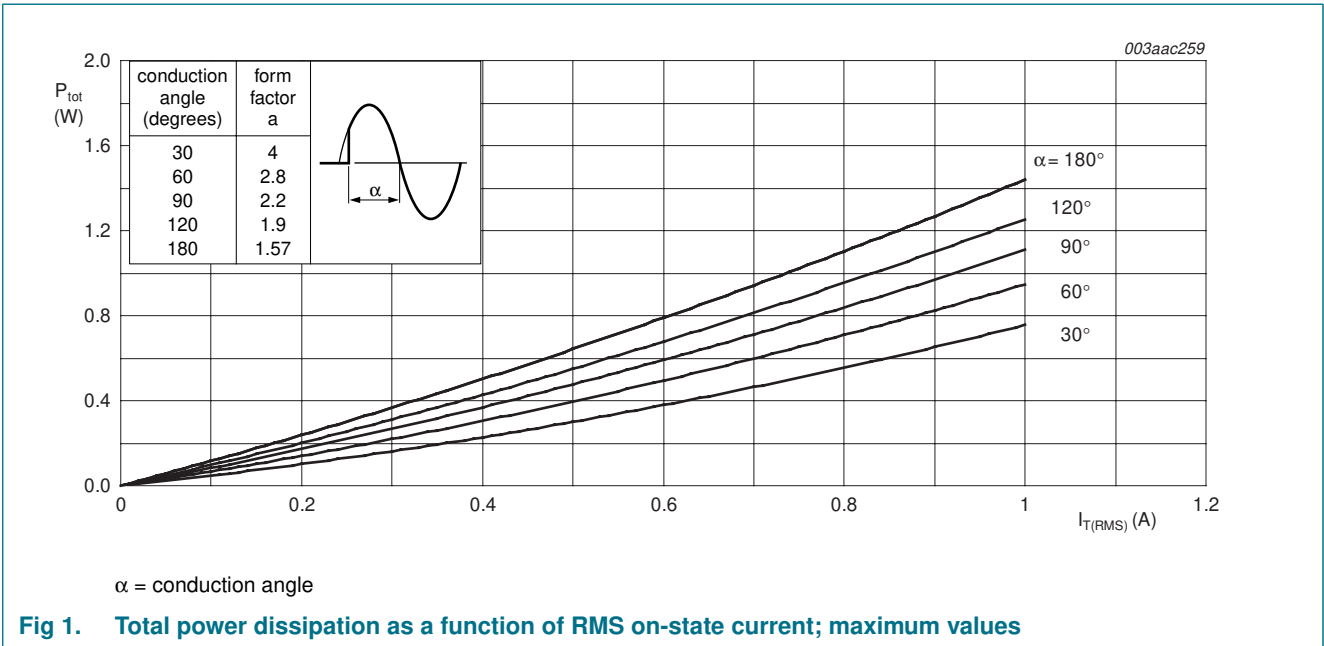
Type number	Package		Version
	Name	Description	
OT407	-	plastic single-ended leaded (through hole) package; 3 leads (wide pitch)	SOT54A

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 Figure 4 and 5	-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge; see Figure 2 and 3			
		$t = 20\text{ ms}$	-	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 ² 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/ 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



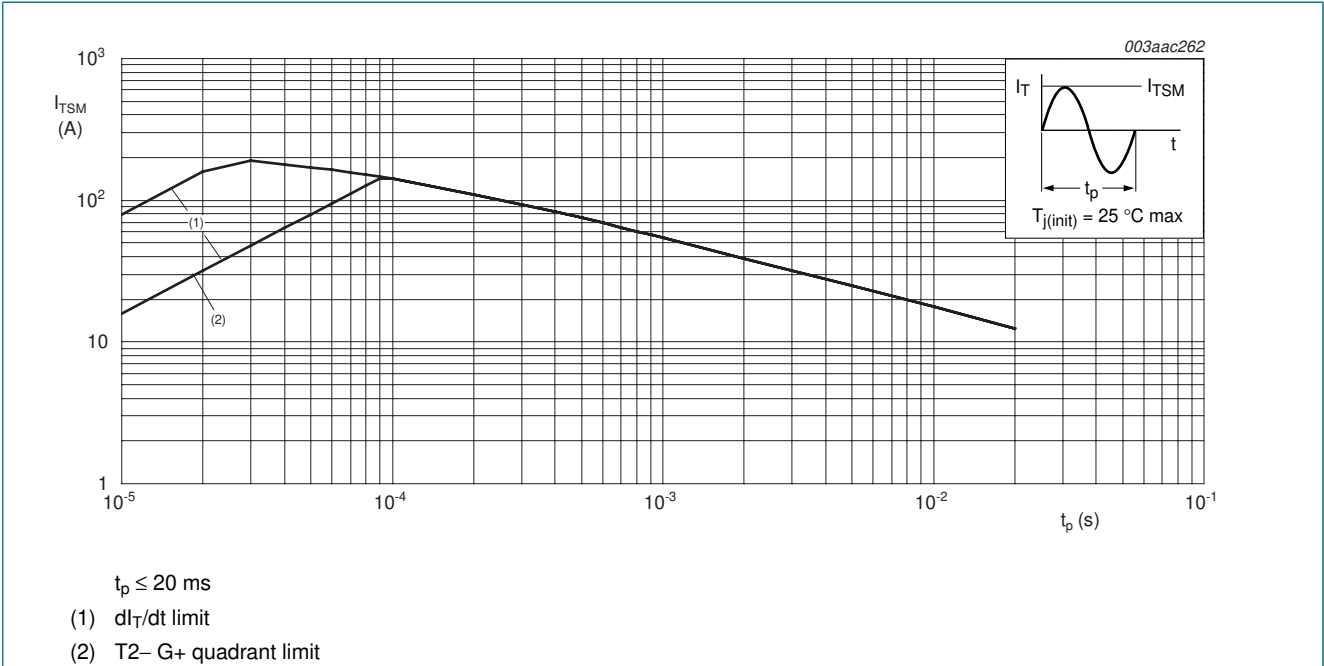


Fig 3. Non-repetitive peak on-state current as a function of pulse width; maximum values

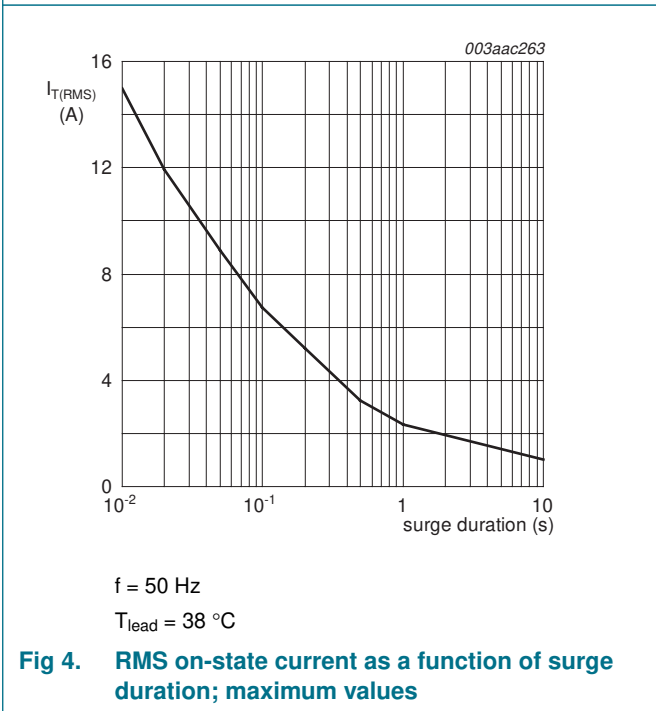


Fig 4. RMS on-state current as a function of surge duration; maximum values

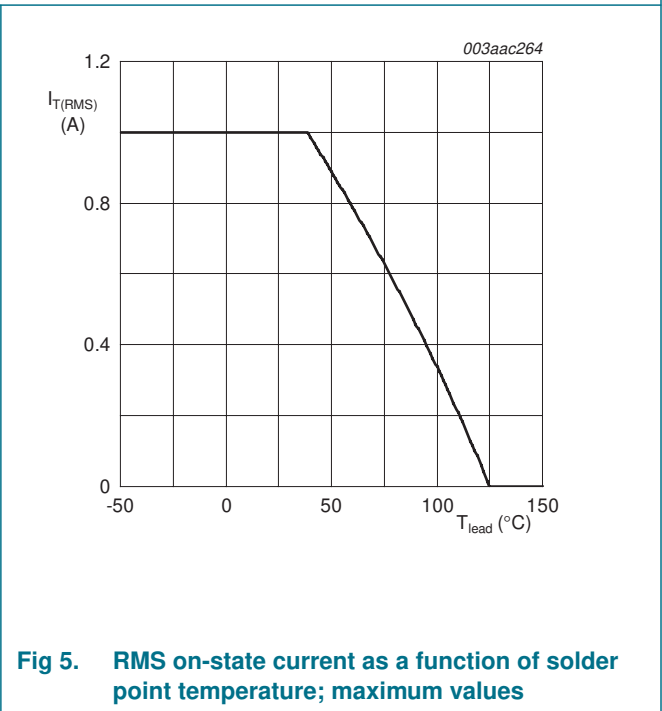


Fig 5. RMS on-state current as a function of solder point temperature; maximum values

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 Figure 6	-	-	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

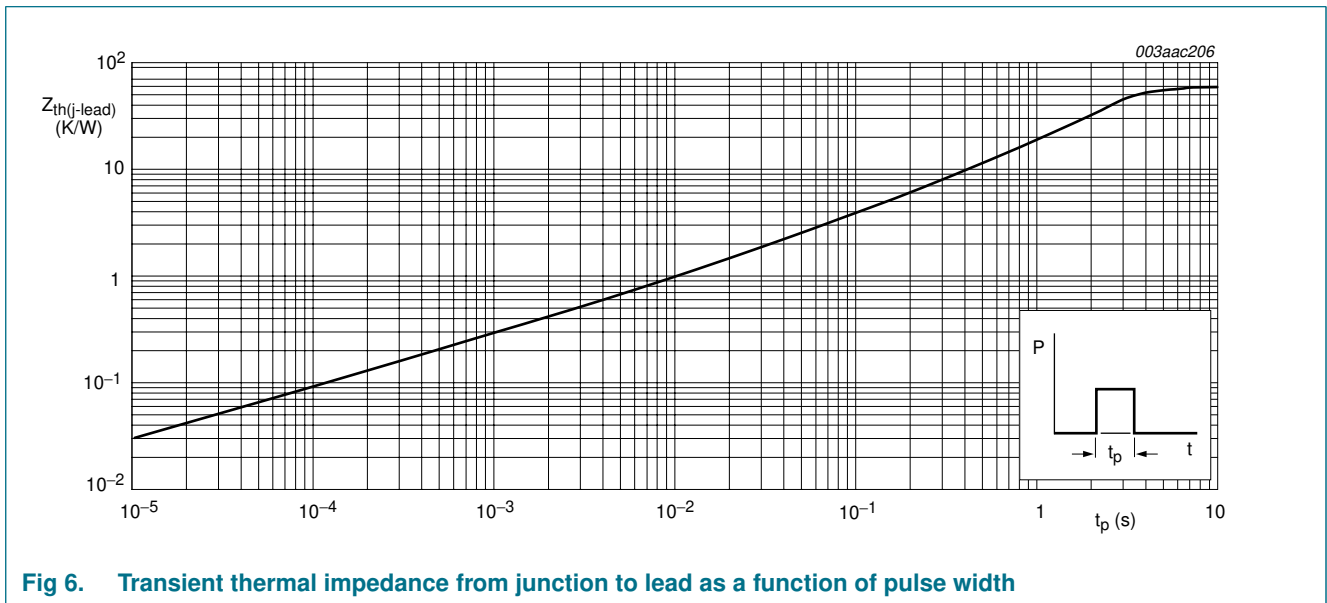


Fig 6. Transient thermal impedance from junction to lead as a function of pulse width

6. Static characteristics

Table 5. Static characteristics

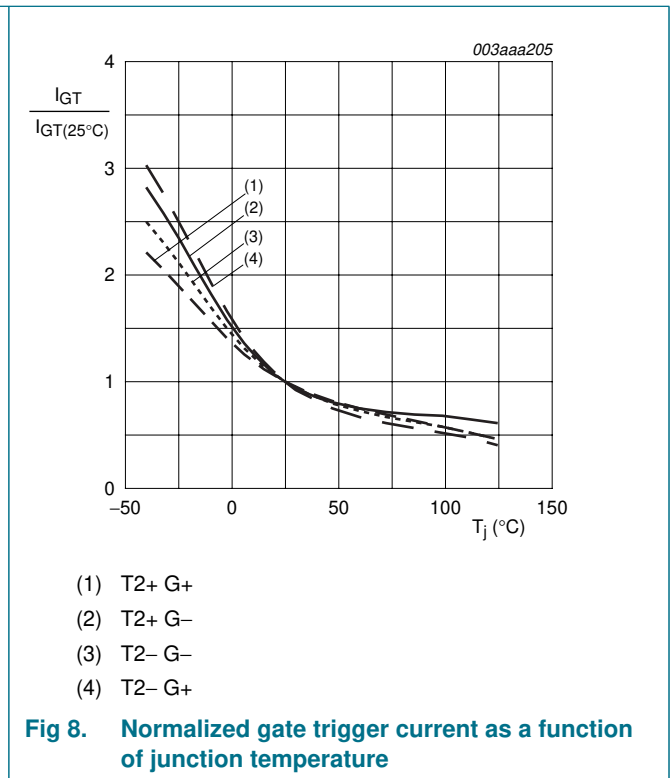
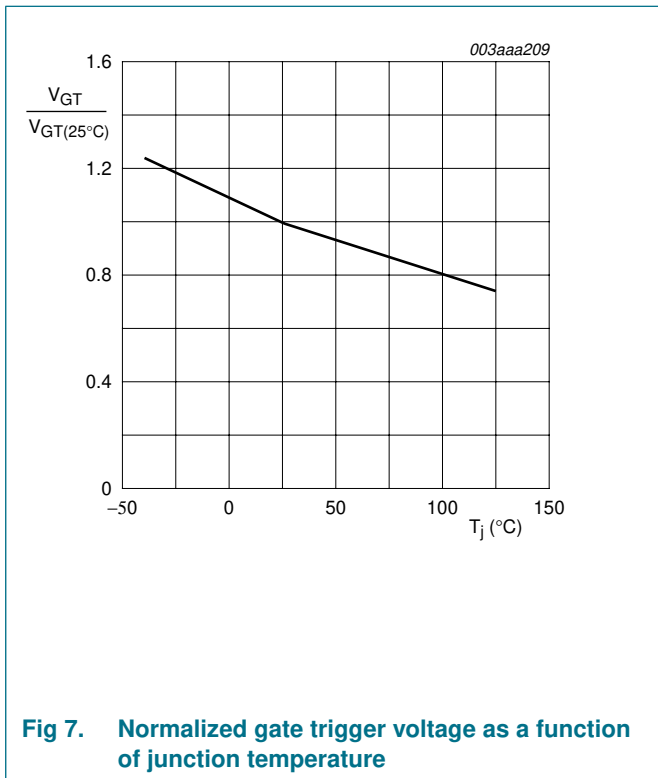
$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

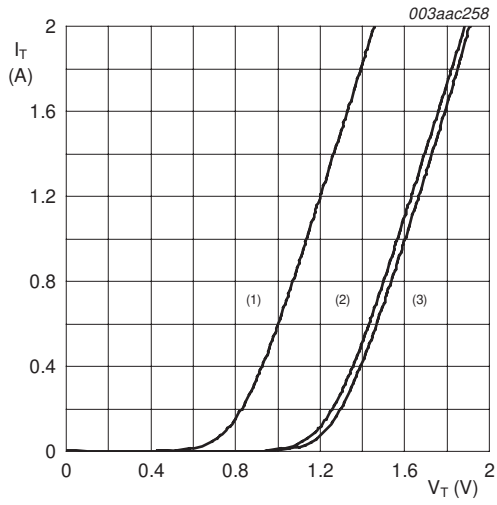
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 8				
		T2+ G+	0.25	-	5	mA
		T2+ G-	0.25	-	5	mA
		T2- G-	0.25	-	5	mA
		T2- G+	0.35	-	7	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; see Figure 10				
		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 Figure 11	-	-	10	mA
V_T	on-state voltage	$I_T = 1\text{ A}$; see Figure 9	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 7	-	-	1.3	V
		$V_D = V_{DRM}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$	0.2	-	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; $T_j = 125\text{ }^\circ\text{C}$	-	-	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/ μs
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/ μs





- $V_o = 1.254 \text{ V}; R_s = 0.31 \Omega$
- (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

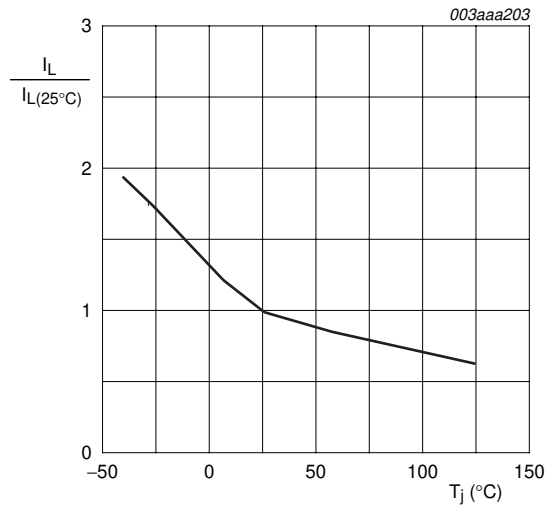


Fig 10. Normalized latching current as a function of junction temperature

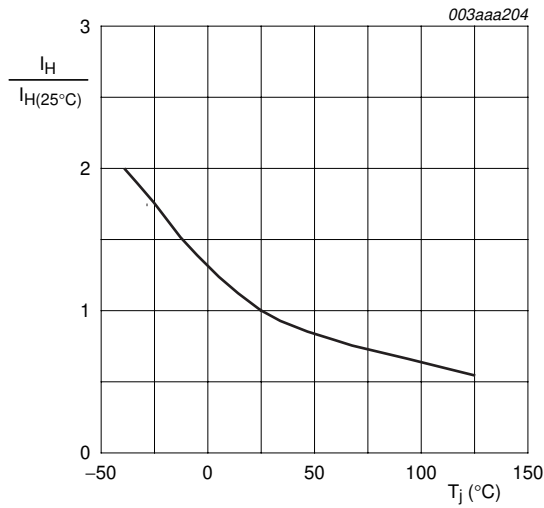
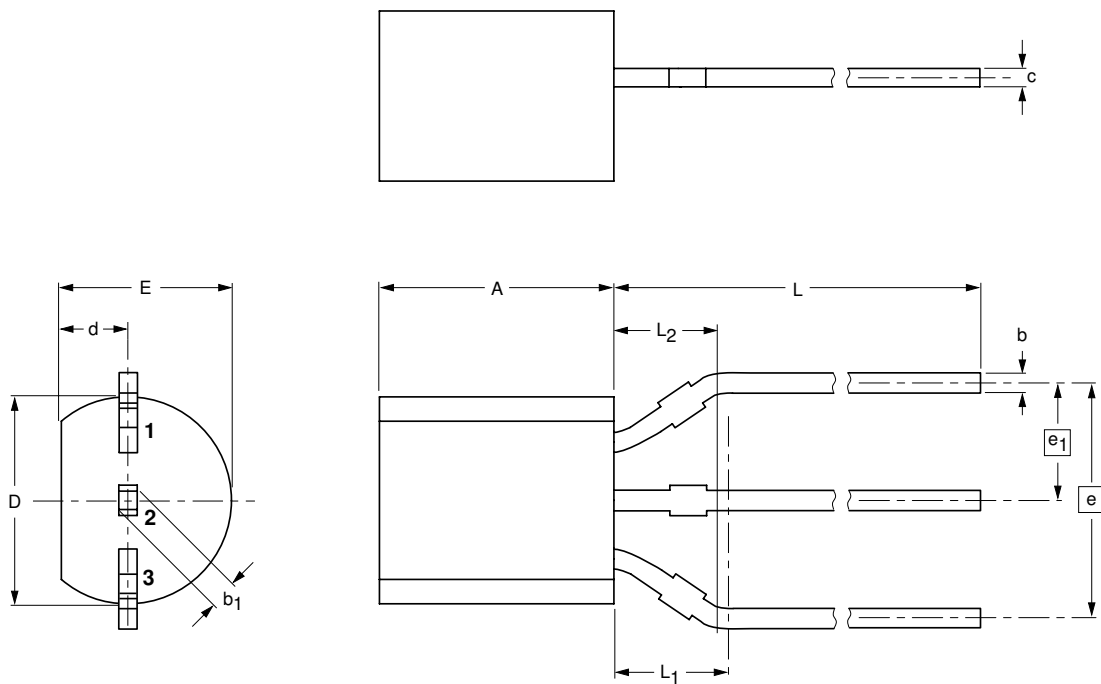


Fig 11. Normalized holding current as a function of junction temperature

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 ₁	c	D	d	E	e	e ₁	L	L ₁ ⁽¹⁾ max.	L ₂
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					

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 ^{[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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Date of release: 19 May 2008

Document identifier: OT407_1