

## 1. General description

AC Thyristor power switch in a SOT223 surface-mountable plastic package with self-protective capabilities against low and high energy transients.

## 2. Features and benefits

- Common terminal on mounting base allows multiple ACTs on shared cooling pad
- Exclusive negative gate triggering
- Full cycle AC conduction
- High voltage capability
- Remote gate separates the gate driver from the effects of the load current
- Safe clamping of low energy over-voltage transients
- Self-protective turn-on during high energy voltage transients
- Surface-mountable package
- Very high noise immunity

## 3. Applications

- Fan motor circuits
- Pump motor circuits
- Lower-power highly inductive, resistive and safety loads
- Contactors, circuit breakers, valves, dispensers and door locks

## 4. Quick reference data

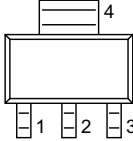
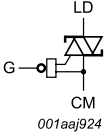
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 112\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	13	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 16.7\text{ ms}$	-	-	14.3	A
$T_j$	junction temperature		-	-	125	°C
$V_{PP}$	peak pulse voltage	$T_j = 25\text{ °C}$ ; non-repetitive, off-state; ten pulses on each voltage polarity; 20s or more between successive pulses; <a href="#">Fig. 6</a>	-	-	2.5	kV

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; \text{LD+ G-}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 10</a>	1	-	10	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; \text{LD- G-}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 10</a>	1	-	10	mA
$I_H$	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 12</a>	-	-	20	mA
$V_T$	on-state voltage	$I_T = 1.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 13</a>	-	-	1.3	V
$V_{CL}$	clamping voltage	$I_{CL} = 0.1\text{ mA}; t_p = 1\text{ ms}; T_j = 25\text{ }^\circ\text{C}$	850	-	-	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C};$ (67% of $V_{DRM}$ ); exponential waveform; gate open circuit; <a href="#">Fig. 15</a>	1000	-	-	V/ $\mu\text{s}$
		$V_{DM} = 402\text{ V}; T_j = 125\text{ }^\circ\text{C};$ exponential waveform; gate open circuit; <a href="#">Fig. 15</a>	2000	-	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 0.8\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s};$ (snubberless condition); gate open circuit; <a href="#">Fig. 16; Fig. 17</a>	0.5	-	-	A/ms

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	LD	load		
2	CM	common		
3	G	gate		
4	CM	common		

## 6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
ACT108W-800E	SOT223	ACT108W-800EF	Reel	4000	SOT223	16-Mar-2006

## 7. Marking

Table 4. Marking codes

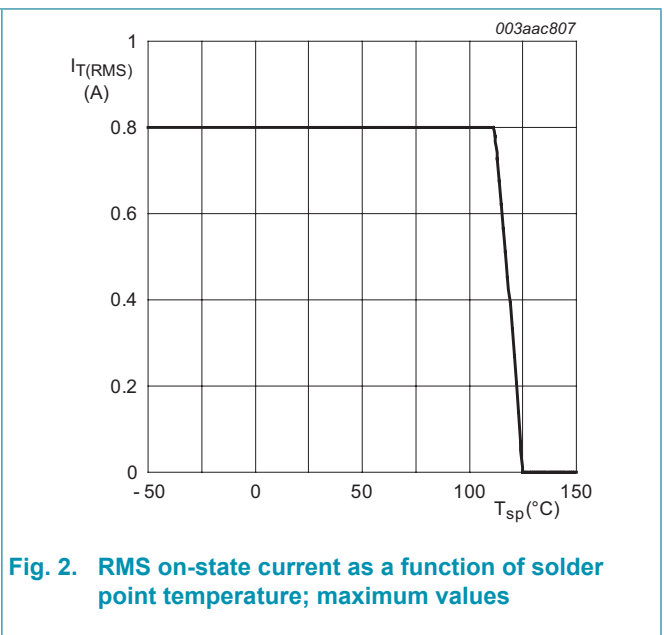
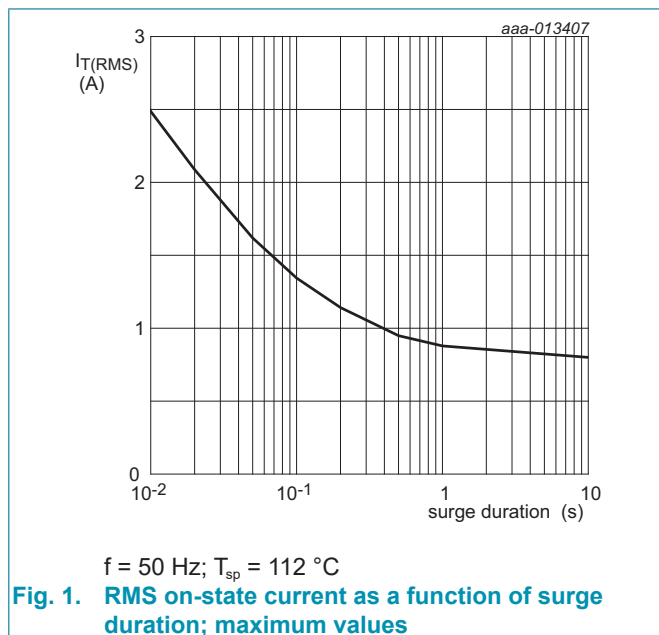
Type number	Marking codes
ACT108W-800E	108W8E

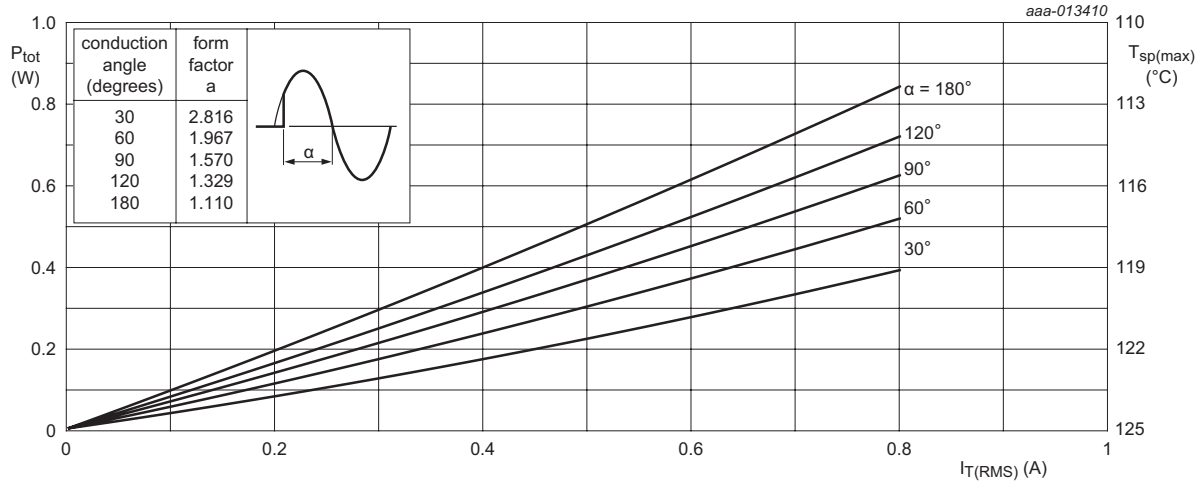
## 8. Limiting values

**Table 5. Limiting values**

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

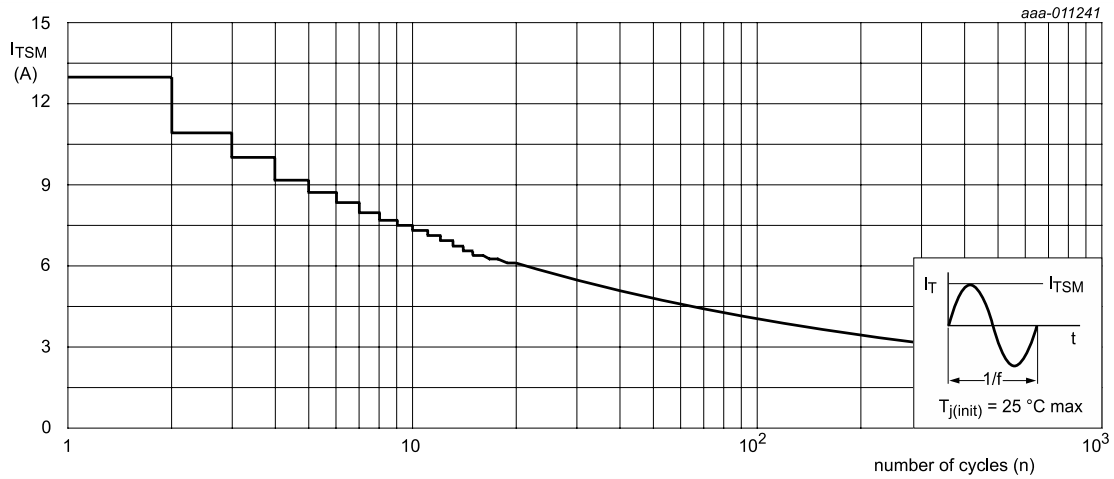
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 112\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig 4</a> ; <a href="#">Fig 5</a>	-	13	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 16.7\text{ ms}$	-	14.3	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN	-	0.84	$A^2s$
$di_T/dt$	rate of rise of on-state current	$I_G = 20\text{ mA}$	-	100	$A/\mu s$
$I_{GM}$	peak gate current	$t = 20\text{ }\mu s$	-	1	A
$V_{GM}$	peak gate voltage	positive applied gate voltage	-	15	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	$^{\circ}C$
$V_{PP}$	peak pulse voltage	$T_j = 25\text{ °C}$ ; non-repetitive, off-state; ten pulses on each voltage polarity; 20s or more between successive pulses; <a href="#">Fig. 6</a>	-	2.5	kV





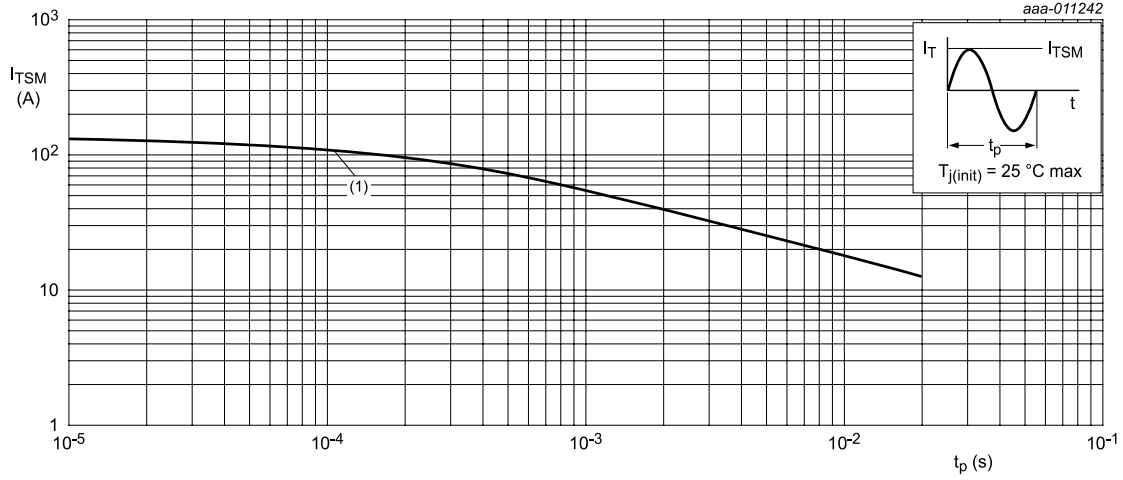
$\alpha$  = conduction angle  
 $a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

**Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values**



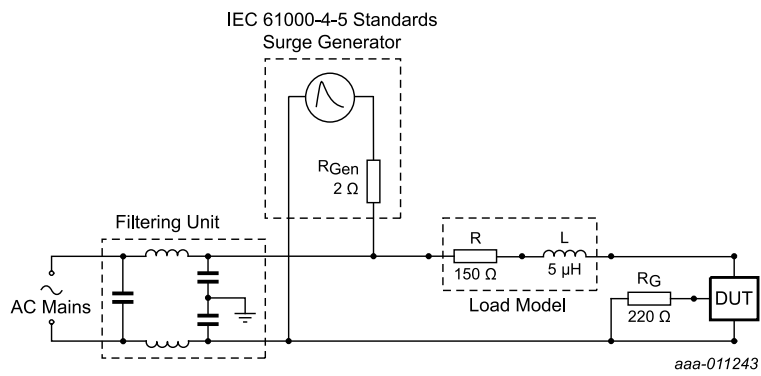
f = 50 Hz

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



$t_p \leq 20\text{ ms}$   
(1)  $di_T/dt$  limit

**Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values**

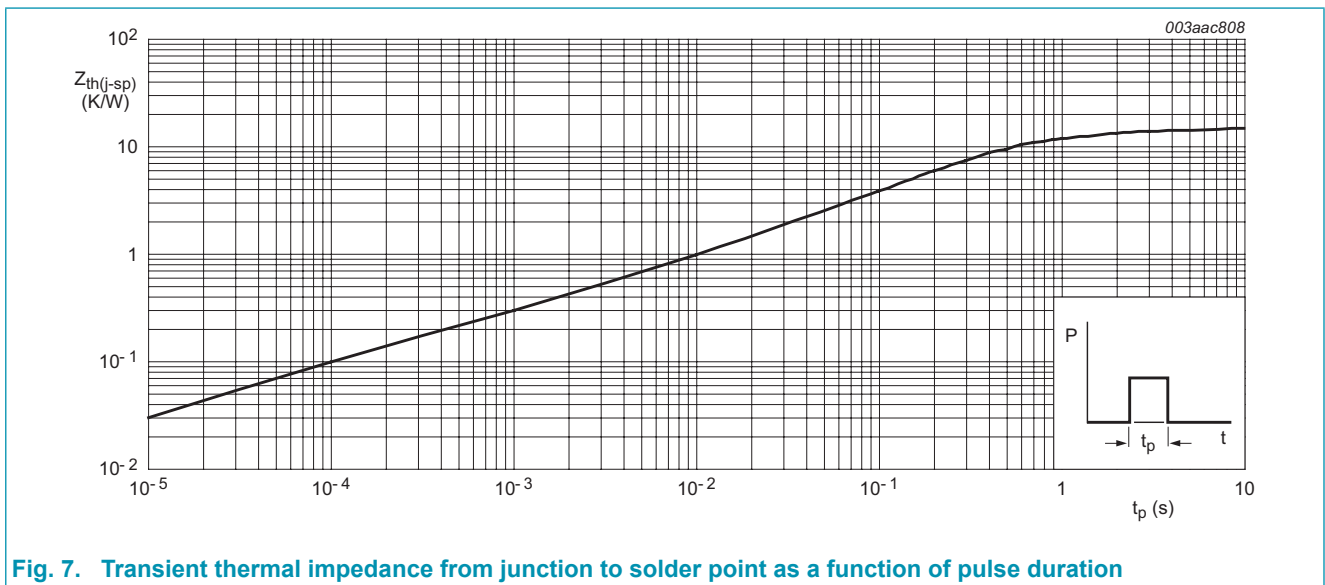


**Fig. 6. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5**

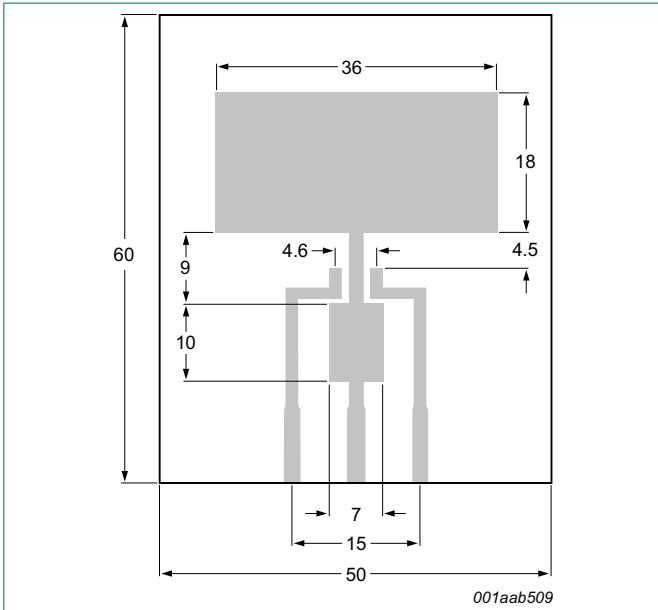
## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle with heatsink compound; <a href="#">Fig. 7</a>	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air; printed circuit board mounted: minimum pad area; <a href="#">Fig. 8</a>	-	70	-	K/W
		in free air; printed circuit board mounted: minimum footprint; <a href="#">Fig. 9</a>	-	156	-	K/W

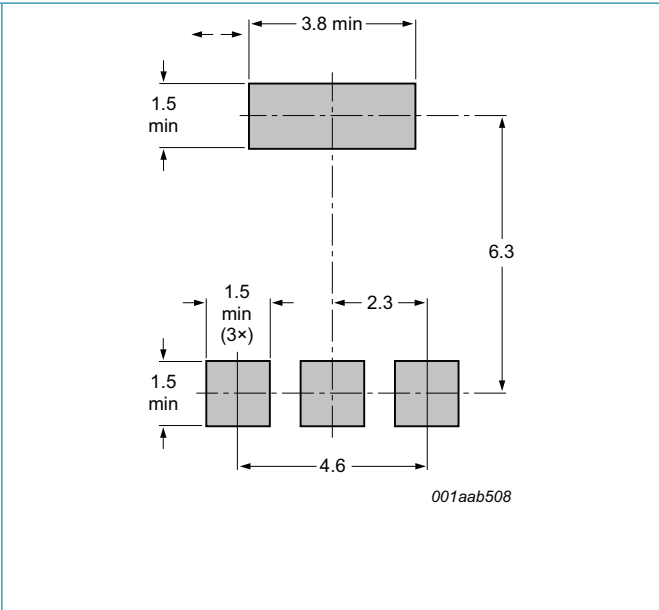


**Fig. 7. Transient thermal impedance from junction to solder point as a function of pulse duration**



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

**Fig. 8. Printed circuit board pad area: SOT223**



All dimensions are in mm

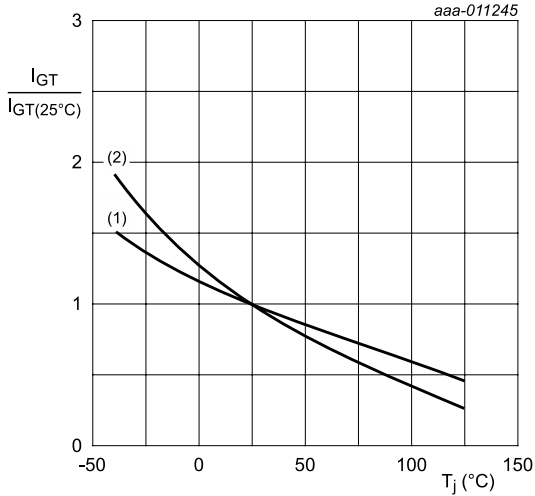
**Fig. 9. Minimum footprint SOT223**

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; LD+ G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	1	-	10	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; LD- G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	1	-	10	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; LD+ G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	-	25	mA
		$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; LD- G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	-	20	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 12</a>	-	-	20	mA
$V_T$	on-state voltage	$I_T = 1.1\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 13</a>	-	-	1.3	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 14</a>	-	-	1	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 125\text{ °C}$	0.15	-	-	V
$I_D$	off-state current	$V_D = 800\text{ V}$ ; $T_J = 25\text{ °C}$	-	-	2	mA
		$V_D = 800\text{ V}$ ; $T_J = 125\text{ °C}$	-	-	0.2	mA
$V_{CL}$	clamping voltage	$I_{CL} = 0.1\text{ mA}$ ; $t_p = 1\text{ ms}$ ; $T_J = 25\text{ °C}$	850	-	-	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_J = 125\text{ °C}$ ; (67% of $V_{DRM}$ ); exponential waveform; gate open circuit; <a href="#">Fig. 15</a>	1000	-	-	V/ $\mu$ s
		$V_{DM} = 402\text{ V}$ ; $T_J = 125\text{ °C}$ ; exponential waveform; gate open circuit; <a href="#">Fig. 15</a>	2000	-	-	V/ $\mu$ s
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}$ ; $T_J = 125\text{ °C}$ ; $I_{T(RMS)} = 0.8\text{ A}$ ; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$ ; (snubberless condition); gate open circuit; <a href="#">Fig. 16</a> ; <a href="#">Fig. 17</a>	0.5	-	-	A/ms





(1) LD+ G-  
(2) LD- G-

Fig. 10. Normalized gate trigger current as a function of junction temperature

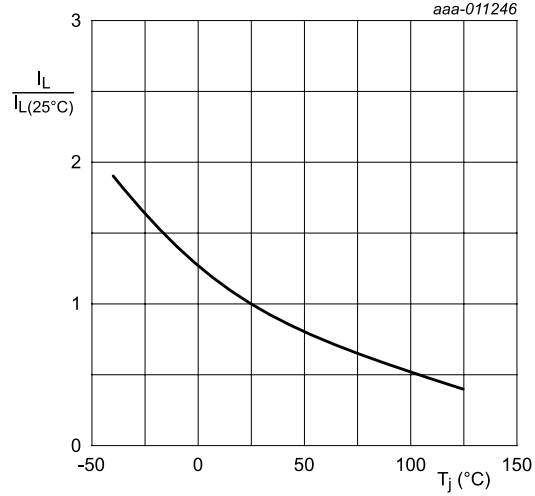


Fig. 11. Normalized latching current as a function of junction temperature

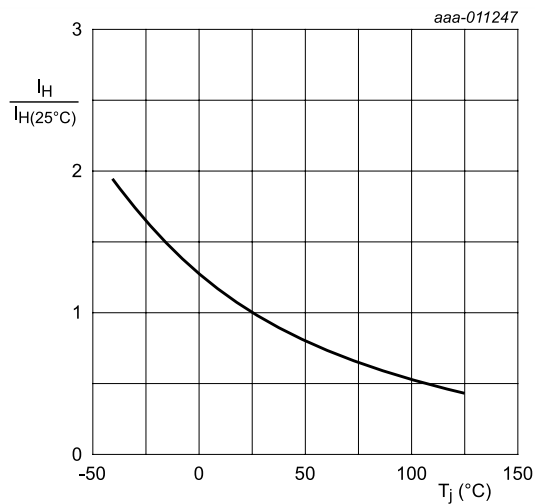
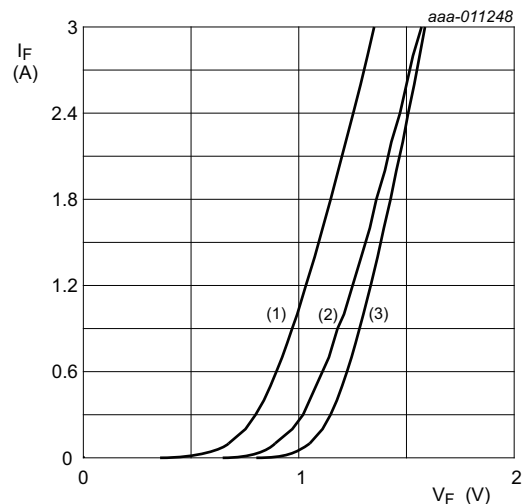
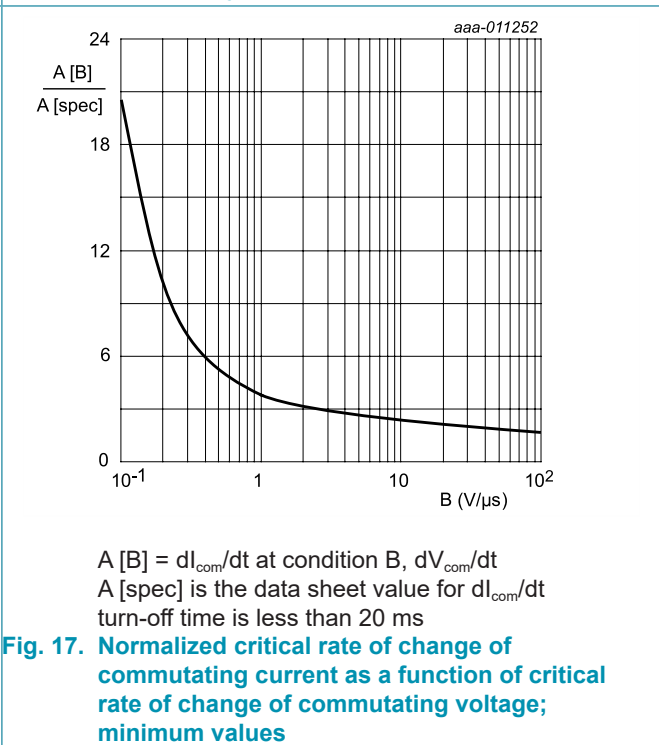
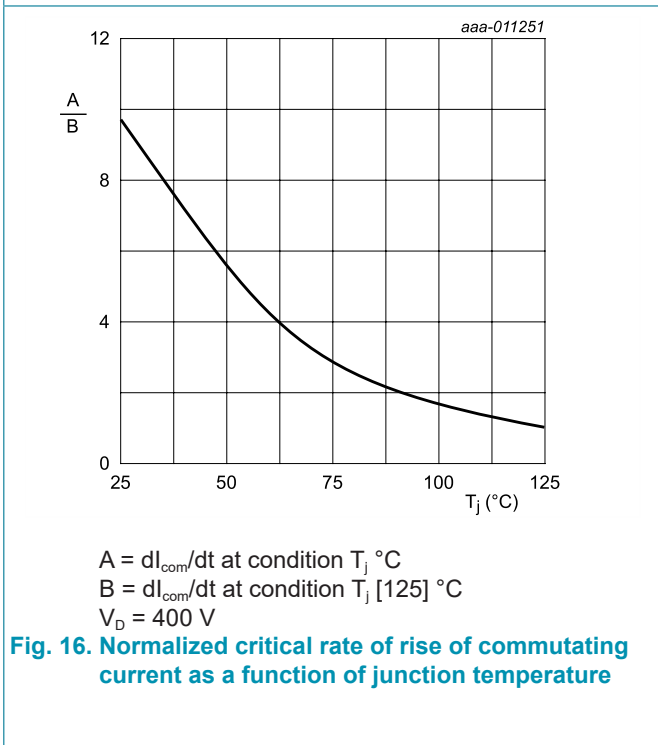
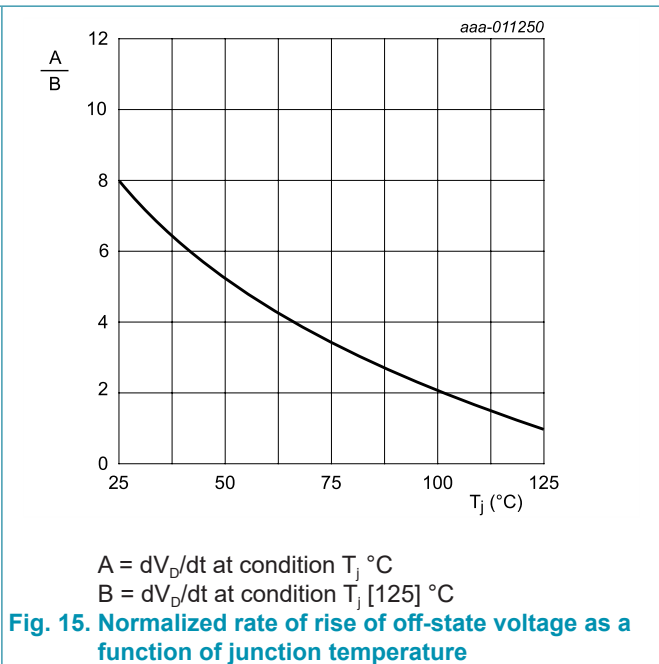
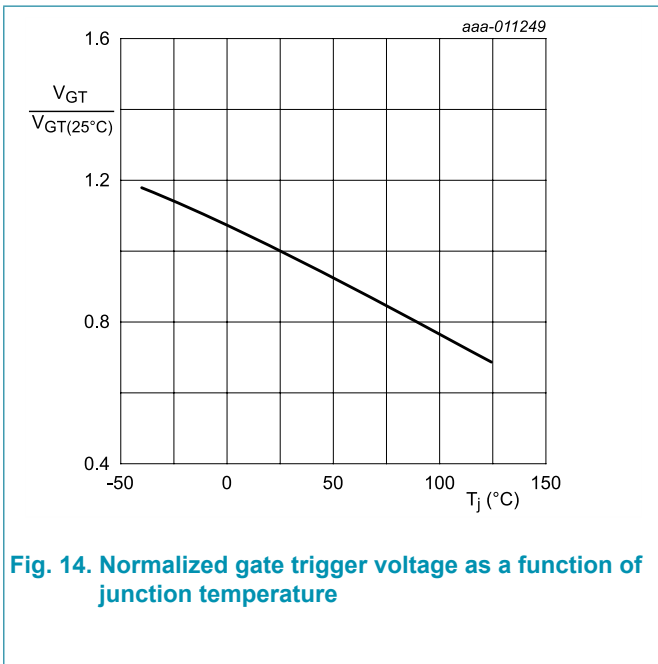


Fig. 12. Normalized holding current as a function of junction temperature



$V_o = 1.031 \text{ V}$ ;  $R_s = 0.1488 \Omega$   
(1)  $T_j = 125^\circ\text{C}$ ; typical values  
(2)  $T_j = 125^\circ\text{C}$ ; maximum values  
(3)  $T_j = 25^\circ\text{C}$ ; maximum values

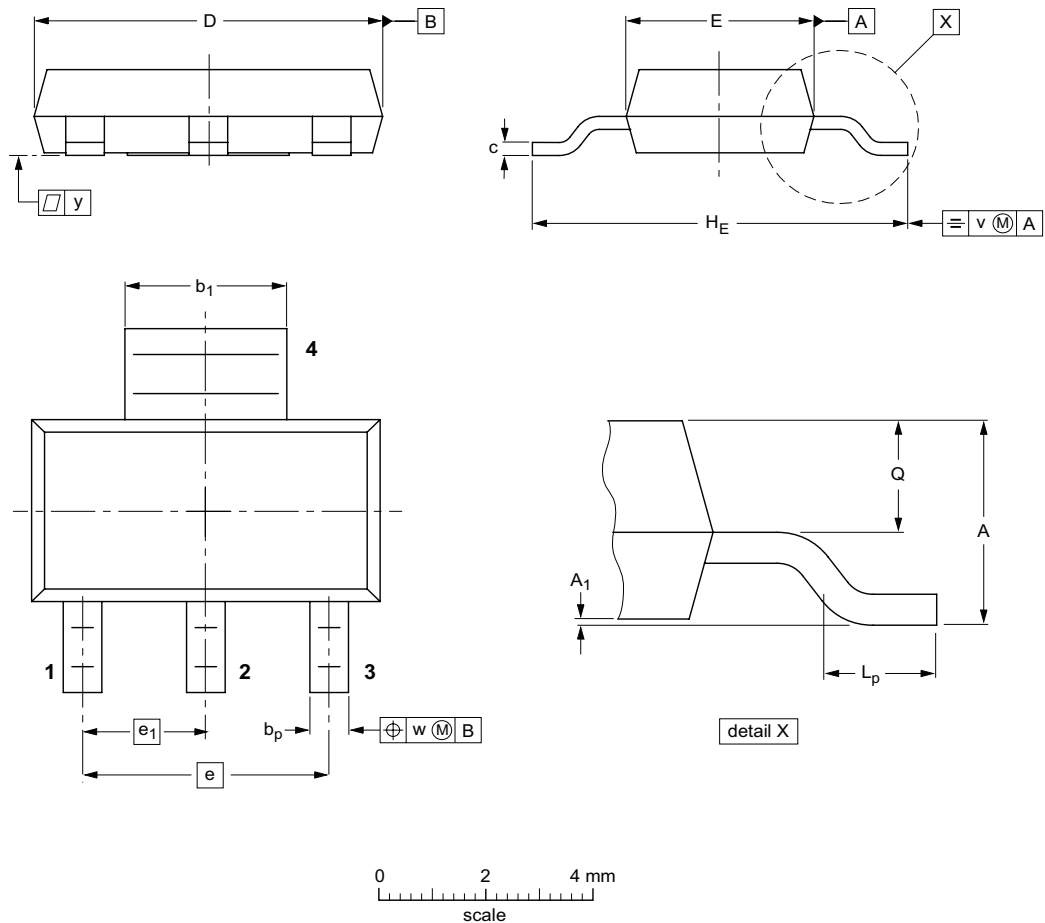
Fig. 13. On-state current as a function of on-state voltage



### 11. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads

SOT223



**DIMENSIONS (mm are the original dimensions)**

UNIT	A	A <sub>1</sub>	b <sub>p</sub>	b <sub>1</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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

· PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.

## 12. Legal information

### 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.

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

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1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data .....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	6
10. Characteristics.....	8
11. Package outline .....	11
12. Legal information .....	12
13. Contents .....	14

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For more information, please visit: <http://www.ween-semi.com>  
For sales office addresses, please send an email to: [salesaddresses@ween-semi.com](mailto:salesaddresses@ween-semi.com)  
Date of release: 31 August 2021

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