

# IMPORTANT NOTICE

10 December 2015

## 1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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Thank you for your cooperation and understanding,

WeEn Semiconductors



# BT1308W-600D

## 4Q Triac

20 August 2013

Product data sheet

## 1. General description

Planar passivated four quadrant triac in a SOT223 surface-mountable plastic package. This very sensitive gate "series D" triac is intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

## 2. Features and benefits

- Direct interfacing to logic level ICs
- Direct interfacing to low power gate drivers and microcontrollers
- High blocking voltage capability
- Planar passivated for voltage ruggedness and reliability
- Surface-mountable package
- Triggering in all four quadrants
- Very sensitive gate

## 3. Applications

- AC Fan controller
- General purpose low power phase control
- General purpose low power switching

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage			-	-	600	V
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p = 20 \text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>		-	-	9	A
$I_T(\text{RMS})$	RMS on-state current	full sine wave; $T_{sp} \leq 107^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		-	-	0.8	A
Static characteristics							
$I_{GT}$	gate trigger current	$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; T2+ G+; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	1	5	mA
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; T2+ G-; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	2	5	mA



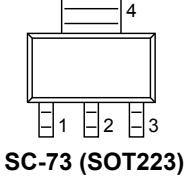
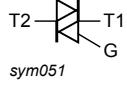
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Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; T2- G-; $T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	2	5	mA
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; T2- G+; $T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	4	7	mA

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		
2	T2	main terminal 2		
3	G	gate		
4	T2	main terminal 2	 <b>SC-73 (SOT223)</b>	 <b>sym051</b>

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT1308W-600D	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 7. Limiting values

**Table 4. 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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 107$ °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; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>		-	9	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms		-	10	A
$I^2t$	$I^2t$ for fusing	$t_p = 10$ ms; SIN		-	0.32	$A^2s$
$dI_T/dt$	rate of rise of on-state current	$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 0.2$ A/ $\mu$ s; T2+ G+		-	50	A/ $\mu$ s
		$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 0.2$ A/ $\mu$ s; T2+ G-		-	50	A/ $\mu$ s
		$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 0.2$ A/ $\mu$ s; T2- G-		-	50	A/ $\mu$ s
		$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 0.2$ A/ $\mu$ s; T2- G+		-	10	A/ $\mu$ s
$I_{GM}$	peak gate current			-	1	A
$P_{GM}$	peak gate power			-	5	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

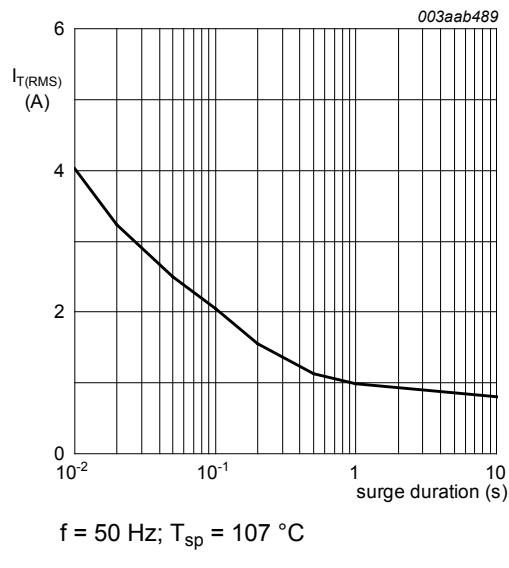


Fig. 1. RMS on-state current as a function of surge duration; maximum values

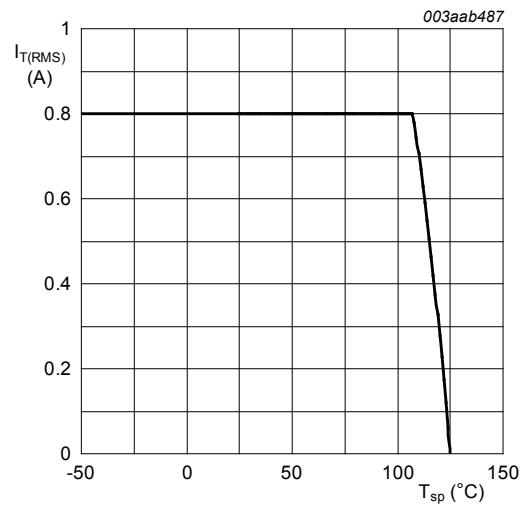
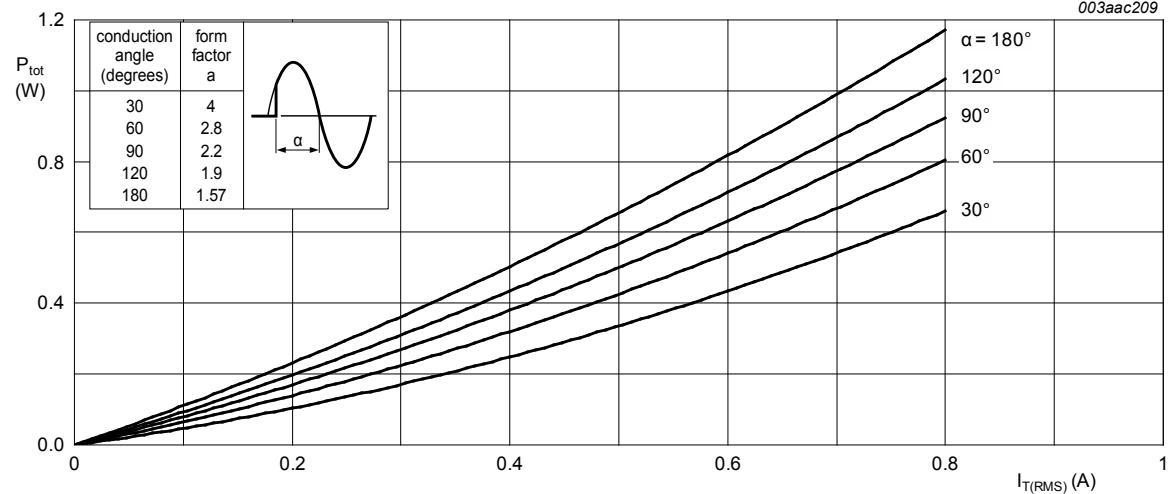
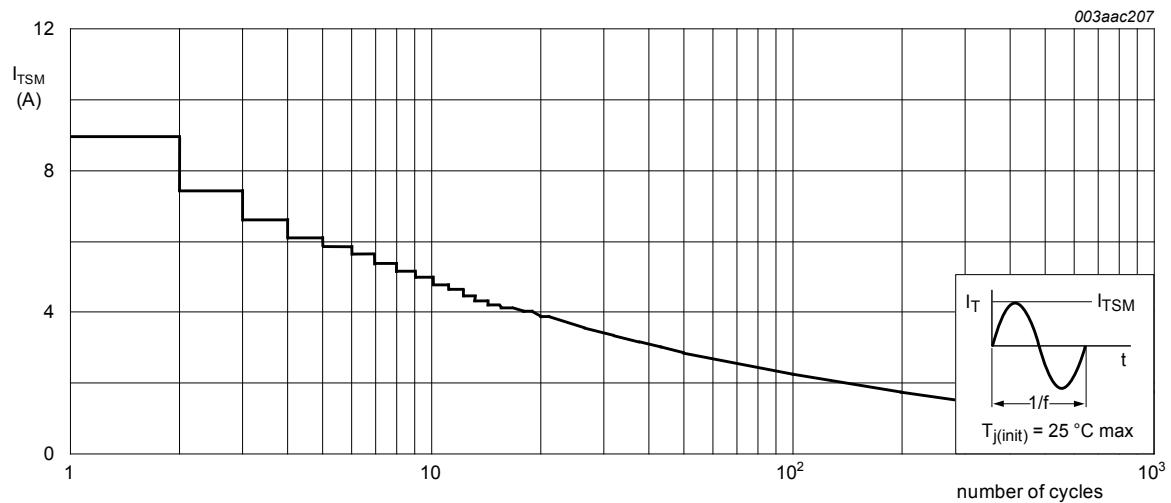


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

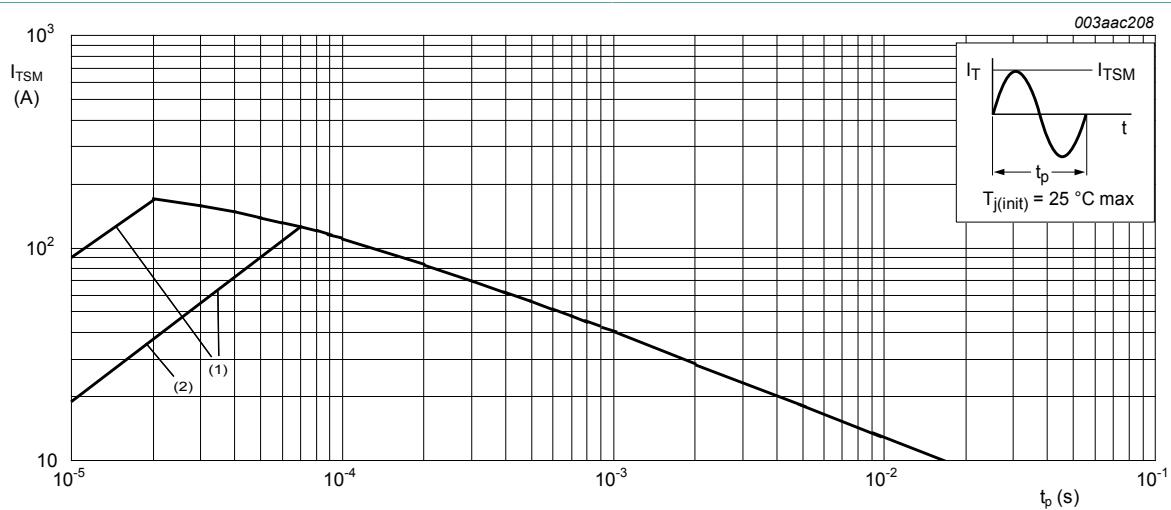


$\alpha$  = conduction angle  
 $a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

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



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

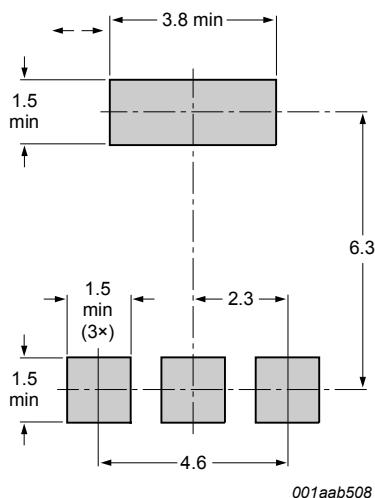


**Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values**

## 8. Thermal characteristics

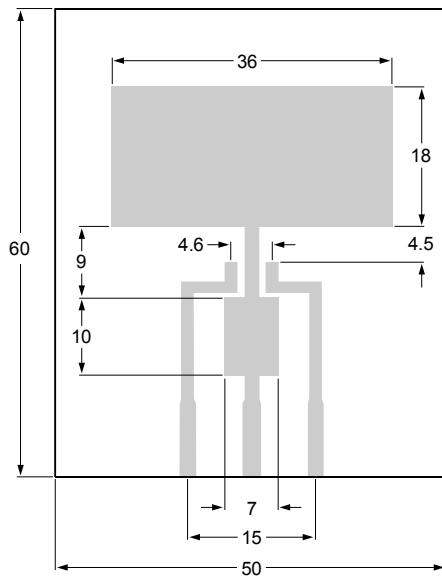
**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle; <a href="#">Fig. 8</a>	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	full cycle; for minimum footprint; <a href="#">Fig. 6</a>	-	156	-	K/W
		full cycle; for pad area; <a href="#">Fig. 7</a>	-	70	-	K/W



All dimensions are in mm

**Fig. 6. Minimum footprint SOT223**



All dimensions are in mm

Printed circuit board:

FR4 epoxy glass (1.6 mm thick), copper laminate (35  $\mu$ m thick)

**Fig. 7. Printed circuit board pad area: SOT223**

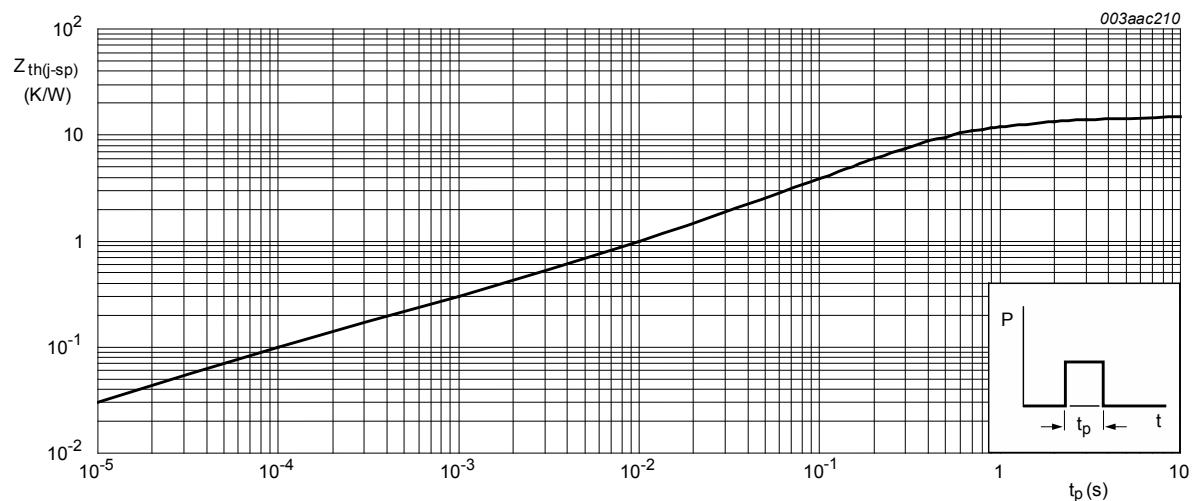
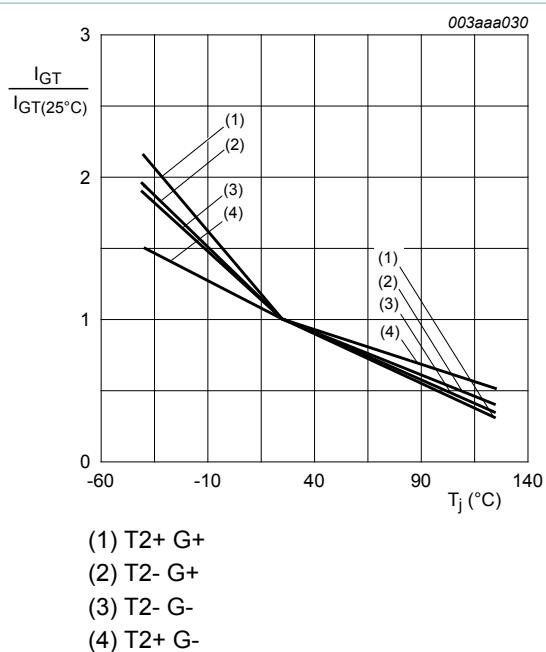


Fig. 8. Transient thermal impedance from junction to solder point as a junction of pulse width

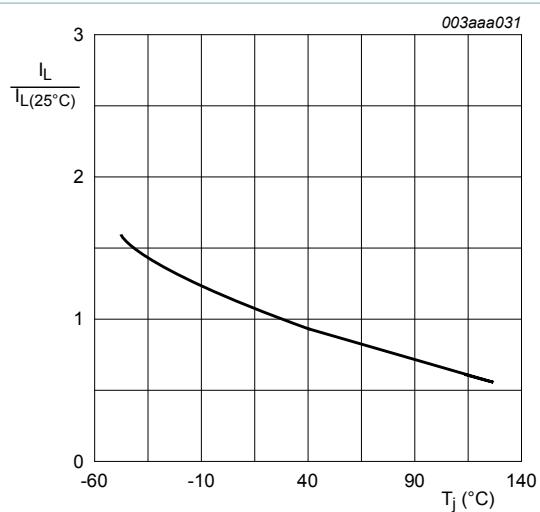
## 9. Characteristics

**Table 6. Characteristics**

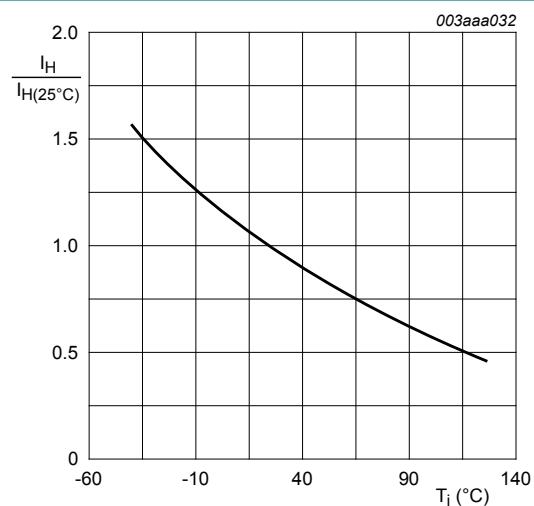
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Static characteristics</b>							
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>		-	1	5	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>		-	2	5	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>		-	2	5	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>		-	4	7	mA
I <sub>L</sub>	latching current	V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	1	10	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	5	10	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	1	10	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2- G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>		-	2	10	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 11</a>		-	1	10	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 0.85 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 12</a>		-	1.35	1.6	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 13</a>		-	0.9	1.5	V
		V <sub>D</sub> = 600 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 110 °C; <a href="#">Fig. 13</a>		0.1	0.7	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = 600 V; T <sub>j</sub> = 125 °C		-	0.1	0.5	mA
<b>Dynamic characteristics</b>							
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 402 V; T <sub>j</sub> = 110 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit		30	45	-	V/μs
dV <sub>com</sub> /dt	rate of change of commutating voltage	V <sub>D</sub> = 600 V; T <sub>j</sub> = 50 °C; dI <sub>com</sub> /dt = 0.3 A/ms; I <sub>T</sub> = 0.84 A; gate open circuit		-	5	-	V/μs
t <sub>gt</sub>	gate-controlled turn-on time	I <sub>TM</sub> = 1 A; V <sub>D</sub> = 600 V; I <sub>G</sub> = 25 mA; dI <sub>G</sub> /dt = 5 A/μs		-	2	-	μs



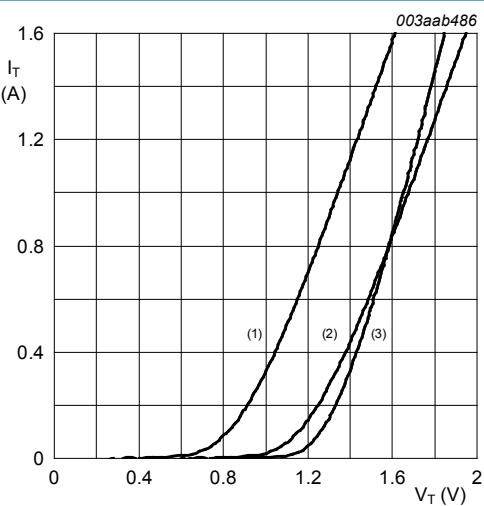
**Fig. 9. Normalized gate trigger current as a function of junction temperature**



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



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



$$V_0 = 1.171 \text{ V}; R_s = 0.5125 \Omega$$

(1)  $T_j = 125$   $^{\circ}$ C; typical values

(2)  $T_j = 125$   $^{\circ}$ C; maximum values

(3)  $T_j = 25$   $^{\circ}$ C; maximum values

**Fig. 12. On-state current as a function of on-state voltage**

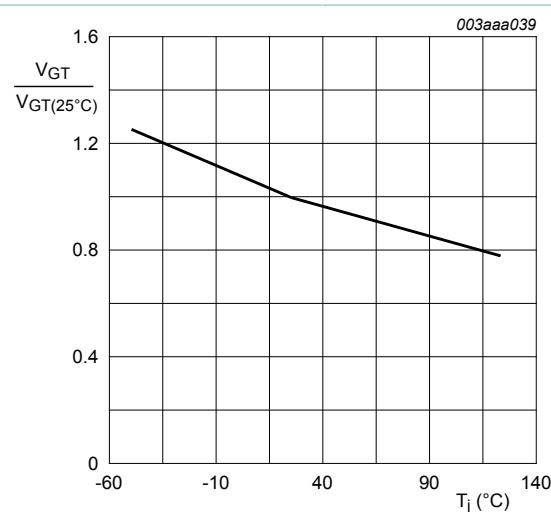


Fig. 13. Normalized gate trigger voltage as a function of junction temperature

## 10. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads

SOT223

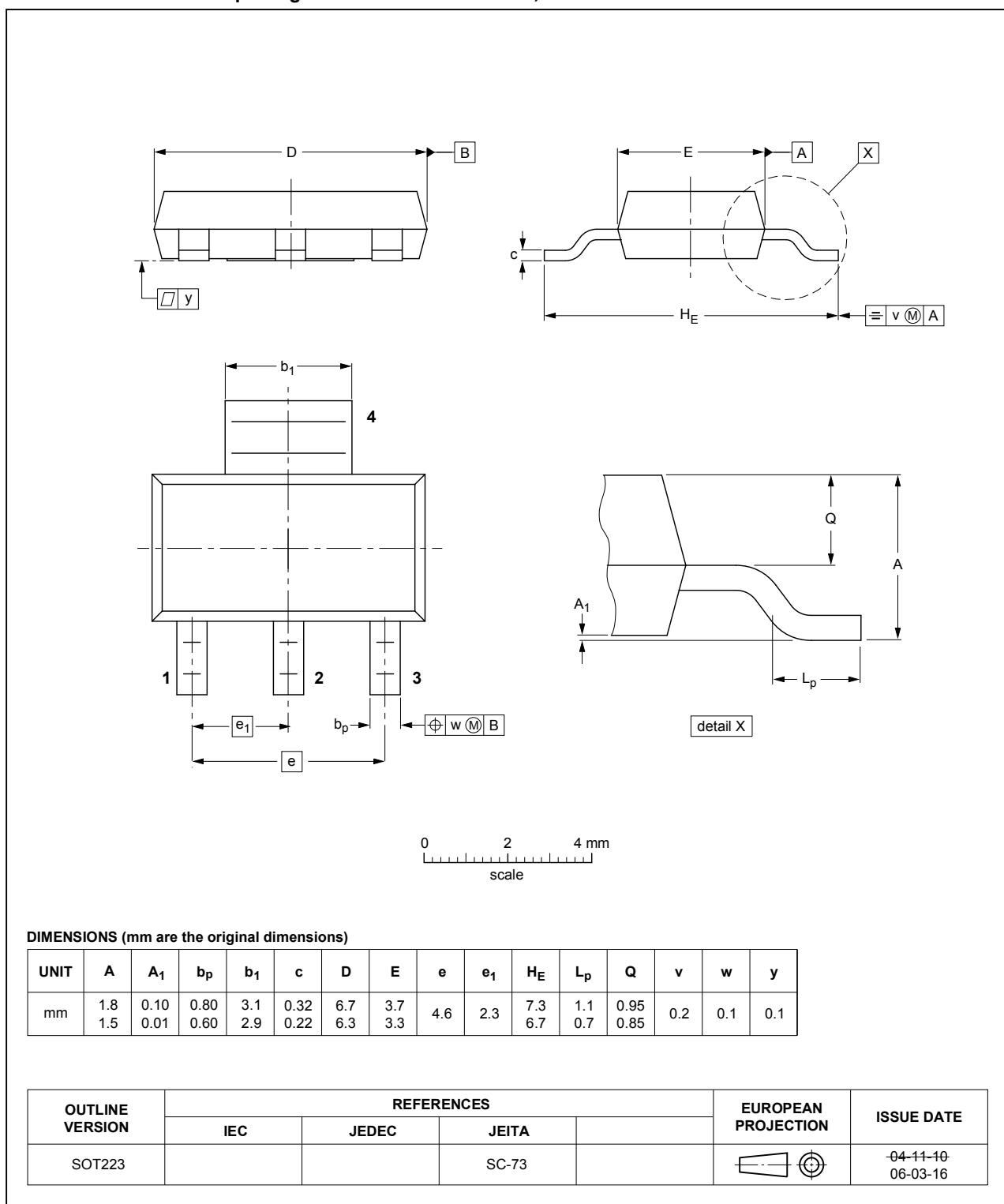


Fig. 14. Package outline SC-73 (SOT223)

## 11. Legal information

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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.
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Date of release: 20 August 2013

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