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

BT148W-600R

SCR

2 December 2014 **Product data sheet**

1. General description

Planar passivated SCR with sensitive gate in a SOT223 (SC-73) surface mountable plastic package. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

2. Features and benefits

- Sensitive gate
- Planar passivated for voltage ruggedness and reliability
- Direct triggering from low power drivers and logic ICs
- Surface mountable package

3. Applications

- Adapters
- Battery powered applications
- Industrial automation

4. Quick reference data

Table 1. Quick reference data

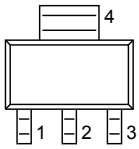
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		[1]	-	-	600	V
V_{RRM}	repetitive peak reverse voltage			-	-	600	V
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)}$ = 25 °C; t_p = 10 ms; Fig. 4; Fig. 5		-	-	10	A
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq$ 112 °C; Fig. 1		-	-	0.6	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq$ 112 °C; Fig. 2; Fig. 3		-	-	1	A
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 9		-	50	200	µA

[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the thyristor may switch to the on-state.

Scan or click this QR code to view the latest information for this product

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SC-73 (SOT223)	
2	A	anode		
3	G	gate		
4	mb	mb; connected to anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT148W-600R	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

7. Marking

Table 4. Marking codes

Type number	Marking code
BT148W-600R	BT148W 60

8. Limiting values

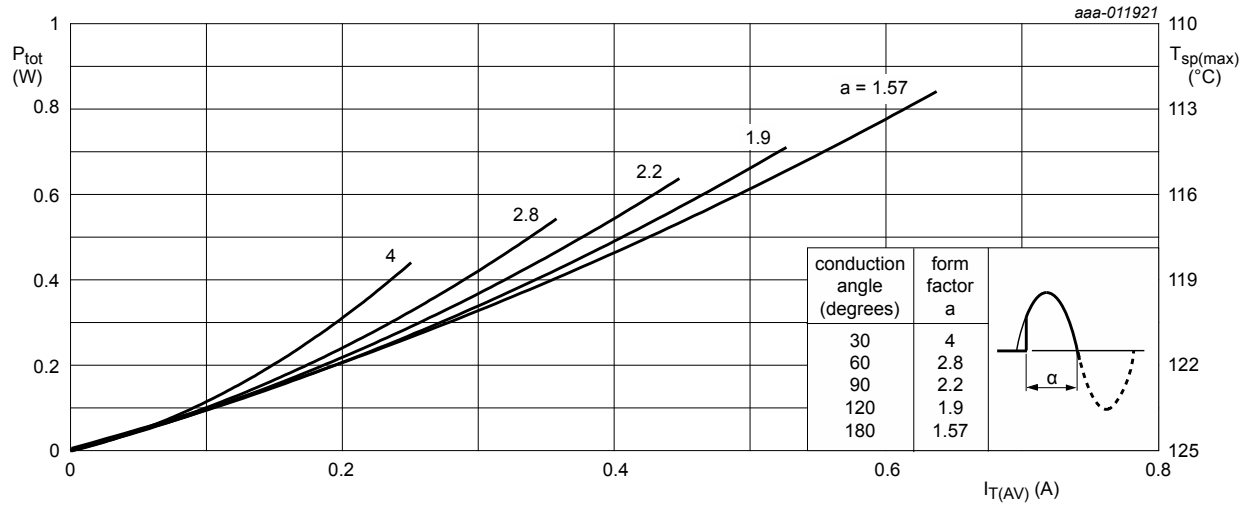
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		[1]	-	600	V
V_{RRM}	repetitive peak reverse voltage			-	600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 112$ °C; Fig. 1		-	0.6	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 112$ °C; Fig. 2; Fig. 3		-	1	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4; Fig. 5		-	10	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		-	11	A
I^2t	I^2t for fusing	$t_p = 10$ ms; SIN		-	0.5	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 400$ µA		-	100	A/µs
I_{GM}	peak gate current			-	1	A
V_{RGM}	peak reverse gate voltage			-	5	V
P_{GM}	peak gate power			-	1.2	W
$P_{G(AV)}$	average gate power	over any 20 ms period		-	0.12	W
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature		[2]	-	125	°C

[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the thyristor may switch to the on-state.

[2] Operation above 110˚C may require the use of a gate to cathode resistor of 1kΩ or less.



α = conduction angle

a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

Fig. 1. Total power dissipation as a function of average on-state current; maximum values

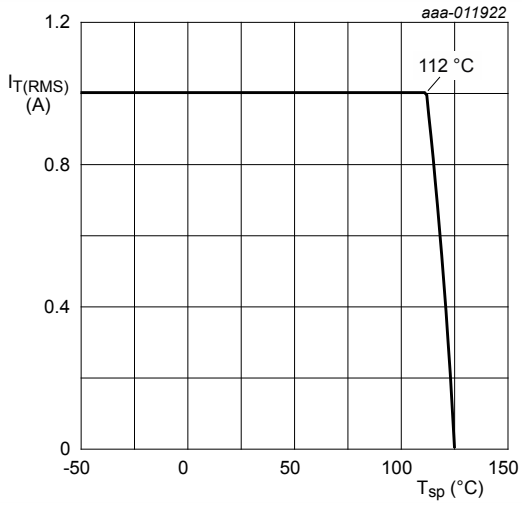
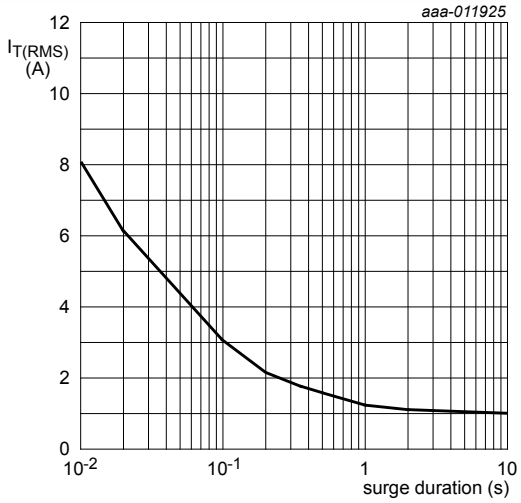
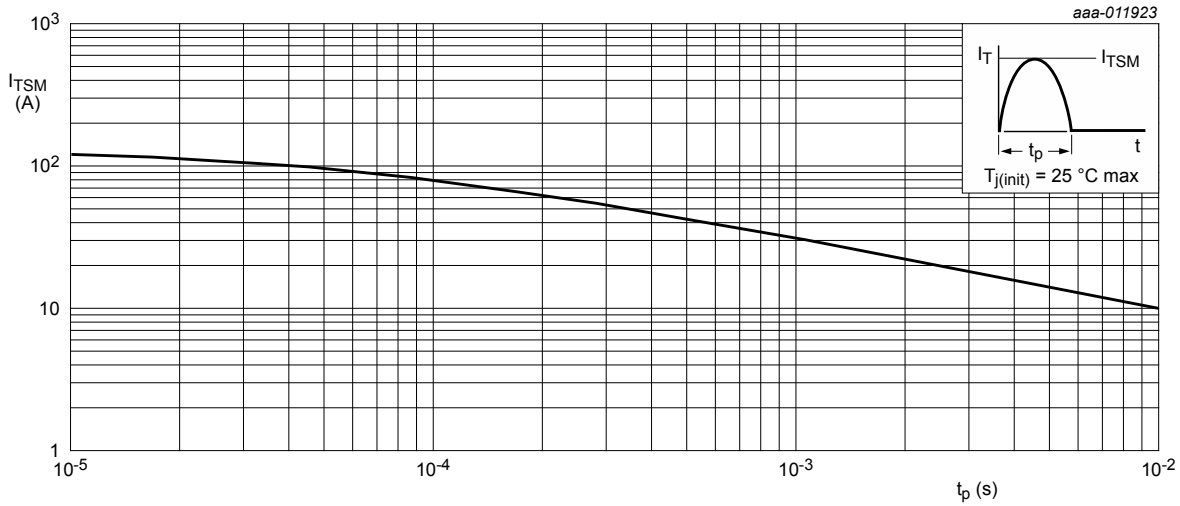


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values



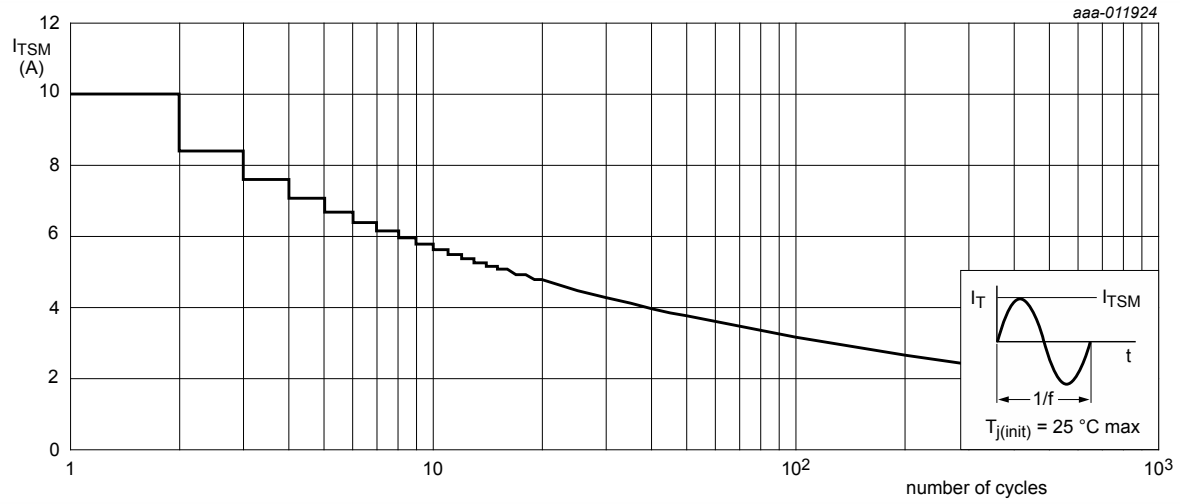
f = 50 Hz; T_{sp} = 112 °C

Fig. 3. RMS on-state current as a function of surge duration; maximum values



$t_p \leq 10$ ms

Fig. 4. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values



f = 50 Hz

Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

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	Fig. 6		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed circuit board mounted; pad area; Fig. 7		-	70	-	K/W
		printed circuit board mounted; minimum footprint; Fig. 8		-	156	-	K/W

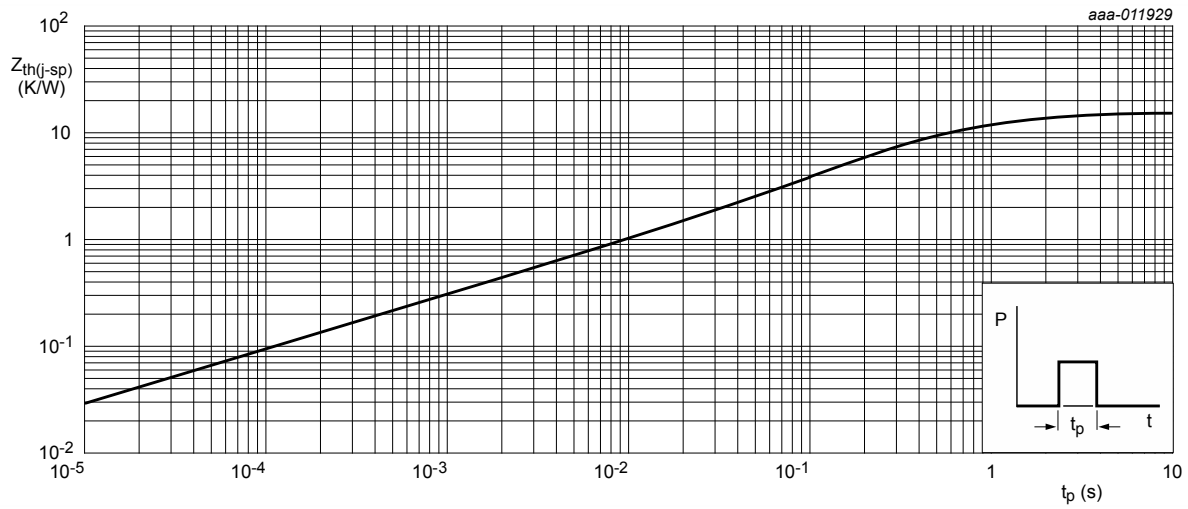
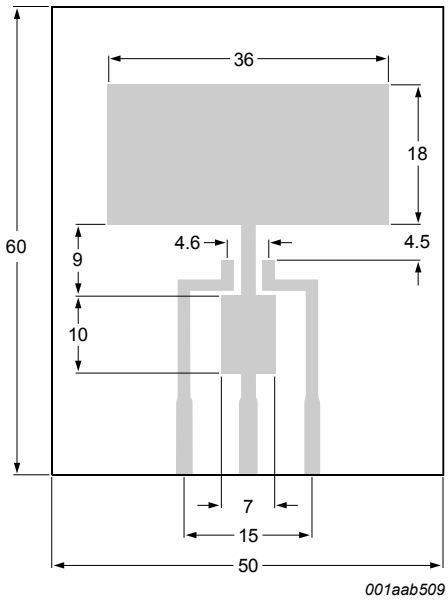


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width

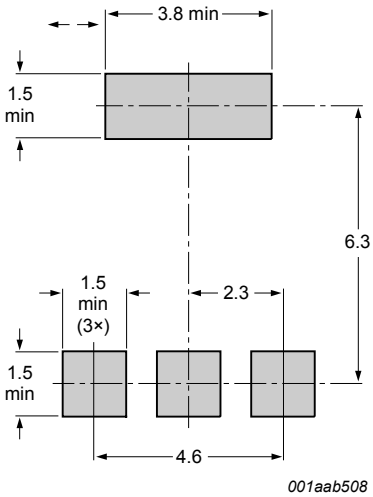


All dimensions are in mm

Printed circuit board:

FR4 epoxy glass (1.6 mm thick), copper laminate (35 um thick)

Fig. 7. Printed circuit board pad area: SOT223



All dimensions are in mm

Fig. 8. Minimum footprint SOT223

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 9		-	50	200	µA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25 °C; Fig. 10		-	0.17	10	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 11		-	0.1	6	mA
V_T	on-state voltage	I_T = 2 A; T_j = 25 °C; Fig. 12		-	1.3	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 13		-	0.4	1	V
		V_D = 600 V; I_T = 0.1 A; T_j = 125 °C; Fig. 13		0.1	0.2	-	V
I_D	off-state current	V_D = 600 V; T_j = 125 °C		-	0.1	0.5	mA
I_R	reverse current	V_R = 600 V; T_j = 125 °C		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 125 °C; R_{GK} = 100 Ω; (V_{DM} = 67% of V_{DRM}); exponential waveform; Fig. 14		-	50	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 4 A; V_D = 600 V; I_G = 5 mA; dI_G/dt = 0.2 A/µs; T_j = 25 °C		-	2	-	µs
t_q	commutated turn-off time	V_{DM} = 402 V; T_j = 125 °C; I_{TM} = 4 A; V_R = 35 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt = 2 V/µs; R_{GK} = 1 kΩ; (V_{DM} = 67% of V_{DRM})		-	100	-	µs

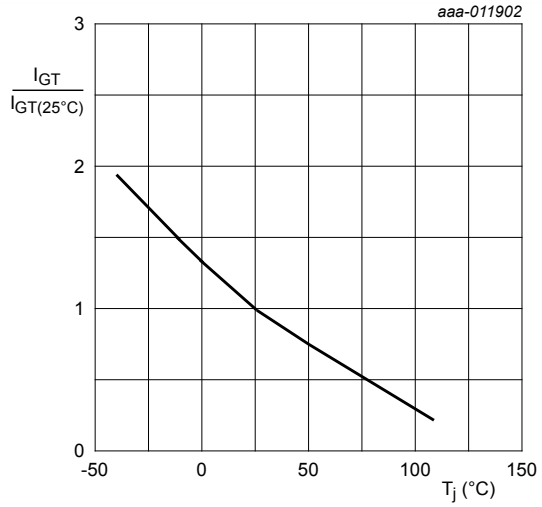
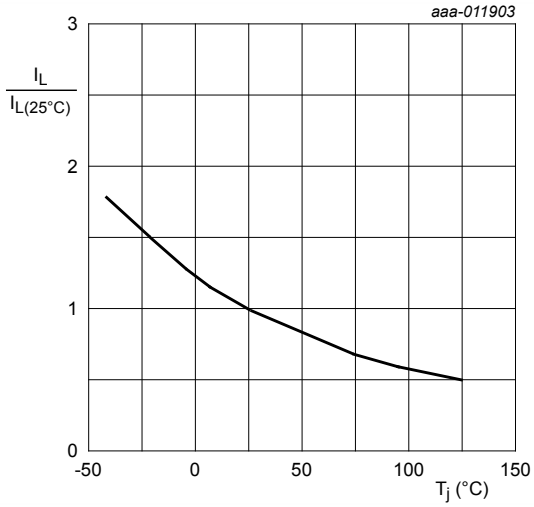
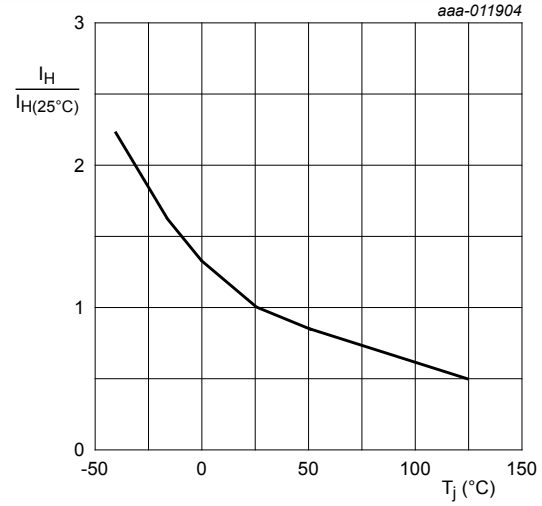


Fig. 9. Normalized gate trigger current as a function of junction temperature



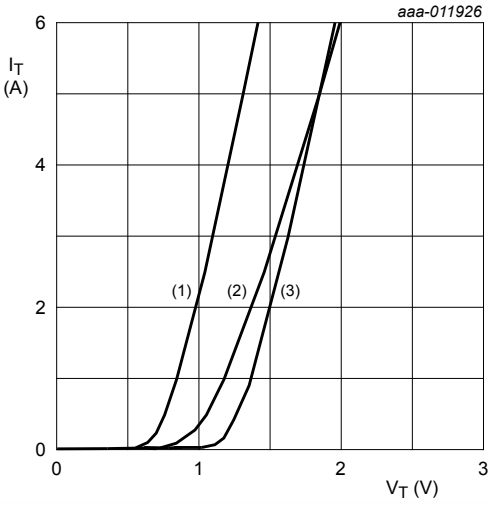
R_{GK} = 1 kΩ

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



R_{GK} = 1 kΩ

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



V_o = 1.107 V; R_s = 0.14 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

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

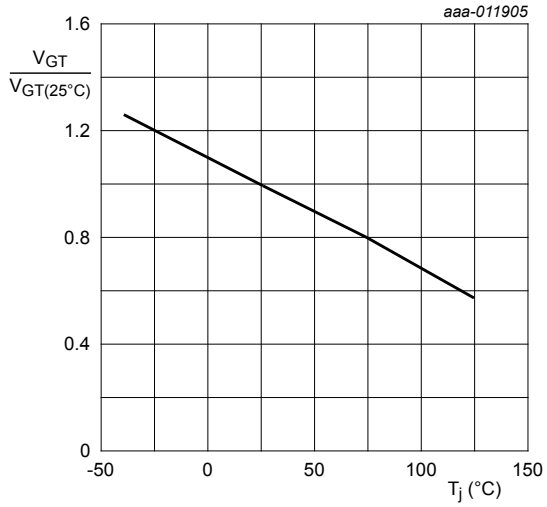
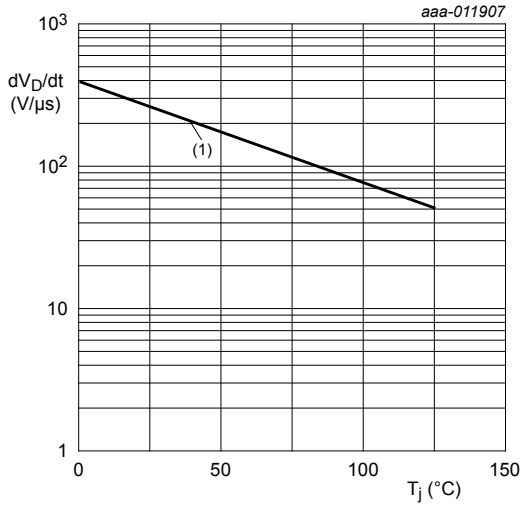


Fig. 13. Normalized gate trigger voltage as a function of junction temperature

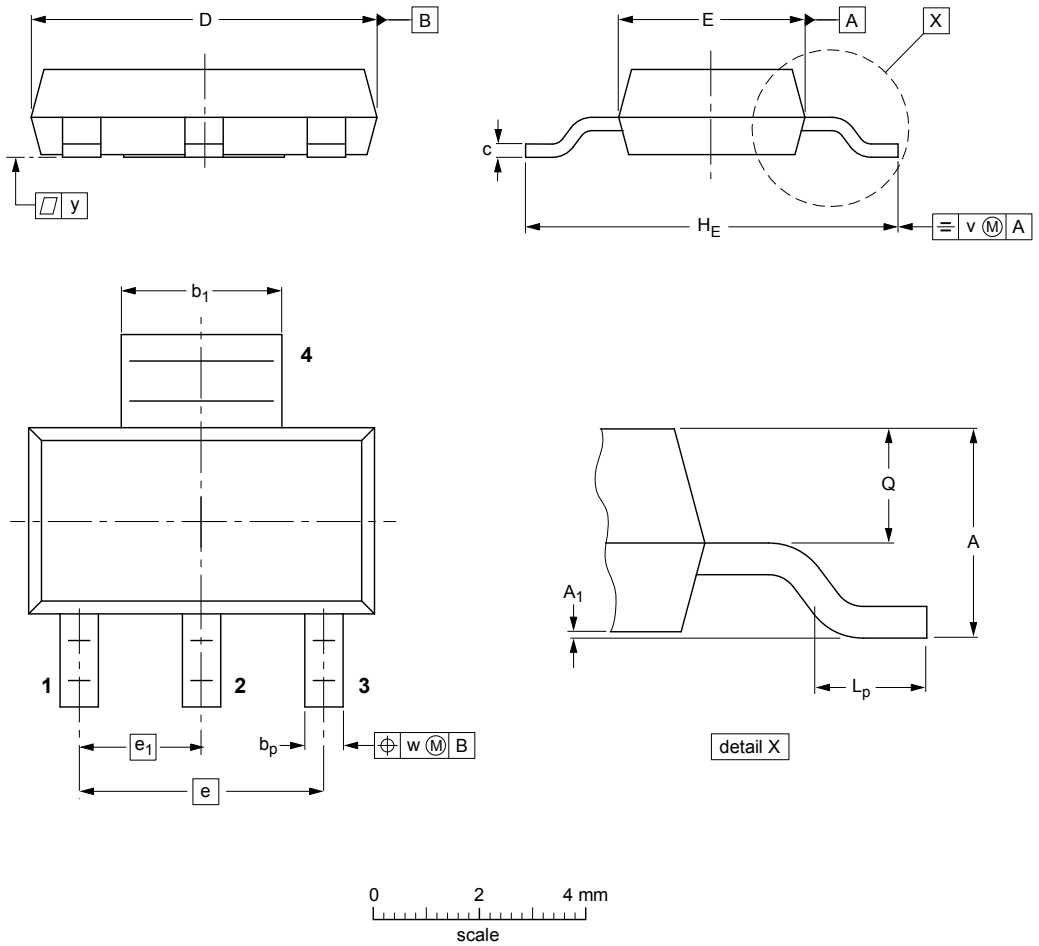


(1) R_{GK} = 100 Ω

Fig. 14. Critical rate of rise of off-state voltage as a function of junction temperature; typical values

11. 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. 15. Package outline SC-73 (SOT223)

12. Soldering

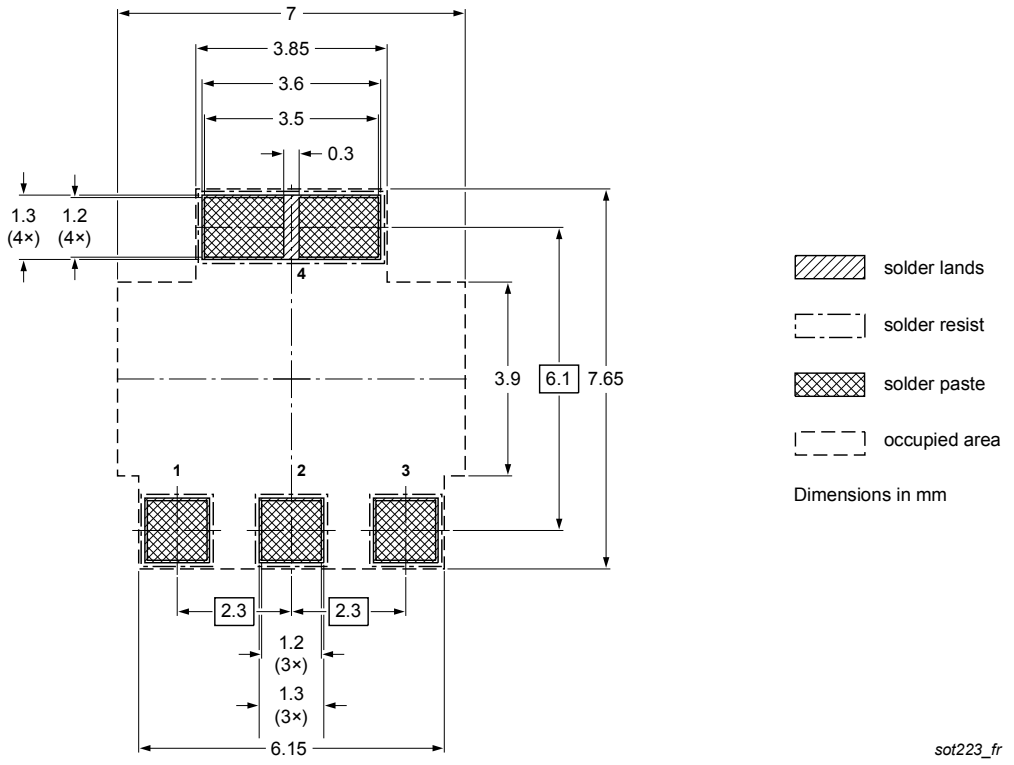


Fig. 16. Reflow soldering footprint for SC-73 (SOT223)

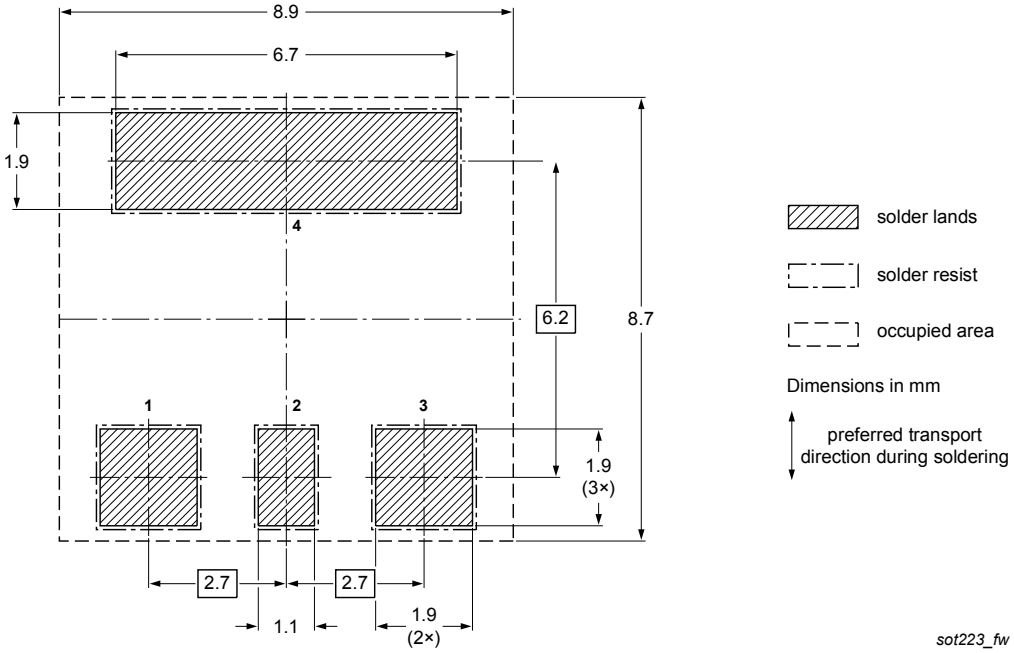


Fig. 17. Wave soldering footprint for SC-73 (SOT223)

13. Legal information

13.1 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.

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