



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.

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WeEn Semiconductors





BT168GW

SCR

17 March 2014

Product data sheet

1. General description

Planar passivated SCR with sensitive gate in a SOT223 surface mountable plastic package. This SCR is designed 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

- Circuit breakers
- RCD/GFI/LCCB applications

4. Quick reference data

Table 1. Quick reference data

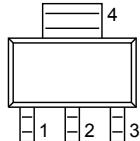

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage	[1]	-	-	600	V
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5	-	-	8	A
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 1	-	-	0.63	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 2 ; Fig. 3	-	-	1	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 9	20	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.



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>SC-73 (SOT223)</p>	
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
BT168GW	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		[1]	-	600	V
V_{RRM}	repetitive peak reverse voltage			-	600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 1		-	0.63	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 112\text{ °C}$; Fig. 2 ; Fig. 3		-	1	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5		-	8	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$		-	9	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		-	0.32	A^2s
di_T/dt	rate of rise of on-state current	$I_T = 2\text{ A}$; $I_G = 10\text{ mA}$; $di_G/dt = 100\text{ mA}/\mu s$		-	50	$A/\mu s$
I_{GM}	peak gate current			-	1	A
V_{RGM}	peak reverse gate voltage			-	5	V
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	$^{\circ}C$

[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.

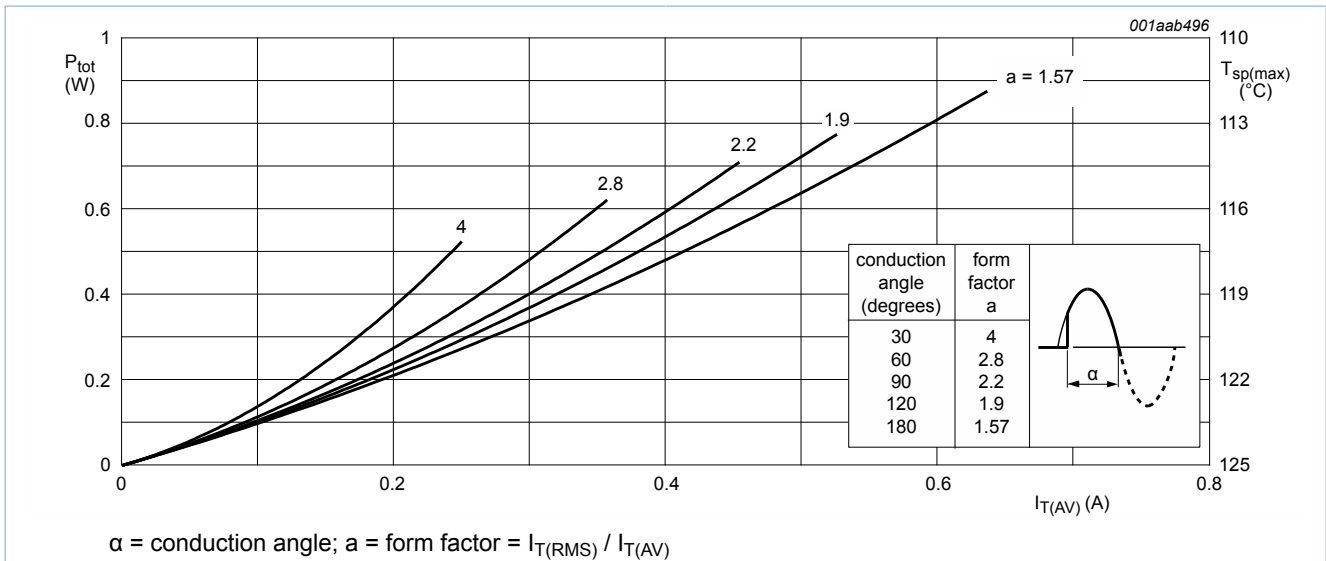


Fig. 1. Total power dissipation as a function of average on-state current; maximum values

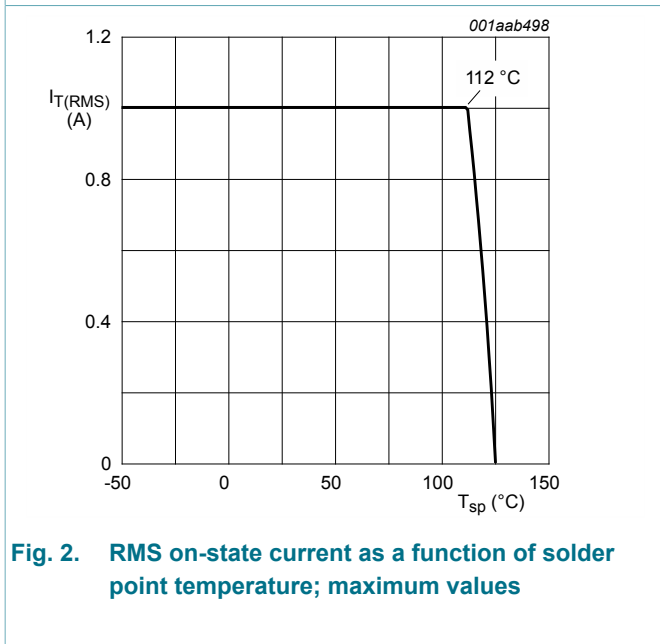


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

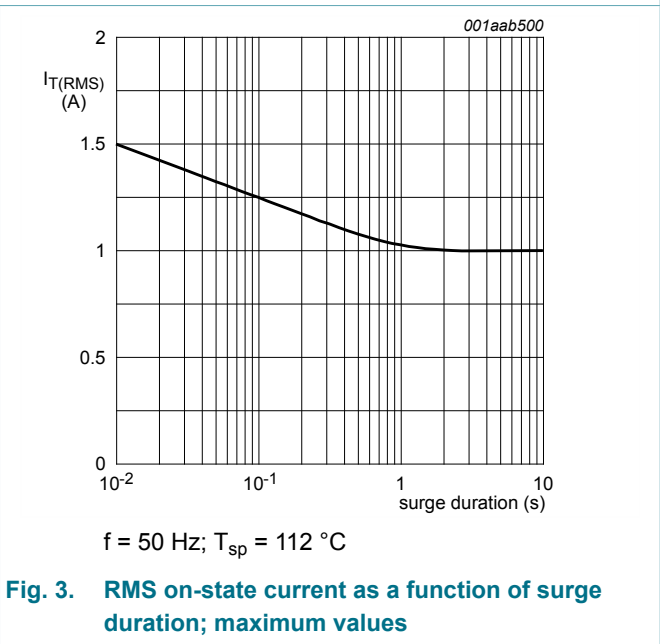


Fig. 3. RMS on-state current as a function of surge duration; maximum values

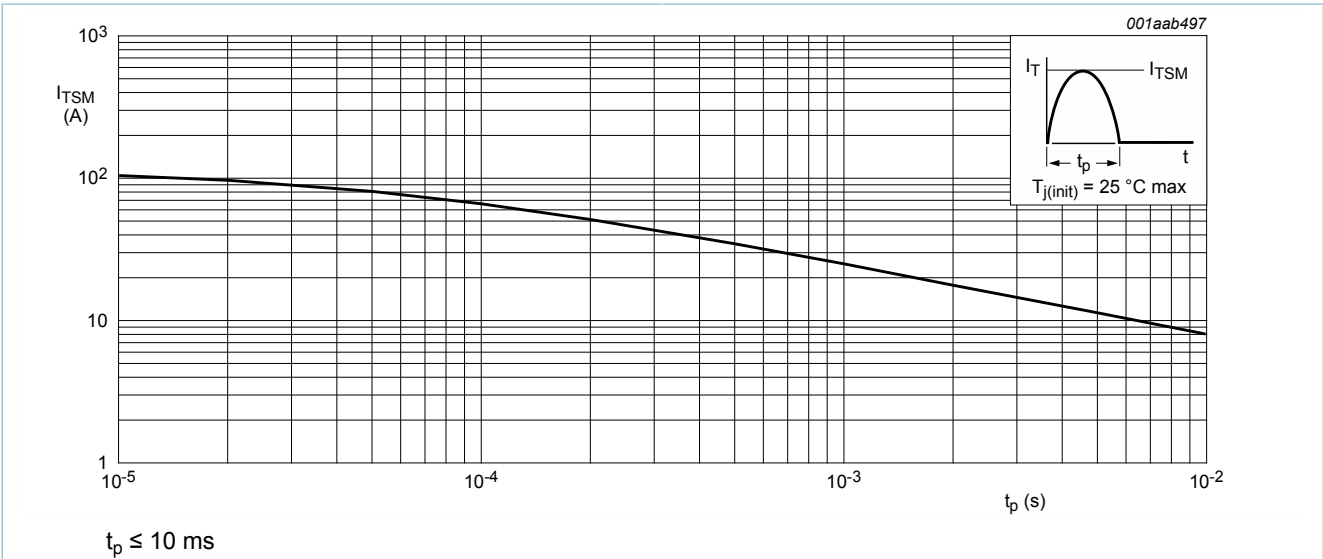


Fig. 4. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values

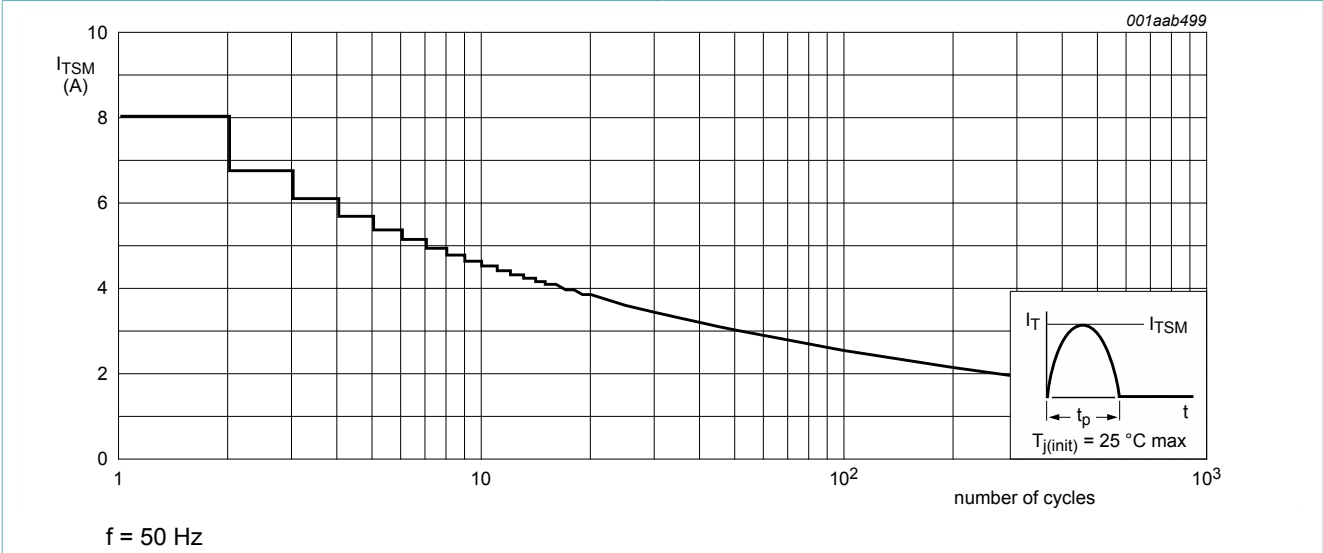
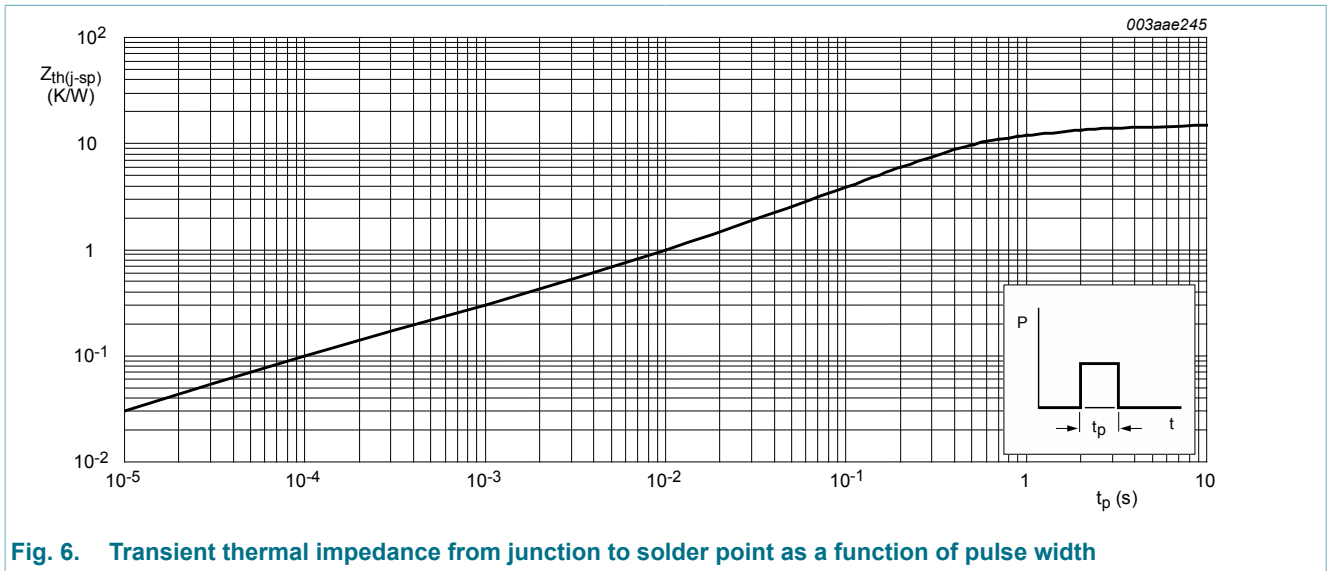


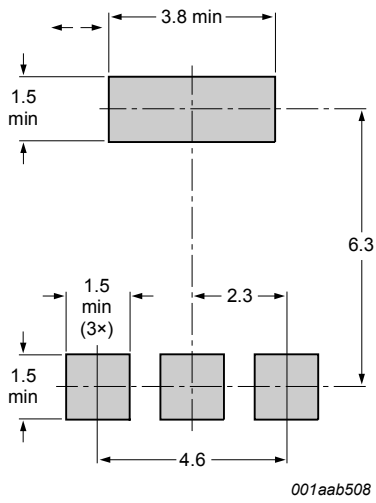
Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

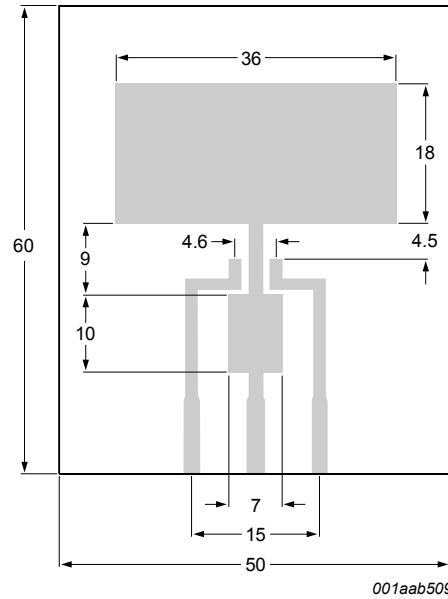
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Fig. 6	-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed circuit board mounted; minimum footprint; Fig. 7	-	156	-	K/W
		printed circuit board mounted; pad area; Fig. 8	-	70	-	K/W





All dimensions are in mm

Fig. 7. Minimum footprint SOT223



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

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 9	20	50	200	μA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.5\text{ mA}$; $R_{GK} = 1\text{ k}\Omega$; $T_j = 25\text{ °C}$; Fig. 10	-	2	6	mA
I_H	holding current	$V_D = 12\text{ V}$; $R_{GK} = 1\text{ k}\Omega$; $T_j = 25\text{ °C}$; Fig. 11	-	2	5	mA
V_T	on-state voltage	$I_T = 1.2\text{ A}$; $T_j = 25\text{ °C}$; Fig. 12	-	1.25	1.7	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 13	-	0.5	0.8	V
		$V_D = 600\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 125\text{ °C}$	0.2	0.3	-	V
I_D	off-state current	$V_D = 600\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA
I_R	reverse current	$V_R = 600\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; Fig. 14	500	800	-	$\text{V}/\mu\text{s}$
		$V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; Fig. 14	-	25	-	$\text{V}/\mu\text{s}$
t_{gt}	gate-controlled turn-on time	$I_{TM} = 2\text{ A}$; $V_D = 600\text{ V}$; $I_G = 10\text{ mA}$; $dI_G/dt = 0.1\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$	-	2	-	μs
t_q	commutated turn-off time	$V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 1.6\text{ A}$; $V_R = 35\text{ V}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM})	-	100	-	μs

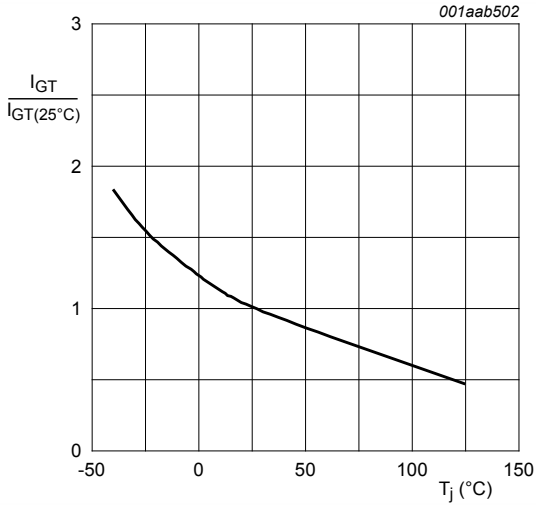
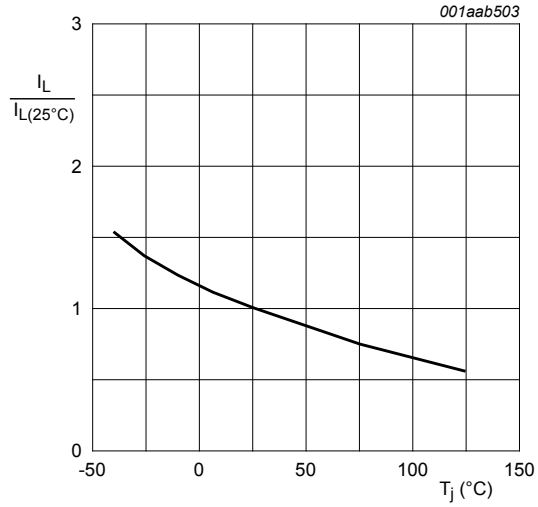
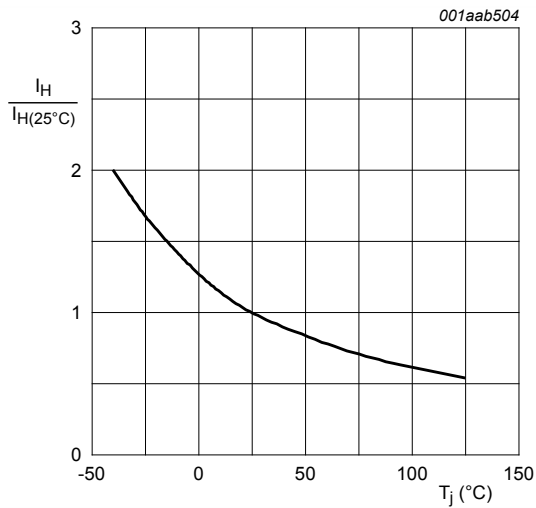


Fig. 9. Normalized gate trigger current as a function of junction temperature



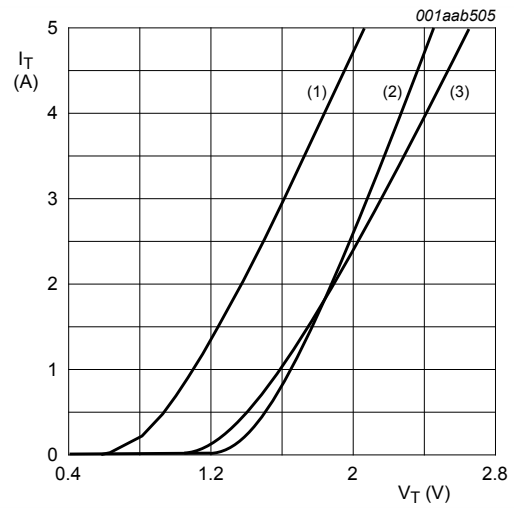
$R_{GK} = 1 \text{ k}\Omega$

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



$R_{GK} = 1 \text{ k}\Omega$

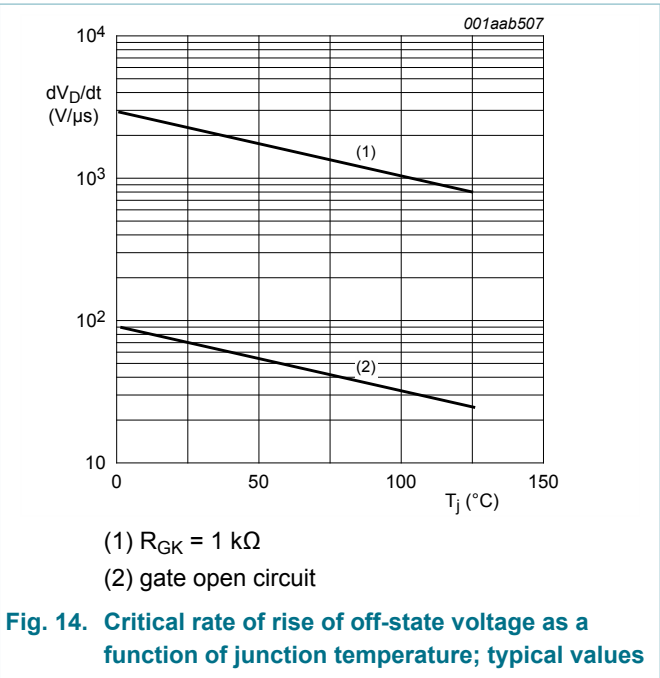
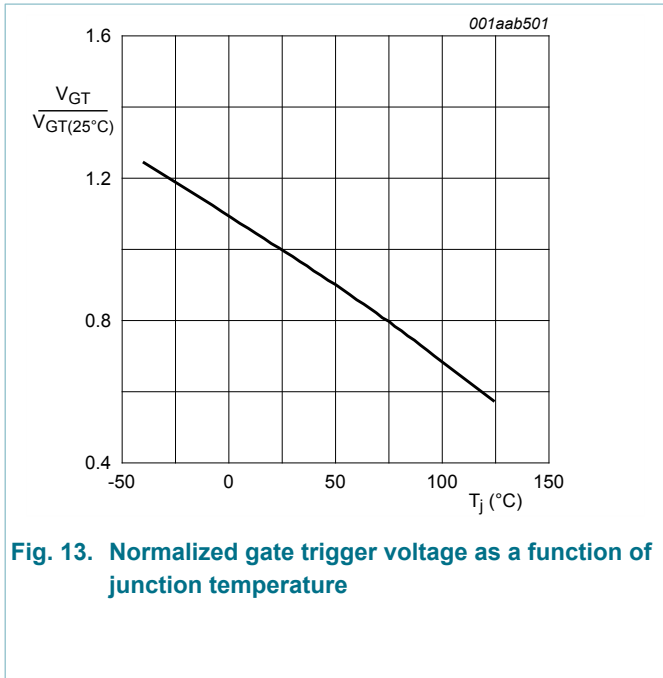
Fig. 11. Normalized holding current as a function of junction temperature



$V_o = 1.0 \text{ V}; R_s = 0.27 \Omega$

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



10. Package outline

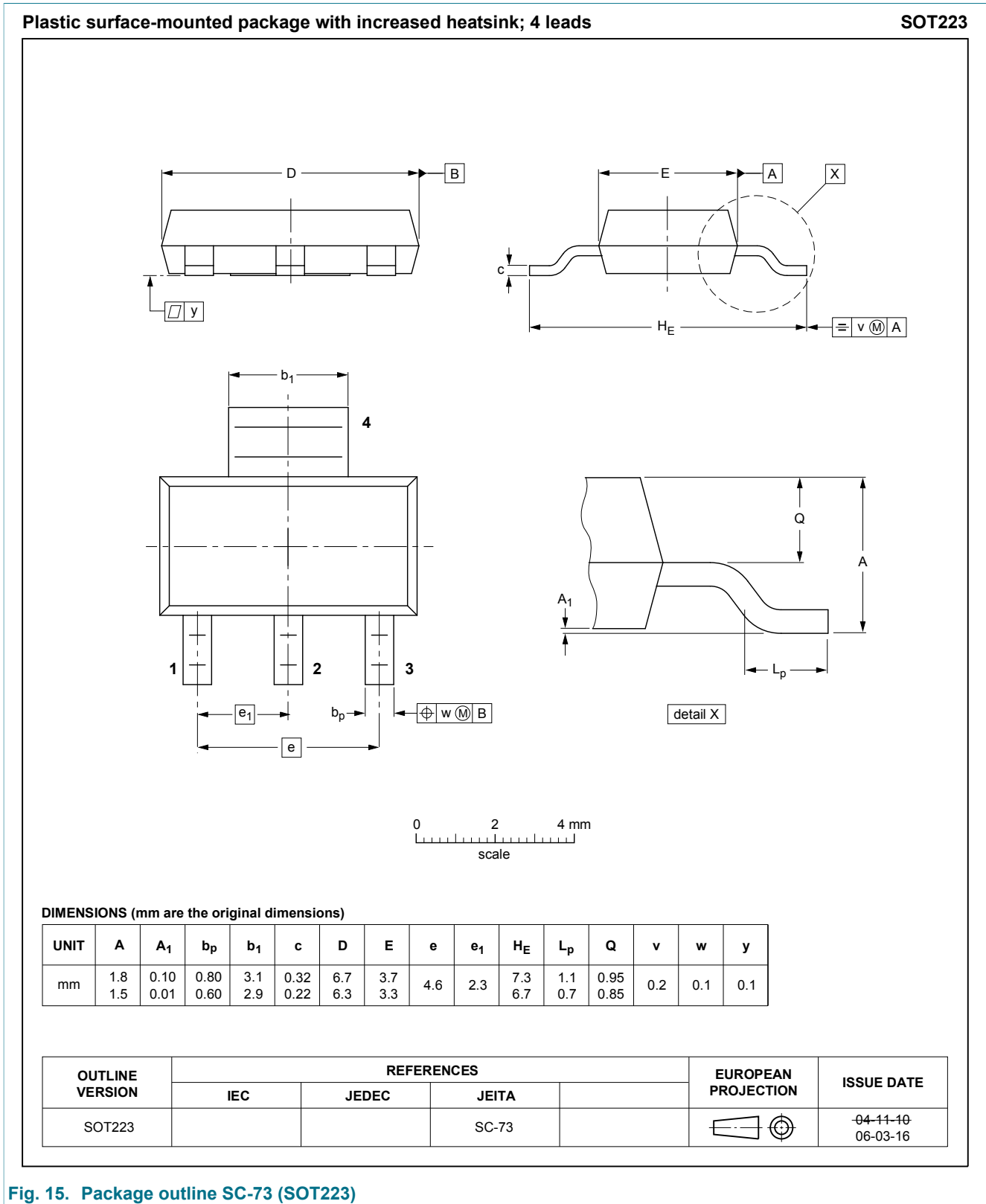


Fig. 15. Package outline SC-73 (SOT223)

12. Legal information

12.1 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.
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