

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

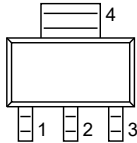

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{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
T_j	junction temperature		-	-	125	°C
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
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	-	V/μs

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		$V_{DM} = 402\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; Fig. 14		-	25	-	V/ μs

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 informat on

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BT168GW	SOT223	BT168GW ,115	Reel	1000	SOT223	16-Mar-2006
		BT168GW ,135	Reel	4000		

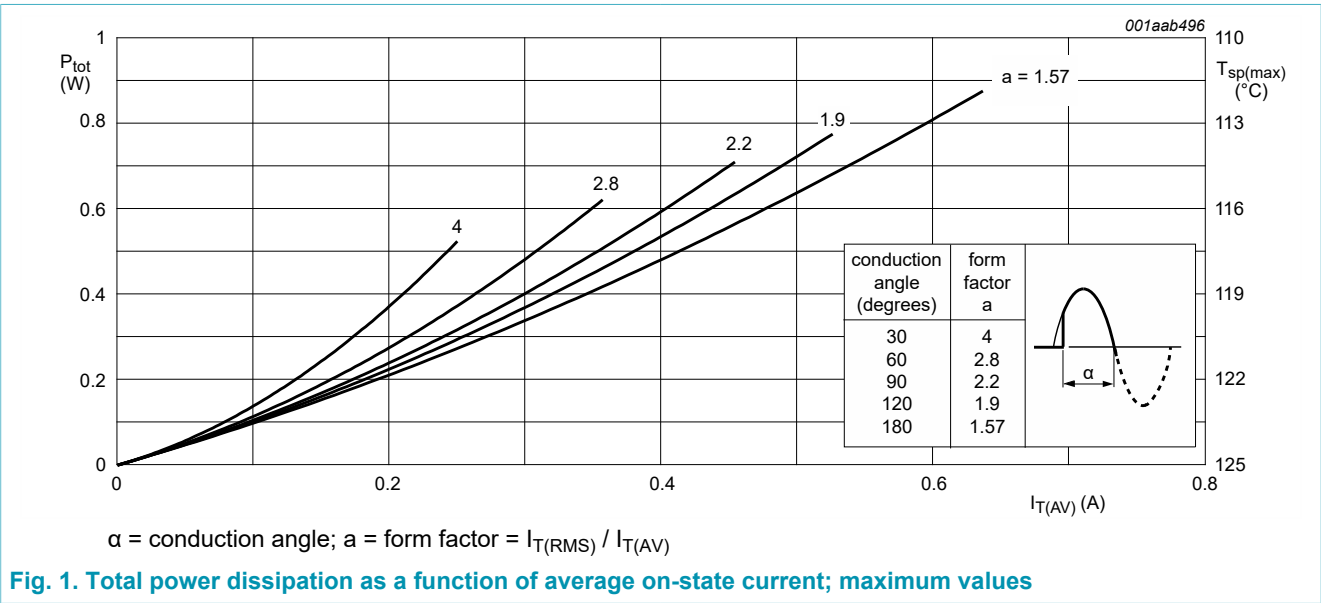
Orderable part number	Marking codes	
	Assembly factory: d	Assembly factory: L
BT168GW ,115	Jdxxx BT168G	JLxxx BT168G
BT168GW ,135	Jdxxx BT168G	-

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; $T_{sp} \leq 112\text{ }^{\circ}\text{C}$; Fig. 1		-	0.63	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 112\text{ }^{\circ}\text{C}$; Fig. 2; Fig. 3		-	1	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig. 4; Fig. 5		-	8	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$		-	9	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		-	0.32	A^2s
dl_T/dt	rate of rise of on-state current	$I_T = 2\text{ A}$; $I_G = 10\text{ mA}$; $dl_G/dt = 100\text{ mA}/\mu\text{s}$		-	50	$\text{A}/\mu\text{s}$
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	$^{\circ}\text{C}$
T_j	junction temperature			-	125	$^{\circ}\text{C}$

[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.



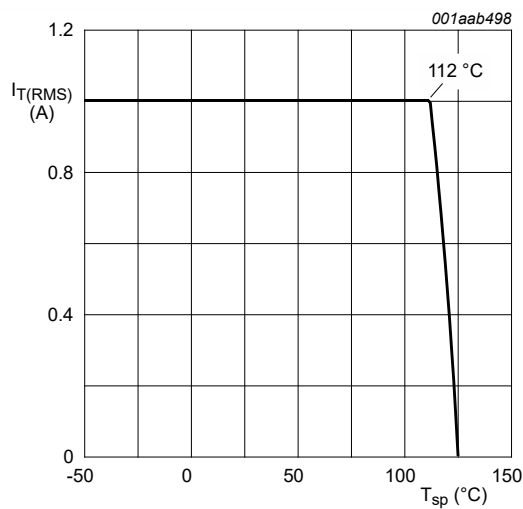


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

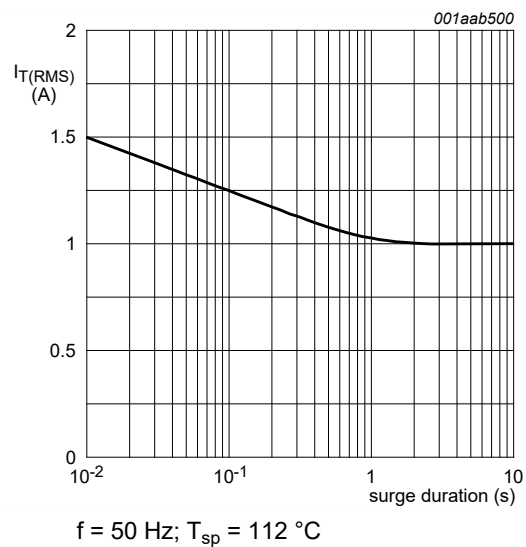


Fig. 3. RMS on-state current as a function of surge duration; maximum values

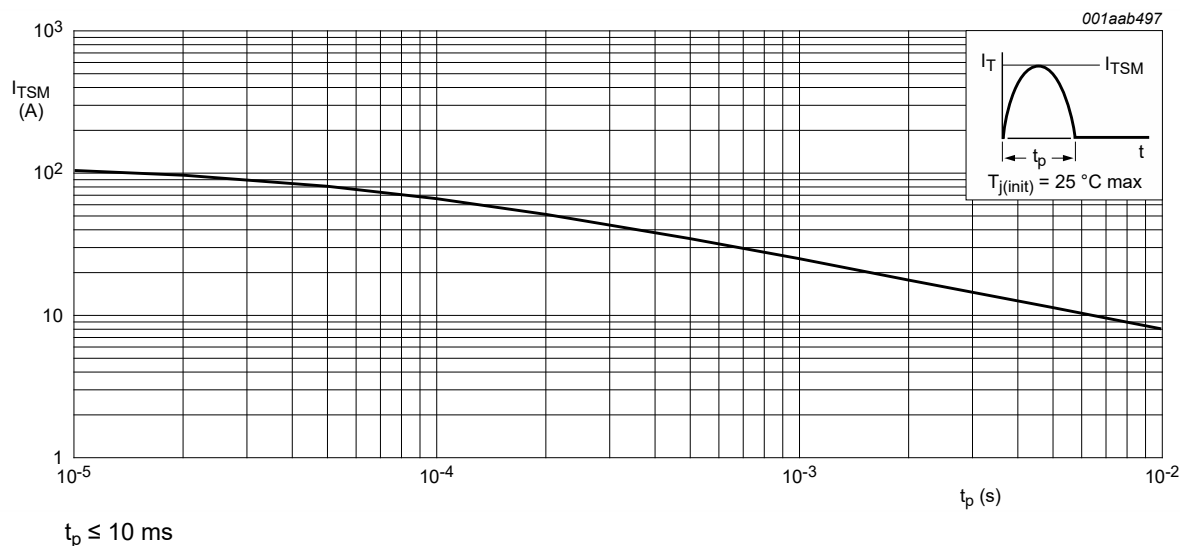
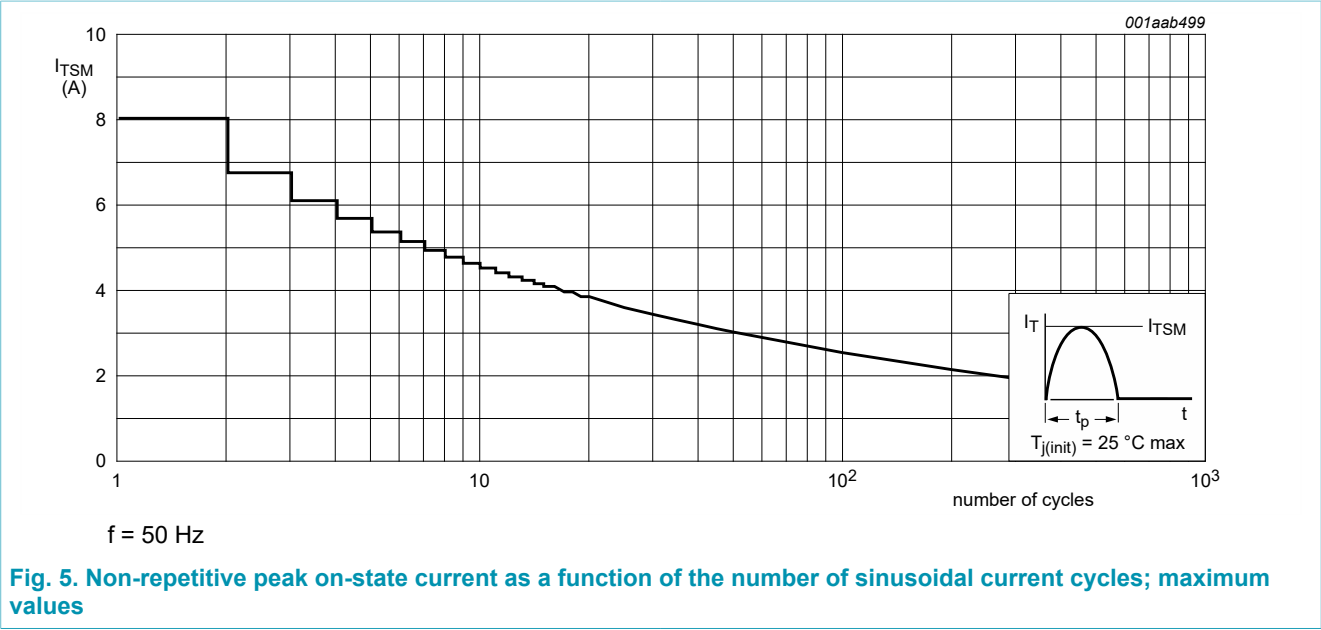


Fig. 4. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values



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 free air	printed circuit board mounted; minimum footprint; Fig. 7		-	156	-	K/W
		printed circuit board mounted; pad area; Fig. 8		-	70	-	K/W

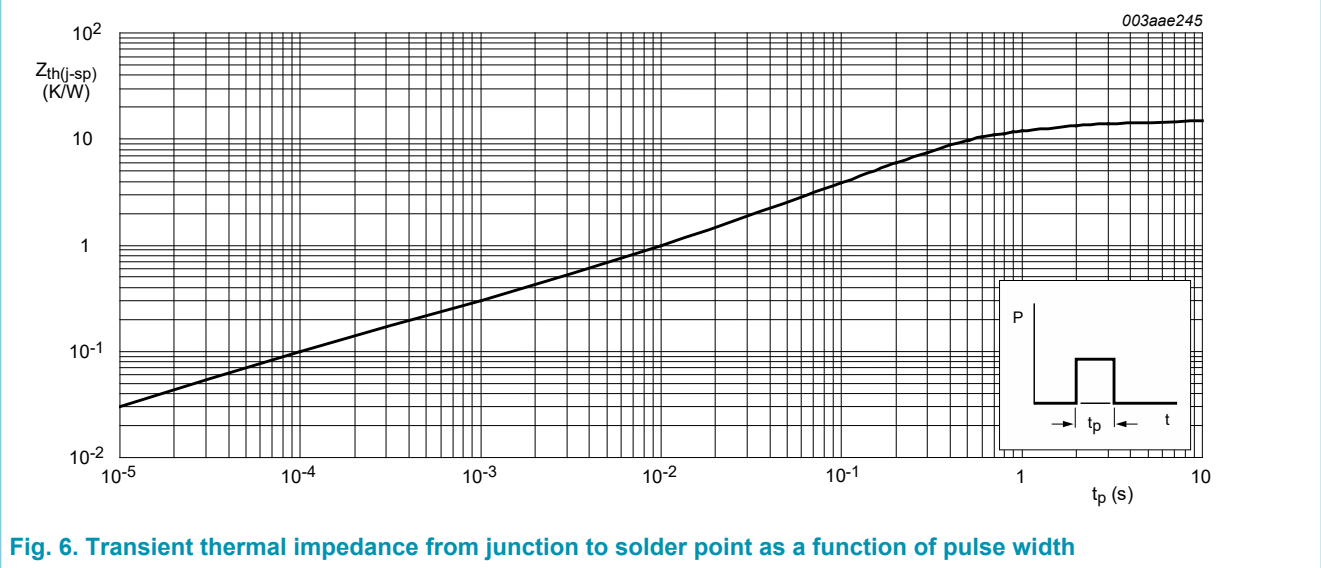
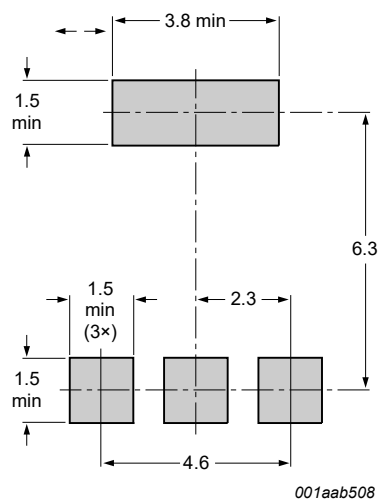
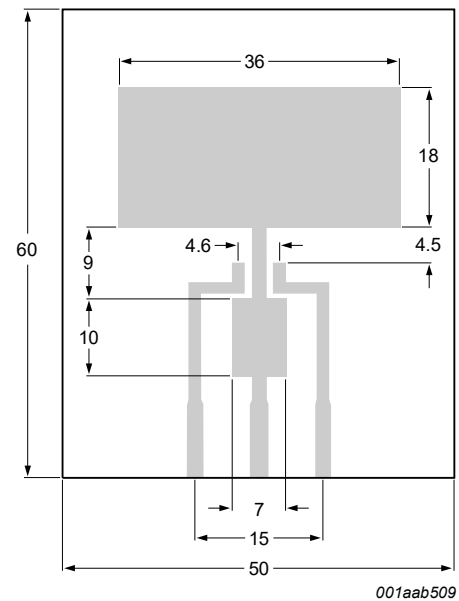


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width



All dimensions are in mm

Fig. 7. Minimum footprint SOT223



All dimensions are in mm

Printed circuit board:

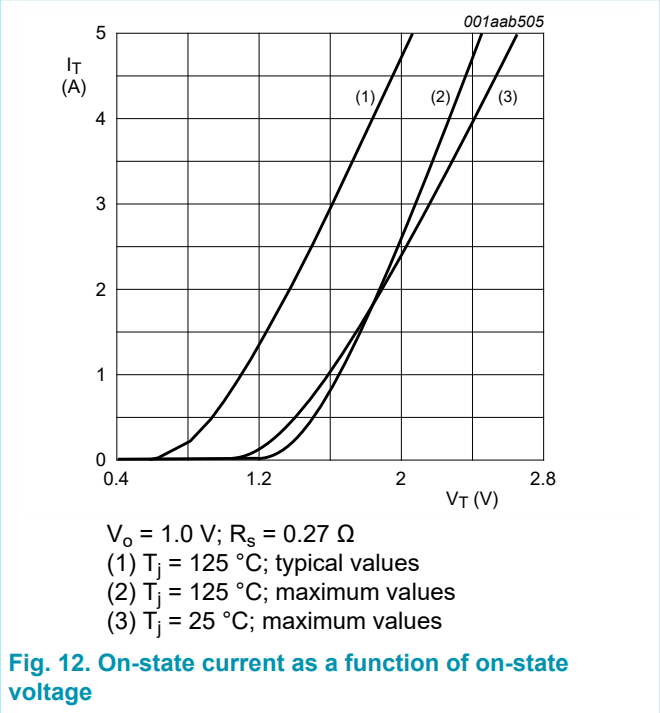
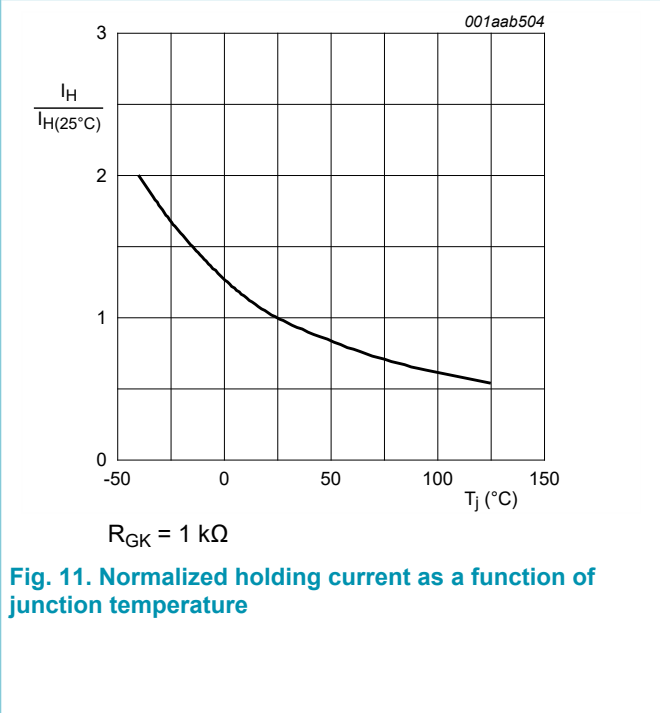
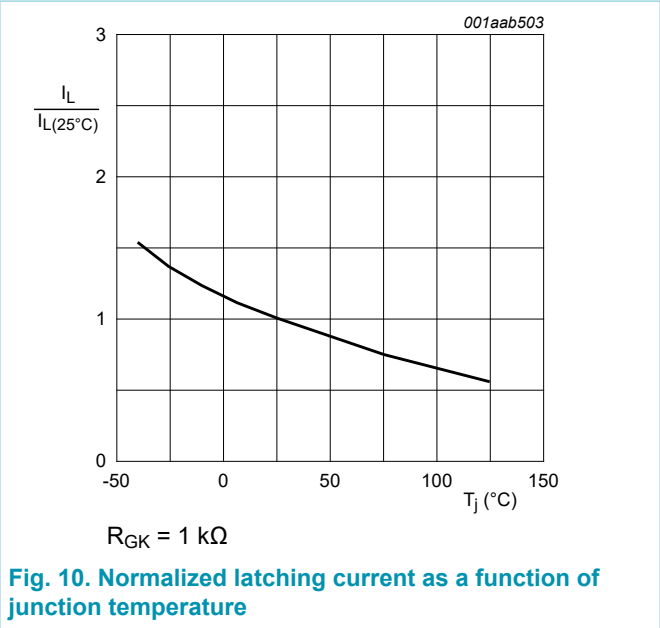
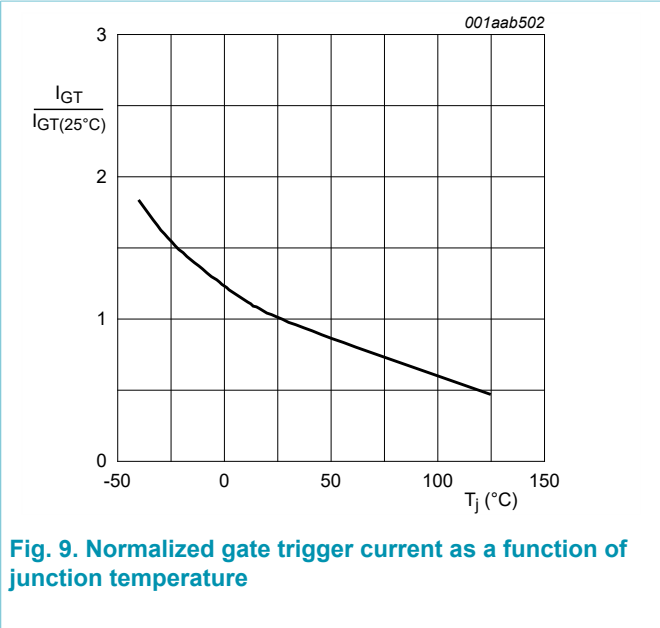
FR4 epoxy glass (1.6 mm thick), copper laminate (35 um thick)

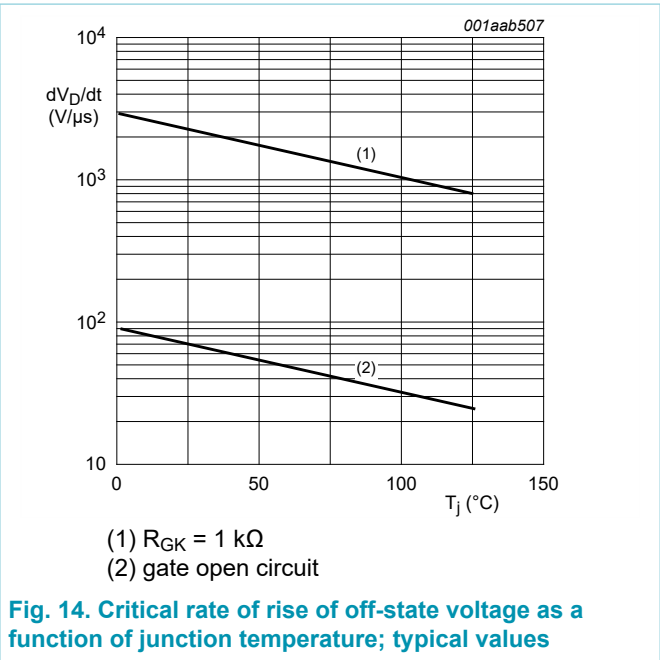
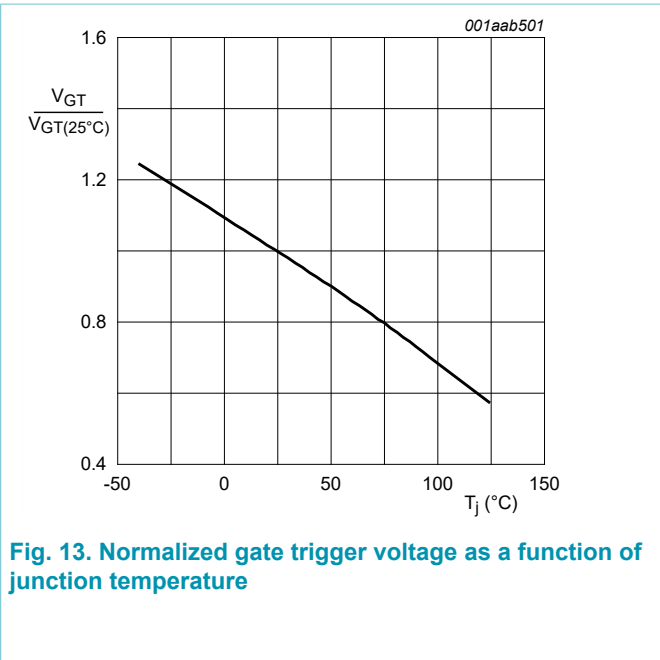
Fig. 8. Printed circuit board pad area: SOT223

9. Characteristics

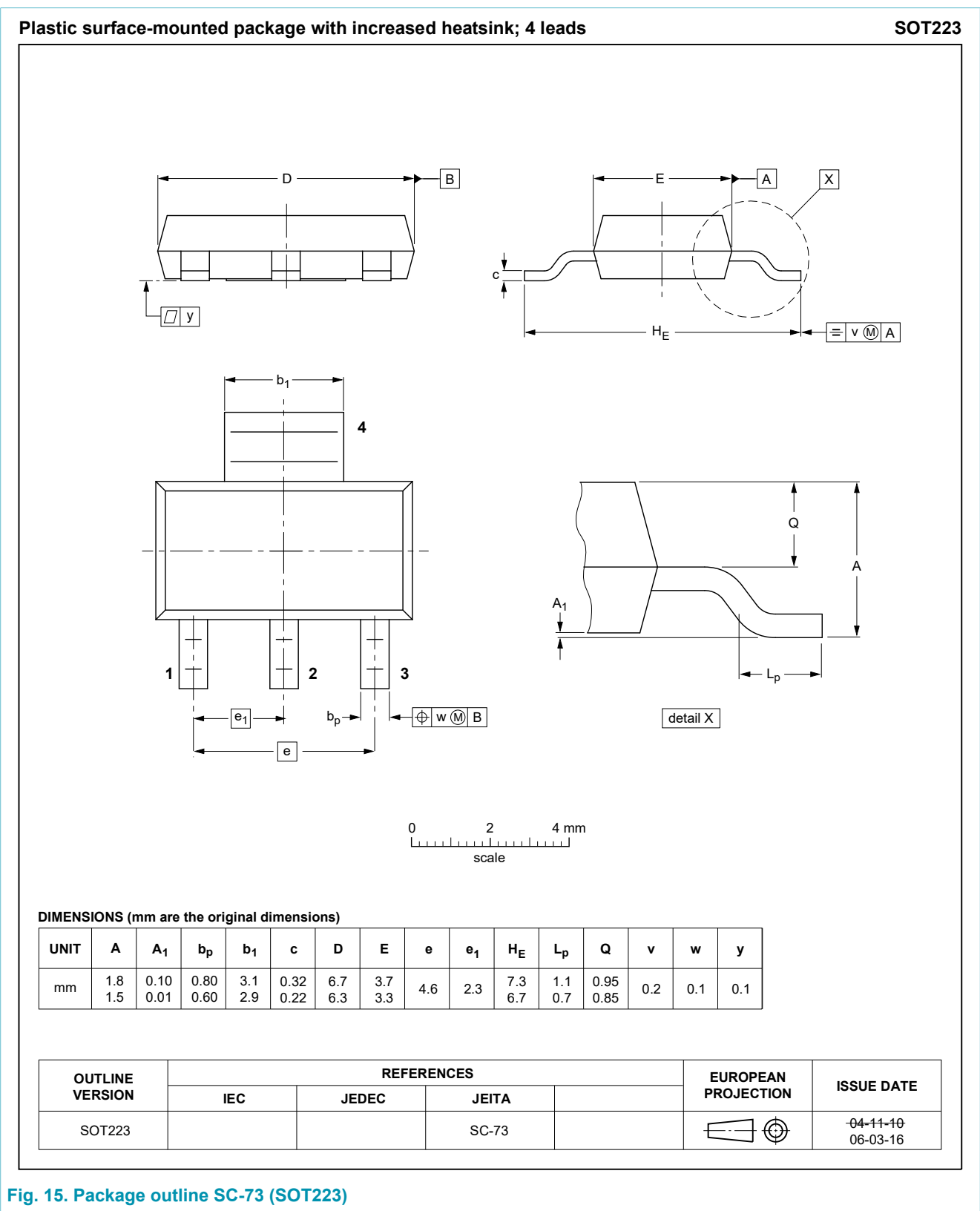
Table 6. Characteristics

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

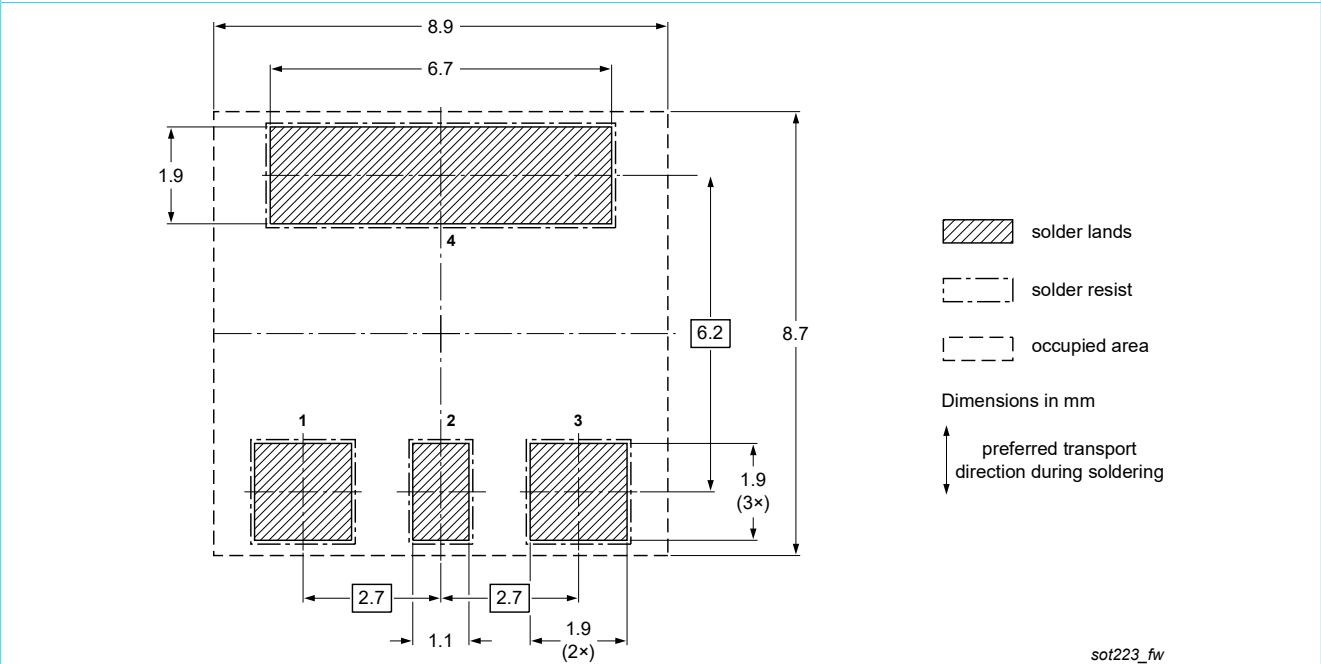
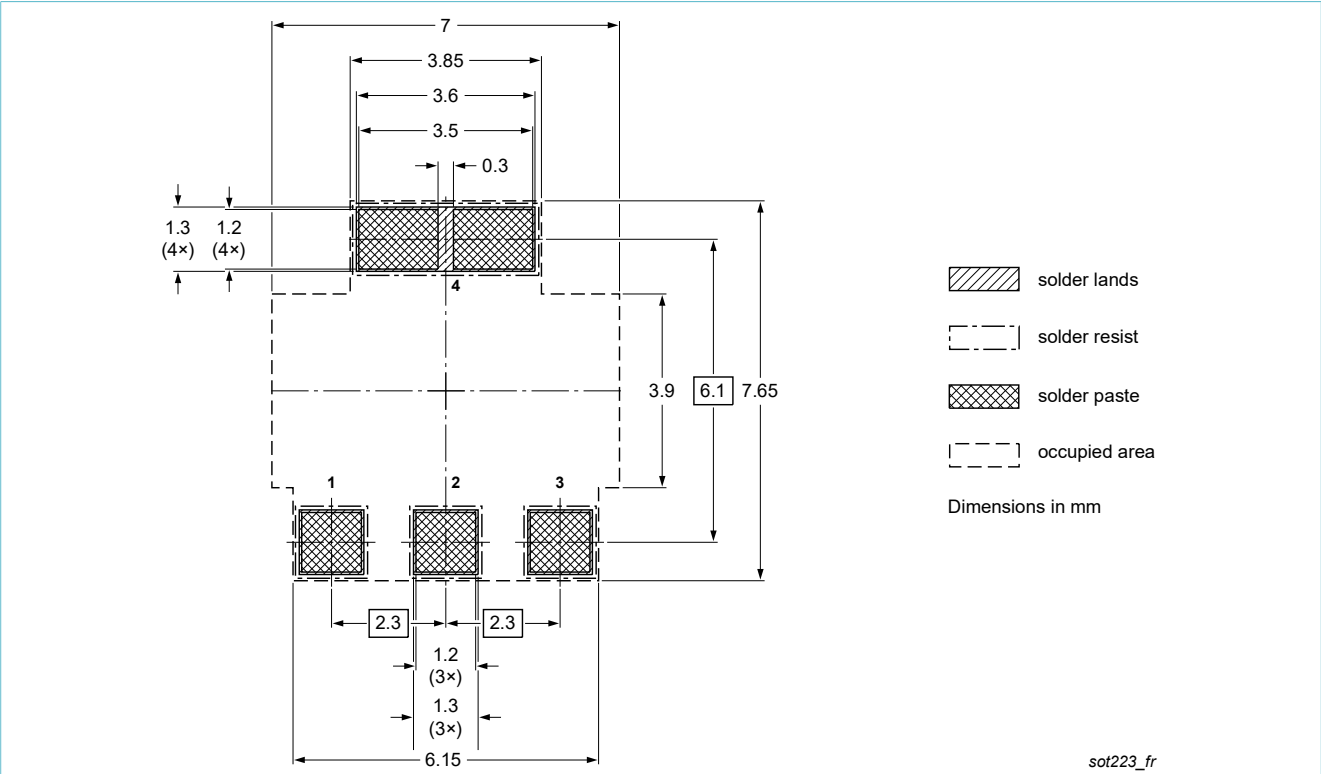




10. Package outline



11. Soldering



12. Legal information

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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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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 26 February 2025