

Z0109MN

4Q Triac

26 August 2013

Product data sheet

1. General description

Planar passivated sensitive gate four quadrant triac in a SOT223 (SC-73) surface-mountable plastic package intended for applications requiring direct interfacing to logic level ICs and low power gate drivers.

2. Features and benefits

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

3. Applications

- General purpose low power motor control
- Home appliances
- Industrial process control
- Low power AC Fan controllers

4. Quick reference data

Table 1. Quick reference data

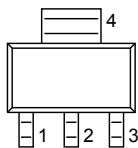
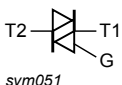
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{J}(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	8	A
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{sp}} \leq 105\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	1	A
Static characteristics						
I_{GT}	gate trigger current	$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T2+ G+; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; Fig. 9	-	-	10	mA
		$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T2+ G-; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; Fig. 9	-	-	10	mA



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
Z0109MN	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
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{sp}} \leq 105\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$; $t_{\text{p}} = 20\text{ ms}$; Fig. 4 ; Fig. 5		-	8	A
		full sine wave; $T_{\text{j(init)}} = 25\text{ °C}$; $t_{\text{p}} = 16.7\text{ ms}$		-	8.5	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; SIN		-	0.32	A ² s
dl_{T}/dt	rate of rise of on-state current	$I_{\text{T}} = 1\text{ A}$; $I_{\text{G}} = 20\text{ mA}$; $dl_{\text{G}}/dt = 0.1\text{ A}/\mu\text{s}$; T2+ G+		-	50	A/ μs
		$I_{\text{T}} = 1\text{ A}$; $I_{\text{G}} = 20\text{ mA}$; $dl_{\text{G}}/dt = 0.1\text{ A}/\mu\text{s}$; T2+ G-		-	50	A/ μs
		$I_{\text{T}} = 1\text{ A}$; $I_{\text{G}} = 20\text{ mA}$; $dl_{\text{G}}/dt = 0.1\text{ A}/\mu\text{s}$; T2- G-		-	50	A/ μs
		$I_{\text{T}} = 1\text{ A}$; $I_{\text{G}} = 20\text{ mA}$; $dl_{\text{G}}/dt = 0.1\text{ A}/\mu\text{s}$; T2- G+		-	20	A/ μs
I_{GM}	peak gate current			-	1	A
P_{GM}	peak gate power			-	2	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period		-	0.1	W
T_{stg}	storage temperature			-40	150	°C
T_{j}	junction temperature			-	125	°C

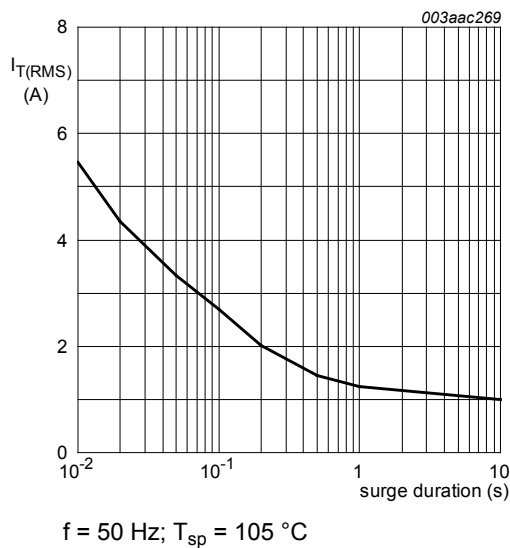


Fig. 1. RMS on-state current as a function of surge duration; maximum values

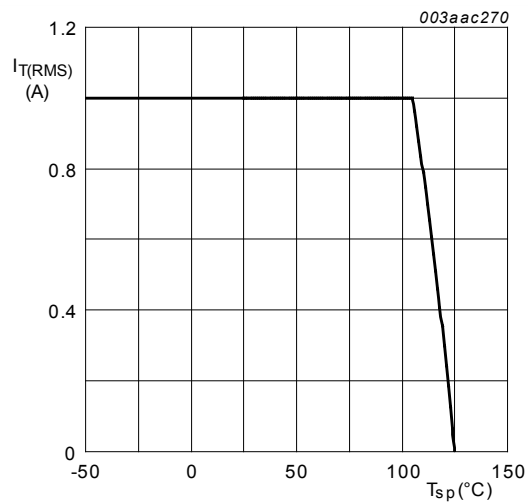


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

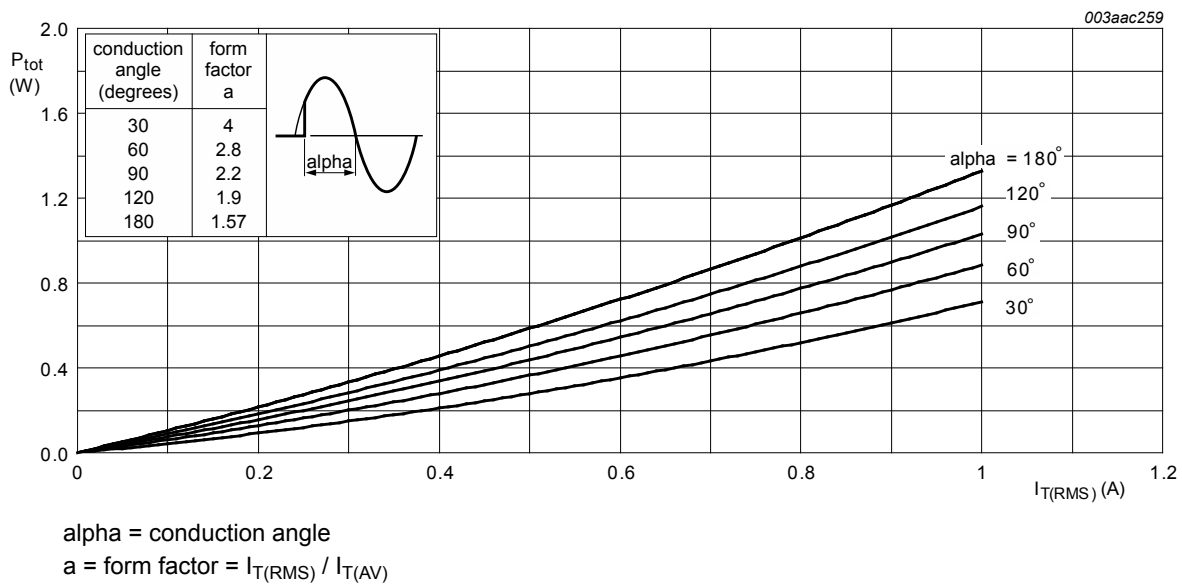


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

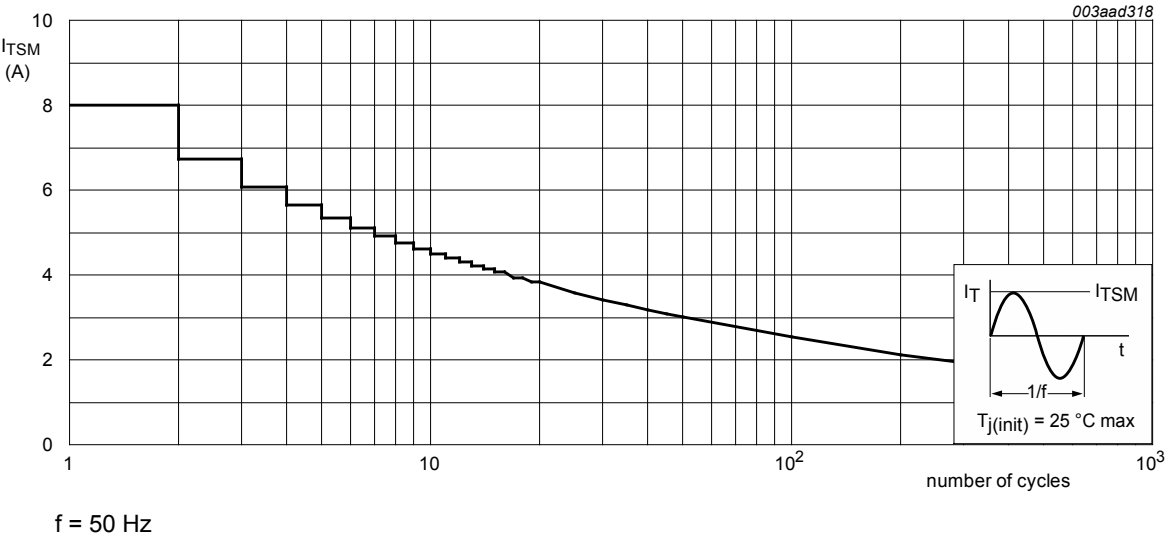


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

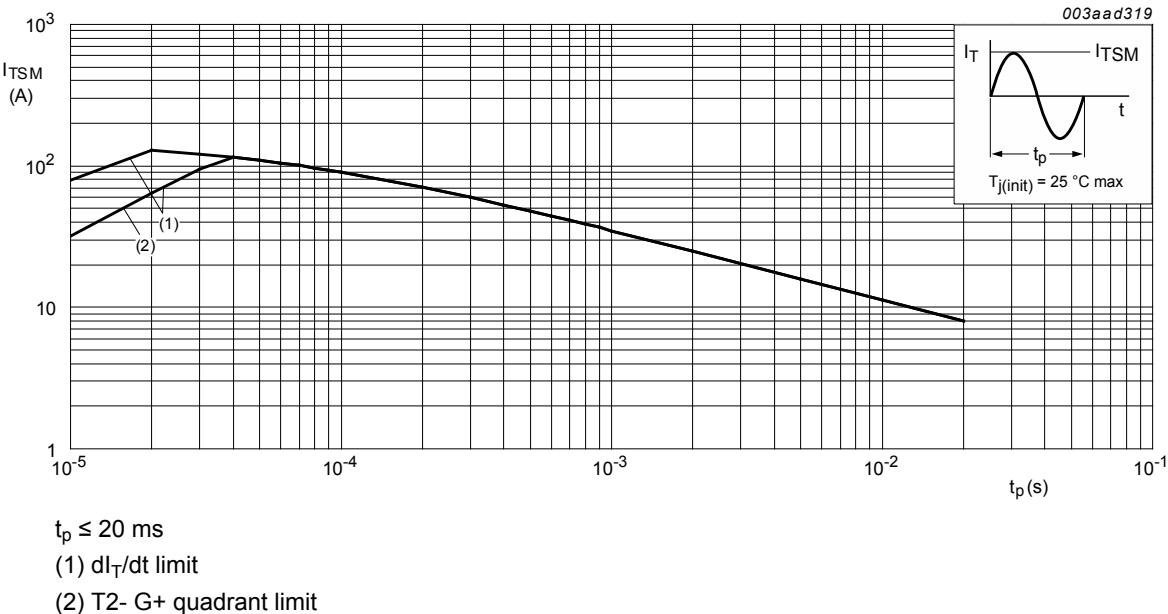
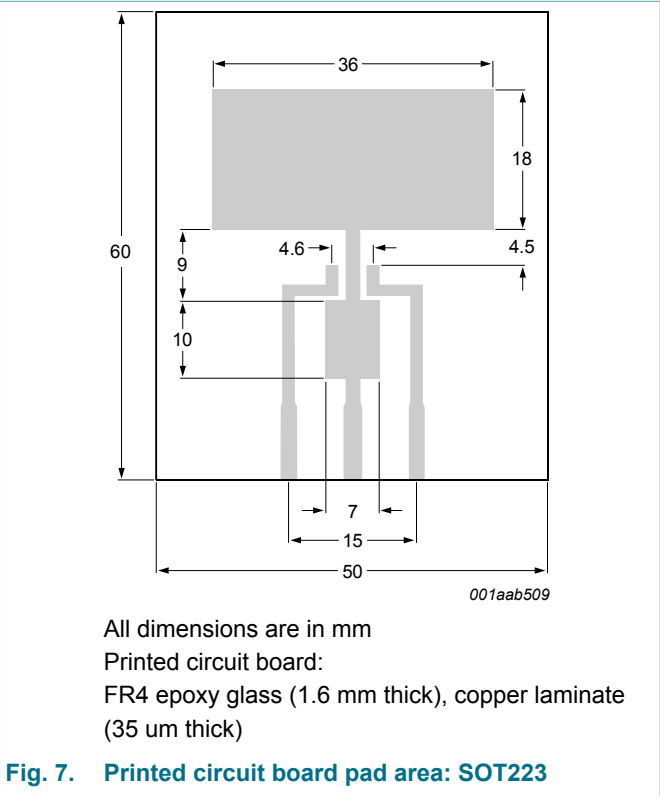
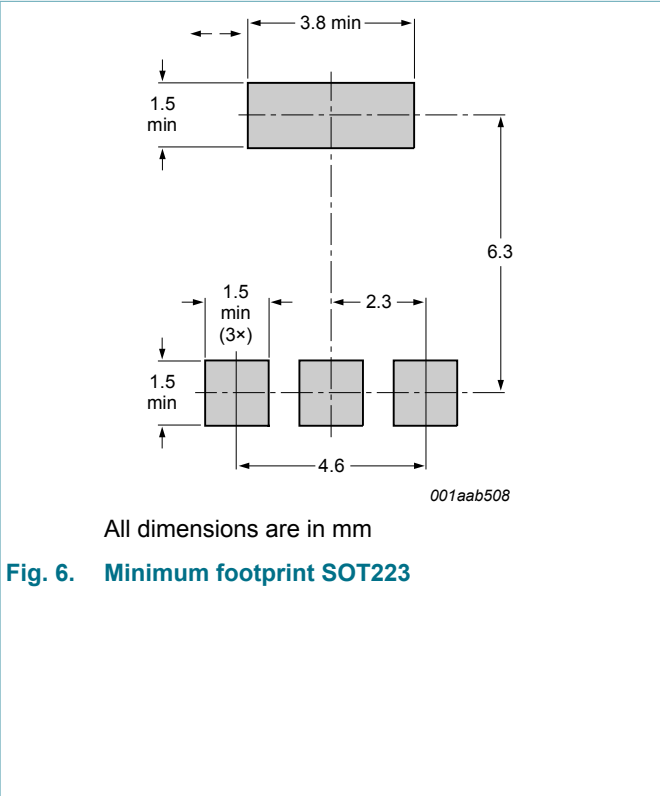


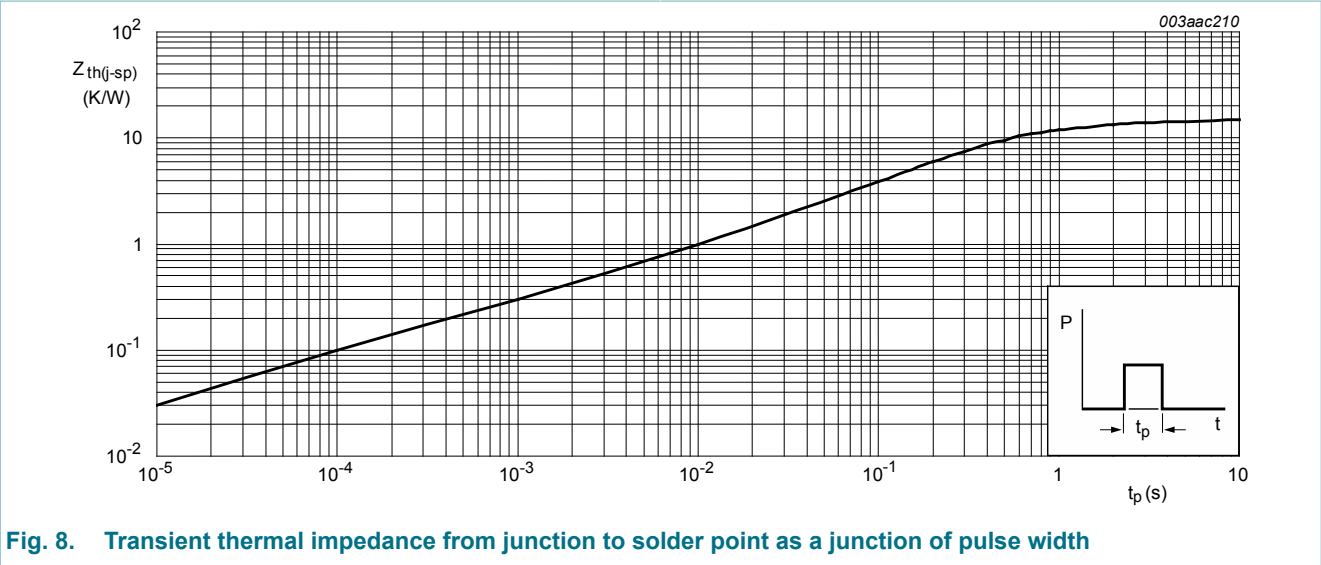
Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

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

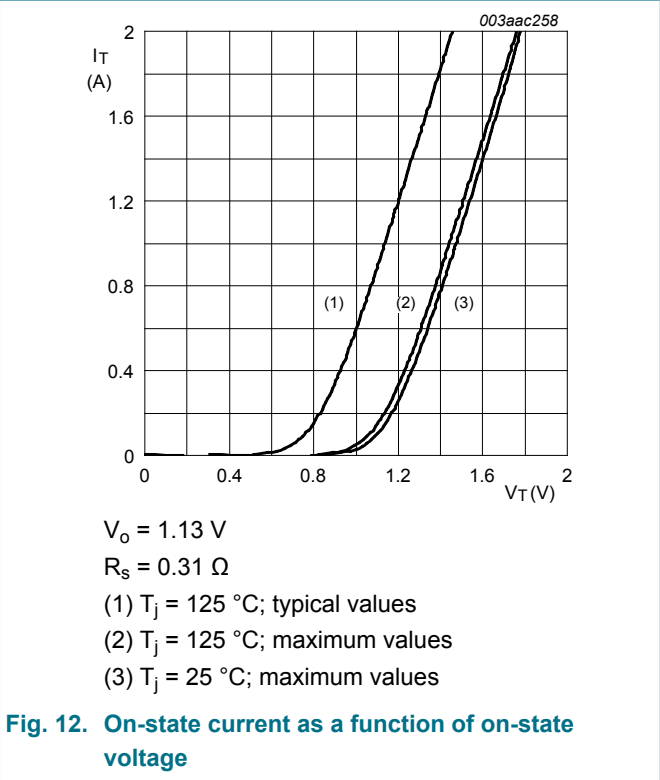
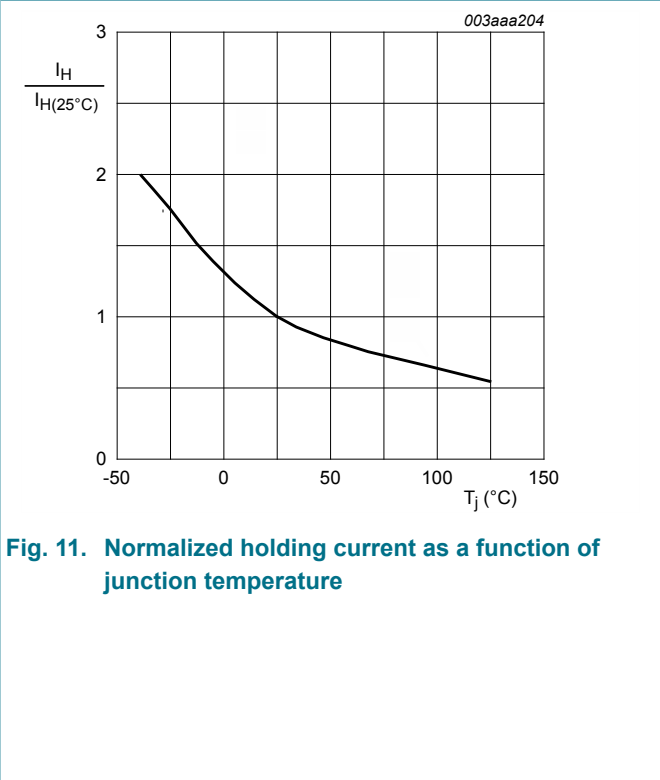
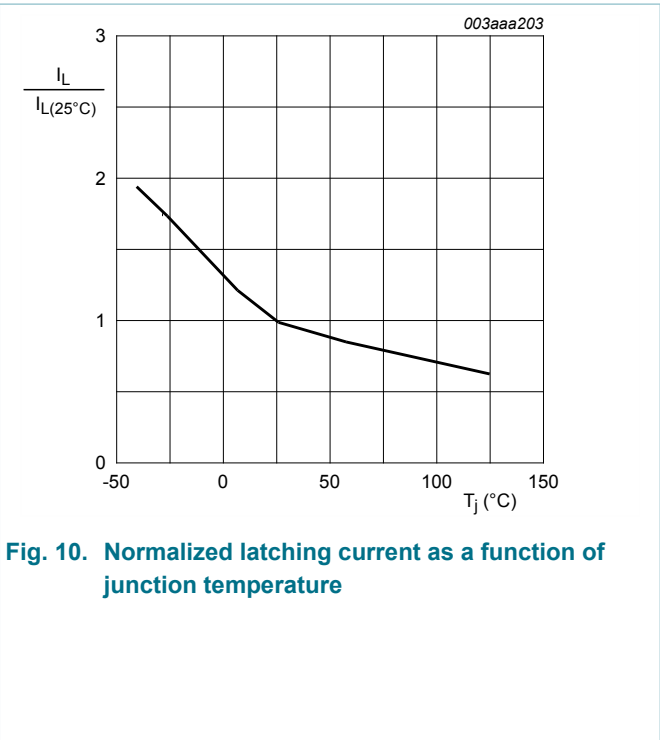
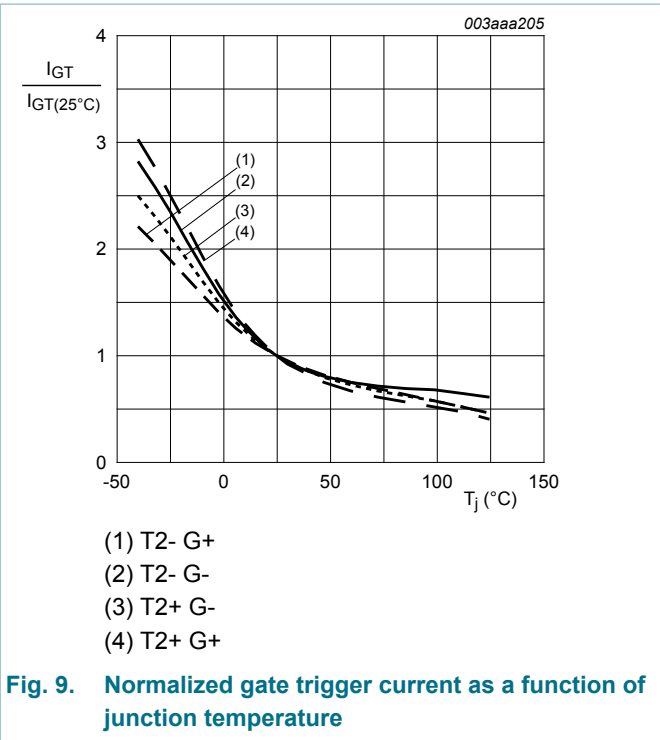


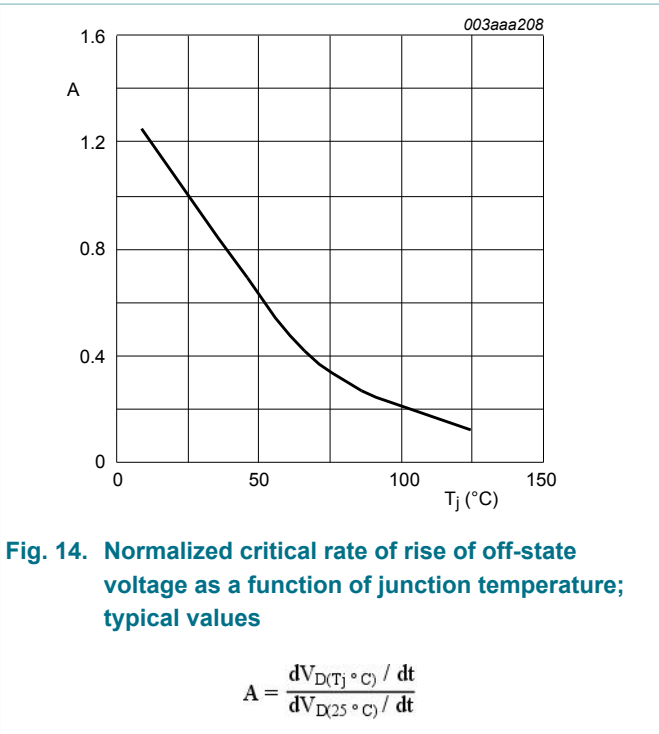
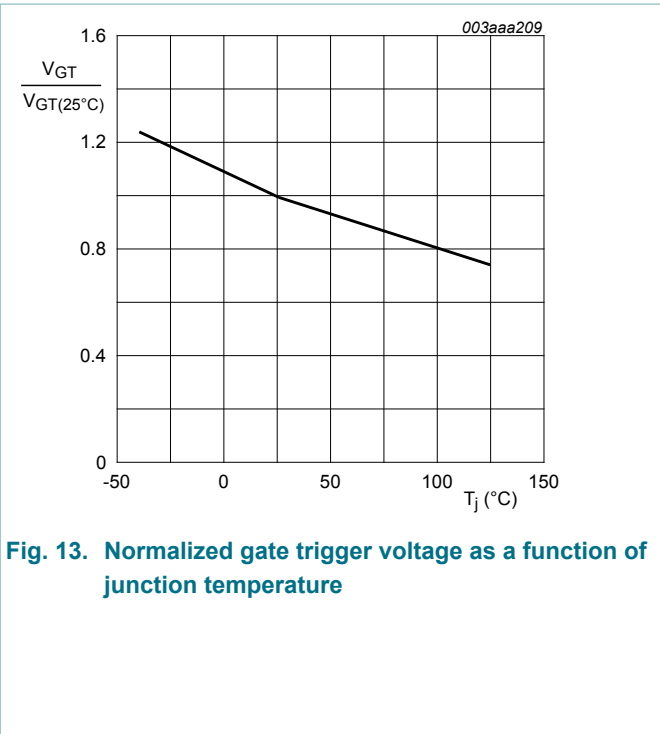


9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	10	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	-	15	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	-	25	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	-	15	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	-	15	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 11	-	-	10	mA
V_T	on-state voltage	$I_T = 1.4\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 12	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 13	-	-	1	V
		$V_D = 600\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$; Fig. 13	0.2	-	-	V
I_D	off-state current	$V_D = 600\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$	-	-	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 110\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; Fig. 14	50	-	-	V/ μs
dV_{com}/dt	rate of change of commutating voltage	$V_D = 400\text{ V}$; $T_j = 110\text{ }^\circ\text{C}$; $dI_{com}/dt = 0.44\text{ A/ms}$; gate open circuit	2	-	-	V/ μs





10. Package outline

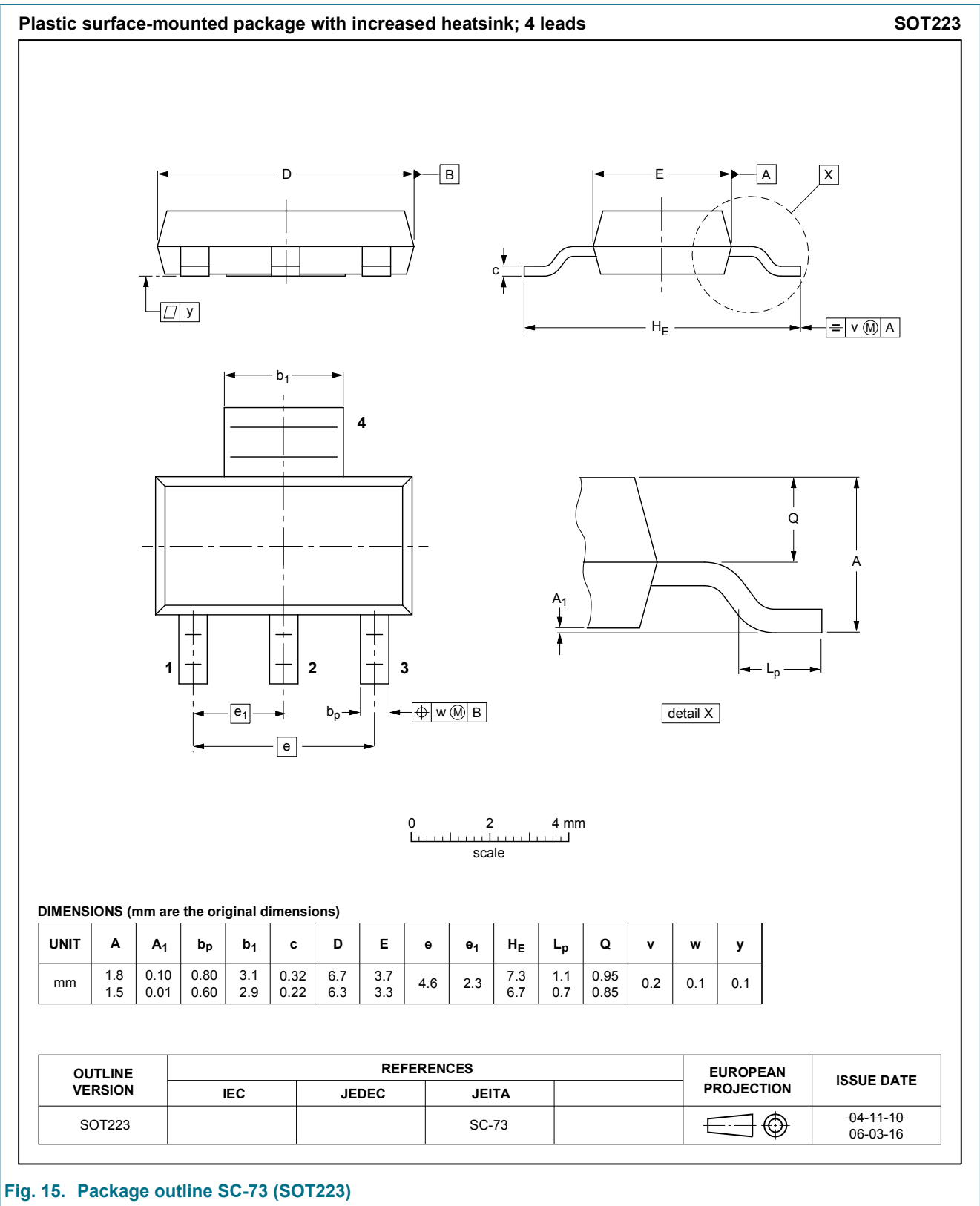


Fig. 15. Package outline SC-73 (SOT223)

11. Soldering

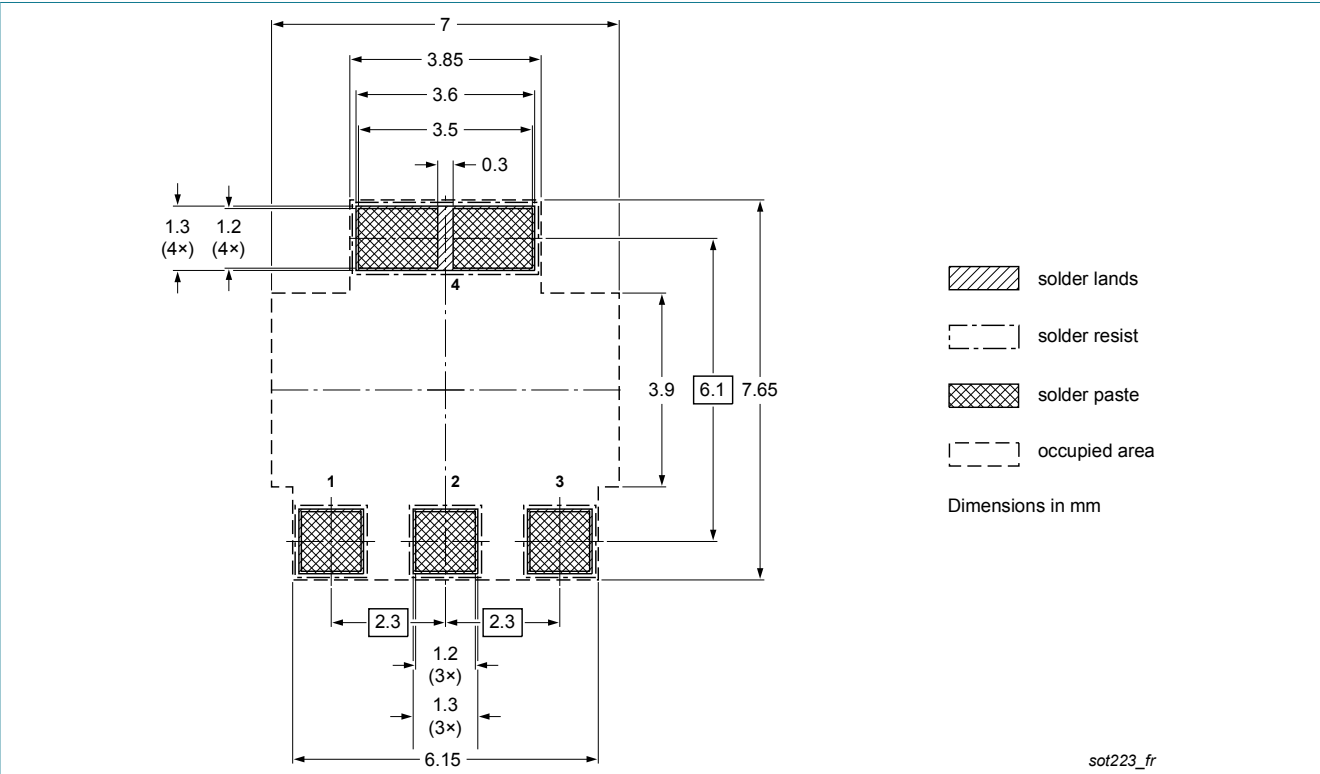


Fig. 16. Reflow soldering footprint for SC-73 (SOT223)

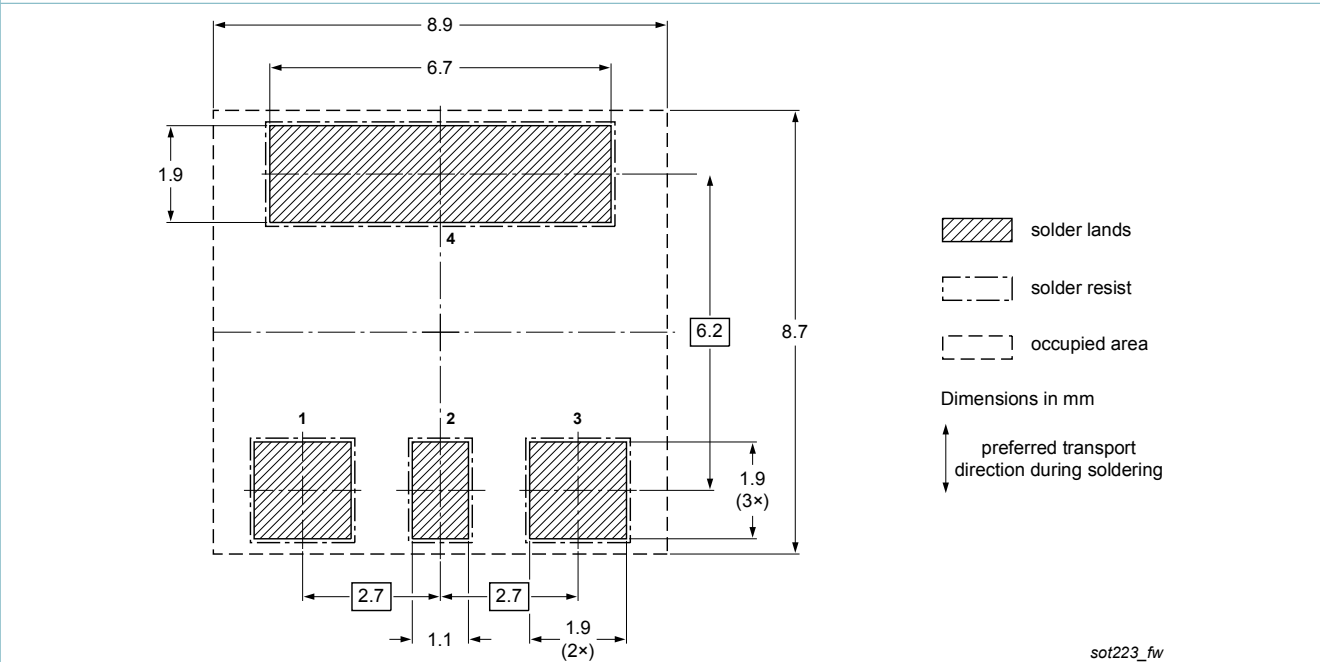


Fig. 17. Wave soldering footprint for SC-73 (SOT223)

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