ACT102H-600D

AC Thyristor power switch

20 August 2014 **Product data sheet**

1. General description

An AC Thyristor power switch with very high noise immunity and over-voltage protection configured for negative gate triggering in a SOT96-1 (SO8) small surface-mountable plastic package

2. Features and benefits

- Exclusive negative gate triggering
- Full cycle AC conduction
- High noise immunity
- Remote gate separates the gate driver from the effects of the load current
- Surface-mountable package
- Very sensitive gate for lowest gate trigger current
- Safe clamping of low energy over-voltage transients
- Self-protective turn-on during high energy voltage transients

3. Applications

- Fan motor circuits
- Pump motor circuits
- Lower-power highly inductive, resistive and safety loads

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; $T_{j(init)}$ = 25 °C; t_p = 20 ms; Fig. 3; Fig. 4		-	-	8	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{amb} \leq$ 100 °C; Fig. 1; Fig. 2		-	-	0.2	A
V_{PP}	peak pulse voltage	$T_j \leq$ 25 °C; non-repetitive, off-state; Fig. 5		-	-	2	kV
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 100 mA; LD+ G-; T_j = 25 °C; Fig. 7		0.5	-	5	mA

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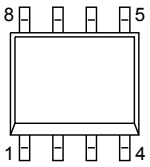
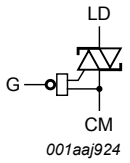
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		V_D = 12 V; I_T = 100 mA; LD- G-; T_j = 25 °C; Fig. 7		0.5	-	5	mA
V_{CL}	clamping voltage	I_{CL} = 0.1 mA; t_p = 1 ms; $T_j \leq$ 125 °C		650	-	-	V

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 SO8 (SOT96-1)	
2	LD	Load		
3	n.c.	not connected		
4	n.c.	not connected		
5	G	Gate		
6	CM	Common		
7	CM	Common		
8	n.c.	not connected		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
ACT102H-600D	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

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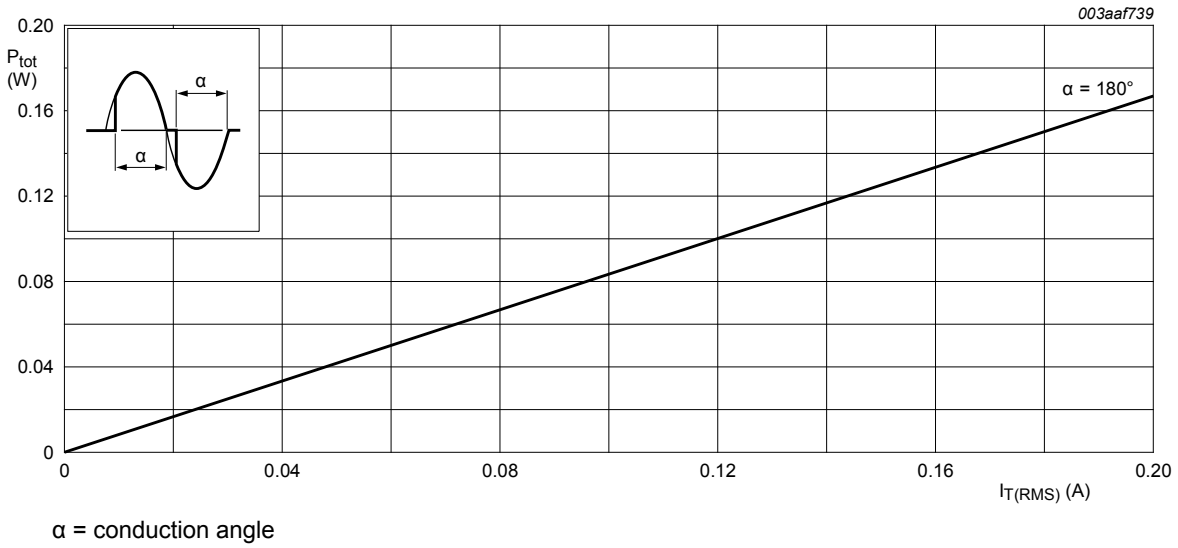
7. Limiting values

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; $T_{amb} \leq 100$ °C; Fig. 1; Fig. 2		-	0.2	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms		-	8.8	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; Fig. 3; Fig. 4		-	8	A
I^2t	I2t for fusing	$t_p = 10$ ms; SIN		-	0.31	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/µs		-	50	A/µs
I_{GM}	peak gate current	t = 20 µs		-	1	A
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	°C
T_j	junction temperature			-	125	°C
V_{PP}	peak pulse voltage	$T_j \leq 25$ °C; non-repetitive, off-state; Fig. 5		-	2	kV



α = conduction angle

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

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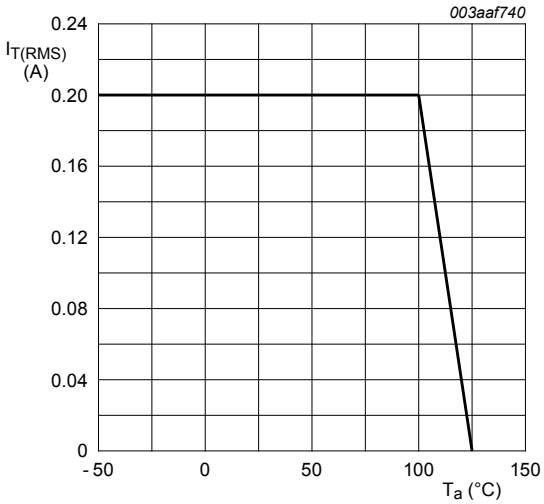
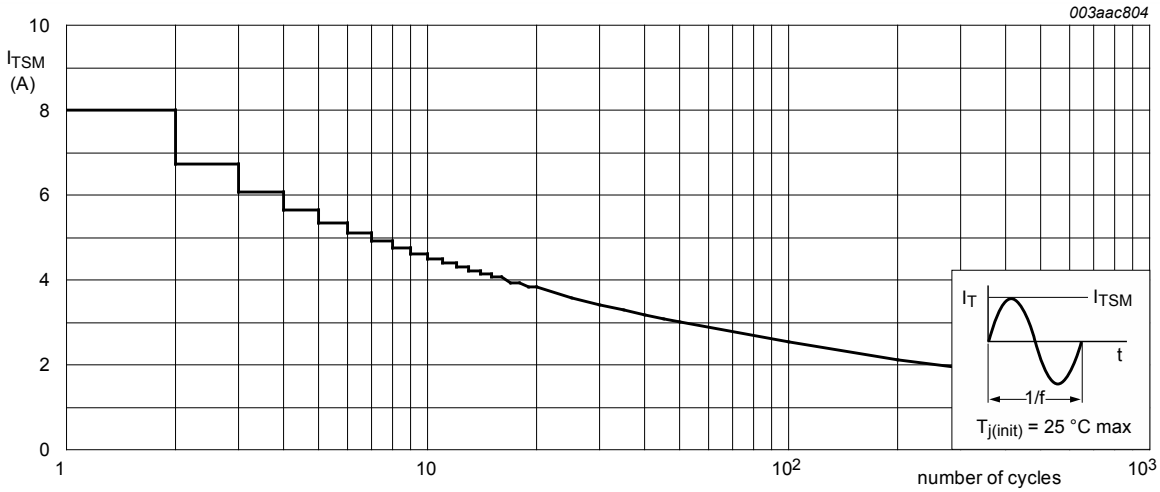


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values



f = 50 Hz

Fig. 3. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

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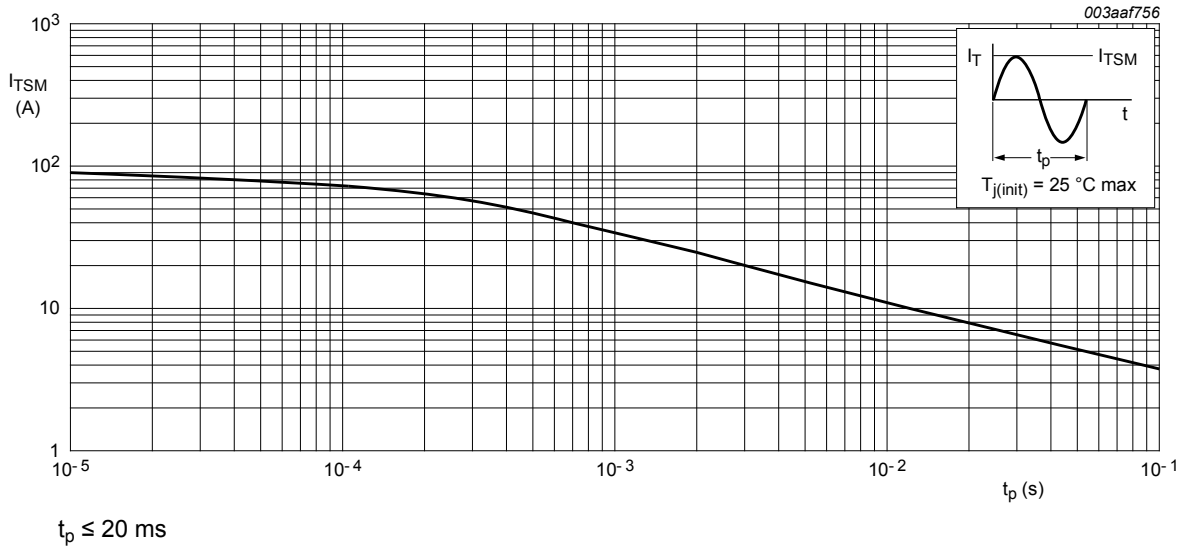

Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

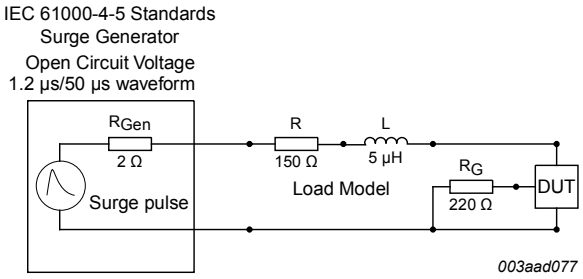

Fig. 5. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

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8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	full cycle; Fig. 6		-	150	-	K/W

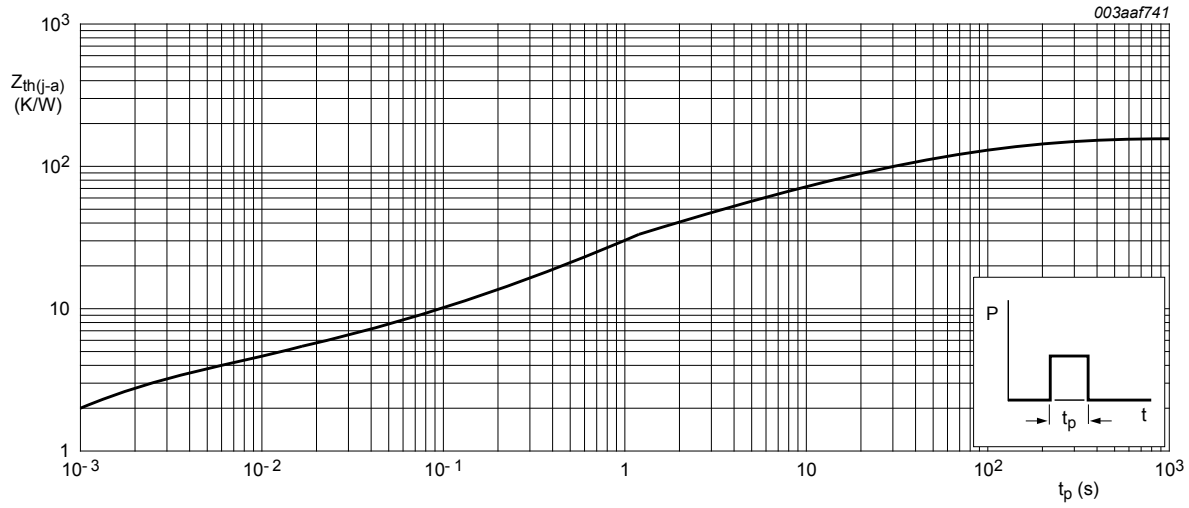

Fig. 6. Transient thermal impedance from junction to lead as a function of pulse width

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9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 100 mA; LD+ G-; T_j = 25 °C; Fig. 7		0.5	-	5	mA
		V_D = 12 V; I_T = 100 mA; LD- G-; T_j = 25 °C; Fig. 7		0.5	-	5	mA
I_L	latching current	V_D = 12 V; I_G = 100 mA; LD+ G-; T_j = 25 °C; Fig. 8		-	-	25	mA
		V_D = 12 V; I_G = 100 mA; LD- G-; T_j = 25 °C; Fig. 8		-	-	25	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	-	20	mA
V_T	on-state voltage	I_T = 0.3 A; T_j = 25 °C; Fig. 10		-	-	1.2	V
V_{GT}	gate trigger voltage	V_D = 400 V; I_T = 100 mA; T_j = 125 °C		0.15	-	-	V
		V_D = 12 V; I_T = 100 mA; T_j = 25 °C		-	-	0.9	V
I_D	off-state current	V_D = 600 V; T_j = 25 °C		-	-	2	µA
		V_D = 600 V; T_j = 125 °C		-	-	0.2	mA
V_{CL}	clamping voltage	I_{CL} = 0.1 mA; t_p = 1 ms; T_j ≤ 125 °C		650	-	-	V
Dynamic charateristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit; Fig. 11		300	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ 1 A; dV_{com}/dt = 15 V/µs; gate open circuit; Fig. 12; Fig. 13		0.15	-	-	A/ms

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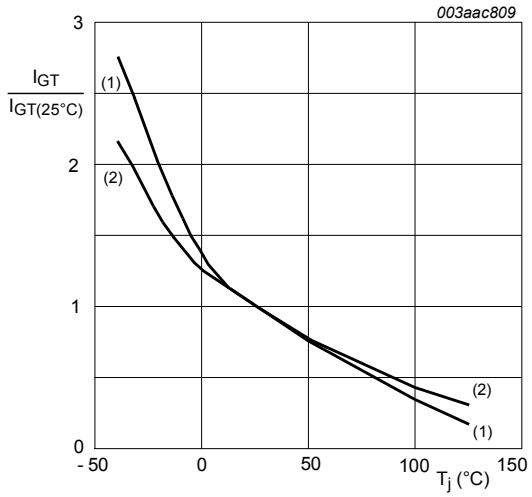


(1) LD+ G-
(2) LD- G-

Fig. 7. Normalized gate trigger current as a function of junction temperature

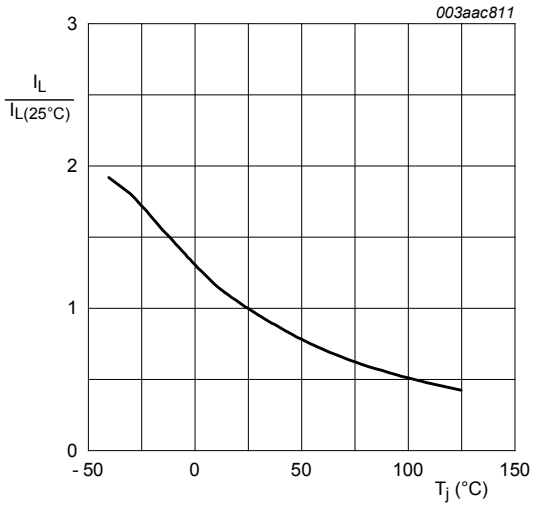


Fig. 8. Normalized latching current as a function of junction temperature

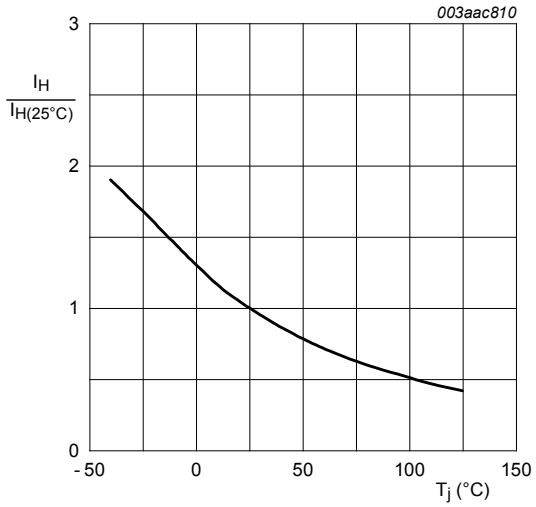
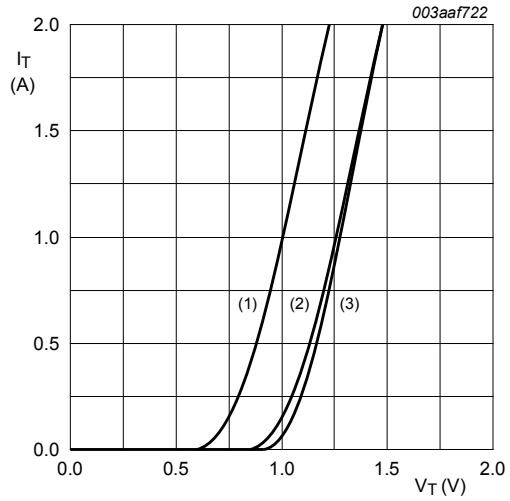


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 0.758 V; R_s = 0.263 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 10. On-state current as a function of on-state voltage

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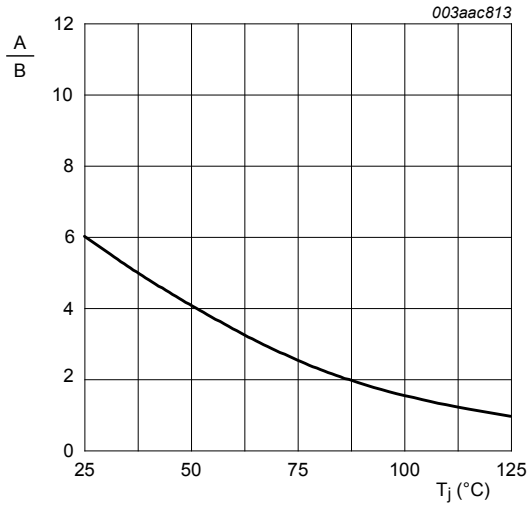
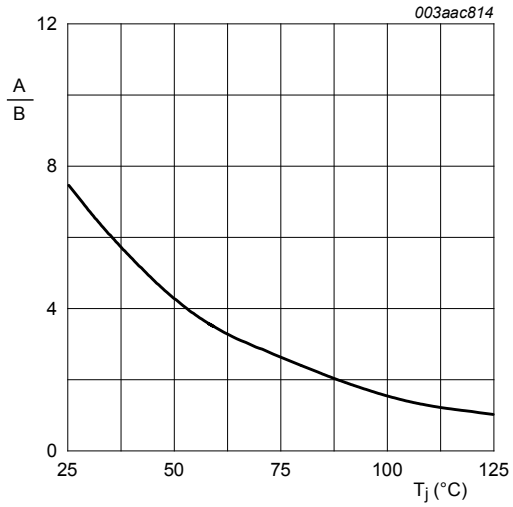


A = dV_D/dt at condition T_j °C

B = dV_D/dt at condition T_j [125] °C

Fig. 11. Normalized rate of rise of off-state voltage as a function of junction temperature

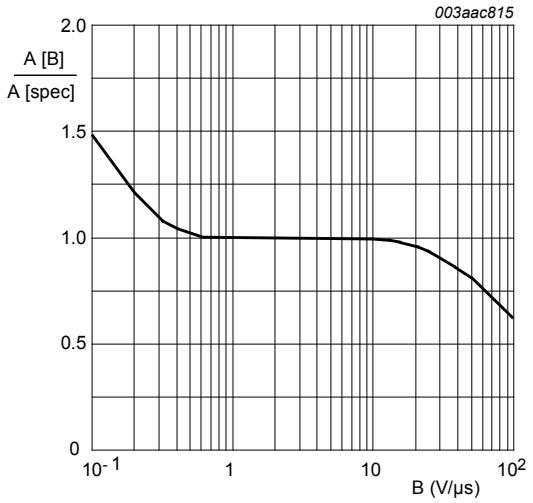


A = dI_{com}/dt at condition T_j °C

B = dI_{com}/dt at condition T_j [125] °C

V_D = 400 V

Fig. 12. Normalized critical rate of rise of commutating current as a function of junction temperature



A [B] = dI_{com}/dt at condition B, dV_{com}/dt

A [spec] is the data sheet value for dI_{com}/dt

turn-off time is less than 20 ms

Fig. 13. Normalized critical rate of change of commutating current as a function of critical rate of change of commutating voltage; minimum values

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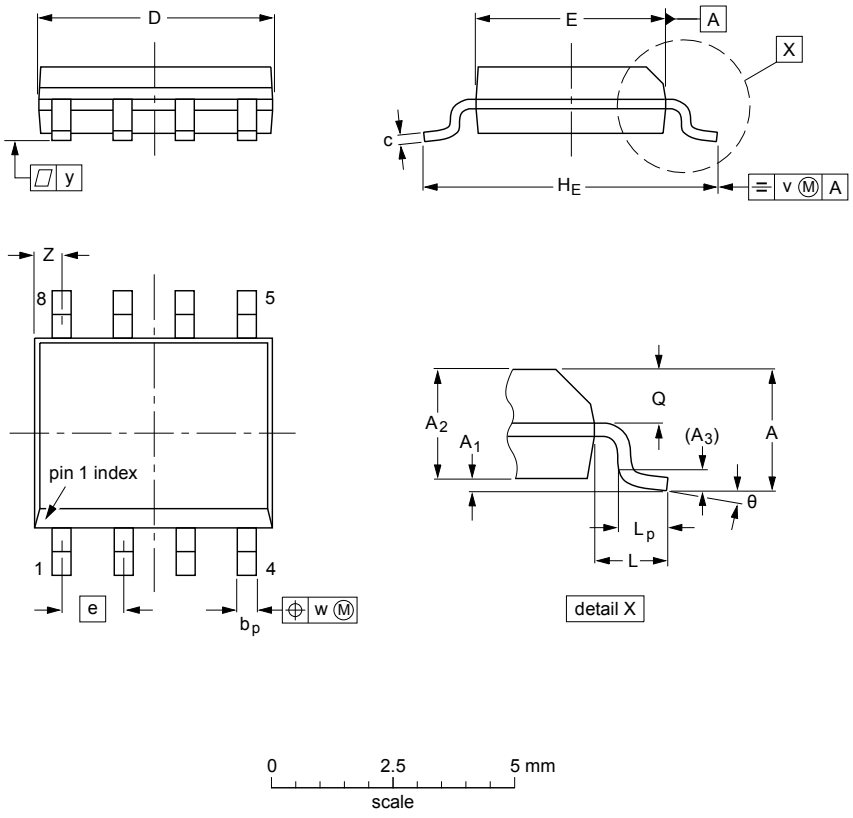
10. Package outline

SO8: plastic small outline package; 8 leads; body width 3.9 mm **SOT96-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	5.0 4.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.20 0.19	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Notes

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT96-1	076E03	MS-012				~~99-12-27~~ 03-02-18

Fig. 14. Package outline SO8 (SOT96-1)

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11. Soldering

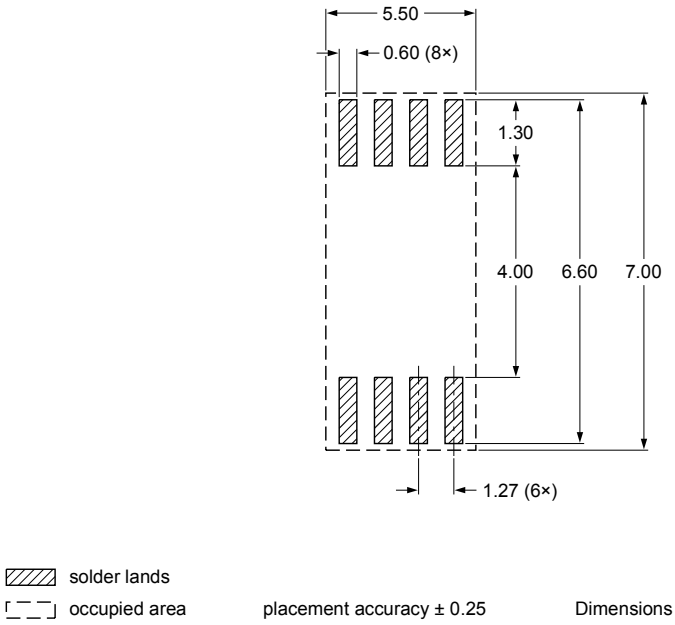

Fig. 15. Reflow soldering footprint for SO8 (SOT96-1)

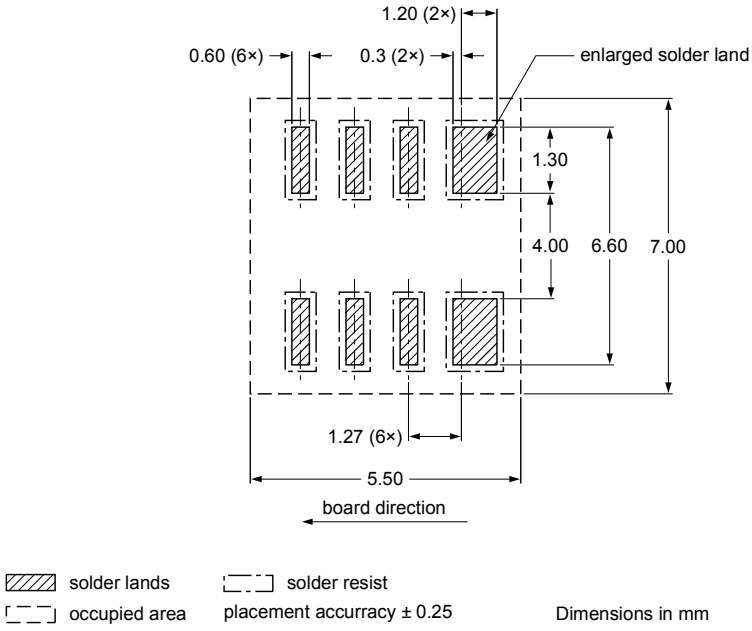

Fig. 16. Wave soldering footprint for SO8 (SOT96-1)

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Document status [1][2]	Product status [3]	Definition
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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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