

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

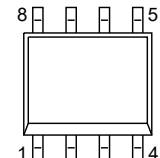
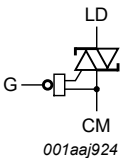
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{amb} \leq 100\text{ °C}$; Fig. 1 ; Fig. 2	-	-	0.2	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	-	8.8	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 3 ; Fig. 4	-	-	8	A
T_j	junction temperature		-	-	125	°C
V_{PP}	peak pulse voltage	$T_j = 25\text{ °C}$; non-repetitive, off-state; Fig. 5	-	-	2	kV
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G-; $T_j = 25\text{ °C}$; Fig. 7	0.5	-	5	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD- G-; $T_j = 25\text{ °C}$; Fig. 7	0.5	-	5	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9	-	-	20	mA
V_T	on-state voltage	$I_T = 0.3\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10	-	-	1.2	V
V_{CL}	clamping voltage	$I_{CL} = 0.1\text{ mA}$; $t_p = 1\text{ ms}$; $T_j = 125\text{ °C}$	650	-	-	V
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; Fig. 11	300	-	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 1\text{ A}$; $dV_{com}/dt = 15\text{ V}/\mu\text{s}$; gate open circuit; Fig. 12 ; Fig. 13	0.15	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 <p>SO8 (SOT96-1)</p>	 <p>001aa/924</p>
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

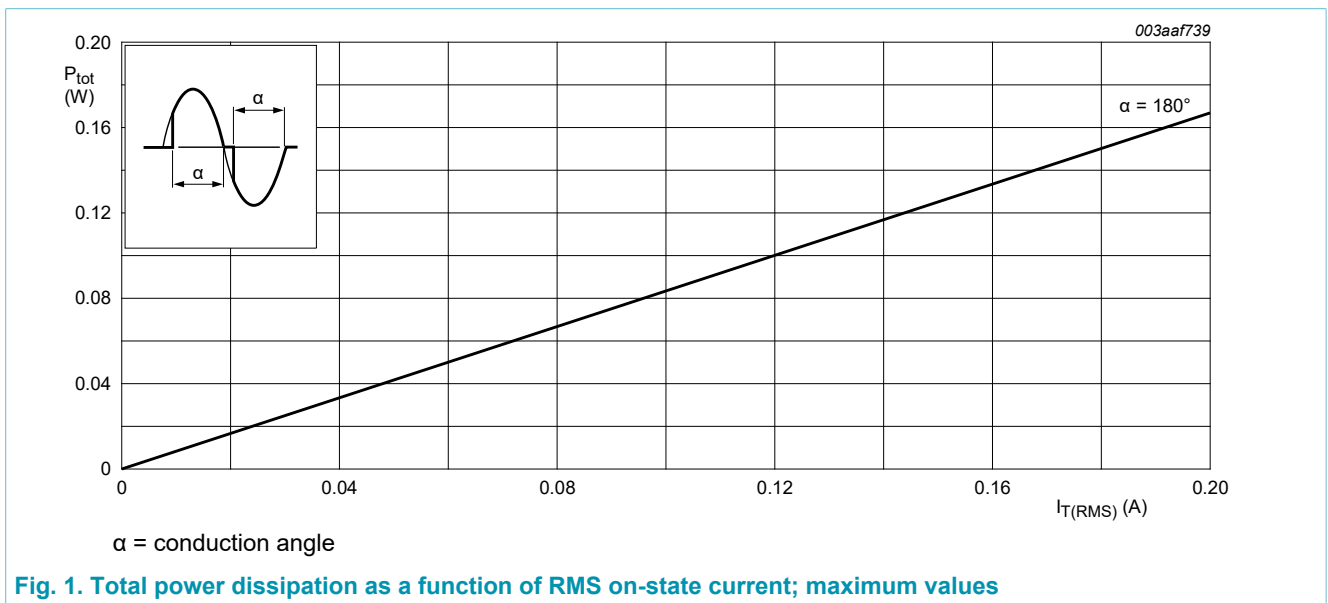
Type number	Package		
	Name	Description	Version
ACT102H-600D	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

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; $T_{amb} \leq 100\text{ °C}$; Fig. 1 ; Fig. 2	-	0.2	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	8.8	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 3 ; Fig. 4	-	8	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	0.31	A ² s
di_T/dt	rate of rise of on-state current	$I_G = 10\text{ mA}$	-	50	A/ μ s
I_{GM}	peak gate current	$t = 20\text{ }\mu$ s	-	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	$T_j = 25\text{ °C}$; non-repetitive, off-state; Fig. 5	-	2	kV



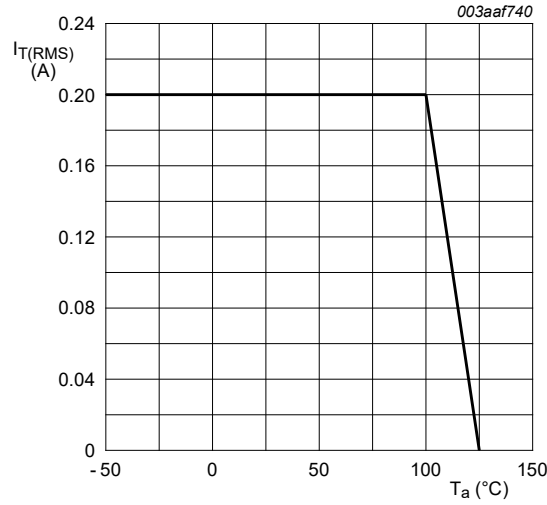


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

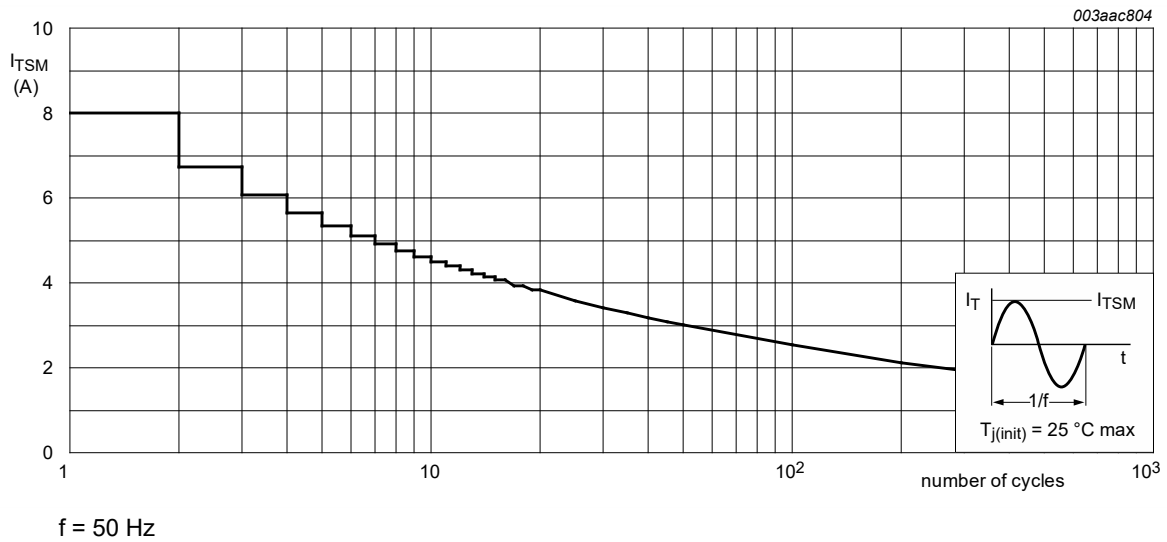


Fig. 3. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

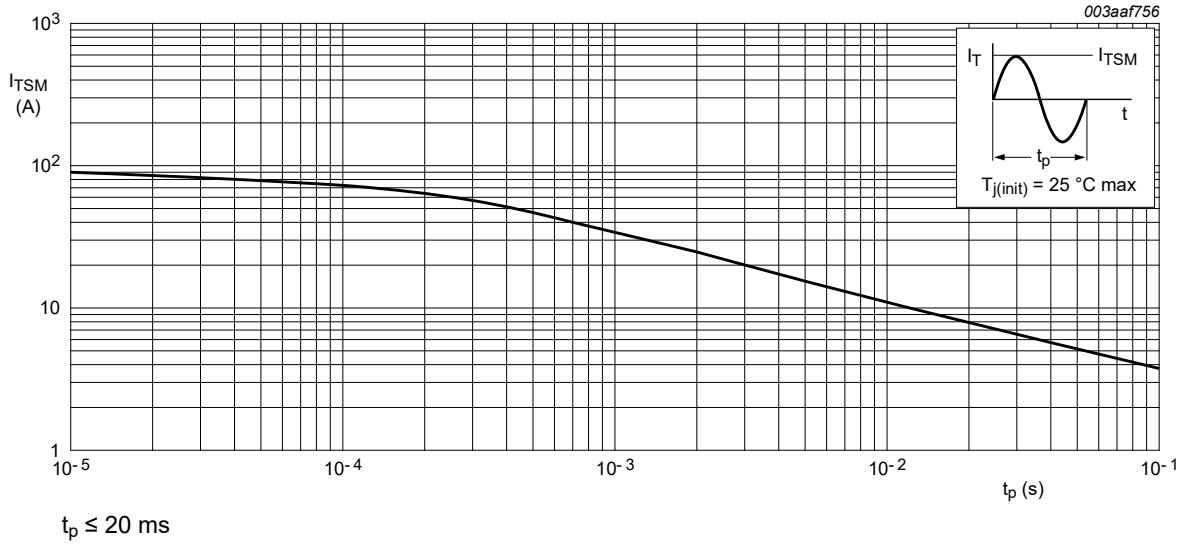


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

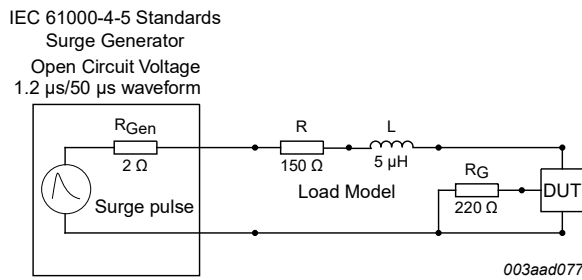
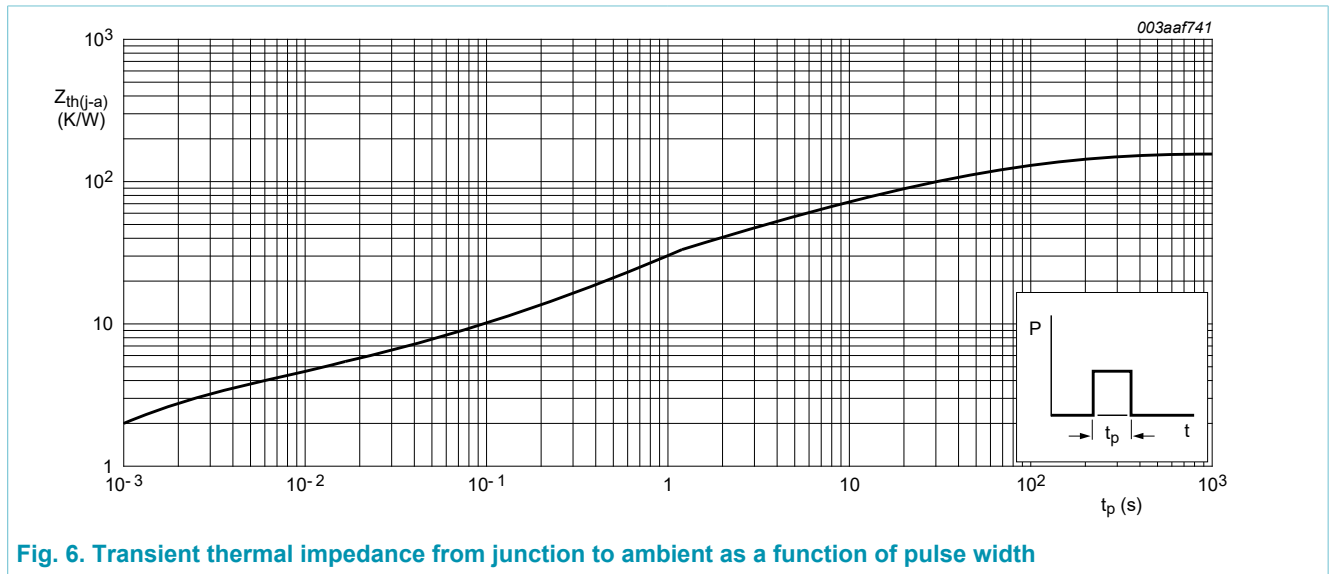


Fig. 5. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

8. Thermal characteristics

Table 5. Thermal characteristics

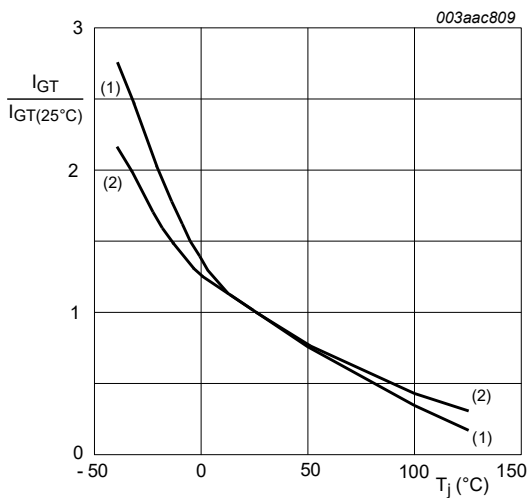
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	full cycle; Fig. 6	-	150	-	K/W



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 characteristics						
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



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

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

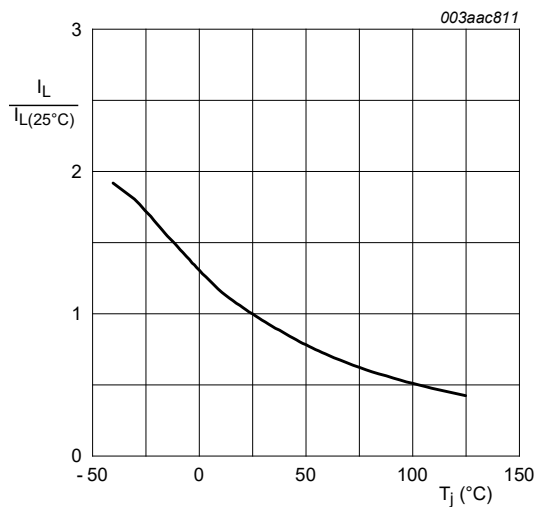


Fig. 8. Normalized latching current as a function of junction temperature

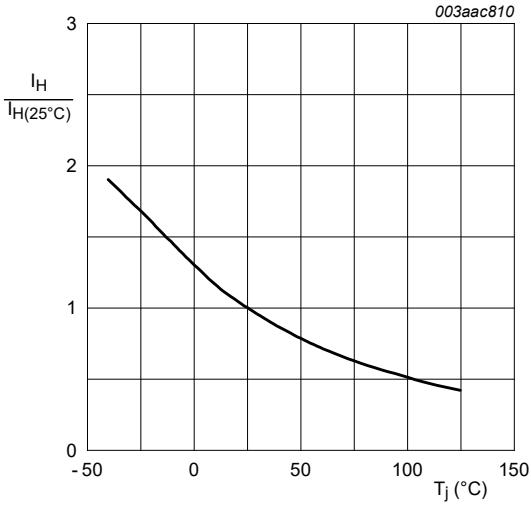
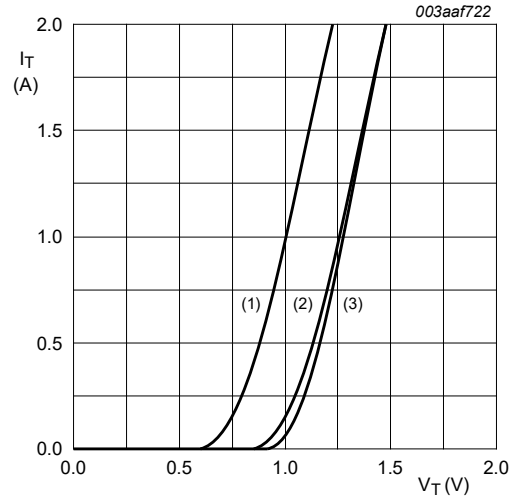


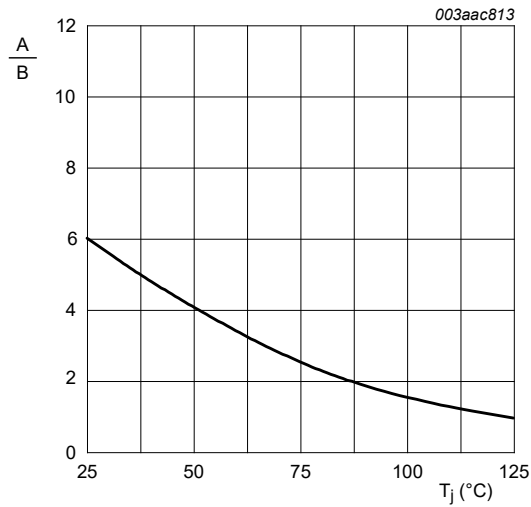
Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 0.758 \text{ V}; R_s = 0.263 \Omega$

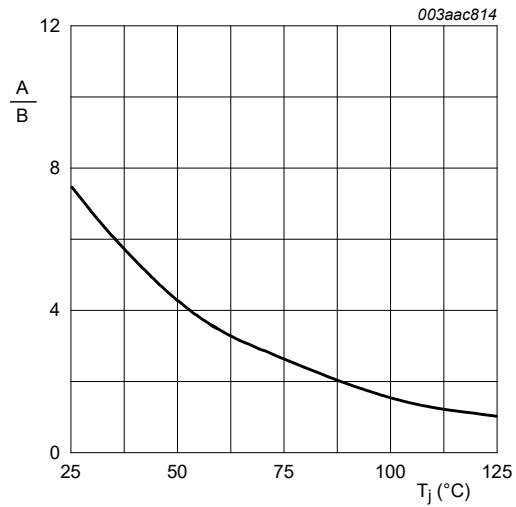
- (1) $T_j = 125^\circ\text{C}$; typical values
- (2) $T_j = 125^\circ\text{C}$; maximum values
- (3) $T_j = 25^\circ\text{C}$; maximum values

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



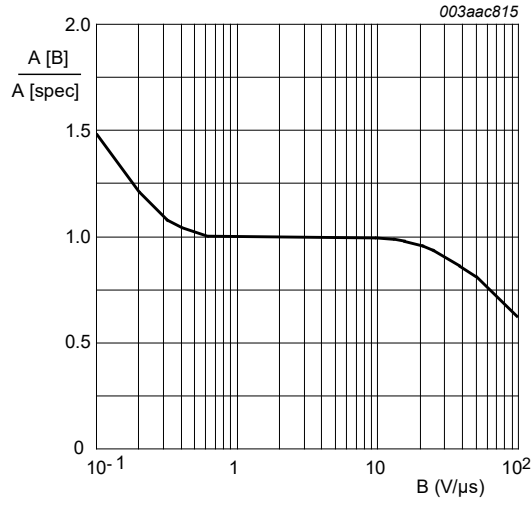
$A = dV_D/dt$ at condition T_j $^\circ\text{C}$
 $B = dV_D/dt$ at condition T_j [125] $^\circ\text{C}$

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



$A = dI_{com}/dt$ at condition T_j $^\circ\text{C}$
 $B = dI_{com}/dt$ at condition T_j [125] $^\circ\text{C}$
 $V_D = 400 \text{ V}$

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



A [B] = dl_{com}/dt at condition B, dV_{com}/dt
 A [spec] is the data sheet value for dl_{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

10. Package outline

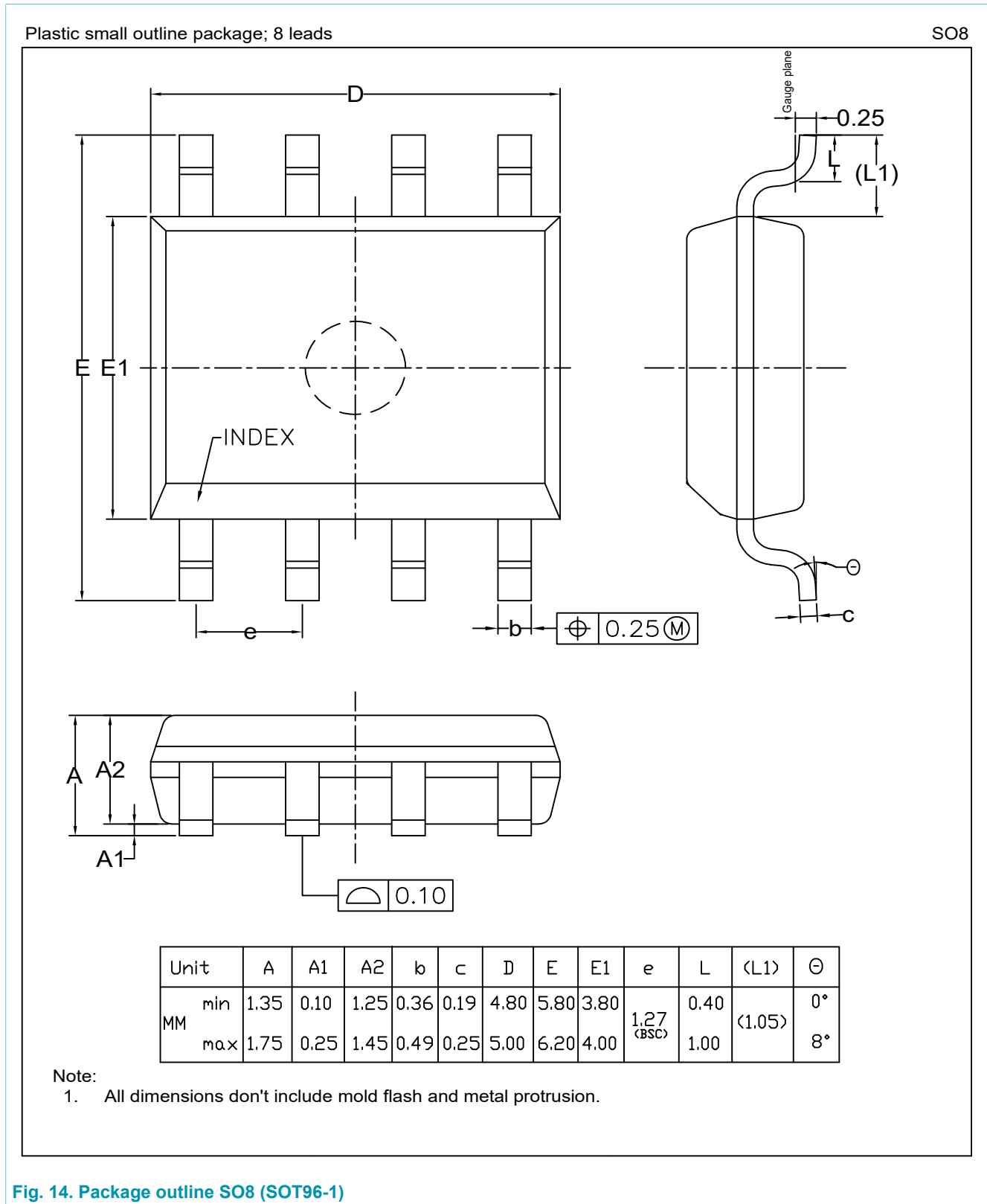


Fig. 14. Package outline SO8 (SOT96-1)

11. 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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