ACT102H-600D

AC Thyristor power switch

21 August 2017 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

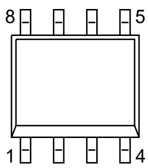
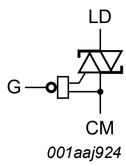
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	-	600	V
$I_{T(RMS)}$	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
T_j	junction temperature			-	-	125	°C
V_{PP}	peak pulse voltage	T_j = 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

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
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_{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

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

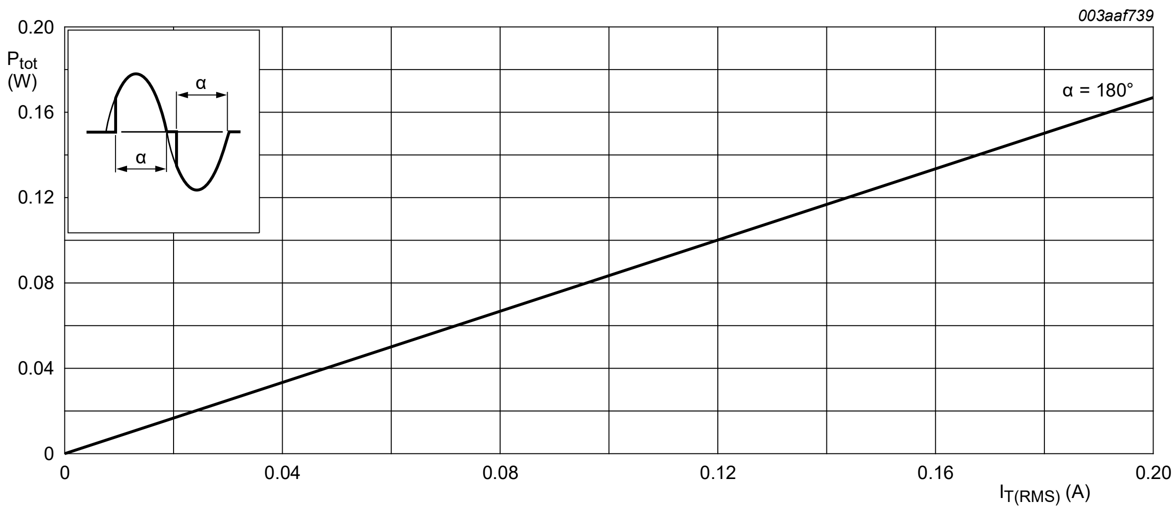
Type number	Package		
	Name	Description	Version
ACT102H-600D	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

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	I^2t for fusing	t_p = 10 ms; SIN		-	0.31	A²s
dI_T/dt	rate of rise of on-state current	I_G = 10 mA		-	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 = 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

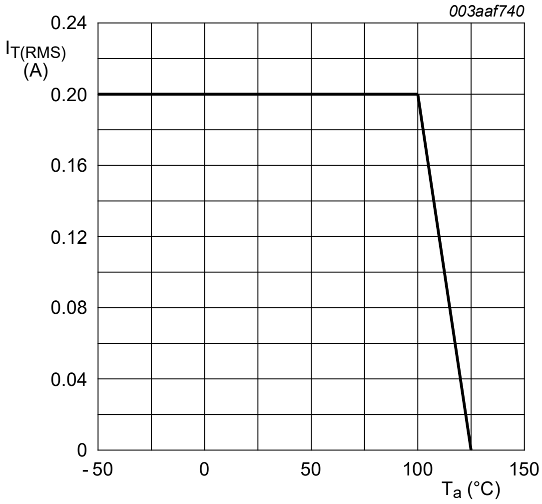


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values

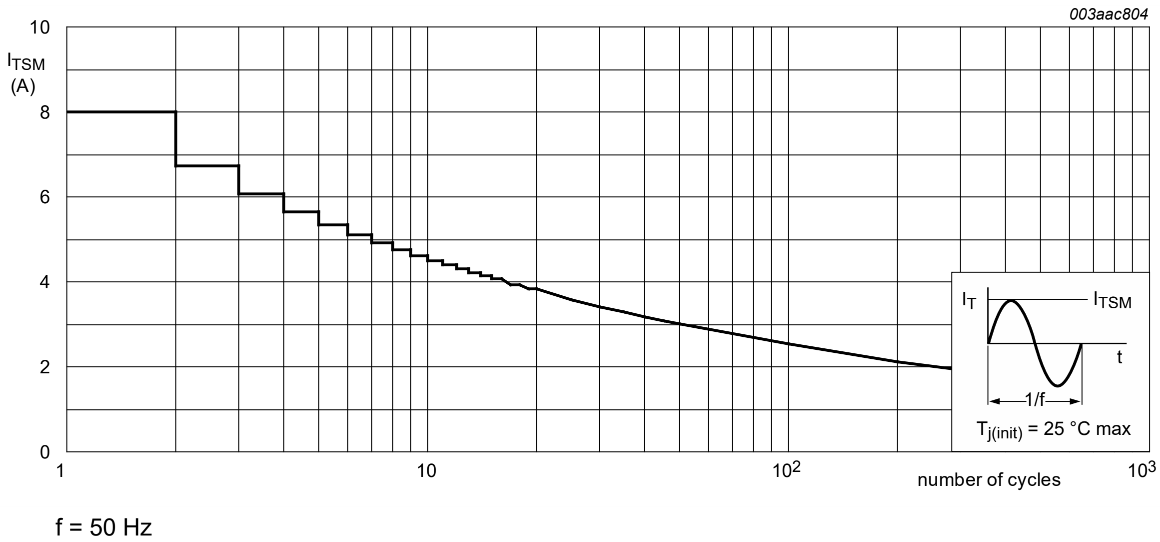
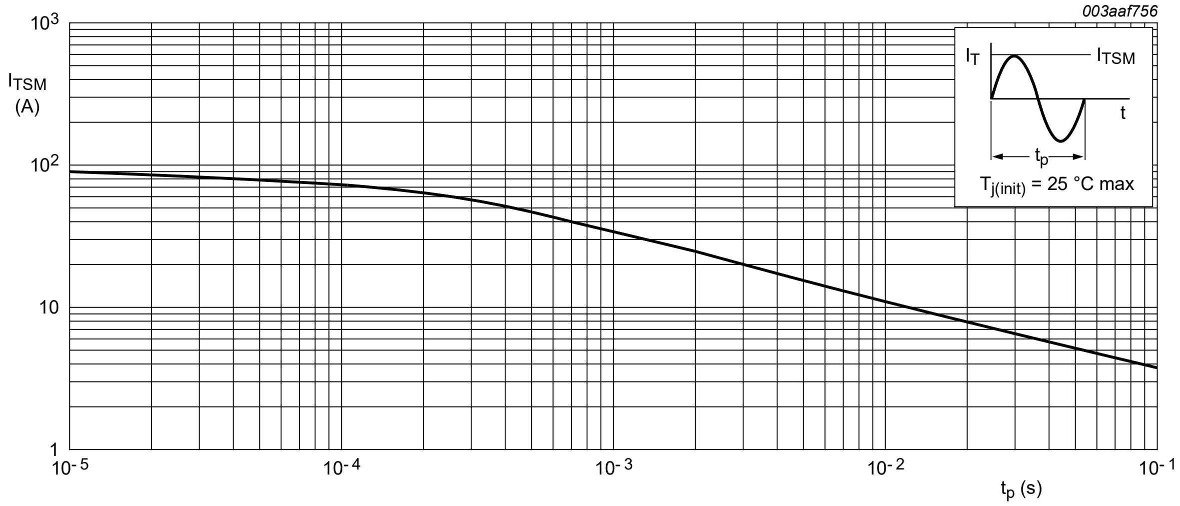


Fig. 3. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20$ ms

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

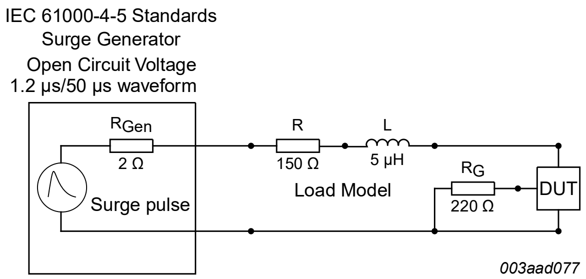


Fig. 5. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

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

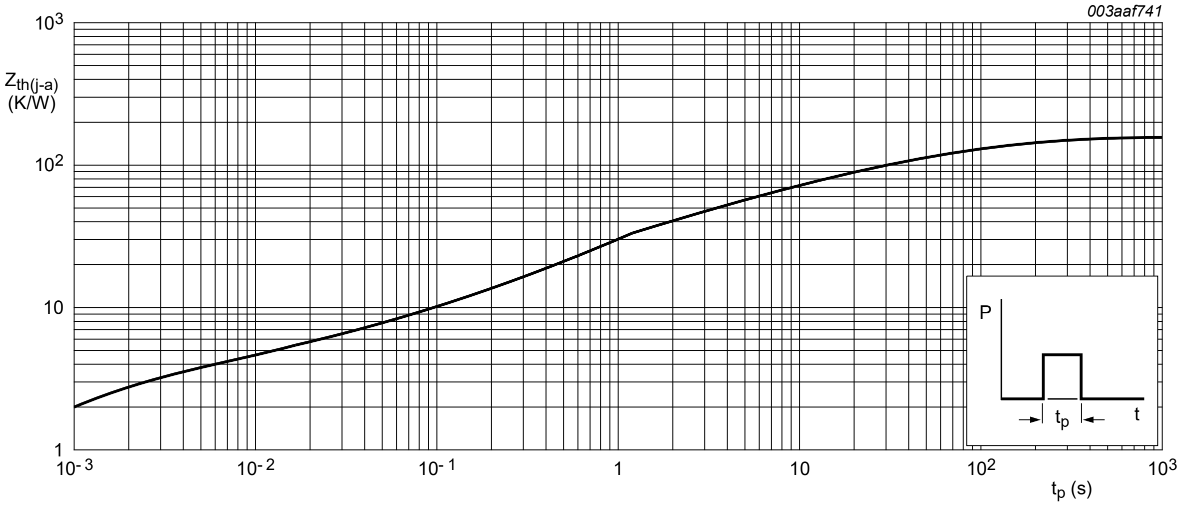
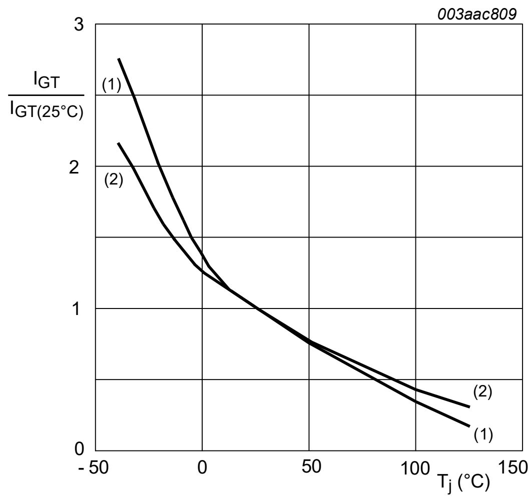


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse width

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



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

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

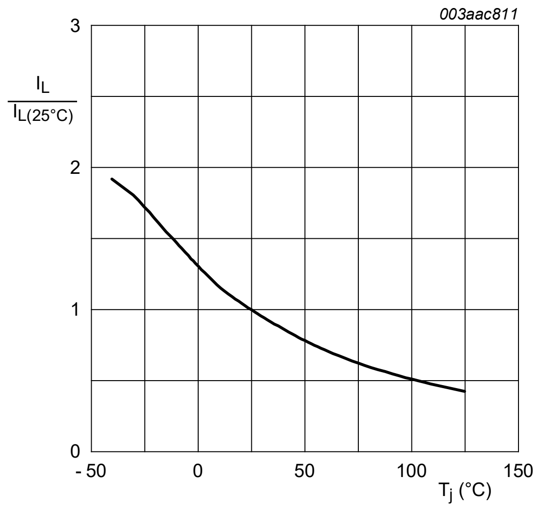


Fig. 8. Normalized latching current as a function of junction temperature

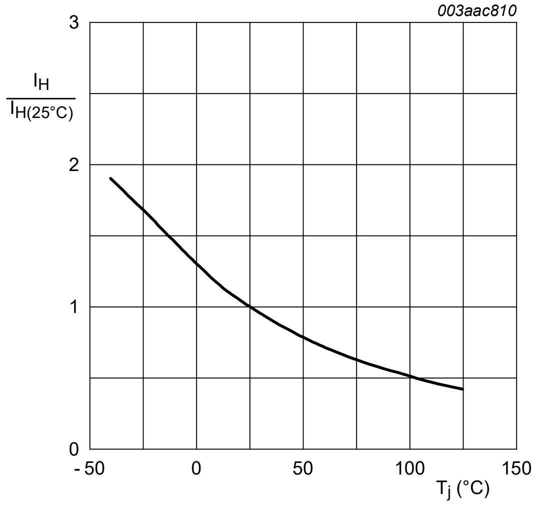
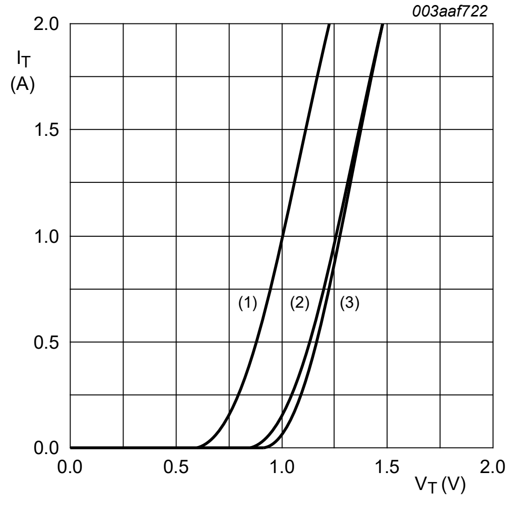
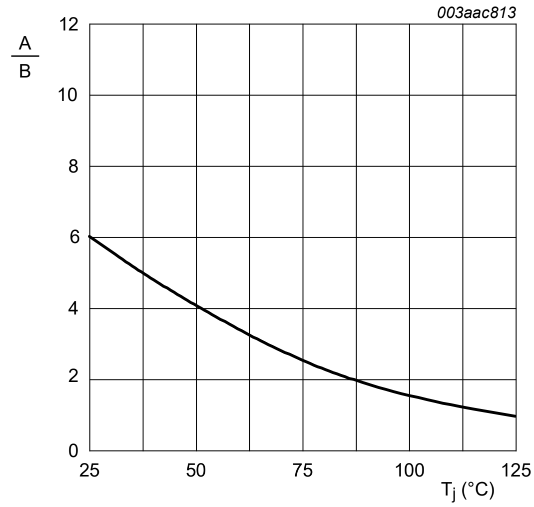


Fig. 9. Normalized holding current as a function of junction temperature



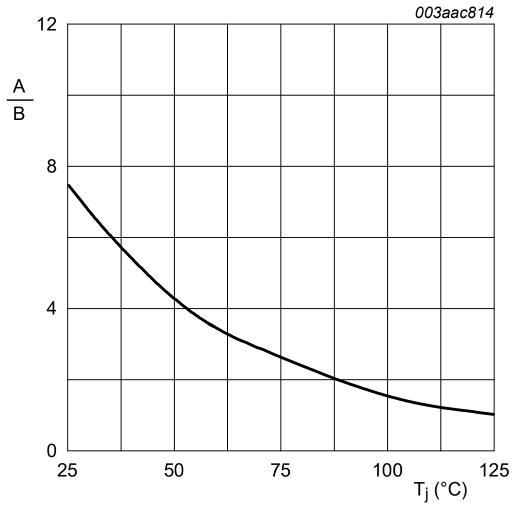
V_o = 0.758 V; R_s = 0.263 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

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



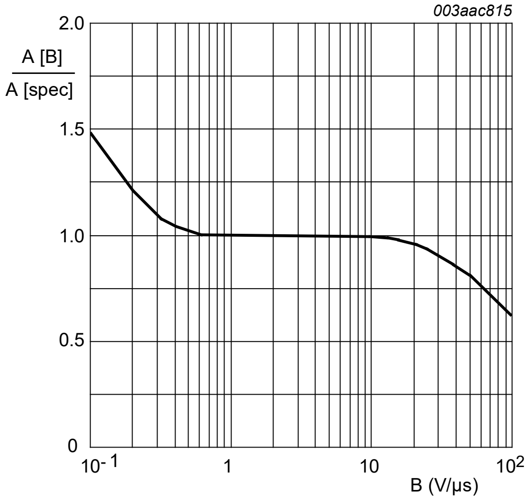
A = dV_D/dt at condition T_j °C
B = dV_D/dt at condition T_j [125] °C

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

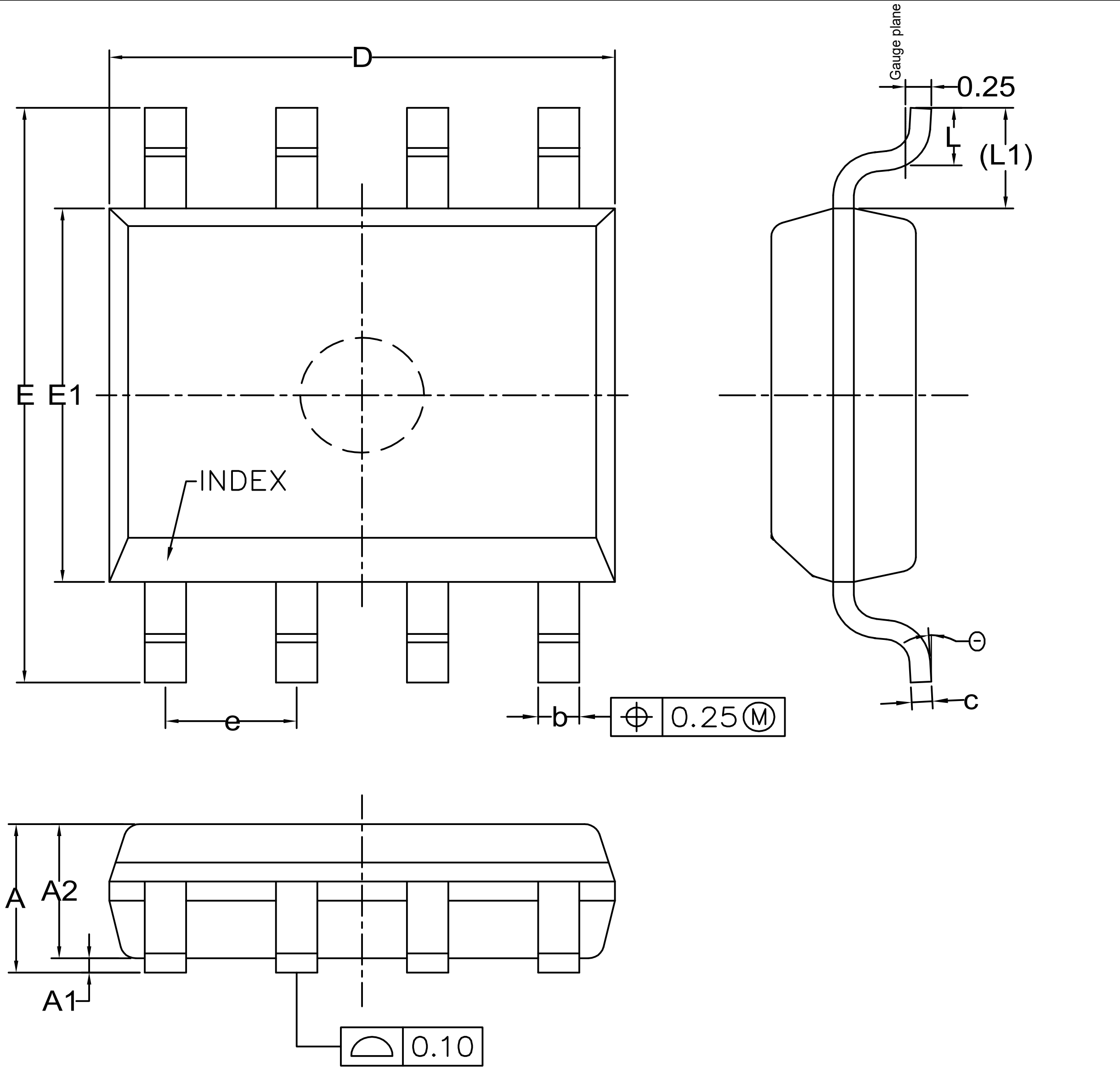


A [B] = dI_{com}/dt at condition B, dV_{com}/dt
A [spec] is the data sheet value for dI_{com}/dt
turn-off time is less than 20 ms

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

10. Package outline

Plastic small outline package; 8 leads SO8



Unit		A	A1	A2	b	c	D	E	E1	e	L	(L1)	Θ
MM	min	1.35	0.10	1.25	0.36	0.19	4.80	5.80	3.80	1.27 (BSC)	0.40	(1.05)	0°
	max	1.75	0.25	1.45	0.49	0.25	5.00	6.20	4.00		1.00		8°

Note:

1. All dimensions don't include mold flash and metal protrusion.

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

11. Legal information

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.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".
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12. Contents

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Date of release: 21 August 2017