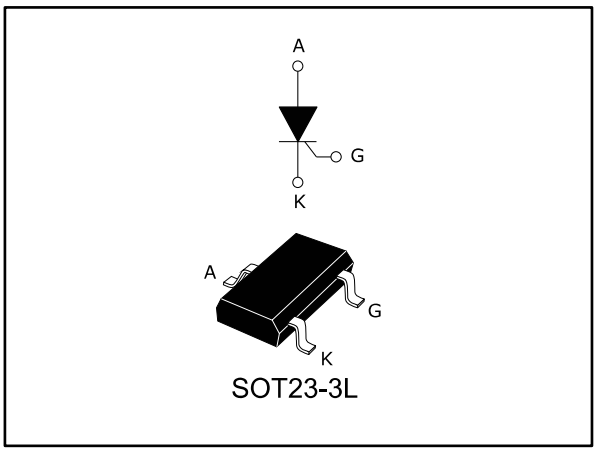
P0109AL

Sensitive high immunity 0.25 A SCR Thyristor

Datasheet - production data



Features

- $I_{T(RMS)}$ 0.25 A
- Low 1 µA gate current
- High noise immunity 100 V/µs
- ECOPACK®2 compliant component

Applications

- Standby mode power supplies
- Smoke detectors
- DC 24/48 V proximity sensors
- Gate driver for large Thyristors
- Overvoltage crowbar protection
- Capacitive ignition circuit

Description

Thanks to highly sensitive triggering levels, the 0.25 A P0109AL SCR Thyristor is suitable for all applications where available gate current is limited. Its high immunity makes it ideal for high electric noise circuits.

The surface mount SOT23-3L package allows compact SMD based designs for automated manufacturing.

Table 1: Device summary

Symbol	Value	Unit
$I_{T(RMS)}$	0.25	A
V_{DRM}/V_{RRM}	100	V
I_{GT}	1	µA
T_j max.	125	°C

1 Characteristics

Table 2: Absolute maximum ratings (limiting values), Tj = 25 °C unless otherwise specified

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_{amb} = 36 °C	0.25	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)			0.16	
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25 °C		t_p = 8.3 ms	7	A
			t_p = 10 ms	6	
I^2t	I^2t value for fusing		t_p = 10 ms	0.18	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, t_r ≤ 100 ns	f = 60 Hz	T_j = 125 °C	50	A/µs
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage		T_j = 125 °C	100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	0.5	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	0.02	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature			-40 to +125	°C

Table 3: Electrical characteristics (Tj = 25 °C unless otherwise specified)

Symbol	Test conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 140 Ω		Max.	1	µA
V_{GT}			Max.	0.8	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ, R_{GK} = 1000 Ω	T_j = 125 °C	Min.	0.1	V
V_{RG}	I_{RG} = 10 µA		Min.	8	V
I_H	I_T = 50 mA, R_{GK} = 1000 Ω		Max.	6	mA
I_L	I_G = 1.2 x I_{GT}, R_{GK} = 1000 Ω		Max.	7	mA
dV/dt	V_D = 67 % V_{DRM}, R_{GK} = 1000 Ω	T_j = 125 °C	Min.	100	V/µs

Table 4: Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 0.4 A, t_p = 380 µs	T_j = 25 °C	Max.	1.7	V
V_{TO}	Threshold voltage	T_j = 125 °C	Max.	1	
R_D	Dynamic resistance	T_j = 125 °C	Max.	1000	mΩ
I_{DRM}/I_{RRM}	V_D = V_{DRM}; V_R = V_{RRM}, R_{GK} = 1000 Ω	T_j = 25 °C	Max.	1	µA
		T_j = 125 °C		100	

Table 5: Thermal parameters

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient (Mounted on FR4 with recommended pad layout)	400	°C/W

1.1 Characteristics (curves)

Figure 1: Maximum average power dissipation versus average on-state current

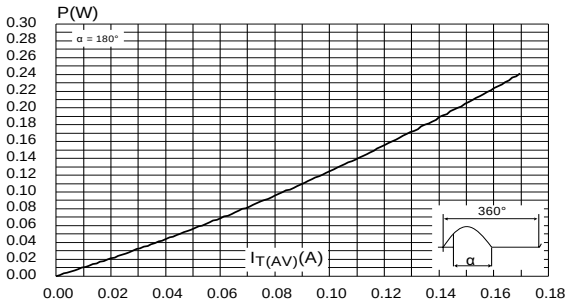


Figure 2: Average and DC on-state current versus ambient temperature

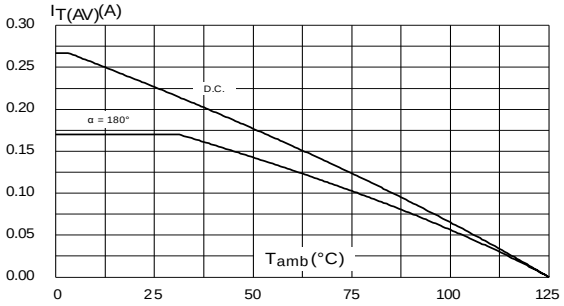


Figure 3: Relative variation of thermal impedance junction to ambient versus pulse duration

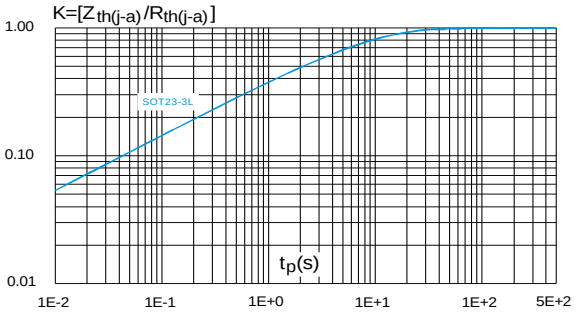


Figure 4: Gate trigger, holding, and latching currents with gate trigger voltage versus junction temperature

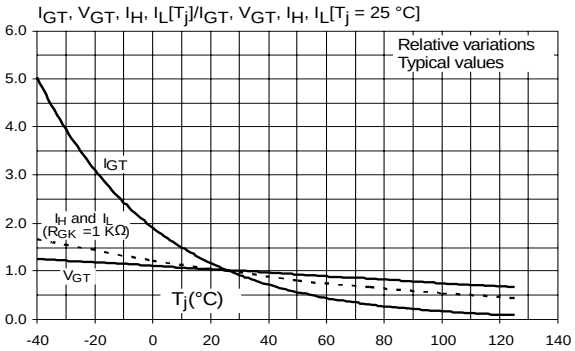


Figure 5: Relative variation of holding current versus gate-cathode resistance

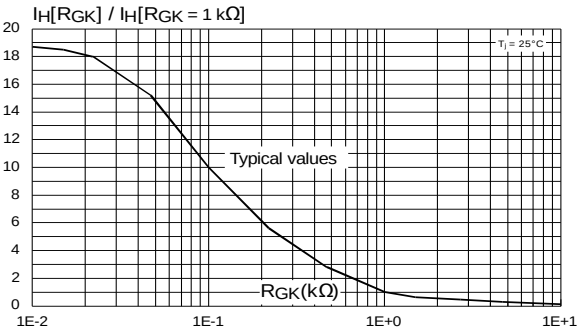


Figure 6: Relative variation of dV/dt immunity versus gate-cathode resistance

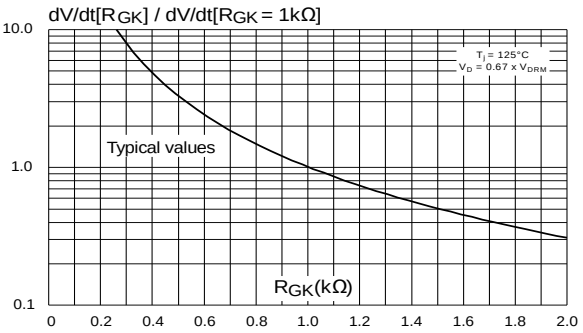


Figure 7: Relative variation of dV/dt immunity versus gate-cathode capacitance

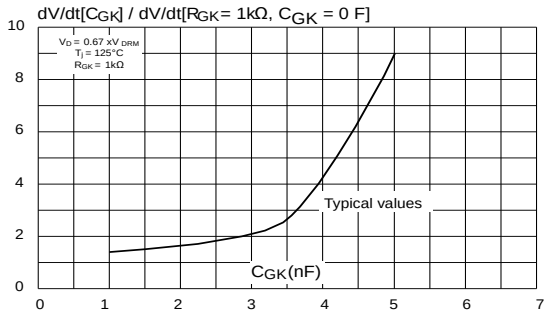


Figure 8: Surge peak on-state current versus number of cycles

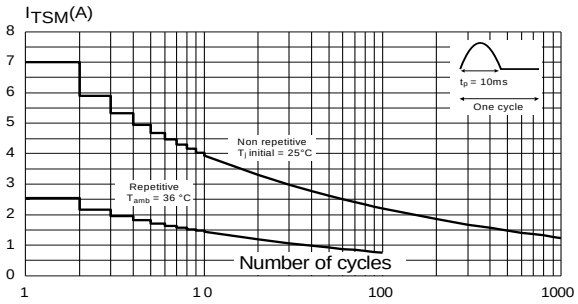


Figure 9: Non-repetitive surge peak on-state current for sinusoidal pulse (t_p< 10 ms)

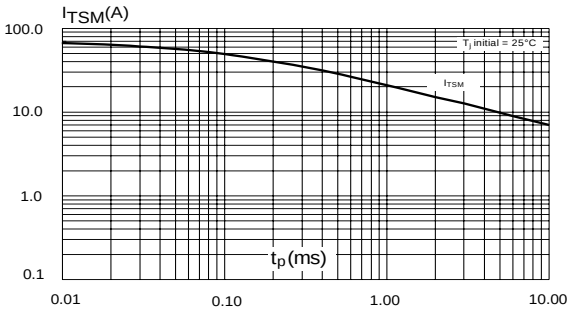


Figure 10: On-state characteristics

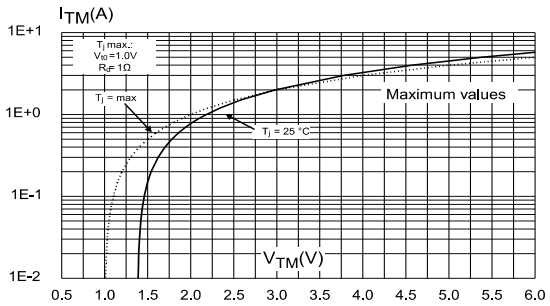
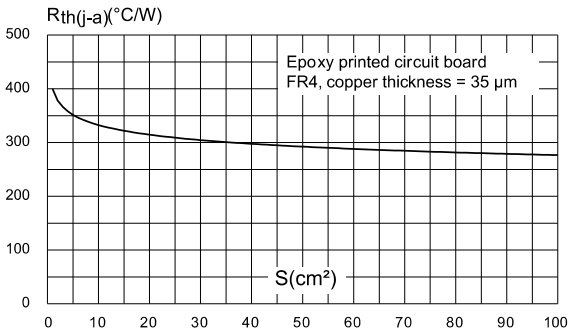


Figure 11: Thermal resistance junction to ambient versus copper surface under tab



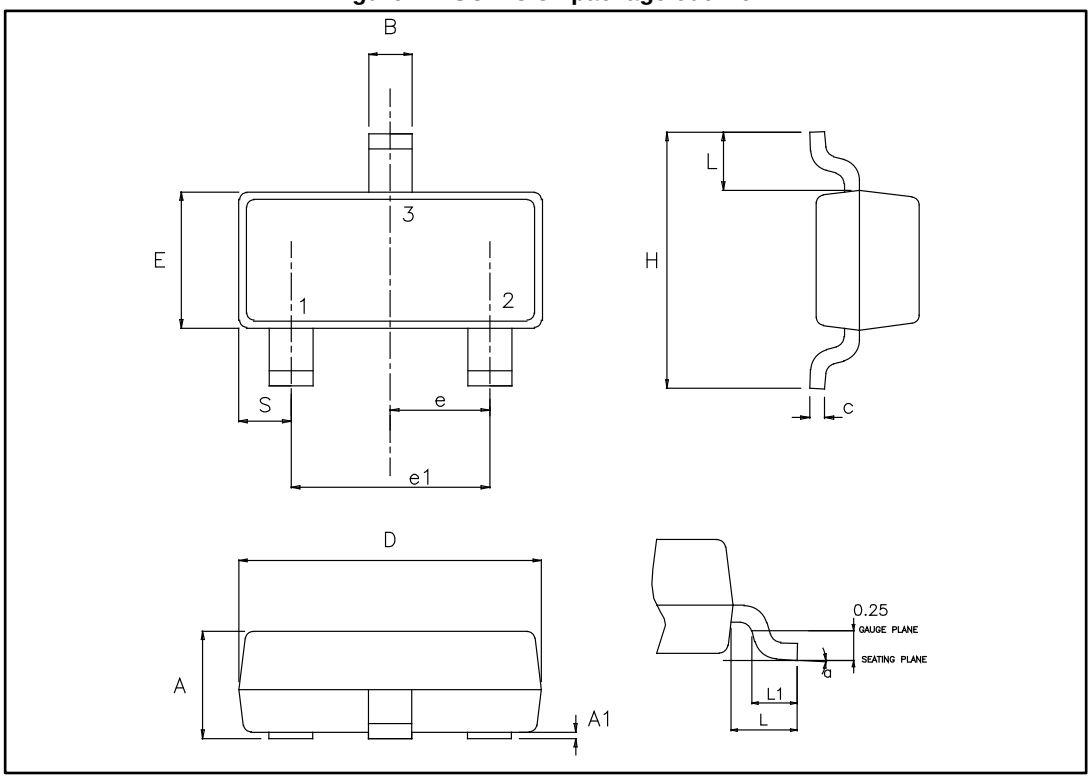
2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

- Lead-free package
- Halogen free molding resin
- Epoxy meets UL94, V0

2.1 SOT23-3L package information

Figure 12: SOT23-3L package outline



This package drawing may slightly differ from the physical package. However, all the specified dimensions in the following table are guaranteed.

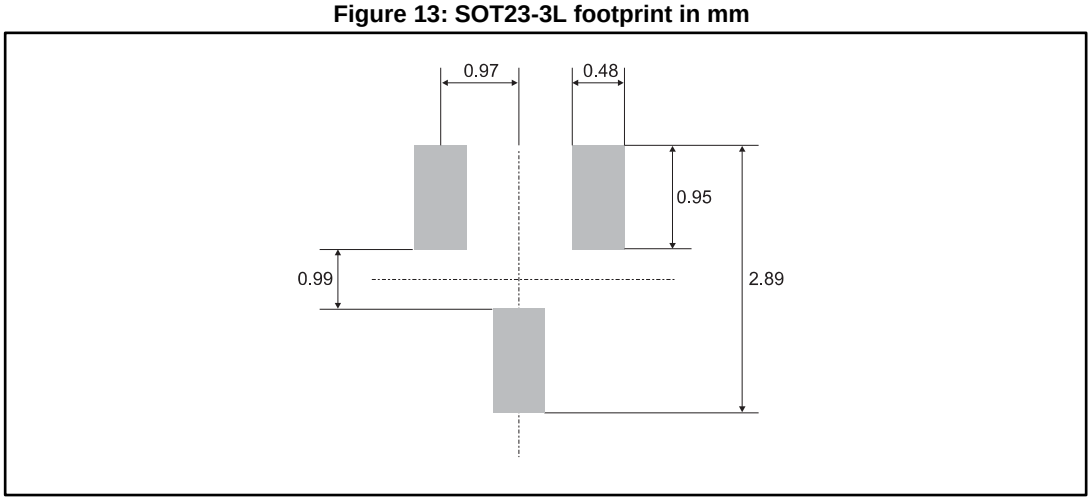
Table 6: SOT23-3L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.89		1.40	0.0350		0.0551
A1	0.00		0.10	0.0000		0.0039
B	0.30		0.51	0.0118		0.0201
C	0.085		0.18	0.0033		0.0071
D	2.75		3.04	0.1083		0.1197
e	0.85		1.05	0.0335		0.0413
e1	1.70		2.10	0.0669		0.0827
E	1.20		1.75	0.0472		0.0689
H	2.10		3.00	0.0827		0.1181
L		0.60			0.0236	
S	0.35		0.65	0.0138		0.256
L1	0.25		0.55	0.0098		0.0217
a	0°		8°	0°		8°

Notes:

[1]Dimension in inches are given for reference only.

Figure 13: SOT23-3L footprint in mm



This drawing may not be in scale; however, all the specified dimensions are guaranteed.

3 Ordering information

Figure 14: Ordering information scheme

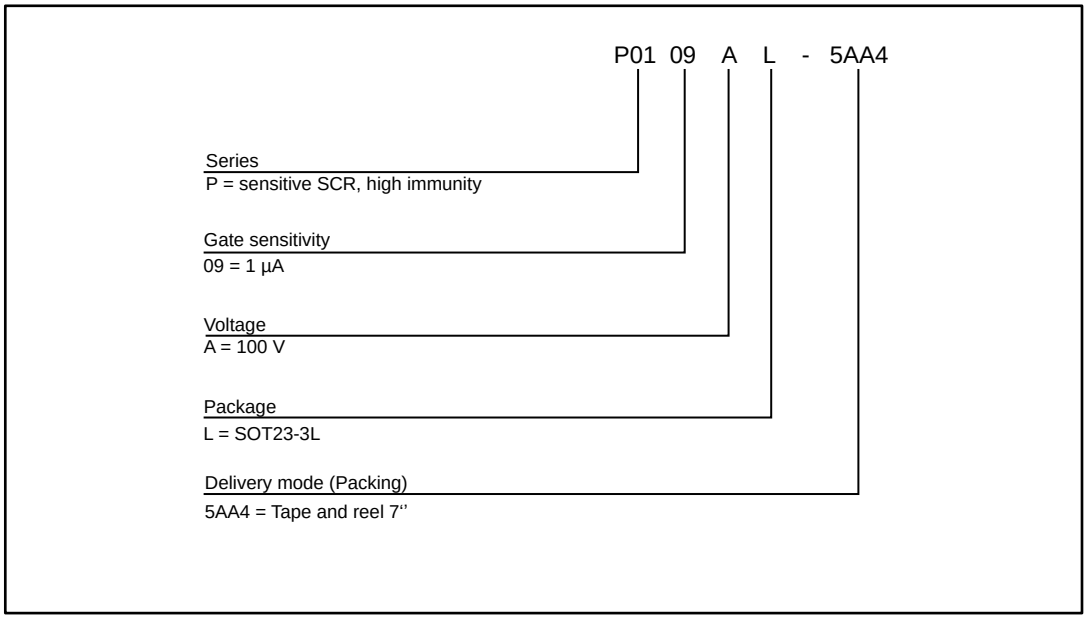


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
P0109AL 5AA4	P9A	SOT23-3L	0.01 g	3000	Tape and reel 7"

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
05-Jun-2017	1	Initial release.
09-Aug-2017	2	Updated drawing in cover page.

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