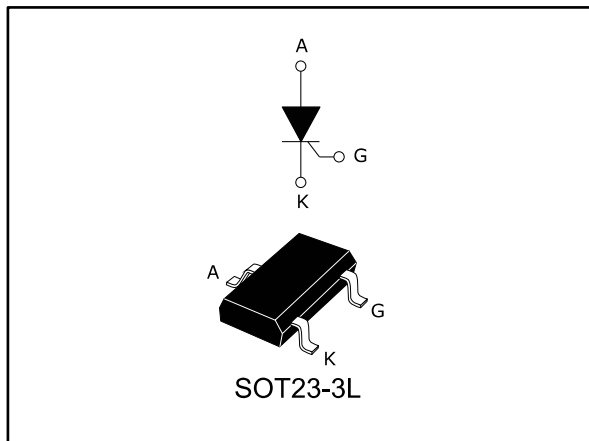


Sensitive high immunity 0.25 A SCR Thyristor

Datasheet - production data



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
$T_j \text{ max.}$	125	$^{\circ}C$

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

1 Characteristics

Table 2: Absolute maximum ratings (limiting values), $T_j = 25\text{ °C}$ 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)				
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 ² t	I ² t value for fusing		t _p = 10 ms	0.18	A ² s
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 ($T_j = 25\text{ °C}$ unless otherwise specified)

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

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

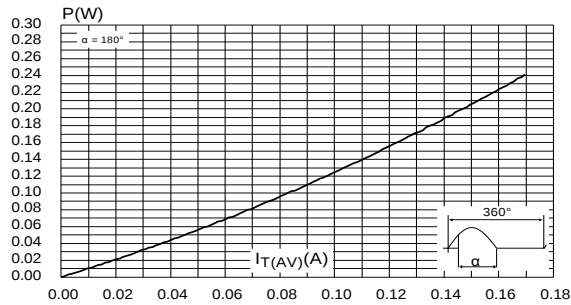


Figure 2: Average and DC on-state current versus ambient temperature

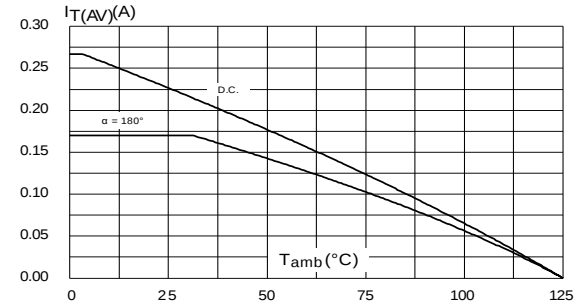


Figure 3: Relative variation of thermal impedance junction to ambient versus pulse duration

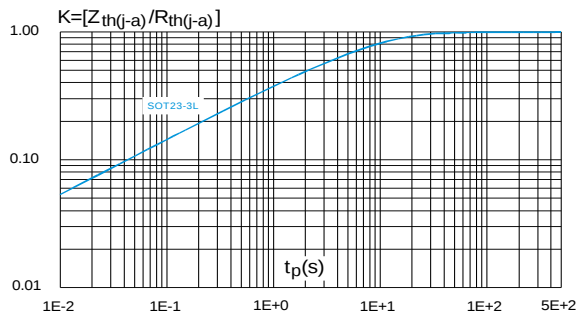


Figure 4: Gate trigger, holding, and latching currents with gate trigger voltage versus junction temperature

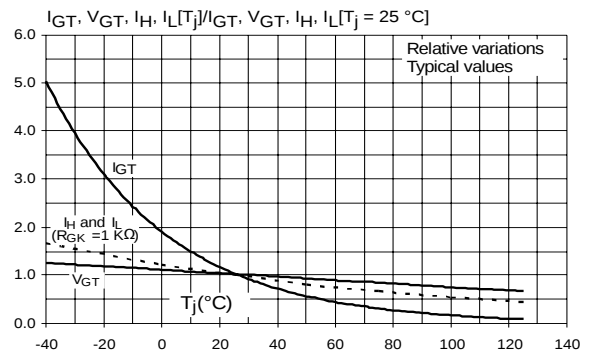


Figure 5: Relative variation of holding current versus gate-cathode resistance

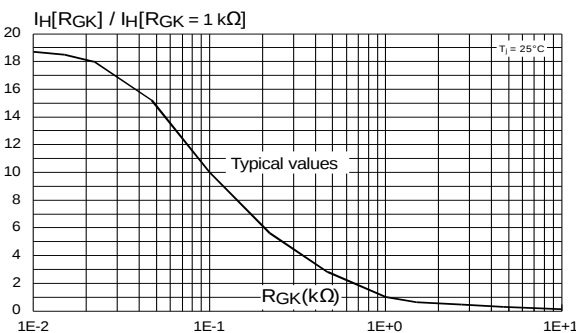


Figure 6: Relative variation of dV/dt immunity versus gate-cathode resistance

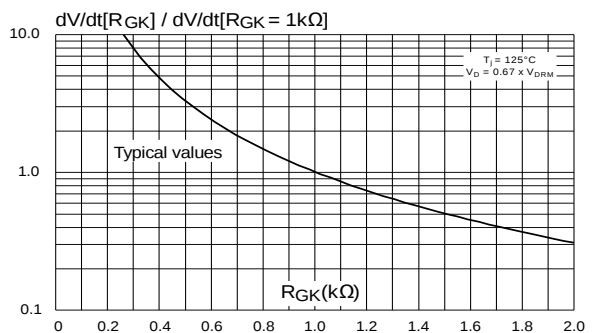


Figure 7: Relative variation of dV/dt immunity versus gate-cathode capacitance

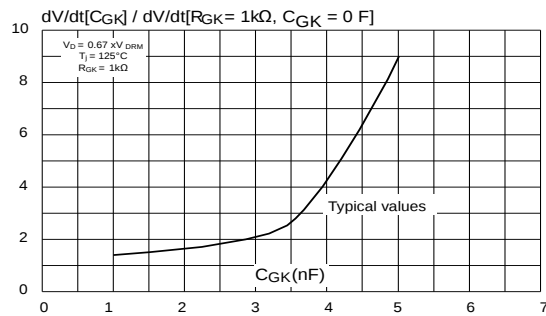


Figure 8: Surge peak on-state current versus number of cycles

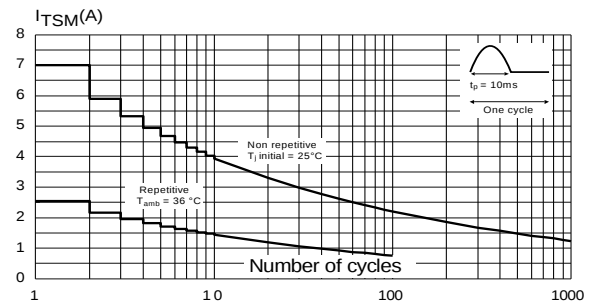


Figure 9: Non-repetitive surge peak on-state current for sinusoidal pulse ($t_p < 10$ ms)

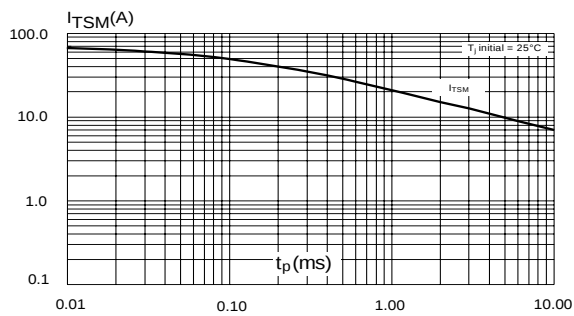


Figure 10: On-state characteristics

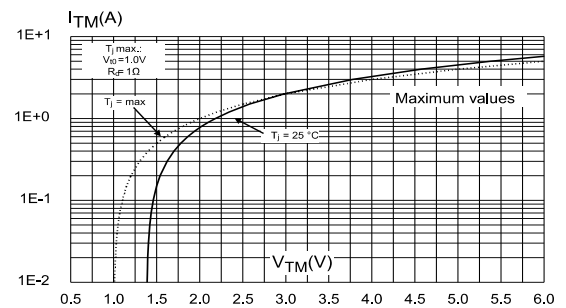
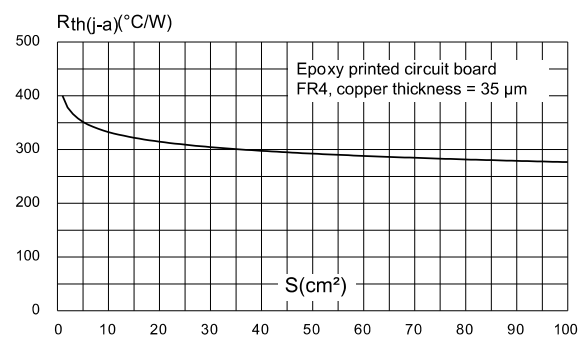


Figure 11: Thermal resistance junction to ambient versus copper surface under tab



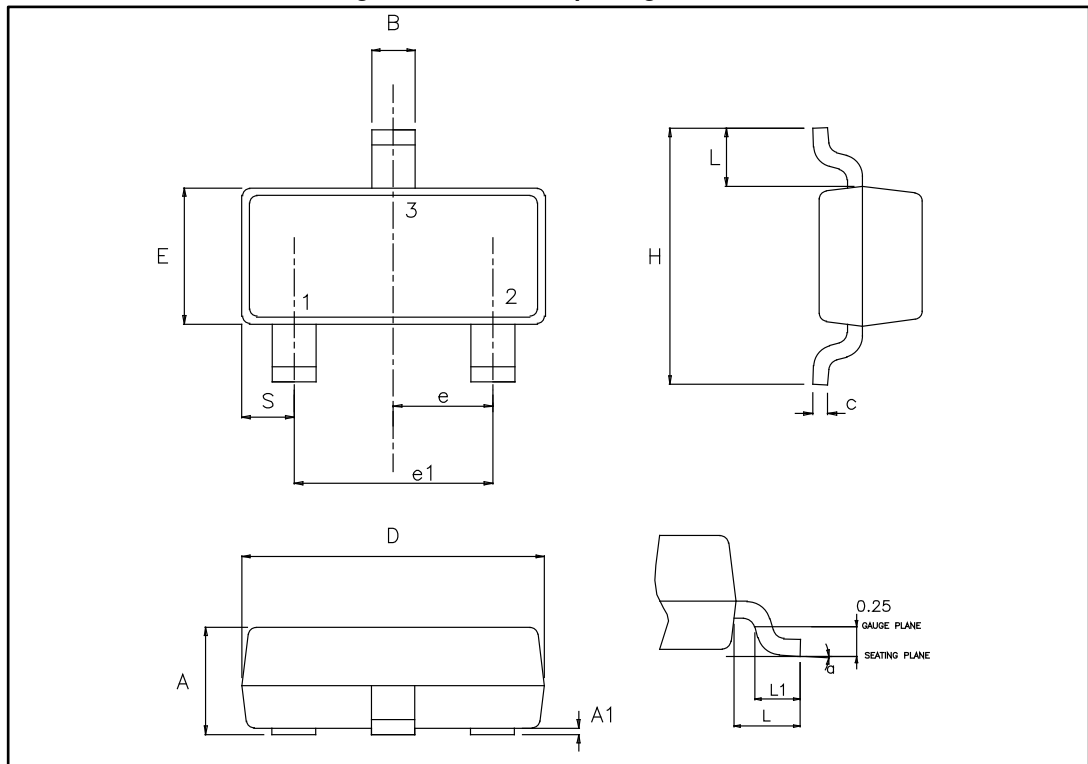
2 Package information

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.

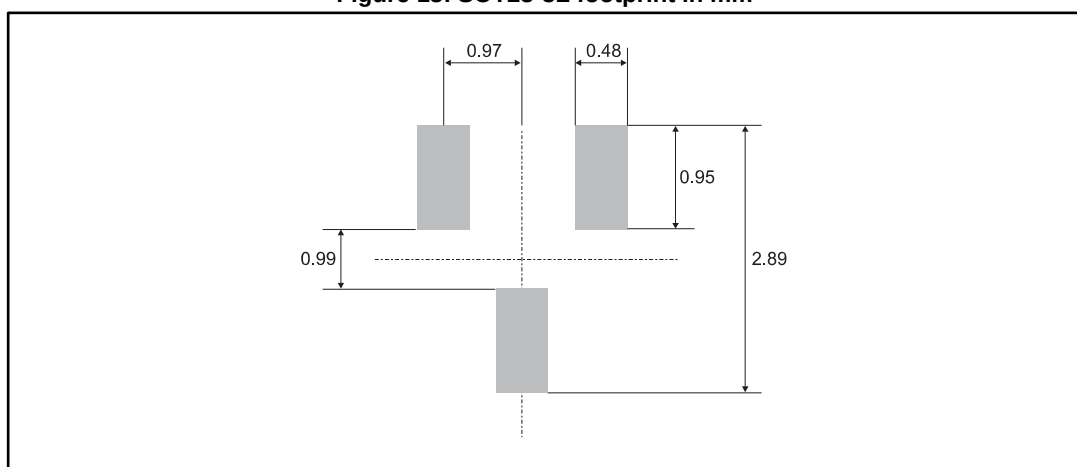
Table 6: SOT23-3L package mechanical data

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

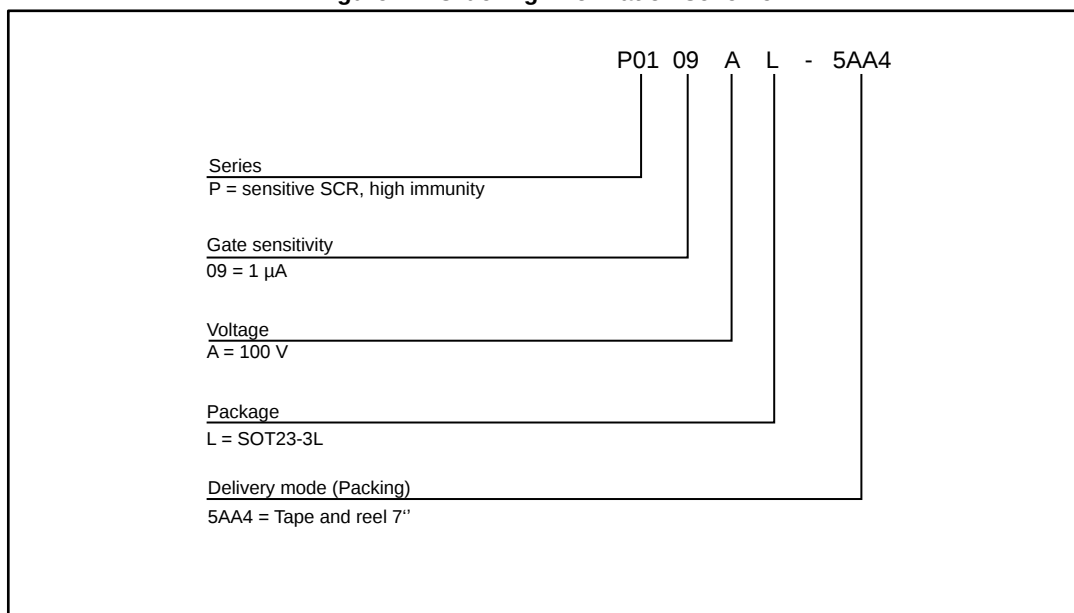


Table 7: Ordering information

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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