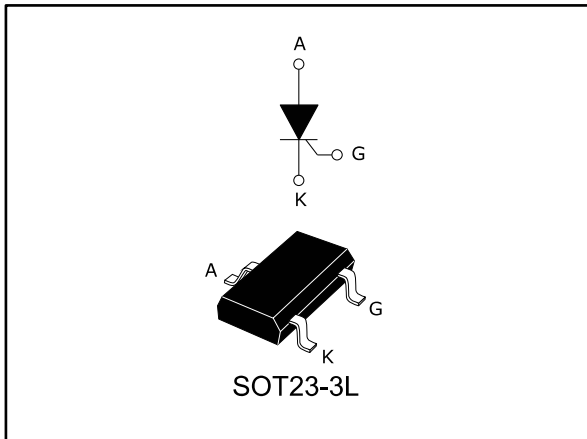## Sensitive high immunity 0.25 A SCR Thyristor

Datasheet - production data

SOT23-3L

Description

Thanks to highly sensitive triggering levels, the 0.25 A P0102AL 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}	200	µA
T_j max.	125	°C

Features

- $I_{T(RMS)}$ 0.25 A
- Low 200 µA gate current
- High noise immunity 200 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

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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 $I_G = 2 \times I_{GT}$, $t_r \leq 100$ 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.	200	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	$I_G = 1.2 \times I_{GT}$, $R_{GK} = 1000$ Ω		Max.	7	mA
dV/dt	$V_D = 67$ % V_{DRM}, $R_{GK} = 1000$ Ω	$T_j = 125$ °C	Min.	200	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
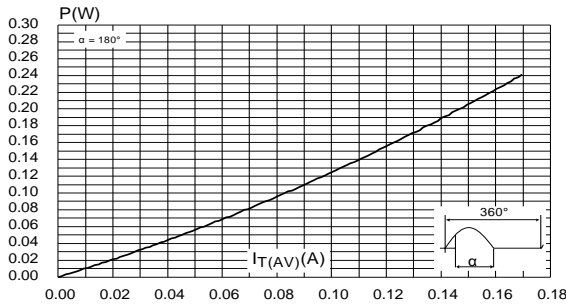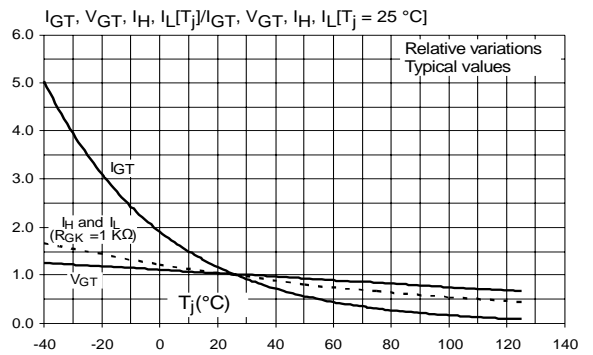

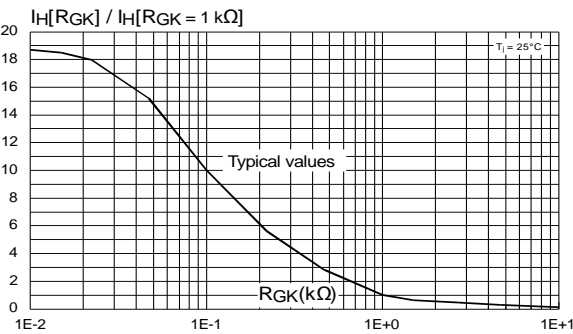**Figure 2: Average and DC on-state current versus ambient temperature**
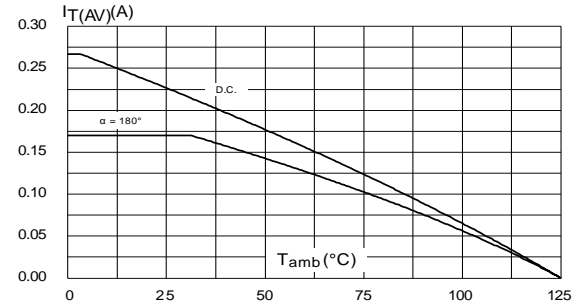
Figure 3: Relative variation of thermal impedance junction to ambient versus pulse duration
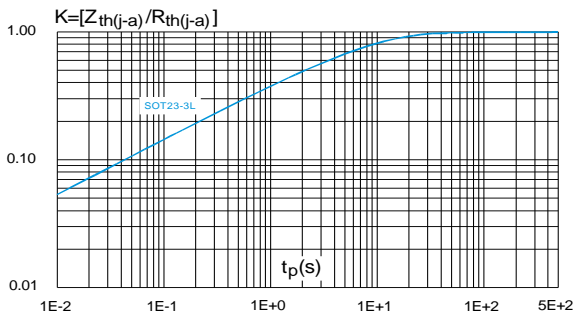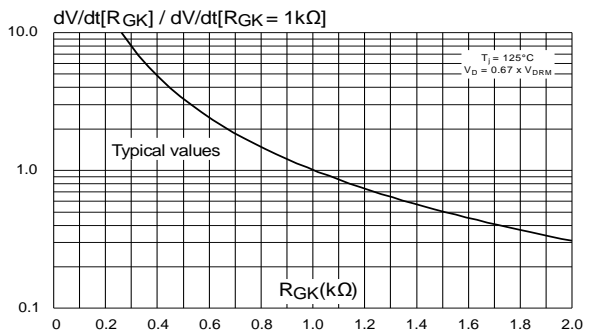

Figure 4: Gate trigger, holding, and latching currents with gate trigger voltage versus junction temperature
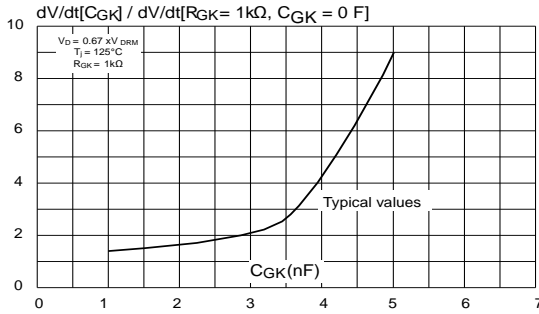

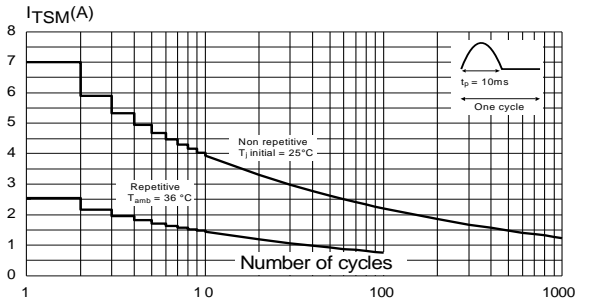**Figure 5: Relative variation of holding current versus gate-cathode resistance**

Figure 6: Relative variation of dV/dt immunity versus gate-cathode resistance
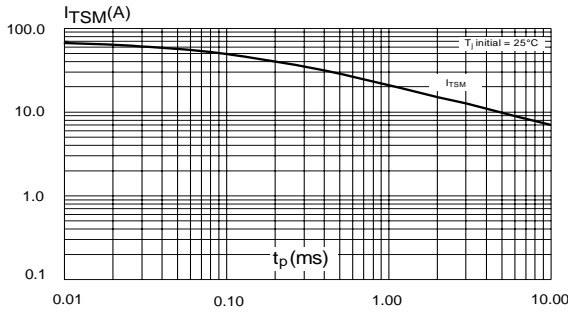
Figure 7: Relative variation of dV/dt immunity versus gate-cathode capacitance
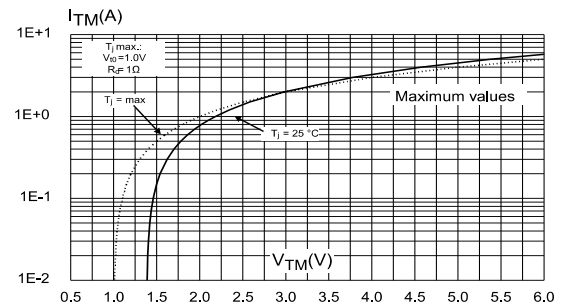

Figure 8: Surge peak on-state current versus number of cycles
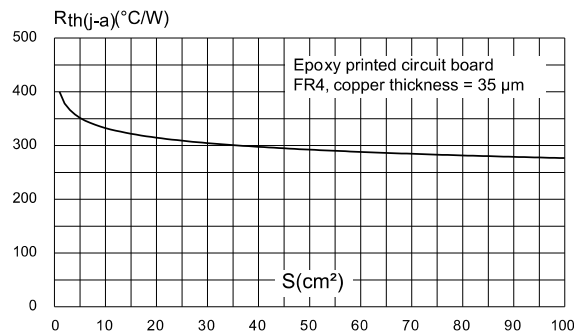

Figure 9: Non-repetitive surge peak on-state current for sinusoidal pulse (t_P< 10 ms)

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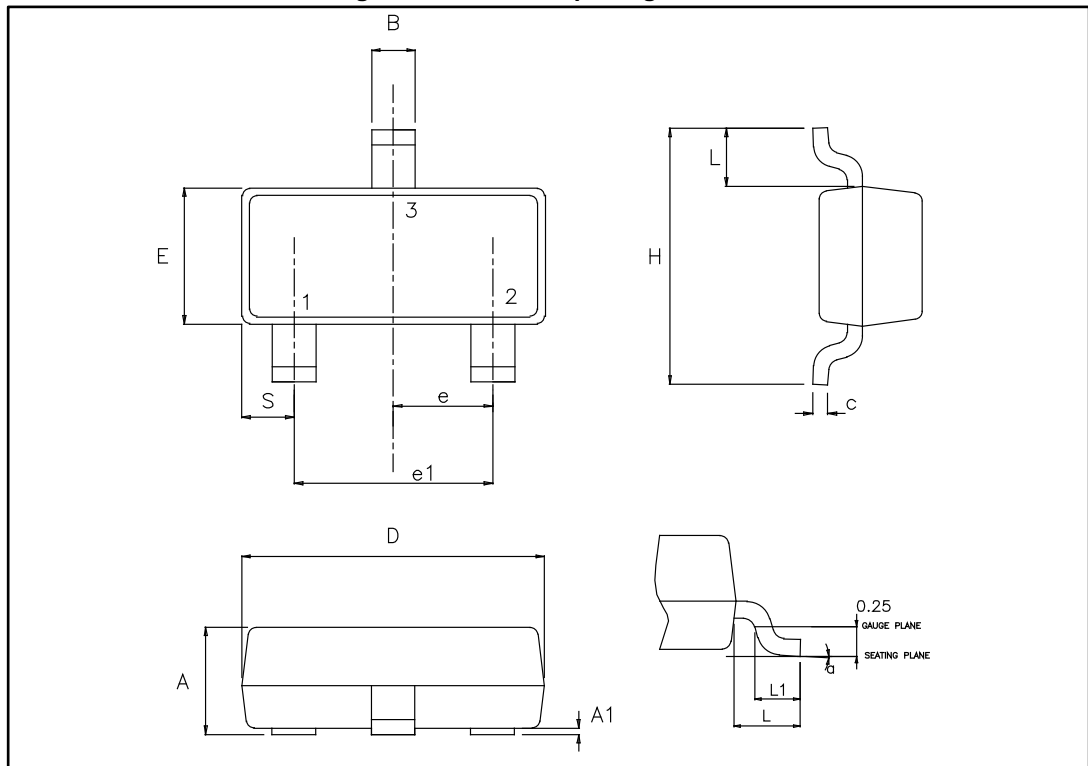
This package drawing may slightly differ from the physical package. However, all the specified dimensions in the following table are guaranteed.

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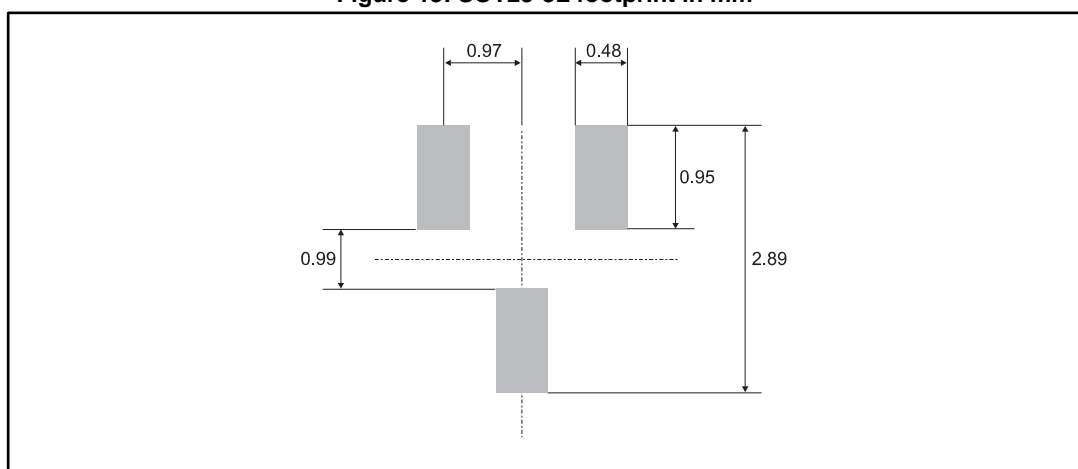
This drawing may not be in scale; however, all the specified dimensions are guaranteed.

3   Ordering information
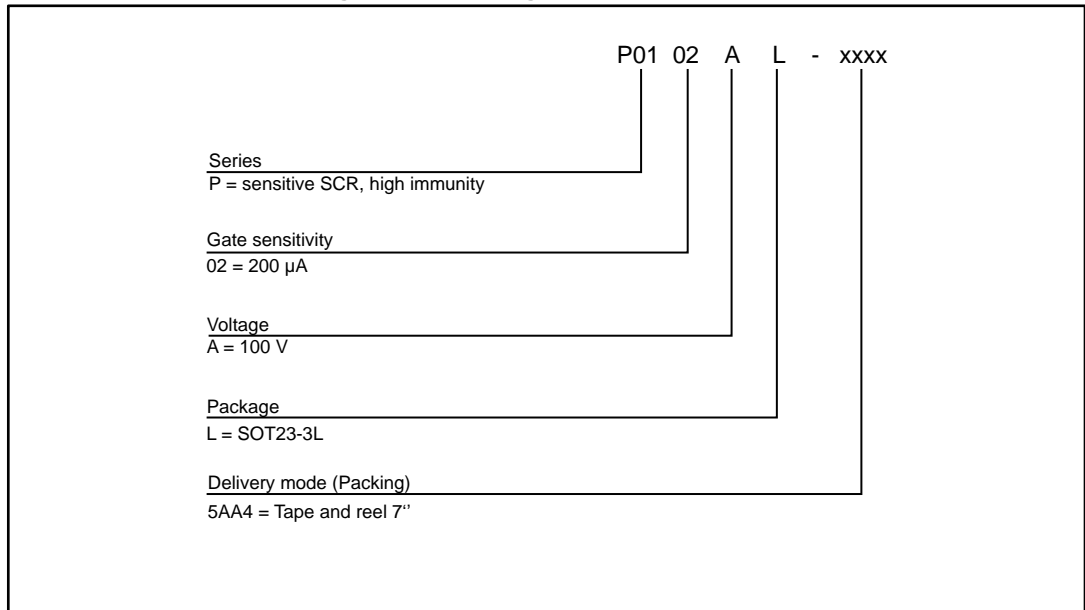
Figure 14: Ordering information scheme

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                                                P01  02   A   L  -  xxxx



                    Series
                    P = sensitive SCR, high immunity

                    Gate sensitivity
                    02 = 200 µA

                    Voltage
                    A = 100 V

                    Package
                    L = SOT23-3L

                    Delivery mode (Packing)
                    5AA4 = Tape and reel 7''
```

Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
P0102AL 5AA4	P2A	SOT23-3L	0.01 g	3000	Tape and reel 7"

4   Revision history

Table 8: Document revision history

Date	Revision	Changes
18-Oct-2016	1	Initial release.
13-Jun-2017	2	Updated *Table 4: "Static characteristics"*.
09-Aug-2017	3	Updated drawing in cover page.

IMPORTANT NOTICE – PLEASE READ CAREFULLY