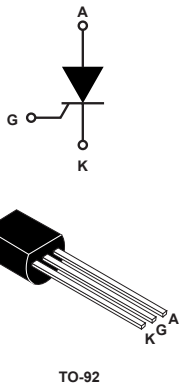


0.8 A 400 V high immunity sensitive SCR thyristor in TO-92



Features

- On-state rms current, $I_{T(RMS)}$ 0.8 A
- 125 °C max. T_j
- Ultra low 1 μ A gate current
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 400 V
- ECOPACK2 compliant

Applications

- Gate driver for large Thyristors
- Overvoltage crowbar protection
- Ground fault circuit interrupters
- Arc fault circuit interrupter
- Standby mode power supplies
- Residual current detector

Description

Thanks to highly sensitive triggering levels, the 0.8 A P0109DA SCR thyristor is suitable for all applications where available gate current is limited.

This device offers a high blocking voltage of 400 V, ideal for applications like interrupters circuits.

The P0109DA is available in through-hole TO-92 package.

Product status link

[P0109DA](#)

Product summary

$I_{T(RMS)}$	0.8 A
V_{DRM}/V_{RRM}	400 V
I_{GT}	1 μ A
$T_{jmax.}$	125 °C

1 Characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Parameters		Value	Unit	
$I_{T(RMS)}$	On-state RMS current (180° conduction angle)		0.8	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	8	A	
		$t_p = 10$ ms			
I^2t	I^2t value for fusing	$t_p = 10$ ms	$T_j = 25$ °C	0.24	A ² s
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100$ ns	F = 60 Hz	$T_j = 25$ °C	50	A/ μ s
V_{DRM} / V_{RRM}	Repetitive peak off-state voltage		$T_j = 125$ °C	400	V
I_{GM}	Peak gate current	$t_p = 20$ μ s	$T_j = 125$ °C	1	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125$ °C	0.1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +125	°C

Table 2. Electrical characteristics ($T_j = 25$ °C, unless otherwise specified)

Symbol	Parameters	Value	Unit
I_{GT}	$V_D = 12$ V, $R_L = 33$ Ω	Max. 1	μ A
V_{GT}		Max. 0.8	V
V_{GD}	$V_D = V_{DRM}$, $R_L = 3.3$ k Ω , $R_{GK} = 1$ k Ω , $T_j = 125$ °C	Min. 0.1	V
V_{RG}	$I_{RG} = 10$ μ A	Min. 8	
I_H	$I_T = 50$ mA, $R_{GK} = 1$ k Ω	Max. 5	mA
I_L	$I_G = 1.2 I_{GT}$, $R_{GK} = 1$ k Ω	Max. 6	mA
dV/dt	$V_D = 67\%$ V_{DRM} , $R_{GK} = 1$ k Ω , $T_j = 125$ °C	Min. 75	V/ μ s

Table 3. Static electrical characteristics

Symbol	Test conditions	T_j	Value	Unit
V_T	$I_{TM} = 1.6$ A, $t_p = 380$ μ s	25 °C	Max. 1.95	V
V_{TO}	Threshold on-state voltage	125 °C	Max. 0.95	V
R_d	Dynamic resistance	125 °C	Max. 600	m Ω
I_{DRM}	$V_D = V_{DRM}$	25 °C	Max.	1
I_{RRM}	$V_R = V_{RRM}$	125 °C		0.1

Table 4. Thermal resistance

Symbol	Parameters	Max. value	Unit
$R_{th(j-l)}$	Junction to lead (DC)	80	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	150	

1.1 Characteristics (curves)

Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)

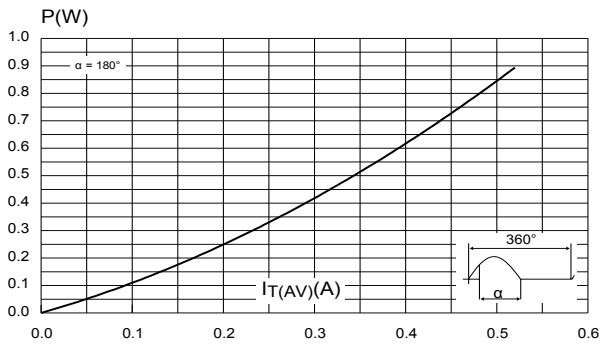


Figure 2. Average and DC on-state current versus lead temperature

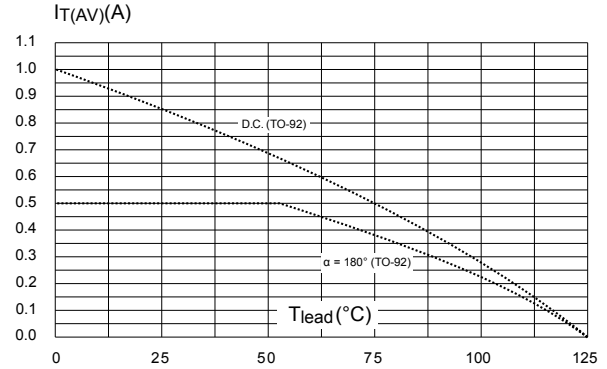


Figure 3. Average and DC on-state current versus ambient temperature

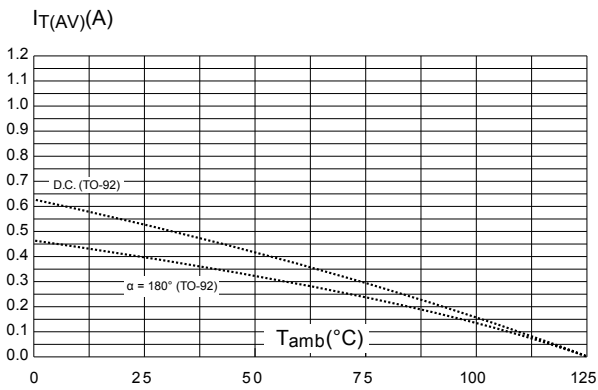


Figure 4. Relative variation of thermal impedance versus pulse duration

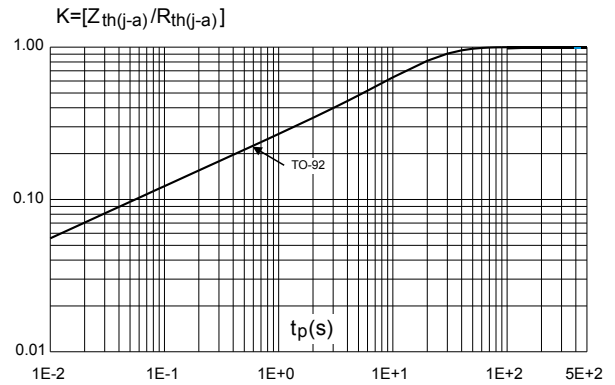


Figure 5. Relative variation of holding current versus gate-cathode resistance

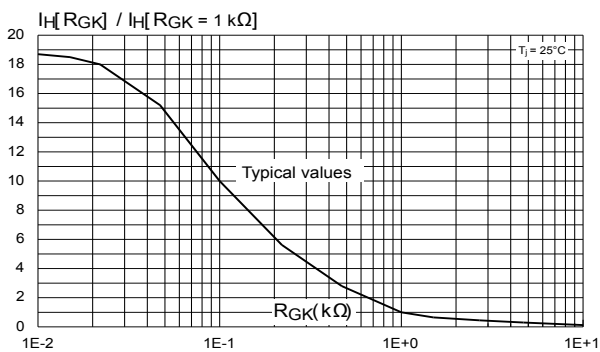


Figure 6. Relative variation of gate voltage and gate, holding and latching current versus junction temperature

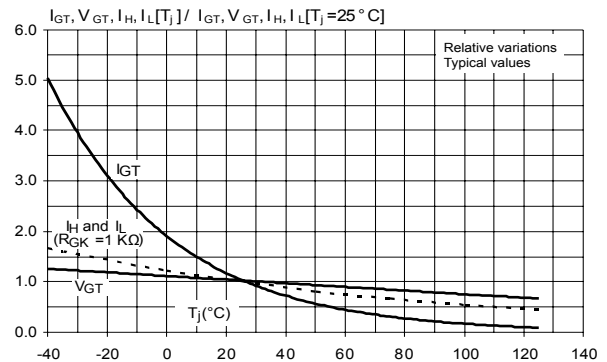


Figure 7. Relative variation of static dV/dt immunity versus gate-cathode resistance

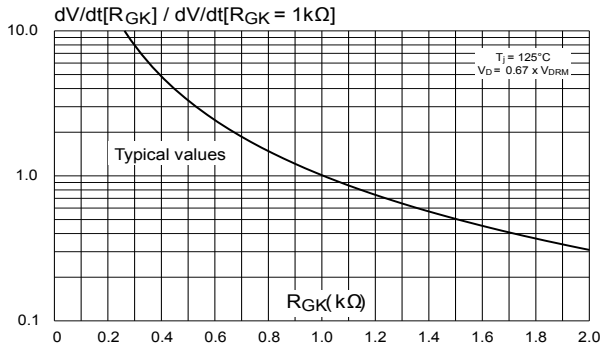


Figure 8. Relative variation of dV/dt immunity versus gate-cathode capacitance

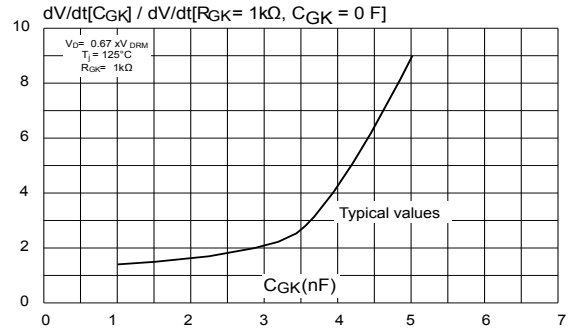


Figure 9. Surge peak on-state current versus number of cycles

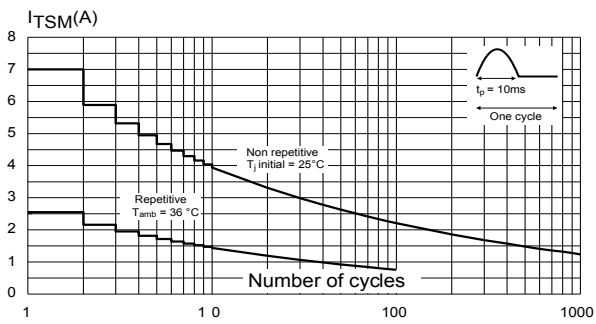


Figure 10. Non-repetitive surge peak on-state current for sinusoidal pulse ($t_p < 10$ ms)

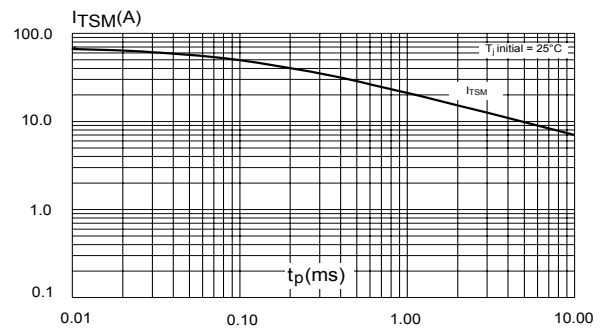
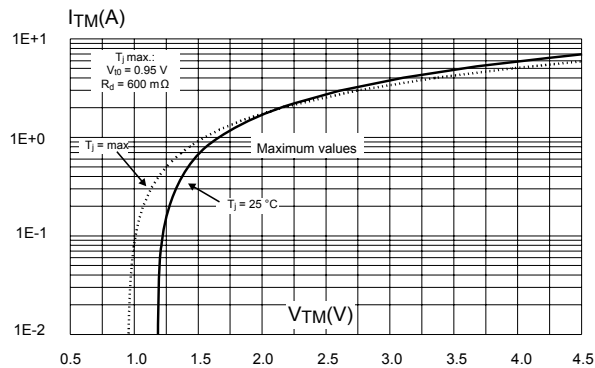


Figure 11. On-state characteristics (maximum values)



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.

2.1 TO-92 package information

- Lead free plating + halogen-free molding resin
- Epoxy meets UL94, V0

Figure 12. TO-92 package outline

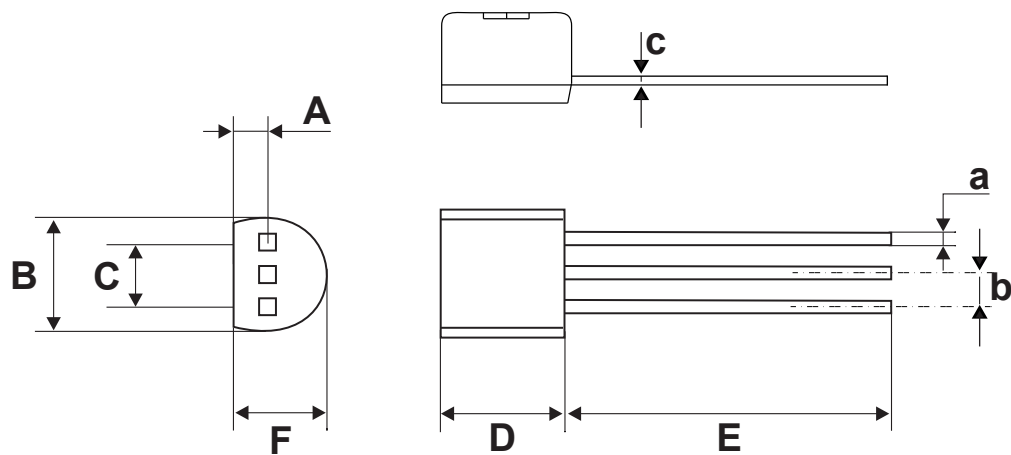


Table 5. TO-92 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		1.35			0.0531	
B			4.70			0.1850
C		2.54			0.1000	
D	4.40			0.1732		
E	12.70			0.5000		
F			3.70			0.1457
a			0.50			0.0197
b		1.27			0.0500	
c			0.48			0.0189

1. Inches dimensions given for information

3 Ordering information

Figure 13. Ordering information scheme

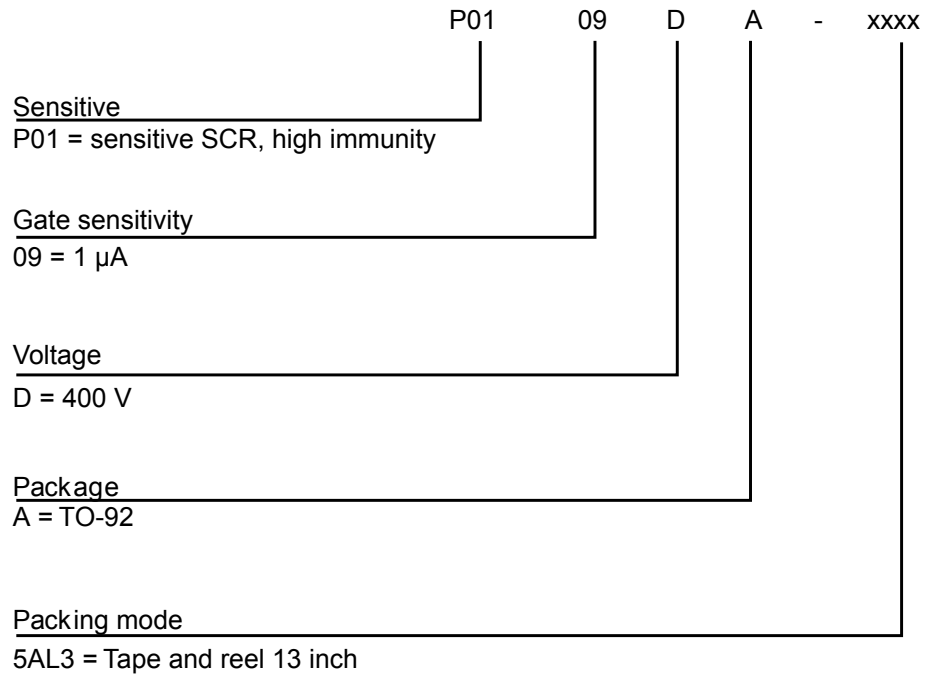


Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
P0109DA 5AL3	P0109 DA	TO-92	0.22 g	2000	Tape and reel 13"

Revision history

Table 7. Document revision history

Date	Revision	Changes
20-Jan-2020	1	Initial release.
16-Jun-2020	2	Updated Section Cover image.

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