P011xx

Sensitive high immunity SCRs up to 0.8 A

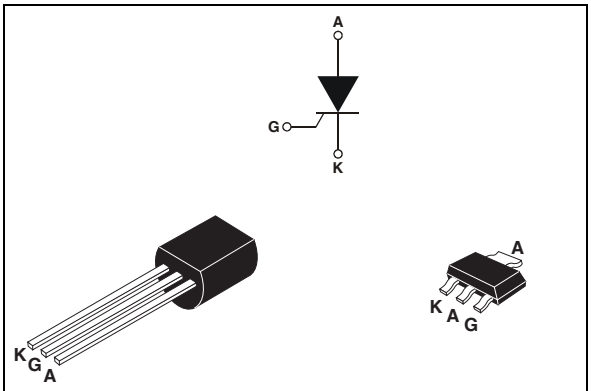
Features

- $I_{T(RMS)}$ up to 0.8 A
- V_{DRM}/V_{RRM} 400 and 600 V
- I_{GT} from 0.5 to 25 µA

Description

Thanks to highly sensitive triggering levels, the P011xx SCR series is suitable for all applications where available gate current is limited, such as ground fault circuit interruptors, pilot circuits in solid state relays, standby mode power supplies, smoke and alarm detectors.

Available in through-hole or surface-mount packages, the voltage capability of this series has been upgraded since its introduction and is now available up to 600 V.



TO-92 (P011xxA)

SOT-223 (P011xxN)

Table 1. Device summary

Order code	Voltage		Sensitivity		Package
	400 V	600 V	Min.	Max.	
P0111DA 1AA3	X		4 µA	25 µA	TO-92
P0111DA 5AL3	X		4 µA	25 µA	TO-92
P0111DN 5AA4	X		4 µA	25 µA	SOT-223
P0111MA 1AA3		X	4 µA	25 µA	TO-92
P0111MA2AL3(1)		X	4 µA	25 µA	TO-92
P0111MN 5AA4		X	4 µA	25 µA	SOT-223
P0115DA 1AA3	X		15 µA	50 µA	TO-92
P0115DA 5AL3	X		15 µA	50 µA	TO-92
P0118DA 1AA3	X		0.5 µA	5 µA	TO-92
P0118DA 5AL3	X		0.5 µA	5 µA	TO-92
P0118DN 5AA4	X		0.5 µA	5 µA	SOT-223
P0118MA 2AL3		X	0.5 µA	5 µA	TO-92
P0118MA 5AL3		X	0.5 µA	5 µA	TO-92

1. This order code has no space.

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180° conduction angle)	TO-92	T_l = 55 °C	0.8	A
		SOT-223	T_{amb} = 70 °C		
$IT_{(AV)}$	Average on-state current (180° conduction angle)	TO-92	T_l = 55 °C	0.5	A
		SOT-223	T_{amb} = 70 °C		
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j = 25 °C	8	A
		t_p = 10 ms		7	
I^2t	I^2t Value for fusing	t_p = 10 ms	T_j = 25 °C	0.24	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} , $t_r \leq$ 100 ns	F = 60 Hz	T_j = 125 °C	50	A/µs
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	1	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	0.1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C

Table 3. Electrical characteristics (T_j = 25 °C, unless otherwise specified)

Symbol	Test conditions			P0111	P0115	P0118	Unit
I_{GT}	V_D = 12 V R_L = 140 Ω		Min.	4	15	0.5	µA
			Max.	25	50	5	
V_{GT}			Max.	0.8			V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ R_{GK} = 1 kΩ	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} = 1 kΩ		Max.	5			mA
I_L	I_G = 1 mA R_{GK} = 1 kΩ		Max.	6			mA
dV/dt	V_D = 67 % V_{DRM} R_{GK} = 1 kΩ	T_j = 125 °C	Min.	80	75	75	V/µs
V_{TM}	I_{TM} = 1.6 A tp = 380 µs	T_j = 25 °C	Max.	1.95			V
V_{t0}	Threshold voltage	T_j = 125 °C	Max.	0.95			V
R_d	Dynamic resistance	T_j = 125 °C	Max.	600			mΩ
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$ = 400 V R_{GK} = 1 kΩ	T_j = 25 °C	Max.	1			µA
	$V_{DRM} = V_{RRM}$ = 600 V R_{GK} = 1 kΩ			10			
	$V_{DRM} = V_{RRM}$ R_{GK} = 1 kΩ	T_j = 125 °C		100			

Table 4. Thermal resistance

Symbol	Parameter			Maximum	Unit
$R_{th(j-a)}$	Junction to case (DC)		TO-92	80	°C/W
$R_{th(j-t)}$	Junction to tab (DC)		SOT-223	30	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)		TO-92	150	°C/W
		$S^{(1)}$ = 5 cm^2	SOT-223	60	

1. S = Copper surface under tab.

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

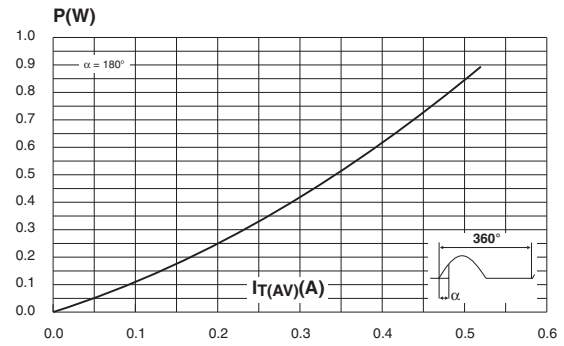


Figure 2. Average and DC on-state current versus lead temperature

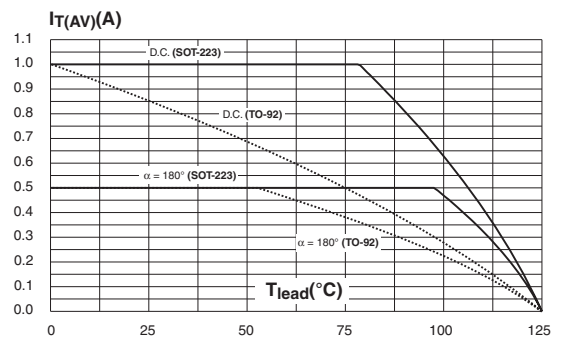


Figure 3. Average and DC on-state current versus ambient temperature

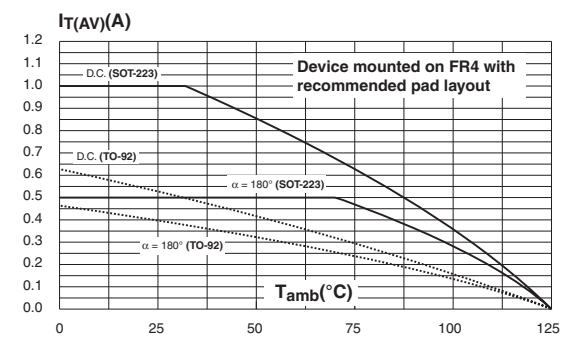


Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration

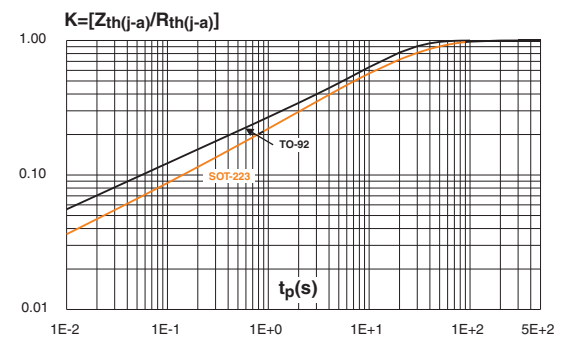


Figure 5. Relative variation of gate trigger, holding and latching current versus junction temperature

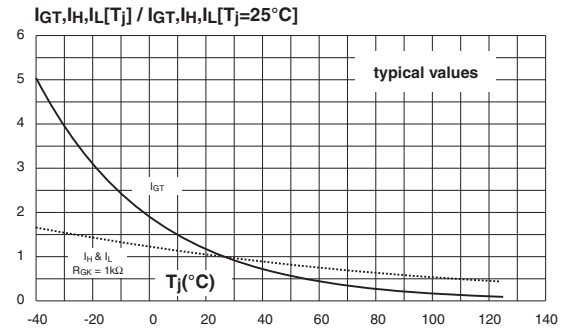


Figure 6. Relative variation of holding current versus gate-cathode resistance (typical values)

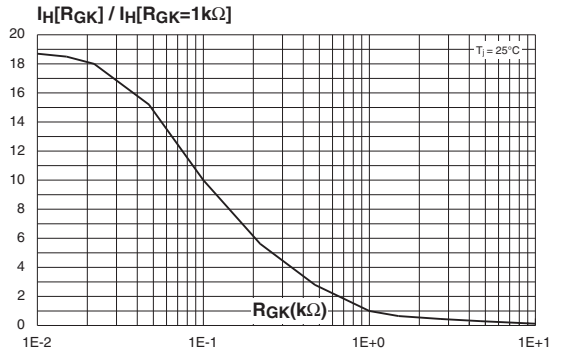


Figure 7. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values).

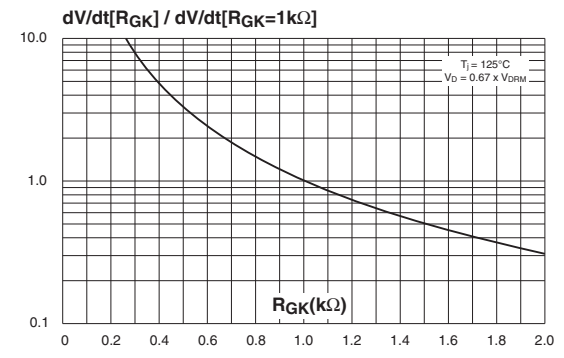


Figure 8. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)

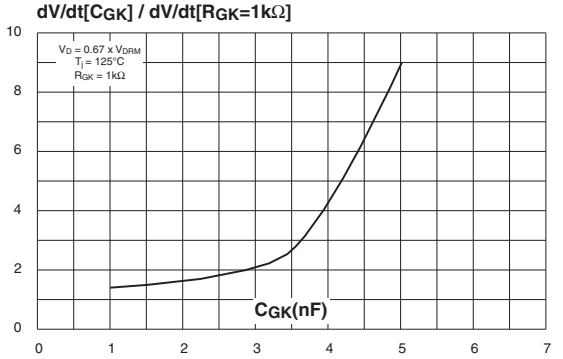


Figure 9. Surge peak on-state current versus number of cycles

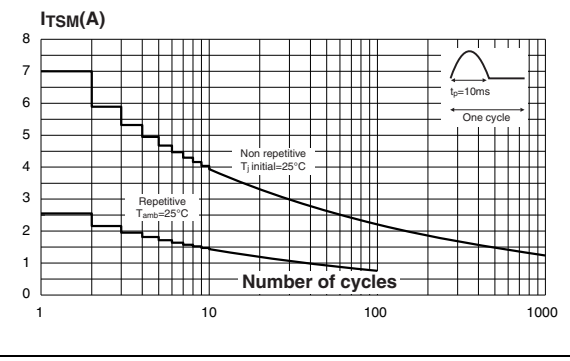


Figure 10. Non-repetitive surge peak on-state current and corresponding value of I^2t

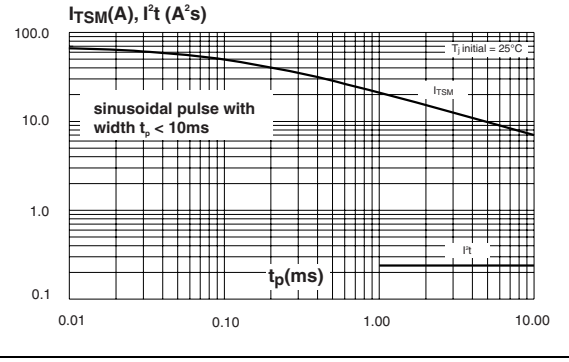


Figure 11. On-state characteristics (maximum values)

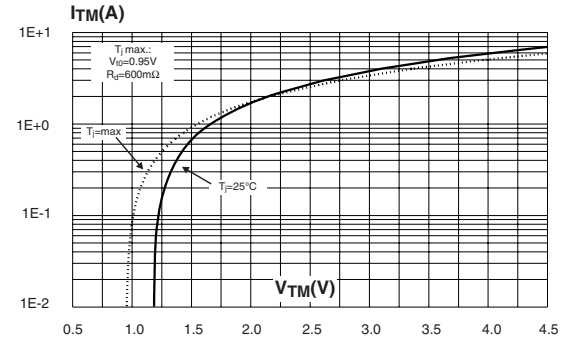
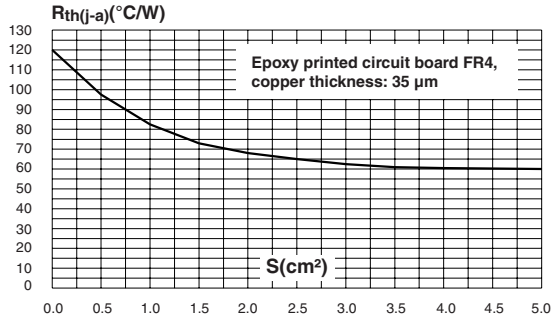
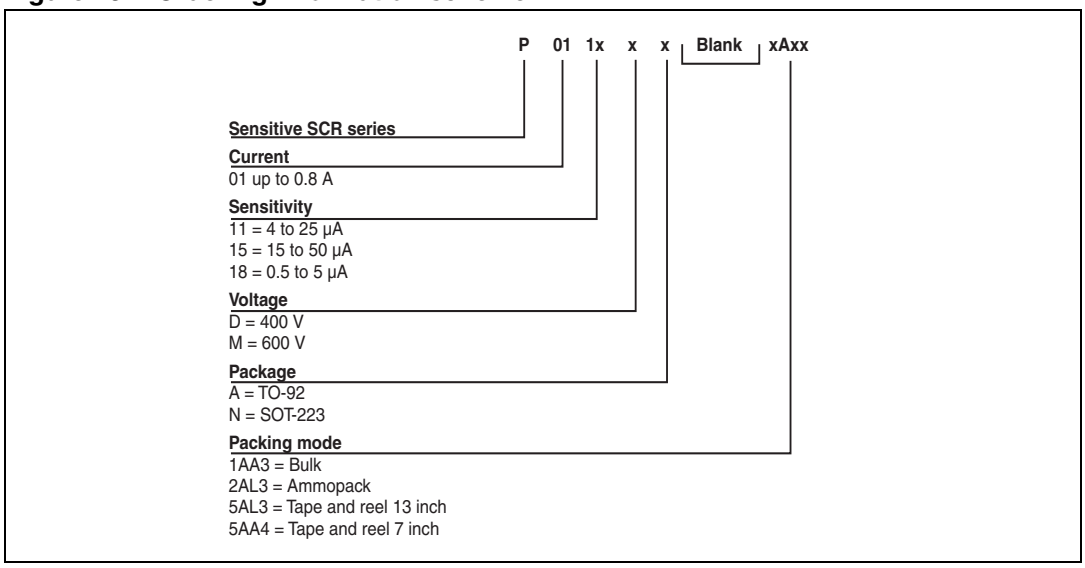


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Ordering information scheme

Figure 13. Ordering information scheme



3 Package information

- Epoxy meets UL94, V0

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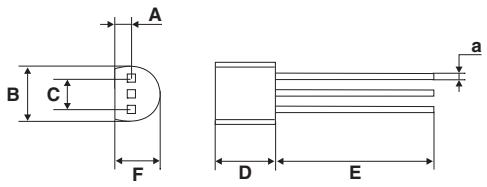
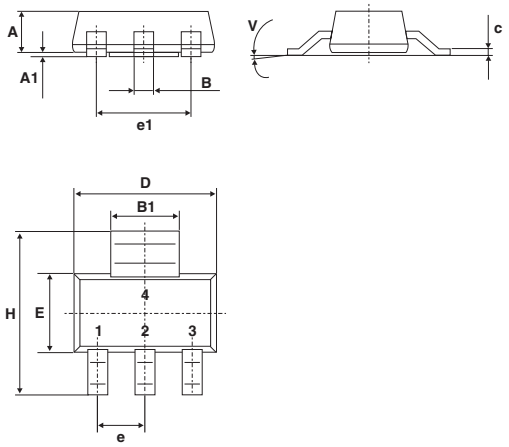
Table 5. TO-92 dimensions



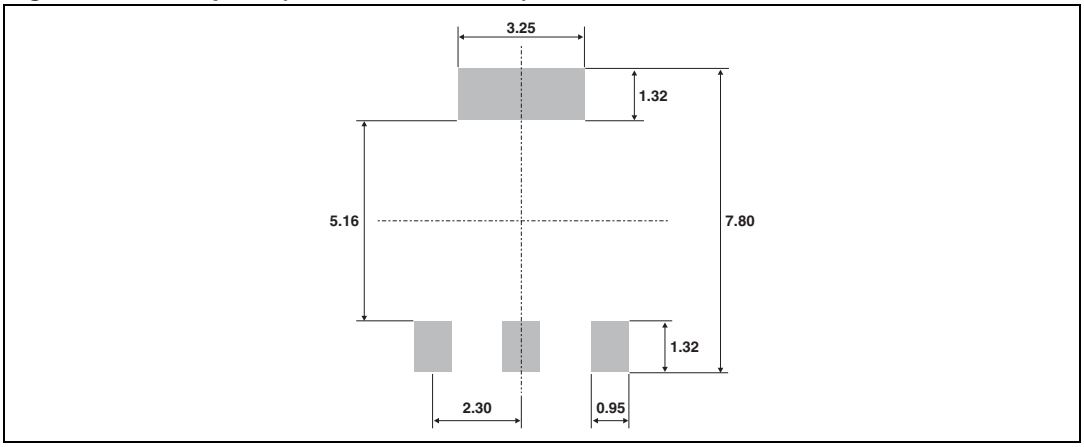
Ref	dimensions					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A		1.35			0.053	
B			4.70			0.185
C		2.54			0.100	
D	4.40			0.173		
E	12.70			0.500		
F			3.70			0.146
a			0.50			0.019

Table 6. SOT-223 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.80			0.071
A1		0.02			0.001	
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.3			0.090	
e1		4.6			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V	10° max					

Figure 14. Footprint (dimensions in mm)



4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Packing mode
P0111DA 1AA3	P0111 DA	TO-92	0.2 g	2500	BAG
P0111DA 5AL3	P0111 DA	TO-92	0.2 g	2000	Tape and reel 13 inch
P0111DN 5AA4	P1D	SOT-223	0.11 g	1000	Tape and reel 7 inch
P0111MA 1AA3	P0111 MA	TO-92	0.2 g	2500	Bag
P0111MA2AL3(1)	P0111 MA	TO-92	0.2 g	2000	Ammopack
P0111MN 5AA4	P1M	SOT-223	0.11 g	1000	Tape and reel 7 inch
P0115DA 1AA3	P0115 DA	TO-92	0.2 g	2500	Bag
P0115DA 5AL3	P0115 DA	TO-92	0.2 g	2000	Tape and reel 13 inch
P0118DA 1AA3	P0118 DA	TO-92	0.2 g	2500	Bag
P0118DA 5AL3	P0118 DA	TO-92	0.2 g	2000	Tape and reel 13 inch
P0118DN 5AA4	P8D	SOT-223	0.11 g	1000	Tape and reel 7 inch
P0118MA 2AL3	P0118 MA	TO-92	0.2 g	2000	Ammopack
P0118MA 5AL3	P0118 MA	TO-92	0.2 g	2000	Tape and reel 13 inch

1. This order code has no space.

5 Revision history

Table 8. Document revision history

Date	Revision	Description of changes
26-Jan-2009	1	First issue.

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