X006

0.8 A sensitive gate SCRs

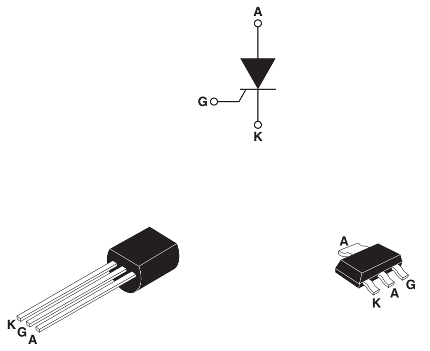
Features

- $I_{T(RMS)}$ = 0.8 A
- V_{DRM}/V_{RRM} = 600 V
- I_{GT} = 200 µA

Description

Thanks to highly sensitive triggering levels, the X006 SCR series is suitable for all applications where the available gate current is limited, such as ground fault circuit interrupters, overvoltage crowbar protection in low power supplies, capacitive ignition circuits, etc.

Available in though-hole or surface-mount packages, these devices are optimized in forward voltage drop and inrush current capabilities, for reduced power losses and high reliability in harsh environments.



TO-92
(X00602A)

SOT-223
(X00602N)

1 Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 °Conduction angle)	TO-92	T_l = 85 °C	0.8	A
		SOT-223	T_{tab} = 100 °C		
$IT_{(AV)}$	Average on-state current (180 °Conduction angle)	TO-92	T_l = 85 °C	0.5	A
		SOT-223	T_{tab} = 100 °C		
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j = 25 °C	10	A
		t_p = 10 ms		9	
I^2t	I^2t Value for fusing	t_p = 10 ms	T_j = 25 °C	0.4	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 2. Electrical characteristics

Symbol	Test Conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 140 Ω		MIN.	15	µA
			MAX.	200	
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.	0.2	V
V_{RG}	I_{RG} = 10 µA		MIN.	5	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.	25	V/µs
V_{TM}	I_{TM} = 1 A, tp = 380 µs	T_j = 25 °C	MAX.	1.35	V
V_{t0}	Threshold voltage	T_j = 125 °C	MAX.	0.85	V
R_d	Dynamic resistance	T_j = 125 °C	MAX.	245	mΩ
I_{DRM} I_{RRM}	V_{DRM} = V_{RRM} , R_{GK} = 1 kΩ	T_j = 25 °C	MAX.	1	µA
		T_j = 125 °C	MAX.	100	

Table 3. Thermal resistances

Symbol	Parameter			Value	Unit
$R_{th(j-a)}$	Junction to ambient (DC)		TO-92	150	°C/W
		S = 5 cm^2	SOT-223	60	
$R_{th(j-l)}$	Junction to lead (DC)		TO-92	70	
$R_{th(j-t)}$	Junction to tab (DC)		SOT-223	30	

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

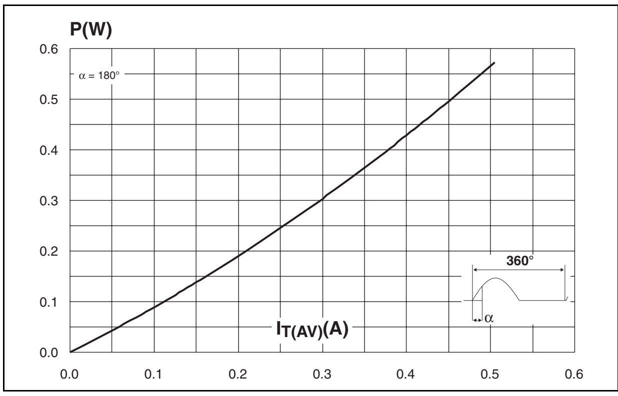


Figure 2. Average and DC on-state current versus case temperature (TO-92)

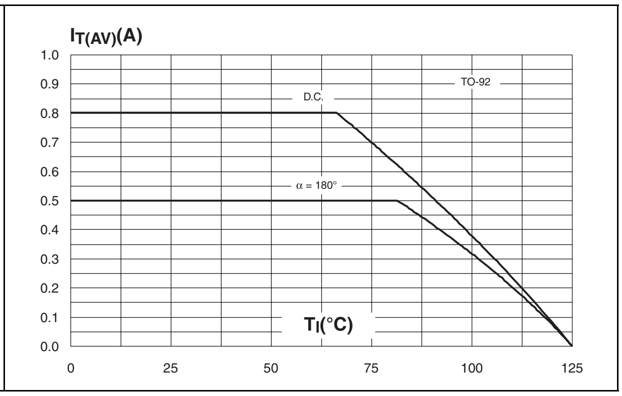


Figure 3. Average and D.C. on-state current versus ambient temperature (epoxy printed circuit board FR4, copper thickness = 35 µm, S_{CU} = 0.5 cm^2) (TO-92)

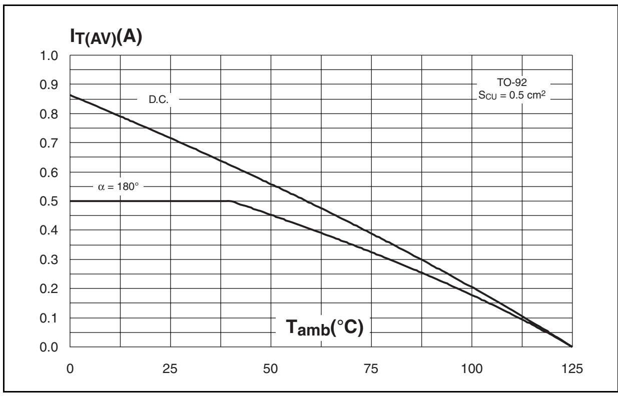


Figure 4. Average and DC on-state current versus case temperature (SOT-223)

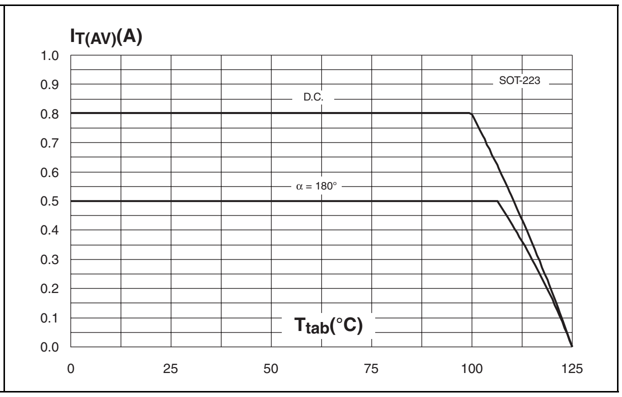


Figure 5. Average and DC on-state current versus ambient temperature (epoxy PCB FR4, copper thickness = 35 µm, S_{CU} = 5 cm^2) (SOT-223)

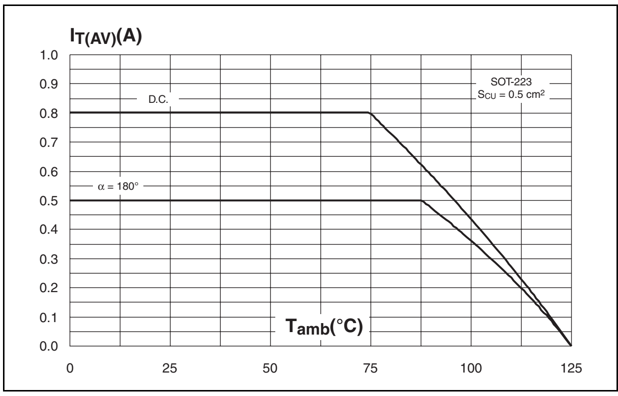


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (PCB FR4, copper thickness = 35 µm, S_{CU} = 0.5 cm^2) (TO-92)

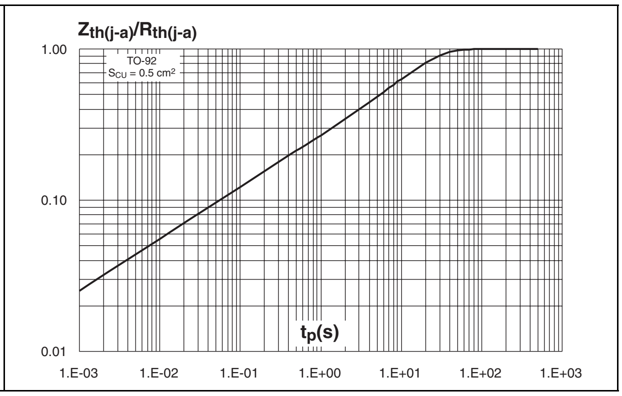


Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (PCB FR4, copper thickness = 35 µm, S_{CU} = 0.5 cm^2) (SOT-223)

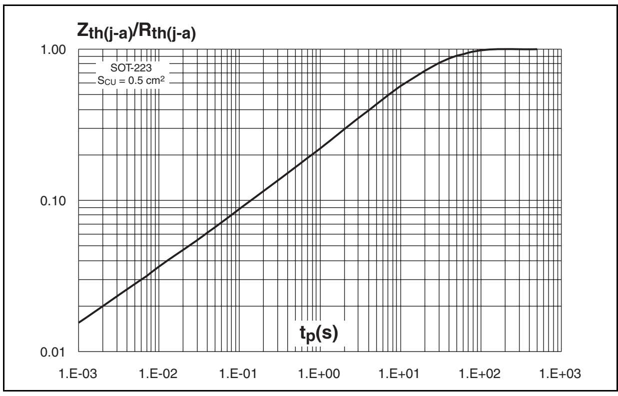


Figure 8. Thermal resistance junction to ambient versus copper surface under tab (PCB FR4, copper thickness = 35 µm) (SOT-223)

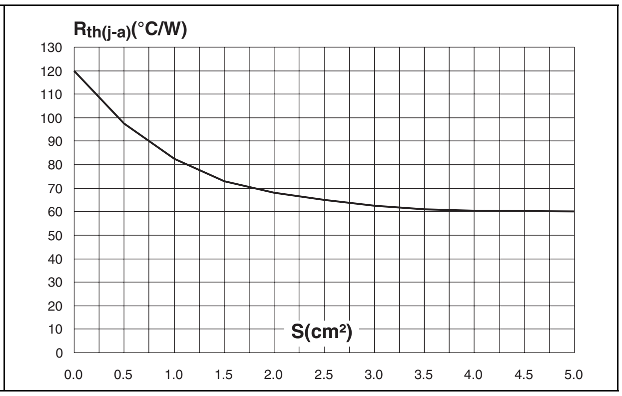


Figure 9. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

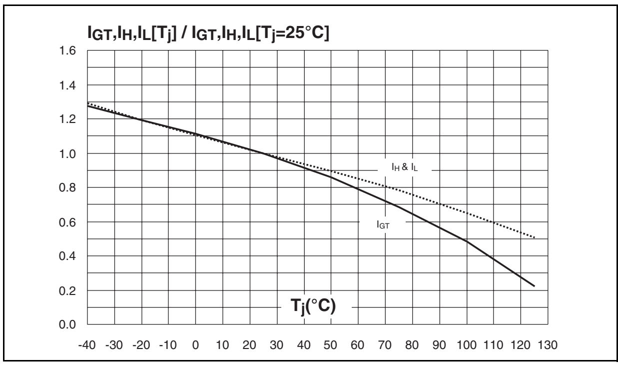


Figure 10. Relative variation of holding current versus gate-cathode resistance (typical values)

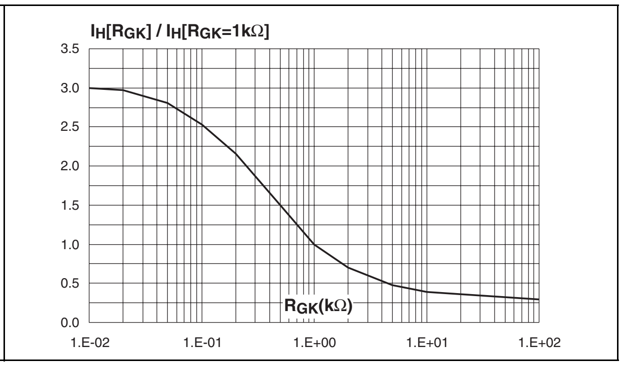


Figure 11. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)

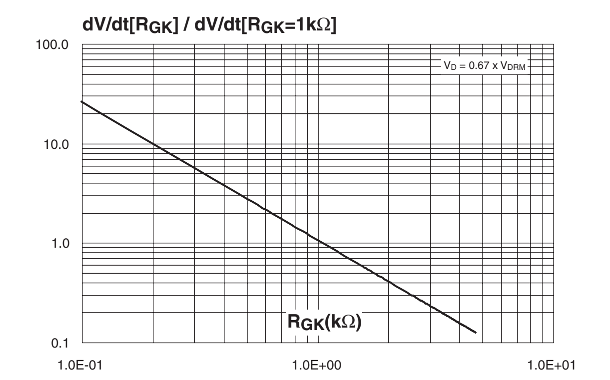


Figure 12. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)

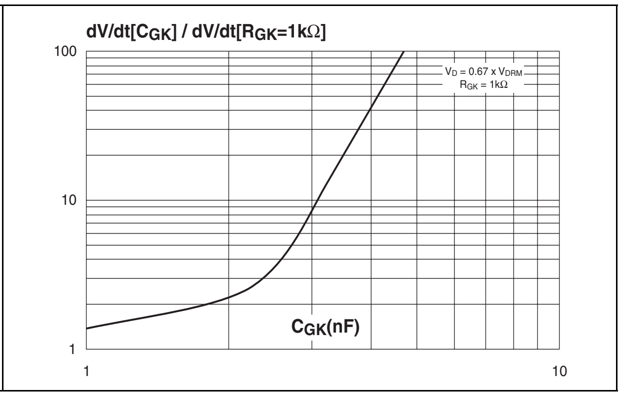


Figure 13. Surge peak on-state current versus number of cycles

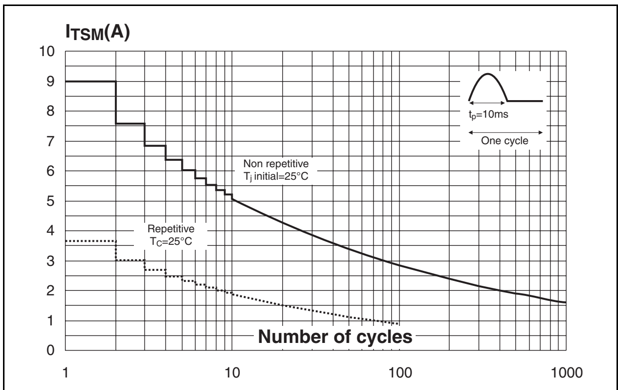


Figure 14. Non repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10ms, and corresponding value of I^2t

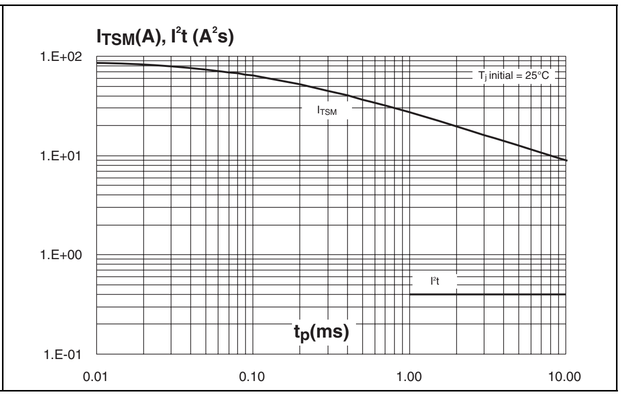
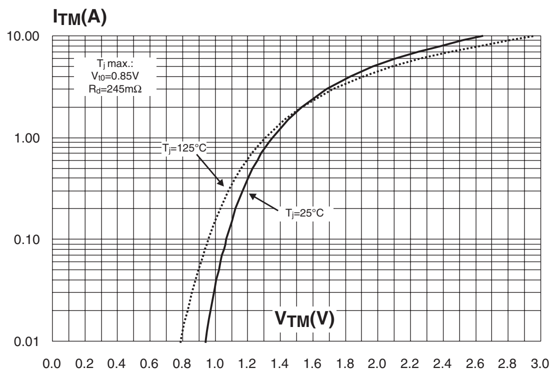
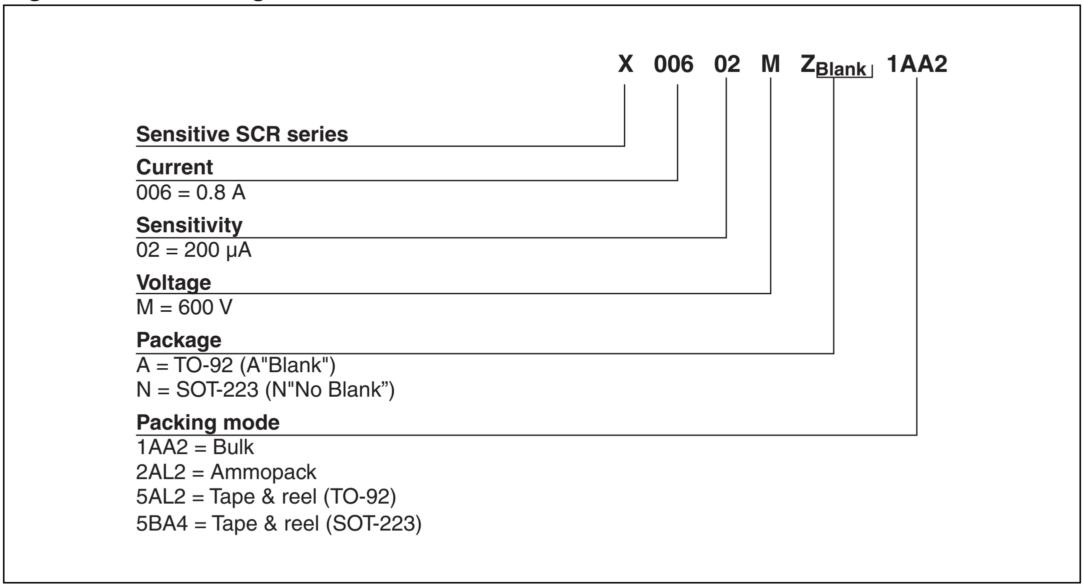


Figure 15. On-state characteristics (maximum values)



2 Ordering information scheme

Figure 16. Ordering information scheme

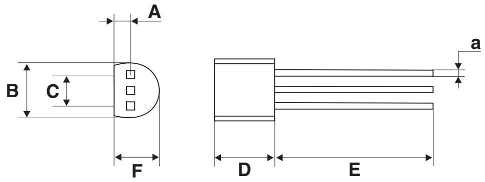


3 Package information

- Epoxy meets UL94, V0

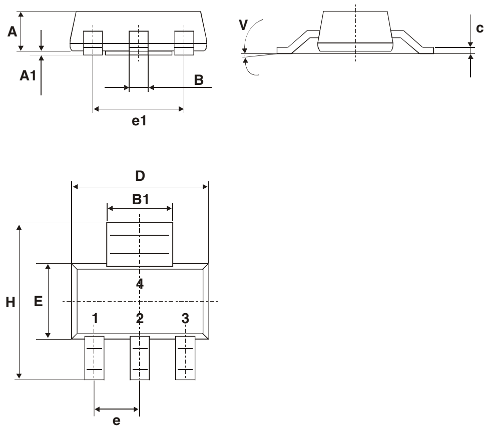
In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at *www.st.com*.

Table 4. TO-92 (plastic) 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

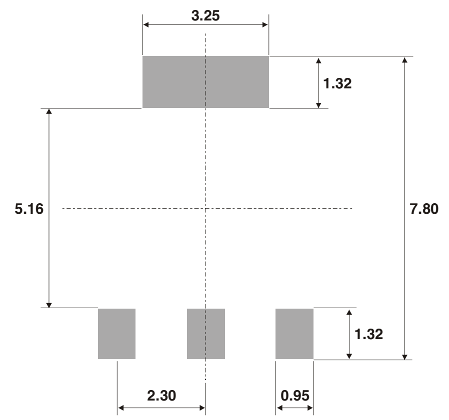
Table 5. SOT-223 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.80			0.071
A1		0.02	0.10		0.001	0.004
B	0.60	0.70	0.85	0.024	0.027	0.033
B1	2.90	3.00	3.15	0.114	0.118	0.124
c	0.24	0.26	0.35	0.009	0.010	0.014
D(1)	6.30	6.50	6.70	0.248	0.256	0.264
e		2.3			0.090	
e1		4.6			0.181	
E(1)	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					

1. Do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (0.006inches)

Figure 17. SOT-223 footprint (dimensions in mm)t



4 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
X00602MA 1AA2	X0602 MA	TO-92	0.2 g	2500	Bulk
X00602MA 2AL2				2000	Ammopack
X00602MA 5AL2				2000	Tape and reel
X00602MN5BA4	X06 2M	SOT-223	0.12 g	1000	

5 Revision history

Table 7. Document revision history

Date	Revision	Changes
Jan-2002	3	Last update.
08-Aug-2006	4	SOT-223 package added.
1-Apr-2008	5	Reformatted to current standards. Device X00605 removed. Updated dimensions in *Table 5*.

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