

### Features

- $I_{T(RMS)} = 0.8\text{ A}$
- $V_{DRM}, V_{RRM} = 600\text{ V}$
- $I_{GT} = 30\text{ to }200\ \mu\text{A}$

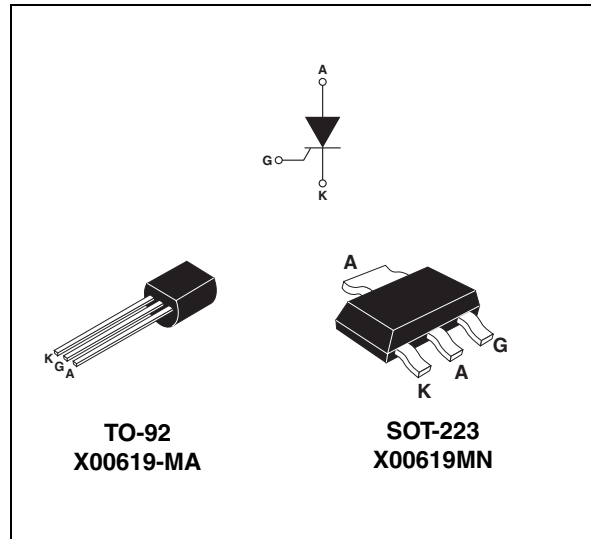
### Applications

- Limited gate current topologies
- Ground fault circuit interrupters
- Overvoltage crowbar protection in power supplies
- Protection in electronic ballasts
- Capacitive discharge ignitions
- Igniters (lighting, oven...)

### Description

The X006 SCR can be used as on/off function in applications where topology does not offer high current for gate triggering.

This device is optimized in forward voltage drop and inrush current capabilities for reduced power losses and high reliability in harsh environments.



**Table 1. Device summary**

$I_{T(RMS)}$	0.8 A
$V_{DRM} / V_{RRM}$	600 V
$I_{GT}$	30 to 200 $\mu\text{A}$

# 1 Characteristics

**Table 2. Absolute ratings (limiting values,  $T_j = 25\text{ °C}$  unless otherwise specified)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state rms current (180 °Conduction angle)	TO-92	$T_L = 83\text{ °C}$	0.8	A
		SOT-223	$T_c = 107\text{ °C}$		
$I_{T(AV)}$	Average on-state current (180 °Conduction angle)	TO-92	$T_L = 83\text{ °C}$	0.5	A
		SOT-223	$T_c = 107\text{ °C}$		
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	10	A
		$t_p = 10\text{ ms}$		9	
$I^2t$	$I^2t$ Value for fusing	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	0.4	$A^2s$
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	F = 60 Hz	$T_j = 125\text{ °C}$	50	A/ $\mu s$
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu s$	$T_j = 125\text{ °C}$	1	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ °C}$	0.1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	$^{\circ}C$

**Table 3. Electrical characteristics ( $T_j = 25\text{ °C}$  unless otherwise specified)**

Symbol	Test conditions		Value	Unit	
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 140\text{ }\Omega$	MIN.	30	$\mu A$	
		MAX.	200		
$V_{GT}$			0.8	V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $R_{GK} = 1\text{ k}\Omega$	$T_j = 125\text{ °C}$	MIN.	0.2	V
$V_{RG}$	$I_{RG} = 10\text{ }\mu A$		MIN.	5	V
$I_H$	$I_T = 50\text{ mA}$ , $R_{GK} = 1\text{ k}\Omega$		MAX.	5	mA
$I_L$	$I_G = 1\text{ mA}$ , $R_{GK} = 1\text{ k}\Omega$		MAX.	6	mA
dV/dt	$V_D = 67\% V_{DRM}$ , $R_{GK} = 1\text{ k}\Omega$	$T_j = 125\text{ °C}$	MIN.	40	V/ $\mu s$

**Table 4. Static electrical characteristics**

Symbol	Test conditions		Value	Unit	
$V_{TM}$	$I_{TM} = 1\text{ A}$ , $t_p = 380\text{ }\mu s$	$T_j = 25\text{ °C}$	MAX	1.35	V
$V_{TO}$	Threshold voltage	$T_j = 125\text{ °C}$		0.85	V
$R_d$	Dynamic resistance			245	$m\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$ , $R_{GK} = 1\text{ k}\Omega$	$T_j = 25\text{ °C}$		1	$\mu A$
		$T_j = 125\text{ °C}$	100	$\mu A$	

**Table 5. Thermal resistances**

Symbol	Parameter		Value	Unit
$R_{th(j-l)}$	Junction to leads (DC)	TO-92	Max.	$^{\circ}\text{C}/\text{W}$
$R_{th(j-c)}$	Junction to case (DC)	SOT-223		
$R_{th(j-a)}$	Junction to ambient (DC)	TO-92		
		$S = 5 \text{ cm}^2$ SOT-223		
			70	
			30	
			150	
			60	

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



**Figure 2. Average and DC on-state current versus case temperature (SOT-223)**



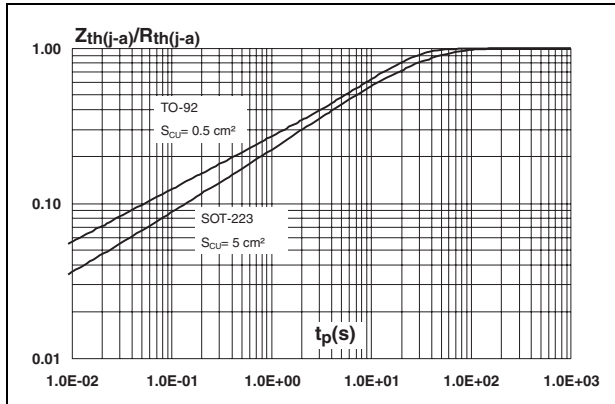
**Figure 3. Average and DC on-state current versus lead temperature (TO-92)**



**Figure 4. Average and DC on-state current versus ambient temperature (free air convection)**



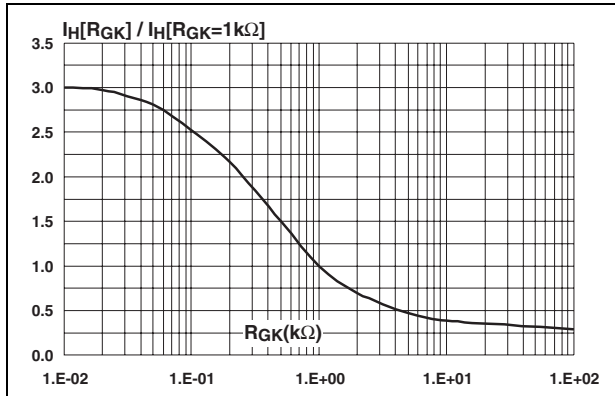
**Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration**



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



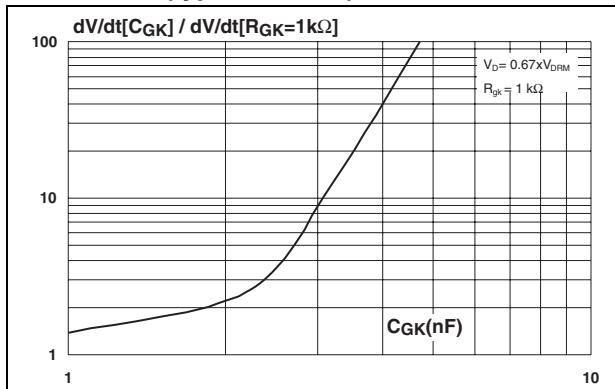
**Figure 7. Relative variation of holding current versus gate-cathode resistance (typical values)**



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



**Figure 9. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)**



**Figure 10. Surge peak on-state current versus number of cycles**



Figure 11. Non repetitive surge peak on state current for a sinusoidal pulse and corresponding value of  $I^2t$

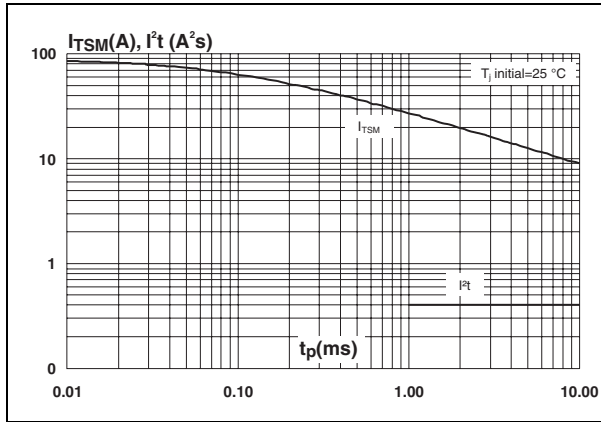


Figure 12. On-state characteristics (maximum values)

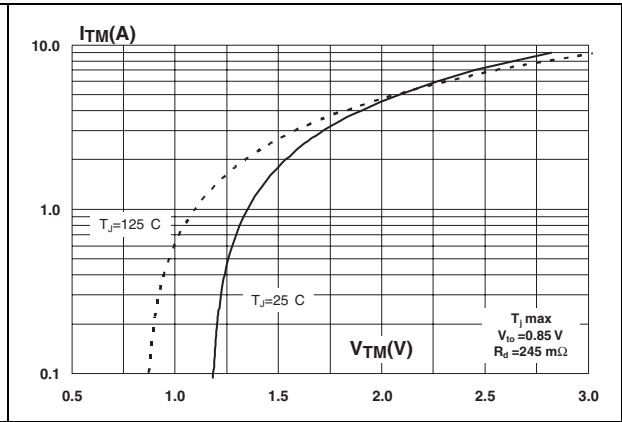
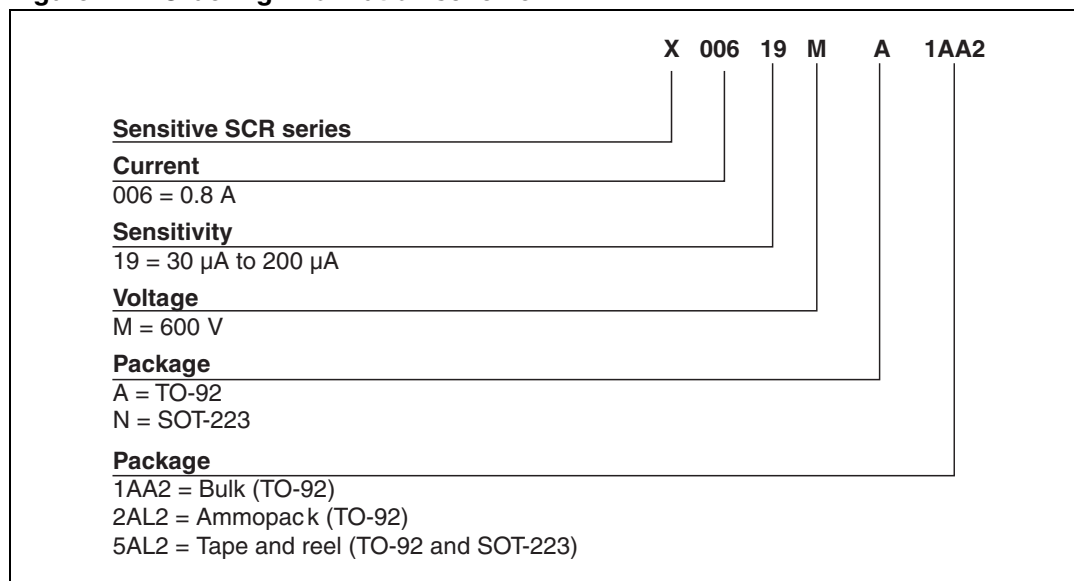


Figure 13. Thermal resistance junction to ambient versus copper surface under tab (SOT-223)



## 2 Ordering information scheme

Figure 14. Ordering information scheme



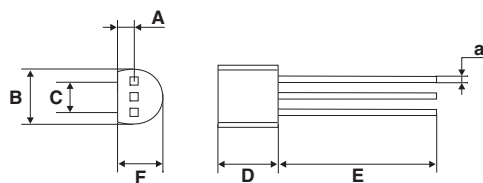
### 3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Table 6. 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

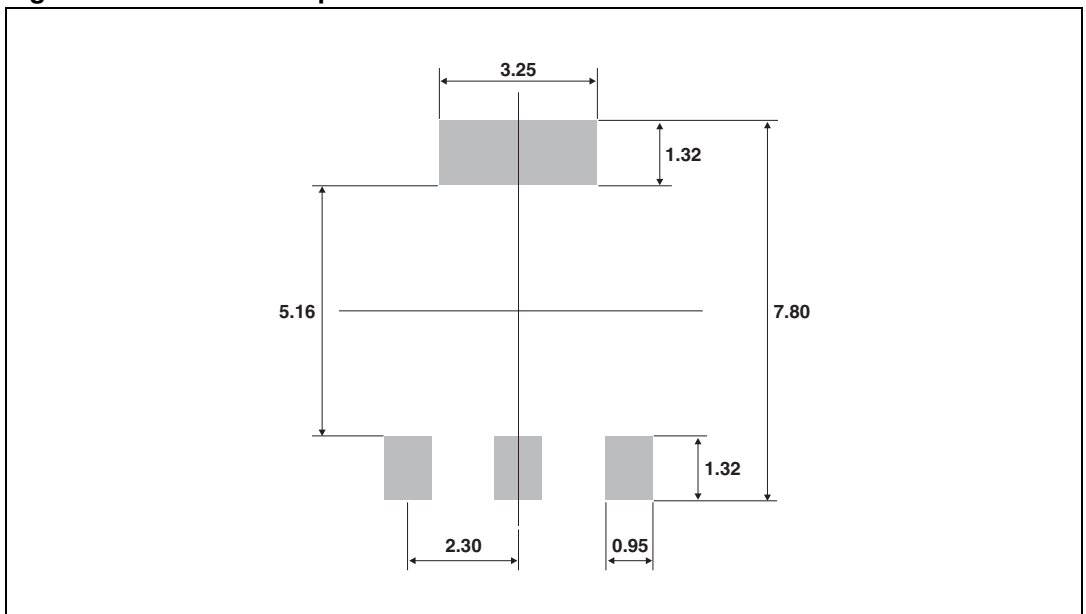


**Table 7. SOT-223 dimensions**

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 <sup>(1)</sup>	6.30	6.50	6.70	0.248	0.256	0.264
e		2.3			0.090	
e1		4.6			0.181	
E <sup>(1)</sup>	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 15. SOT-223 footprint**





## 4 Ordering information

**Table 8. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
X00619MA1AA2	X0619 MA	TO-92	0.2 g	2500	Bulk
X00619MA2AL2				2000	Ammopack
X00619MA5AL2				2000	Tape and reel
X00619MN5AL2	X0 619 MN	SOT-223	0.12 g	1000	

## 5 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
26-May-2009	1	First issue
03-May-2012	2	Added SOT-223 package.

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