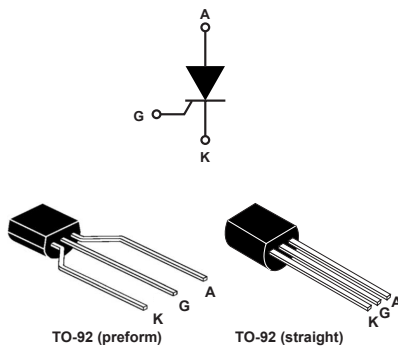


## 0.8 A 600 V logic level gate thyristor SCR in TO-92 package



### Features

- On-state RMS current,  $I_{T(RMS)}$  0.8 A
- Repetitive peak off-state voltage 600 V
- Triggering gate current 200  $\mu$ A
- ECOPACK2 compliant

### Applications

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

#### Product status link

X006

#### Product summary

$I_{T(RMS)}$	0.8 A
$V_{DRM}/V_{RRM}$	600 V
$I_{GT}$	200 $\mu$ A
$T_{jmax.}$	125 °C

### Description

Available in through hole package, 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.

Thanks to its highly sensitive triggering current the X006 is suitable for the applications such as breaker, ground fault interrupter, overvoltage crowbar protection of power supplies or capacitive ignition circuits.

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values,  $T_j = 25\text{ °C}$  unless otherwise specified)**

Symbol	Parameters			Value	Unit
$I_{T(RMS)}$	On-state RMS current (180° conduction angle)	TO-92	$T_L = 83\text{ °C}$	0.8	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)	TO-92	$T_L = 83\text{ °C}$	0.5	A
$I_{TSM}$	Non repetitive surge peak on-state current, $T_j$ initial = 25 °C	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	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 <sup>2</sup> s
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	$F = 60\text{ Hz}$	$T_j = 125\text{ °C}$	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
$T_{stg}$	Storage junction temperature range			-40 to +150	°C
$T_j$	Operating junction temperature range			-40 to +125	°C

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Parameters	Value		Unit
		Min.	Max.	
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 140\text{ }\Omega$	15	200	$\mu$ A
$V_{GT}$		0.8		V
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $R_{GK} = 1\text{ k}\Omega$ , $T_j = 125\text{ °C}$	0.2		V
$V_{RG}$	$I_{RG} = 10\text{ }\mu$ A	5		
$I_H$	$I_T = 50\text{ mA}$ , $R_{GK} = 1\text{ k}\Omega$	5		mA
$I_L$	$I_G = 1\text{ mA}$ , $R_{GK} = 1\text{ k}\Omega$	6		mA
$dV/dt$	$V_D = 67\% V_{DRM}$ , $R_{GK} = 1\text{ k}\Omega$ , $T_j = 125\text{ °C}$	25		V/ $\mu$ s

**Table 3. Static electrical characteristics**

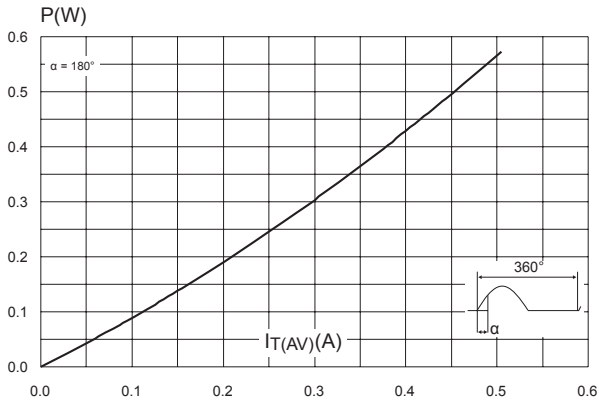
Symbol	Test conditions	Value		Unit
$V_{TM}$	$I_{TM} = 1\text{ A}$ , $t_p = 380\text{ }\mu$ s	25 °C	Max. 1.35	V
$V_{TO}$	Threshold on-state voltage	125 °C	Max. 0.85	V
$R_d$	Dynamic resistance	125 °C	Max. 245	m $\Omega$
$I_{DRM}$	$V_{DRM} = V_{RRM}$ , $R_{GK} = 1\text{ k}\Omega$	25 °C	Max. 1	$\mu$ A
$I_{RRM}$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

**Table 4. Thermal resistance**

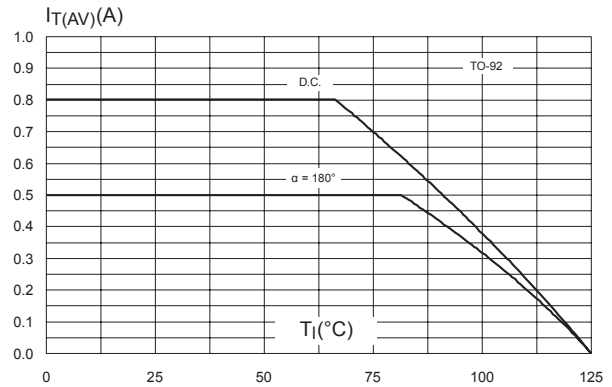
Symbol	Parameters		Max. value	Unit
$R_{th(j-l)}$	Junction to leads (DC)	TO-92	70	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	TO-92	150	

## 1.1 Characteristics (curves)

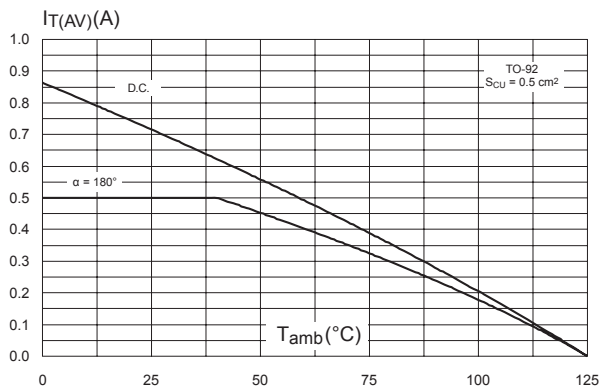
**Figure 1. Maximum average power dissipation versus average on-state current**



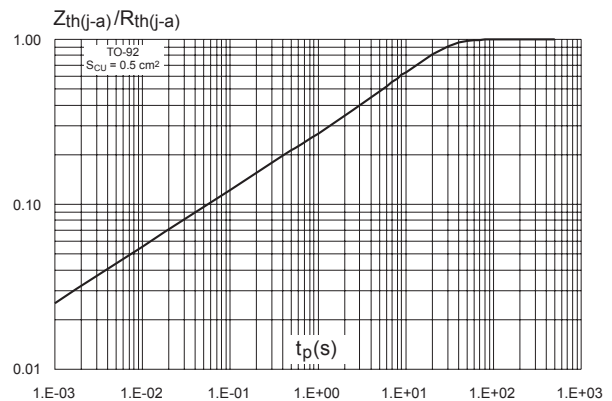
**Figure 2. Average and DC on-state current versus lead temperature (TO-92)**



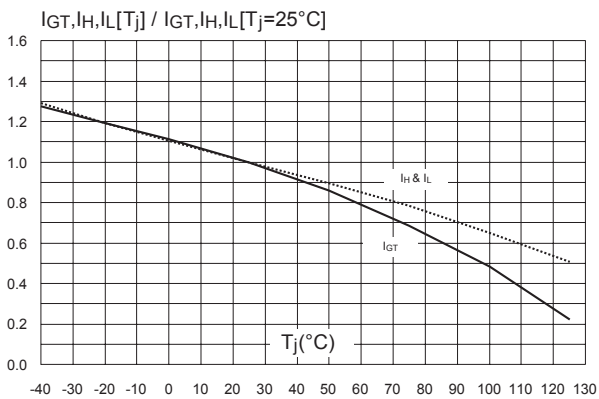
**Figure 3. Average and DC on-state current versus ambient temperature (epoxy printed circuit board FR4, copper thickness = 35 μm, S<sub>CU</sub> = 0.5 cm<sup>2</sup>)(TO-92)**



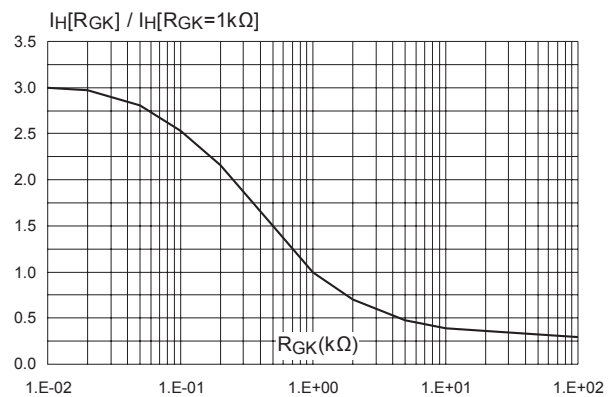
**Figure 4. Relative variation of thermal impedance junction to ambient versus pulse duration (PCB FR4, copper thickness = 35 μm, S<sub>CU</sub> = 0.5 cm<sup>2</sup>)(TO-92)**

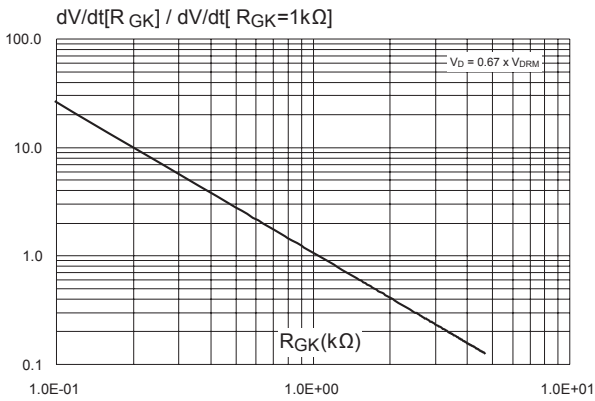
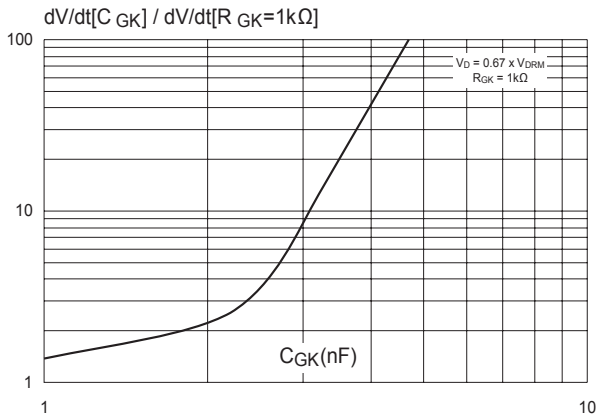
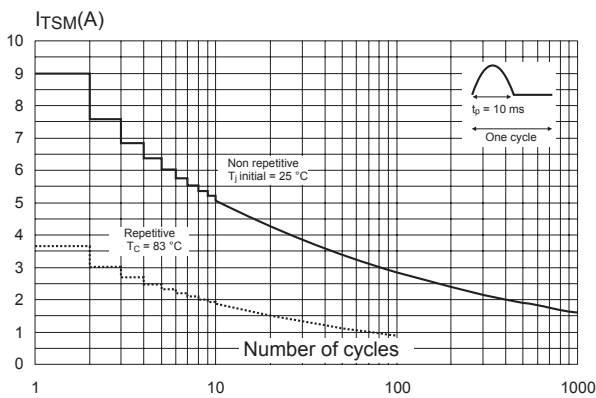
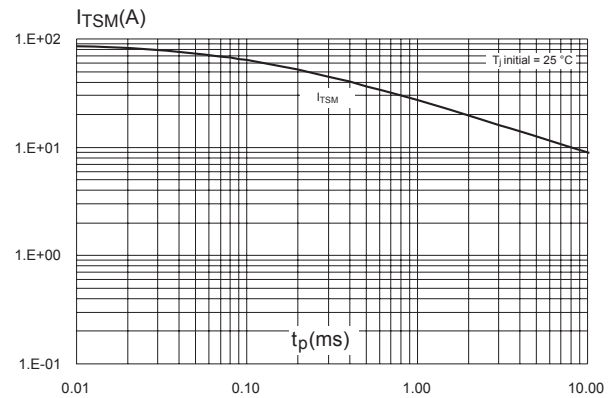
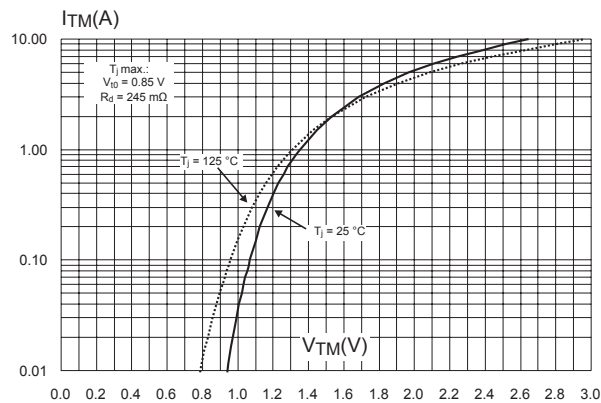


**Figure 5. Relative variation of gate trigger, holding and latching current versus junction temperature (typical values)**



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



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

**Figure 8. Relative variation of static 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 for sinusoidal pulse ( $t_p < 10$  ms)**

**Figure 11. On-state characteristics (maximum values)**


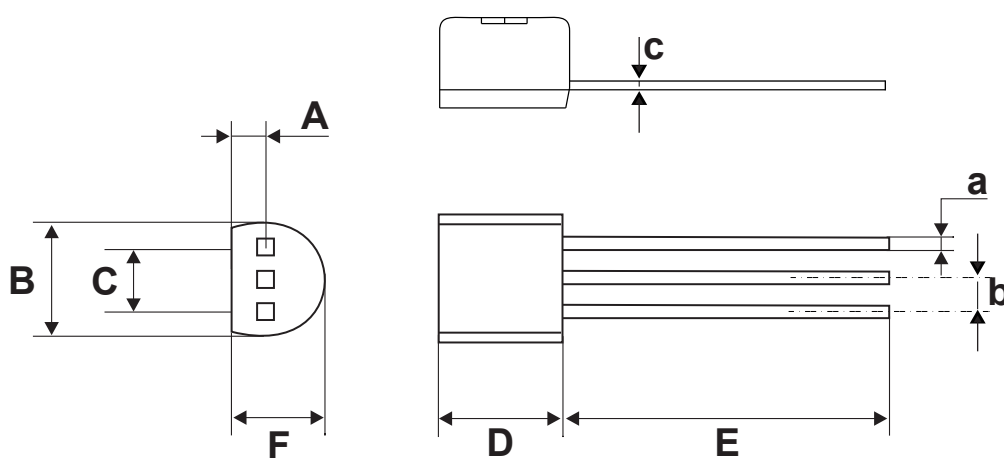
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 TO-92 with straight leads (plastic) package information

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

**Figure 12.** TO-92 with straight leads (plastic) package outline



**Table 5.** TO-92 with straight leads (plastic) package mechanical data

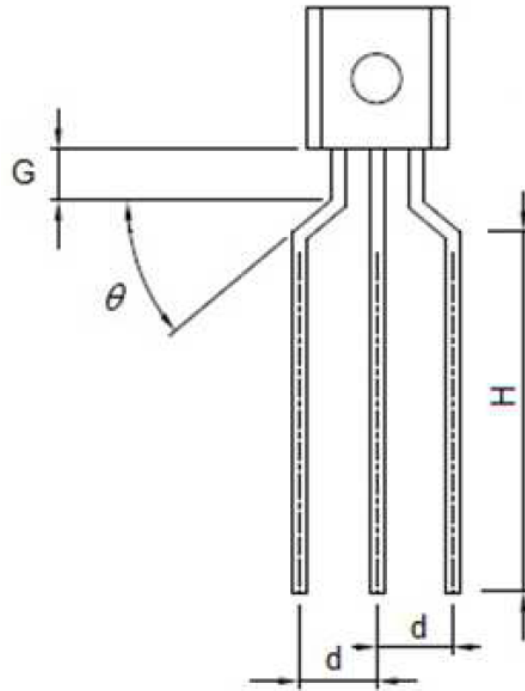
Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		1.35			0.048	
B			4.70			0.190
C		2.54			0.100	
D	4.40			0.172		
E	12.70			0.554		
F			3.70			0.152
a			0.50			0.022
b		1.27			0.050	
c			0.48			0.019

1. Inches dimensions given for information

## 2.2 TO-92 with leads preform (plastic) package information

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

**Figure 13.** TO-92 with leads preform (plastic) package outline



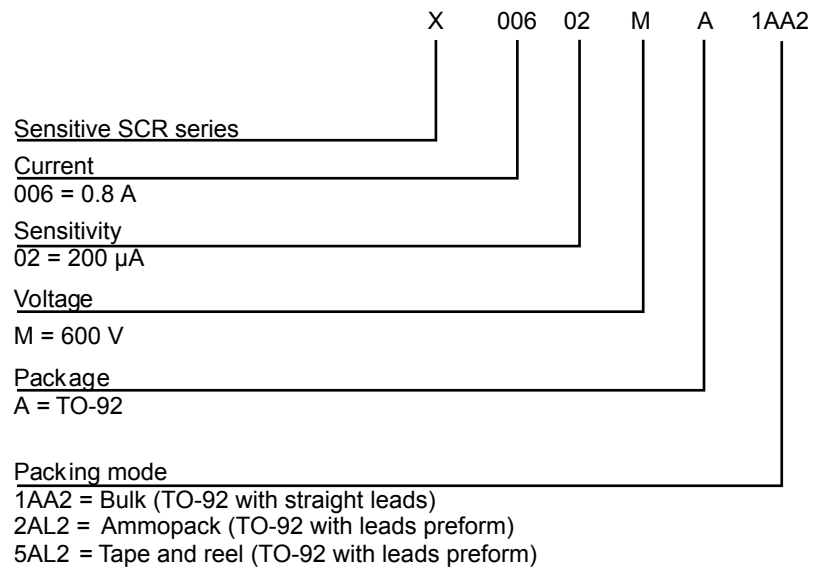
**Table 6.** TO-92 with leads preform (plastic) package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
G	1.30	1.70	2.00	0.051	0.067	0.079
H	7.69		9.69	0.303		0.381
d	2.40		2.90	0.094		0.114
θ	30°	40°	50°	30°	40°	50°

1. Inches dimensions given for information

### 3 Ordering information

**Figure 14. Ordering information scheme**



**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
X00602MA 1AA2	X0602 MA	TO-92 straight leads	0.2 g	2500	Bulk
X00602MA 2AL2		TO-92 leads preform	0.2 g	2000	Ammopack
X00602MA 5AL2			0.2 g	2000	Tape and reel

## Revision history

**Table 8. Document revision history**

Date	Revision	Changes
26-May-2009	3	Last update.
03-May-2012	4	SOT-223 package added.
03-Sep-2021	5	Reformatted to current standards. Device X00605 removed. Updated dimensions in Table 5.
18-Jan-2022	6	Removed SOT-223 package information. Added Section 2.2 TO-92 with leads preform (plastic) package information.



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