

# STC X0205MN

## Sensitive Gate

### Silicon Controlled Rectifier

#### Reverse Blocking Thyristor

PNPN device designed for line-powered general purpose applications such as relay and lamp drivers, small motor controls, gate drivers for larger thyristors, and sensing and detection circuits. Supplied in a cost effective plastic SOT-223 package.

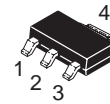
- Sensitive Gate Allows Direct Triggering by Microcontrollers and Other Logic Circuits
- On-State Current Rating of 1.25 Amperes RMS at 80°C
- Surge Current Capability – 20 Amperes
- Immunity to  $dV/dt$  – 20 V/ $\mu$ sec Minimum at 110°C
- Glass-Passivated Surface for Reliability and Uniformity
- Blocking Voltage to 600 Volts

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1.) ( $T_J = -40$ to $110^\circ\text{C}$ , Sine Wave, 50 to 60 Hz; Gate Open)	$V_{DRM}$ , $V_{RRM}$	600	Volts
On-State RMS Current ( $T_C = 80^\circ\text{C}$ ) 180° Conduction Angles	$I_{T(RMS)}$	1.25	Amp
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, $T_J = 25^\circ\text{C}$ )	$I_{TSM}$	20	Amps
Circuit Fusing Consideration ( $t = 10$ ms)	$I^2t$	0.415	$\text{A}^2\text{s}$
Forward Peak Gate Power ( $T_A = 25^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )	$P_{GM}$	0.1	Watt
Forward Average Gate Power ( $T_A = 25^\circ\text{C}$ , $t = 20$ ms)	$P_{G(AV)}$	0.20	Watt
Forward Peak Gate Current ( $T_A = 25^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )	$I_{GM}$	1.2	Amp
Reverse Peak Gate Voltage ( $T_A = 25^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )	$V_{GRM}$	5.0	Volts
Operating Junction Temperature Range @ Rate $V_{RRM}$ and $V_{DRM}$	$T_J$	-40 to 110	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to 150	$^\circ\text{C}$

(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant source such that the voltage ratings of the devices are exceeded.

**SCR**  
**1.25 AMPERES RMS**  
**600 VOLTS**



**SOT-223**

PIN ASSIGNMENT	
1	Cathode
2	Anode
3	Gate
4	Anode

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## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction to Case – Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	75 200	°C/W
Lead Solder Temperature ( $< 1/16"$ from case, 10 secs max)	$T_L$	260	°C

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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## OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current (Note 1.) ( $V_D = \text{Rated } V_{DRM}$ and $V_{RRM}$ ; $R_{GK} = 1.0 \text{ k}\Omega$ )	$T_C = 25^\circ\text{C}$ $T_C = 110^\circ\text{C}$	$I_{DRM}, I_{RRM}$	– –	– –	10 0.1	$\mu\text{A}$ mA
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## ON CHARACTERISTICS

Peak Forward On-State Voltage(*) ( $I_{TM} = 1.0 \text{ Amp Peak @ } T_A = 25^\circ\text{C}$ )		$V_{TM}$	–	–	1.7	Volts
Gate Trigger Current (Continuous dc) (Note 2.) ( $V_{AK} = 12 \text{ V}$ , $R_L = 100 \text{ Ohms}$ )	$T_C = 25^\circ\text{C}$	$I_{GT}$	–	8	20	$\mu\text{A}$
Holding Current (Note 2.) ( $V_{AK} = 12 \text{ V}$ , $I_{GT} = 0.5 \text{ mA}$ )	$T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$	$I_H$	– –	0.5 –	5.0 10	mA
Latch Current ( $V_{AK} = 12 \text{ V}$ , $I_{GT} = 0.5 \text{ mA}$ , $R_{GK} = 1.0 \text{ k}$ )	$T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$	$I_L$	– –	0.6 –	10 15	mA
Gate Trigger Voltage (Continuous dc) (Note 2.) ( $V_{AK} = 12 \text{ V}$ , $R_L = 100 \text{ Ohms}$ , $I_{GT} = 10 \text{ mA}$ )	$T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$	$V_{GT}$	– –	0.62 –	0.8 1.2	Volts

## DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, $R_{GK} = 1000 \text{ Ohms}$ , $T_J = 110^\circ\text{C}$ )	$dV/dt$	20	35	–	$\text{V}/\mu\text{s}$
Critical Rate of Rise of On-State Current ( $I_{PK} = 20 \text{ A}$ ; $P_w = 10 \mu\text{sec}$ ; $di/dt = 1.0 \text{ A}/\mu\text{sec}$ , $I_{gt} = 20 \text{ mA}$ )	$di/dt$	–	–	50	$\text{A}/\mu\text{s}$

\*Indicates Pulse Test: Pulse Width  $\leq 1.0 \text{ ms}$ , Duty Cycle  $\leq 1\%$ .

1.  $R_{GK} = 1000 \text{ Ohms}$  included in measurement.
2. Does not include  $R_{GK}$  in measurement.

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## Voltage Current Characteristic of SCR

Symbol	Parameter
$V_{DRM}$	Peak Repetitive Off State Forward Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Off State Reverse Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Peak on State Voltage
$I_H$	Holding Current

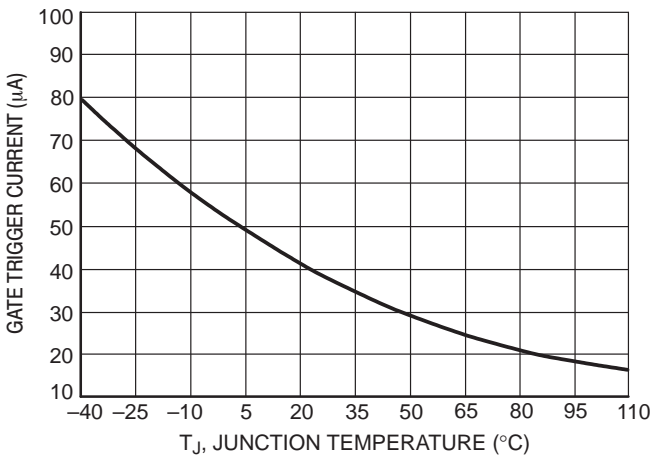
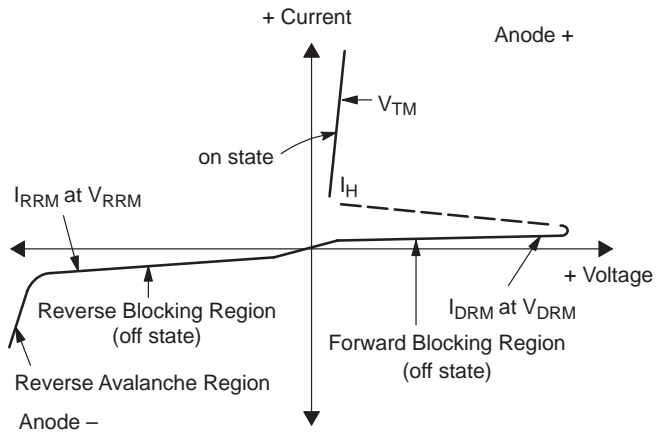


Figure 1. Typical Gate Trigger Current versus Junction Temperature

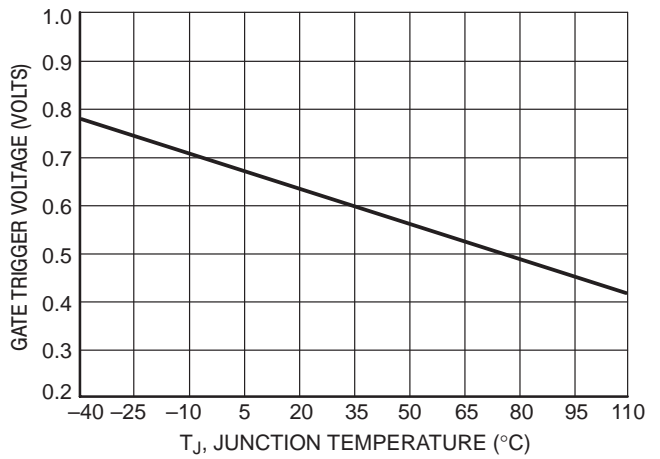
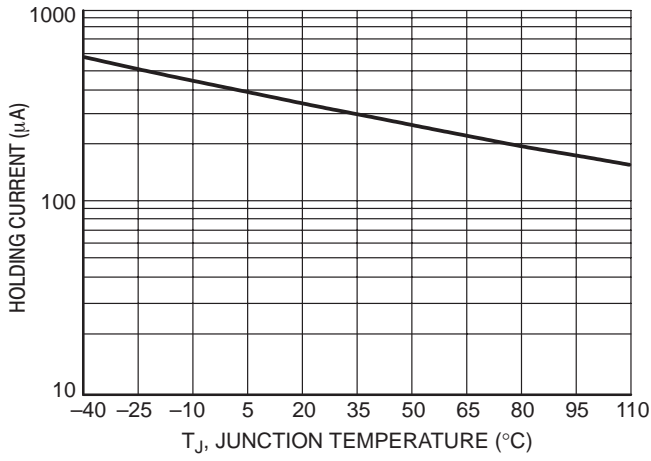
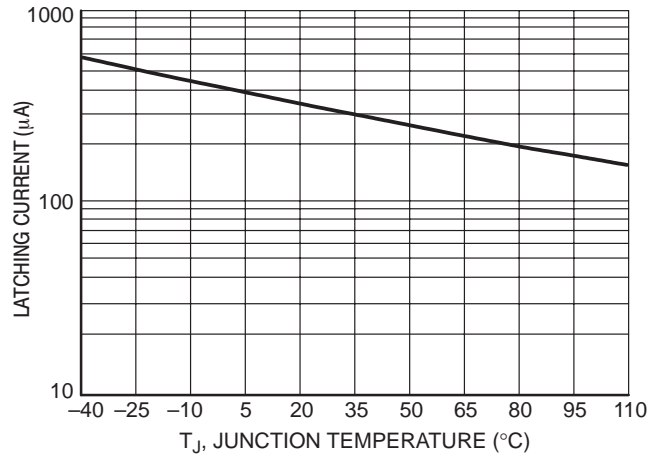


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

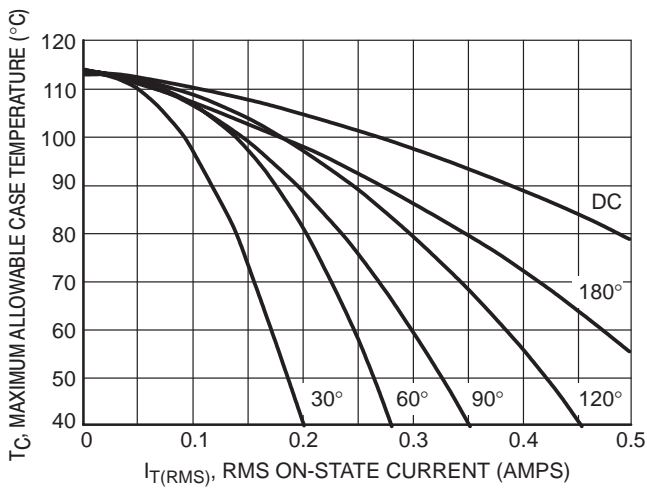
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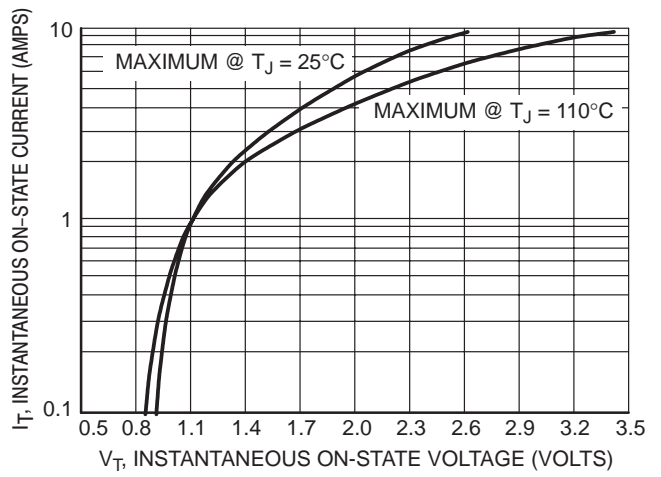
**Figure 3. Typical Holding Current versus Junction Temperature**



**Figure 4. Typical Latching Current versus Junction Temperature**



**Figure 5. Typical RMS Current Derating**



**Figure 6. Typical On-State Characteristics**