



Description

This new .8 A sensitive gate SCR in an TO-92 package with a GAK pin out, offers a high static component series with a high static dv/dt and a low turn off (t_q) time by the use of small die planar construction implementation. All SCR's junctions are glass-passivated to ensure long term reliability and parametric stability.

Features

- Surge capability >10Amps
- TO-92 G-A-K pinout
- High dv/dt noise immunity
- Sensitive gate for direct microprocessor interface
- Improved turn-off time (t_q) $\leq 25 \mu\text{s}$.
- RoHS compliant and Halogen-Free

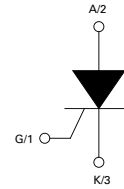
Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	0.8	A
V_{DRM} / V_{RRM}	600	V
I_{GT}	30	μA

Applications

The S6X8ECS2 is specifically designed for GFCI (Ground Fault Circuit Interrupter) and gas ignition applications.

Schematic Symbol



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	$T_c = 55^\circ\text{C}$	0.8 A
$I_{T(AV)}$	Average on-state current	$T_c = 55^\circ\text{C}$	0.51 A
I_{TSM}	Non repetitive surge peak on-state current (Single cycle, T_J initial = 25°C)	F = 50 Hz	8 A
		F = 60 Hz	10 A
I^2t	I^2t Value for fusing	$t_p = 10 \text{ ms}$, F = 50 Hz	0.32 A^2s
		$t_p = 8.3 \text{ ms}$, F = 60 Hz	0.41 A^2s
di/dt	Critical rate of rise of on-state current $I_G = 10\text{mA}$	$T_J = 125^\circ\text{C}$	50 A/ μs
I_{GM}	Peak gate current	$t_p = 10 \mu\text{s}$, $T_J = 125^\circ\text{C}$	1.0 A
$P_{G(AV)}$	Average gate power dissipation	$T_J = 125^\circ\text{C}$	0.1 W
T_{stg}	Storage junction temperature range		-40 to 150 $^\circ\text{C}$
T_J	Operating junction temperature range		-40 to 125 $^\circ\text{C}$

Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Description	Test Conditions	Value		Unit
			Min	Max	
I_{GT}	DC Gate Trigger Current	$V_D = 6\text{V}$ $R_L = 100\ \Omega$	1	30	μA
V_{GT}			—	0.8	V
V_{GRM}	Peak Reverse Gate Voltage	$I_{RG} = 10\ \mu\text{A}$	5	—	V
I_H	Holding Current	$R_{GK} = 1\ \text{k}\Omega$ Initial Current = 20mA	—	3	mA
(dv/dt)s	Critical Rate-of-Rise of Off-State Voltage	$T_J = 125^\circ\text{C}$, $V_D = V_{DRM} / V_{RRM}$ Exponential Waveform, $R_{GK} = 1\ \text{k}\Omega$	75	—	V/ μs
V_{GT}	Gate Non-Trigger Voltage	$V_D = V_{DRM}$, $R_{GK} = 1\ \text{k}\Omega$ $T_J = 25^\circ\text{C}$	0.2	—	V
t_q	Turn-Off Time	$T_J = 125^\circ\text{C}$ @ 600 V $R_{GK} = 1\ \text{k}\Omega$	—	25	μs
t_{gt}	Turn-On Time	$I_G = 10\text{mA}$ PW = 15 μsec $I_T = 1.6\text{A}$ (pk)	2.0 (Typ)		μs

Static Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Description	Test Conditions	Value	Unit
			Max	
V_{TM}	Peak On-State Voltage	$I_{TM} = 1.2\ \text{A}$ (pk)	1.4	V
I_{DRM}	Off-State Current, Peak Repetitive	$T_J = 25^\circ\text{C}$ @ $V_D = V_{DRM}$, $R_{GK} = 1\ \text{k}\Omega$	3	μA
		$T_J = 125^\circ\text{C}$ @ $V_D = V_{DRM}$, $R_{GK} = 1\ \text{k}\Omega$	500	μA

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{\theta(JC)}$	Junction to case (AC)	75	$^\circ\text{C}/\text{W}$
$R_{\theta(JA)}$	Junction to ambient		150

$I_T = 0.8\ \text{A}$ I_{RMS} , 60Hz AC resistive load condition, 100% conduction.

Figure 1: Normalized DC Gate Trigger Current For All Quadrants vs. Junction Temperature

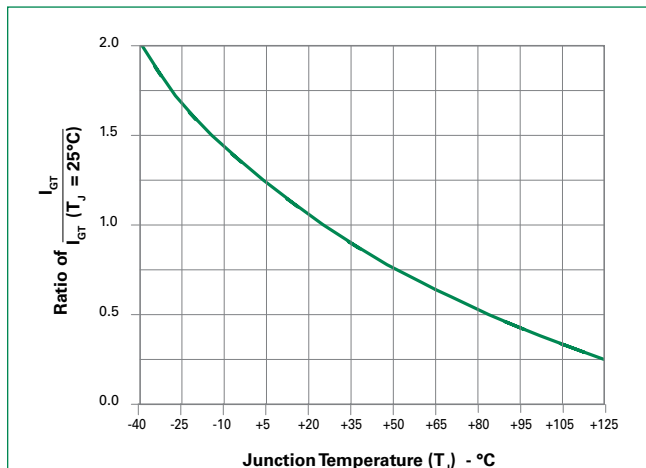


Figure 2: Normalized DC Holding Current vs. Junction Temperature

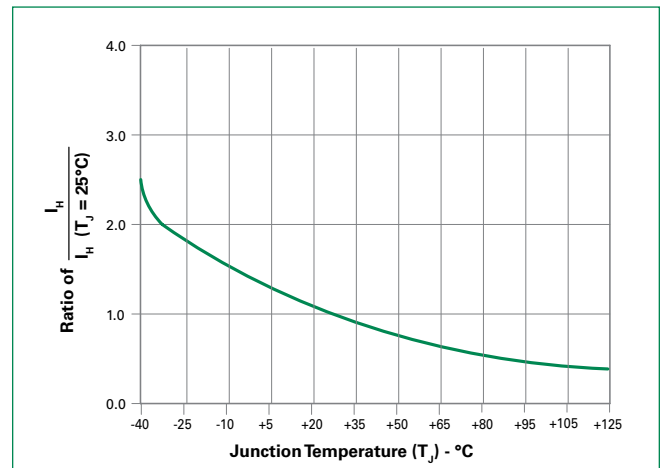


Figure 3: DC Gate Trigger Voltage vs. Junction Temperature

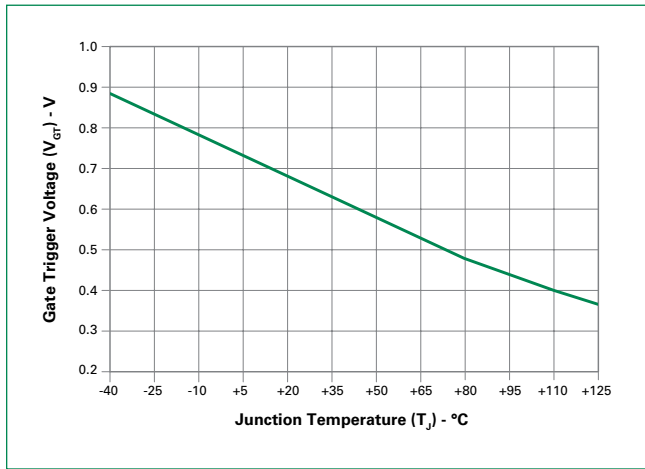


Figure 4: On-State Current vs. On-State Voltage (Typical)

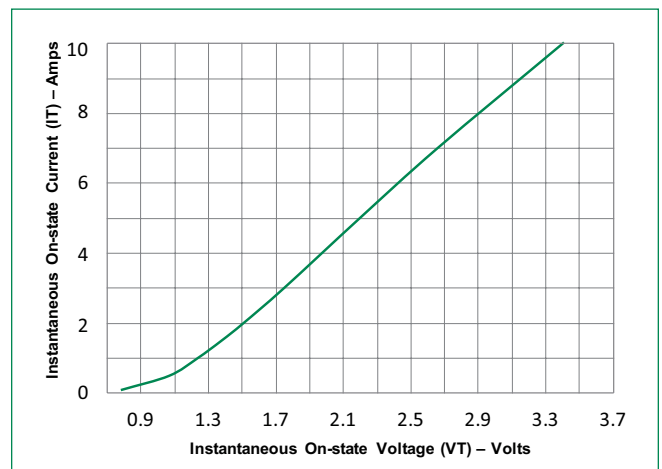


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

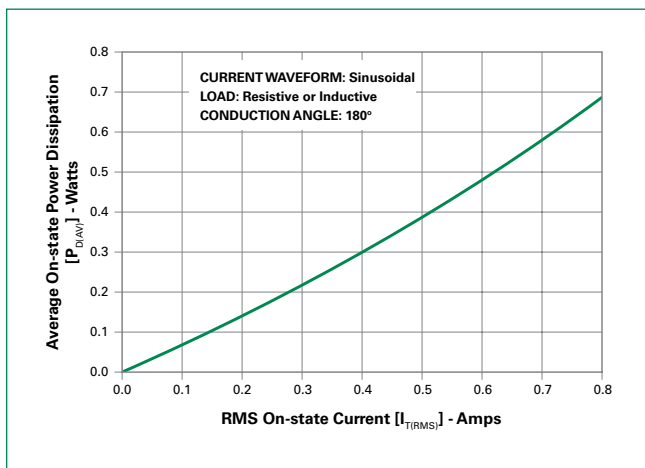


Figure 6: Maximum Allowable Case Temperature vs. On-State Current

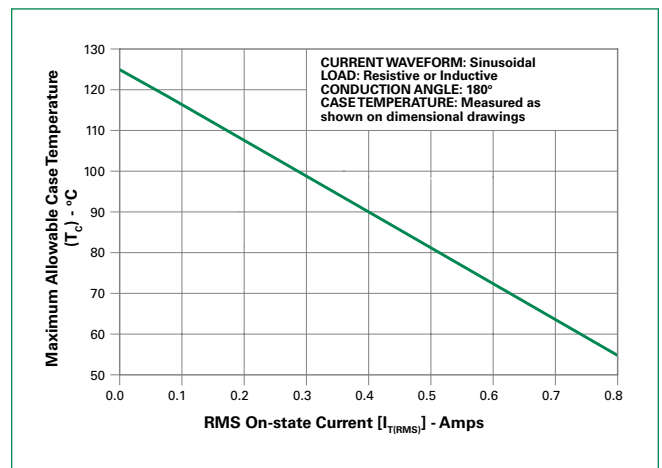
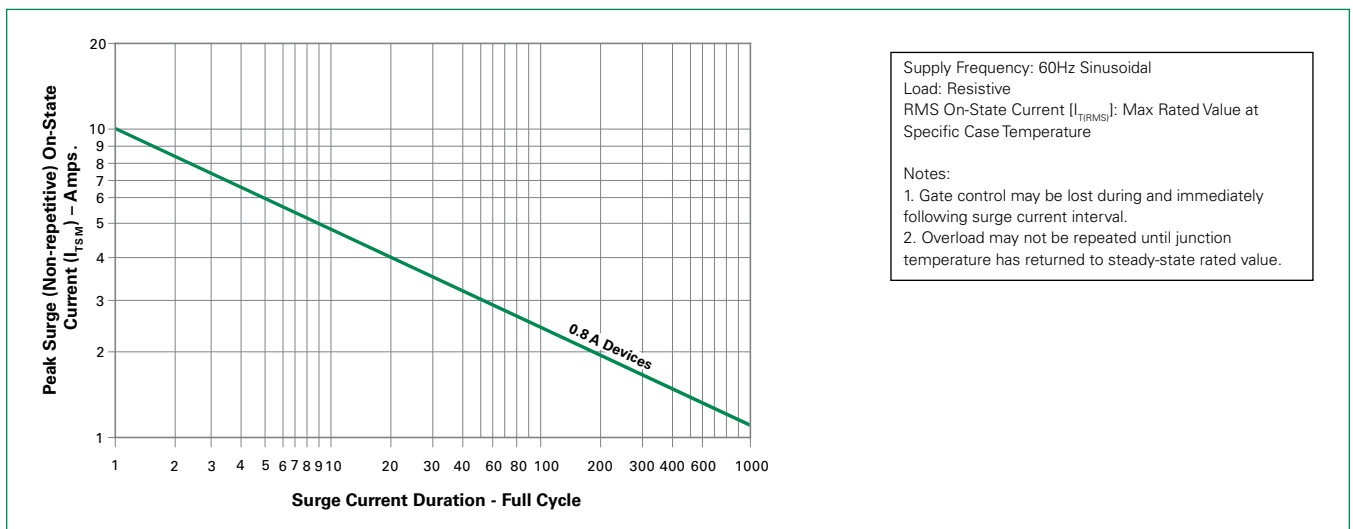
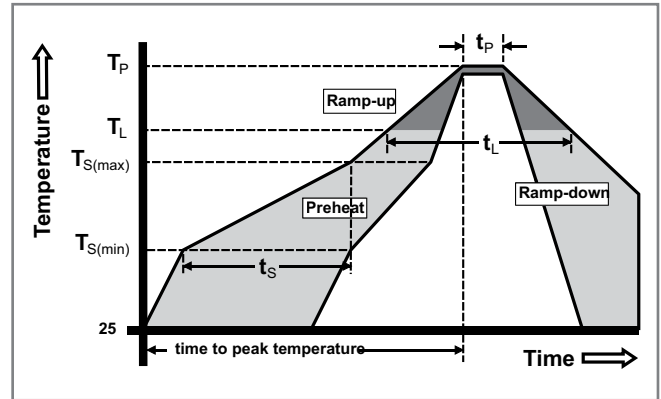


Figure 7: Surge Peak On-State Current vs. Number of Cycles



Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp (T_L) to peak)		5°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		5°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Time (min to max) (t_s)	60 – 150 seconds
Peak Temperature (T_p)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_p)		8 minutes Max.
Do not exceed		280°C



Physical Specifications

Terminal Finish	100% Matte Tin-plated.
Body Material	UL Recognized compound meeting flammability rating V-0.
Lead Material	Copper Alloy

Design Considerations

Careful selection of the correct component for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the component rating. Other ways to ensure long life for a power discrete semiconductor are proper heat sinking and selection of voltage ratings for worst case conditions. Overheating, overvoltage (including dv/dt), and surge currents are the main killers of semiconductors. Correct mounting, soldering, and forming of the leads also help protect against component damage.

Reliability/Environmental Tests

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 100 cycles; -40°C to +150°C; 15-min dwell-time
Temperature/Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC: 85°C; 85% rel humidity
High Temp Storage	MIL-STD-750, M-1031, 1008 hours; 150°C
Low-Temp Storage	1008 hours; -40°C
Resistance to Solder Heat	MIL-STD-750 Method 2031
Solderability	ANSI/J-STD-002, category 3, Test A
Lead Bend	MIL-STD-750, M-2036 Cond E