S6X8ECS2

HF RoHS

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.

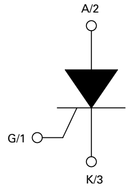
Description

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
- High dv/dt noise immunity
- Improved turn-off time (t_q) ≤ 25 µs.
- TO-92 G-A-K pinout
- Sensitive gate for direct microprocessor interface
- RoHS compliant and Halogen-Free

Schematic Symbol



Absolute Maximum Ratings

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

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Electrical Characteristics (T_J = 25°C, unless otherwise specified)

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

Static Characteristics (T_J = 25°C, unless otherwise specified)

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

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(JC)}$	Junction to case (AC)	I_T = 0.8 A $_{(RMS)}$, 60Hz AC resistive load condition, 100% conduction.	75	°C/W
$R_{\theta(J-A)}$	Junction to ambient		150	°C/W

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

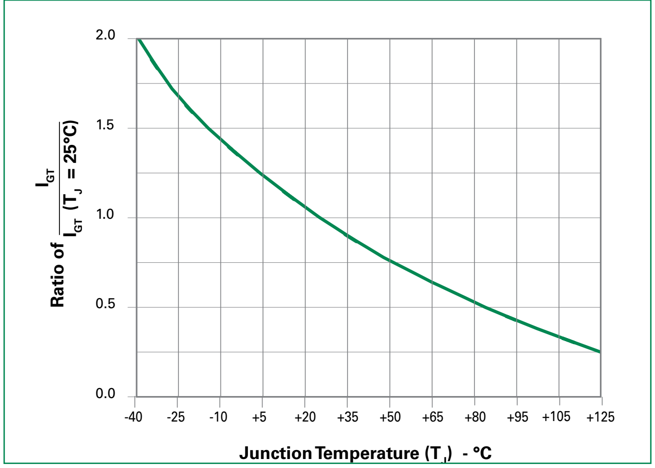

Figure 2: Normalized DC Holding Current vs. Junction Temperature

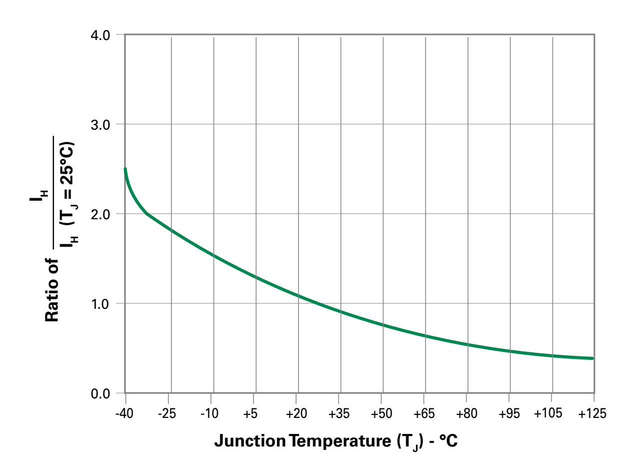

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Figure 3: DC Gate Trigger Voltage vs. Junction Temperature

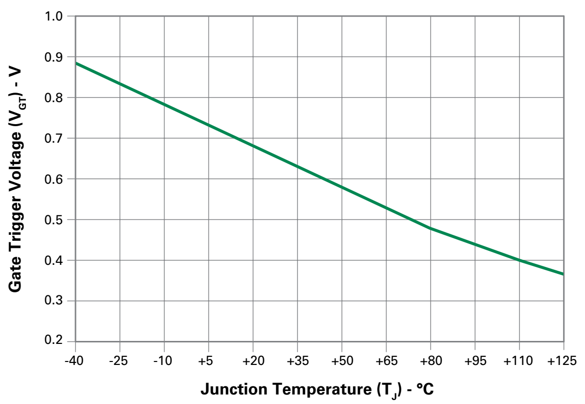


Figure 4: On-State Current vs. On-State Voltage (Typical)

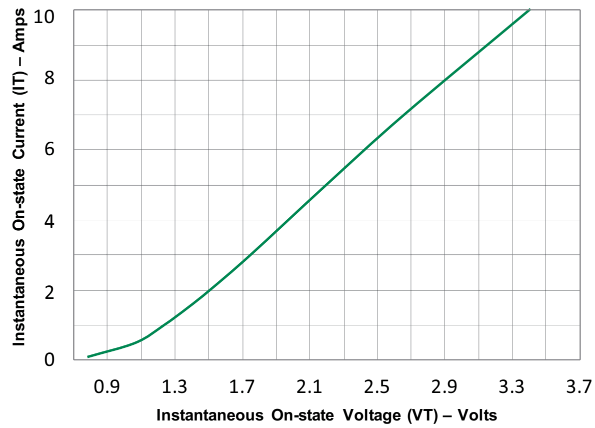


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

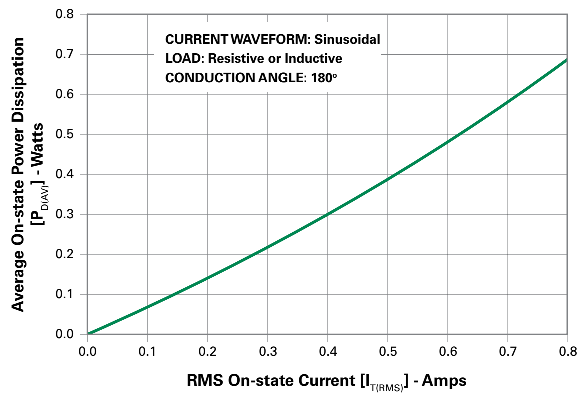


Figure 6: Maximum Allowable Case Temperature vs. On-State Current

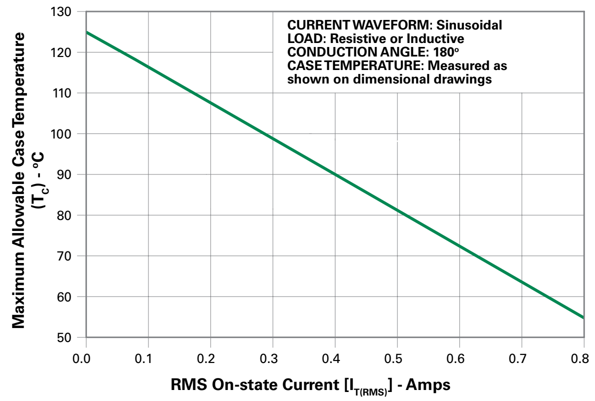
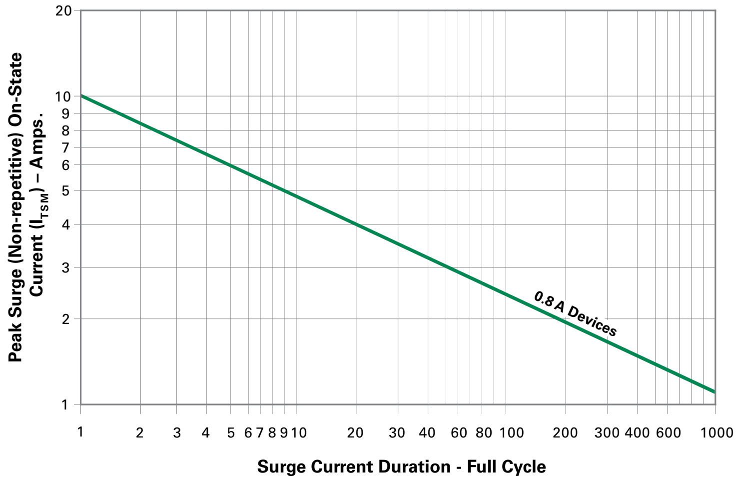


Figure 7: Surge Peak On-State Current vs. Number of Cycles

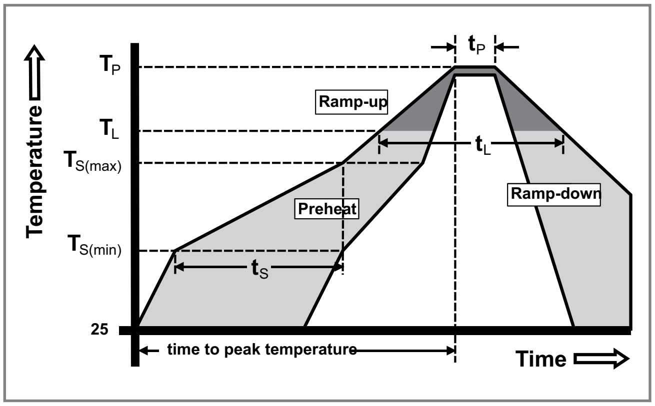


Supply Frequency: 60Hz Sinusoidal
Load: Resistive
RMS On-State Current [$I_{T(RMS)}$]: Max Rated Value at Specific Case Temperature

Notes:
1. Gate control may be lost during and immediately following surge current interval.
2. Overload may not be repeated until junction temperature has returned to steady-state rated value.

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