



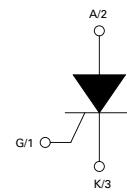
Description

This new 1.5 A sensitive gate SCR in an TO-92 package with a G-A-K 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.

Features

- Surge capability >15Amps
- High dv/dt noise immunity
- Improved turn-off time (t_q) $\leq 35 \mu\text{sec}$.
- TO-92 G-A-K pinout
- Sensitive gate for direct microprocessor interface
- RoHS compliant and Halogen-Free

Schematic Symbol



Main Features

Symbol	Value	Unit
I _{TRMS}	1.5	A
V _{DRM} /V _{RRM}	600	V
I _{GT}	100	μA

Applications

The S602ECS is specifically designed for Gas Ignition applications that require high pulse surge current capability.

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
I _{TRMS}	RMS on-state current (full sine wave)	1.5	A
I _{TAV}	Average on-state current	0.95	A
I _{TSM}	Non repetitive surge peak on-state current (Single cycle, T _j initial = 25°C)	F = 50 Hz	14.0
		F = 60 Hz	16.8
I ² t	I ² t Value for fusing	t _p = 10 ms	F = 50 Hz
		t _p = 8.3 ms	F = 60 Hz
di/dt	Critical rate of rise of on-state current IG = 10mA	T _j = 125°C	A/μs
I _{GM}	Peak gate current	t _p = 10 μs	T _j = 125°C
P _{GAV}	Average gate power dissipation	T _j = 125°C	W
T _{stg}	Storage junction temperature range	-40 to 150	°C
T _j	Operating junction temperature range	-40 to 125	°C

Thyristors

1.5 Amp Sensitive SCRs

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

Symbol	Description	Test Conditions	S602ECS		Unit
			Min	Max	
I_{GT}	DC Gate Trigger Current	$V_D = 12\text{V}$ $R_L = 60\ \Omega$	20	100	μA
V_{GT}	DC Gate Trigger Voltage		—	0.8	V
V_{GRM}	Peak Reverse Gate Voltage	$I_{RG} = 10\mu\text{A}$	5	—	V
I_H	Holding Current	$R_{GK} = 1\ \text{k}\Omega$	—	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 $R_{GK} = 1\ \text{k}\Omega$	50	—	V/ μs
t_q	Turn-Off Time	$T_j = 125^\circ\text{C} @ 600\text{V}$ $R_{GK} = 1\ \text{k}\Omega$	—	35	μs
t_{gt}	Turn-On Time	$I_G = 10\text{mA}$ PW = 15 μsec $I_T = 3.0\text{A (pk)}$	—	3	μs

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

Symbol	Description	Test Conditions	Value		Unit
			Min	Max	
V_{TM}	Peak On-State Voltage	$I_{TM} = 4\text{A (pk)}$	—	1.8	V
I_{DRM}	Off-State Current, Peak Repetitive	$T_j = 25^\circ\text{C} @ V_D = V_{DRM}$ $R_{GK} = 1\ \text{k}\Omega$	—	5	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)	$I_T = 1.5\text{A}_{(\text{RMS})}$, 60Hz AC resistive load condition, 100% conduction.	50	$^\circ\text{C/W}$
$R_{\theta(J-A)}$	Junction to ambient		160	$^\circ\text{C/W}$

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

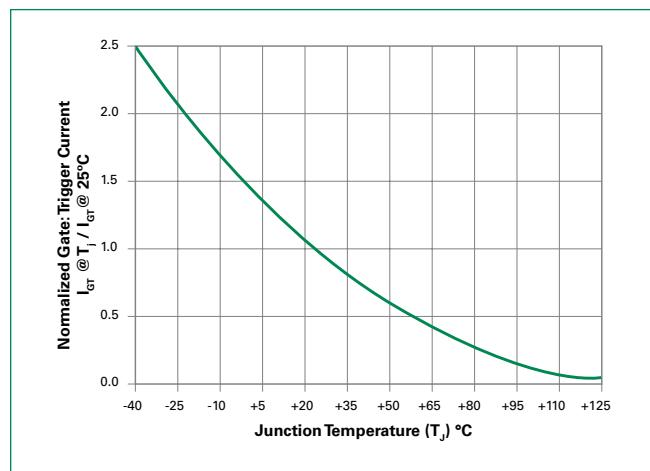
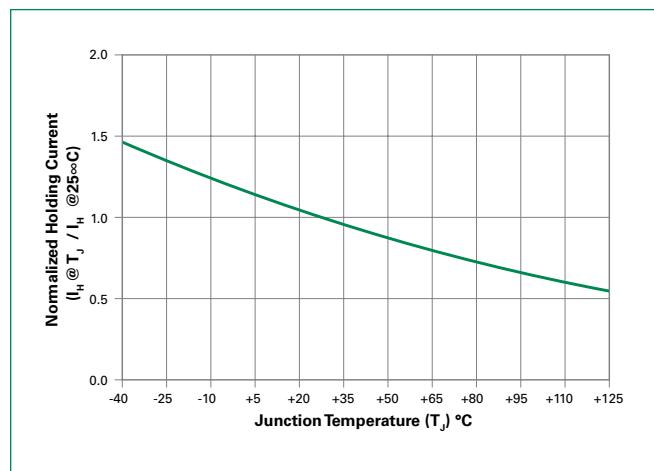


Figure 2: Normalized DC Holding Current vs. Junction Temperature



Thyristors

1.5 Amp Sensitive SCRs

Figure 3: Normalized DC Gate Trigger Voltage vs. Junction Temperature

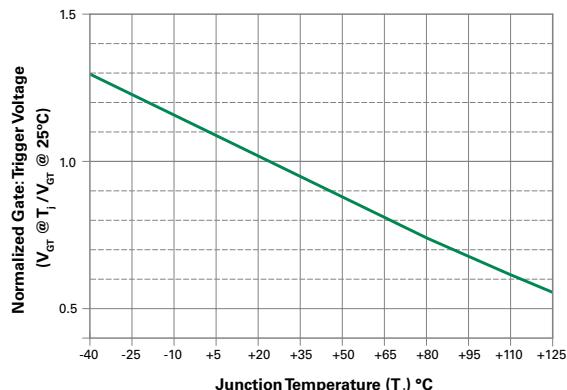


Figure 4: On-State Current vs. On-State Voltage (Typical)

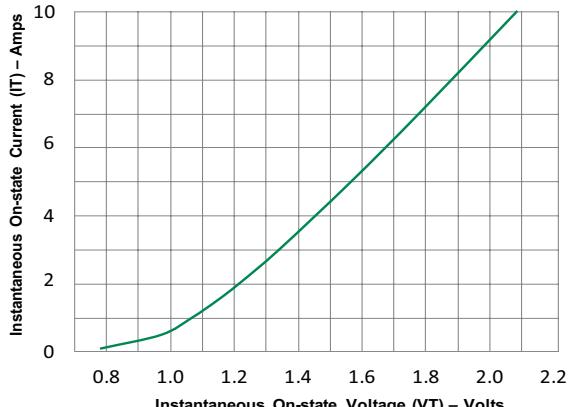


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

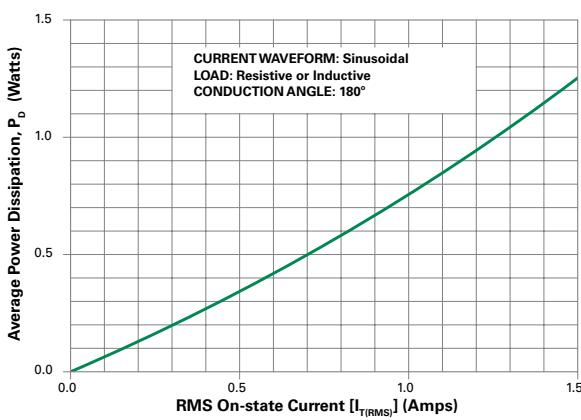


Figure 6: Maximum Allowable Case Temperature vs. On-State Current

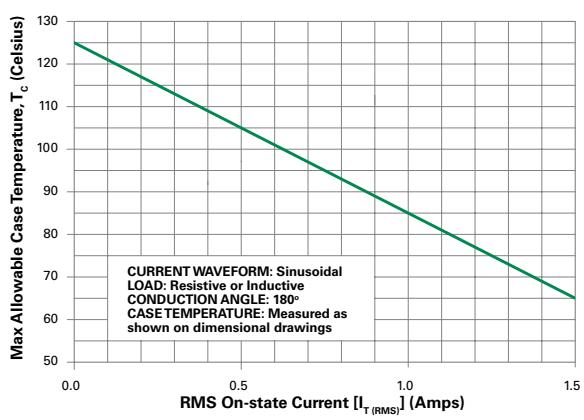
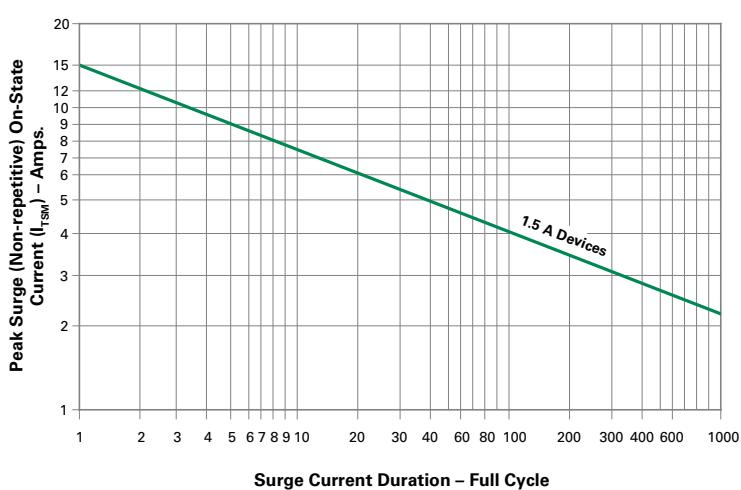
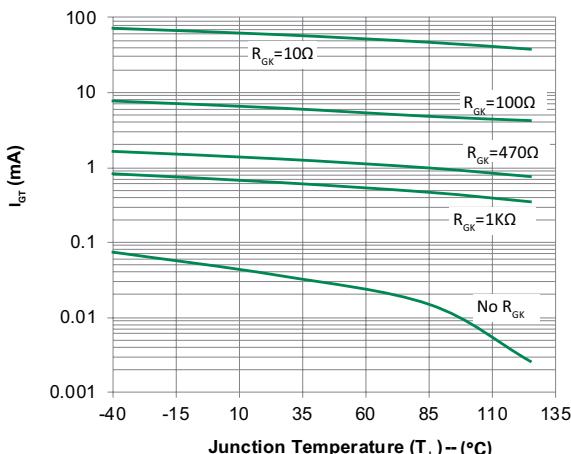
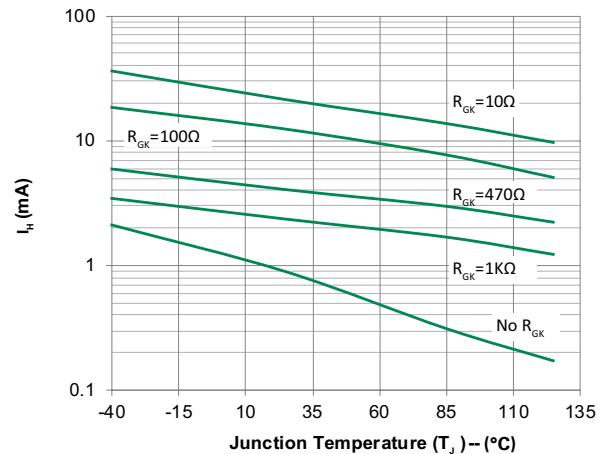
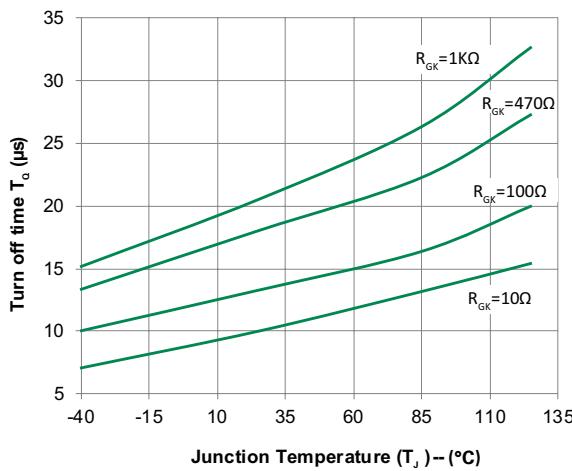
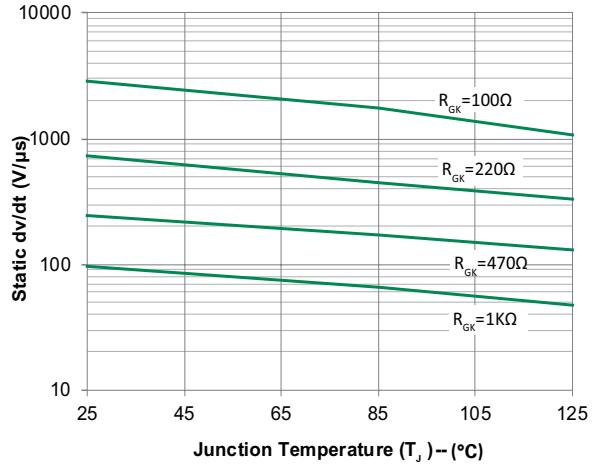


Figure 6: Surge Peak On-State Current vs. Number of Cycles



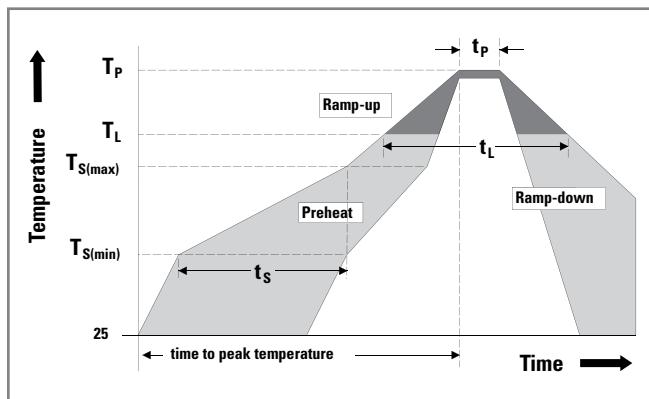
Supply Frequency: 60Hz Sinusoidal
Load: Resistive
RMS On-State Current [$I_{T(RMS)}$]: Max Rated Value at Specific Case Temperature

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.

Figure 7: Typical DC Gate Trigger Current with R_{GK} vs. Junction Temperature

Figure 8: Typical DC Holding Current with R_{GK} vs. Junction Temperature

Figure 9: Typical turn off time with R_{GK} vs. Junction Temperature

Figure 10: Typical Static dv/dt with RGK vs. Junction Temperature


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

Environmental Specifications

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

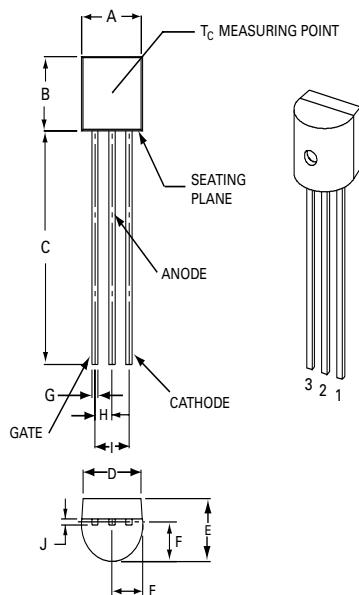
Design Considerations

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.

Thyristors

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Dimensions



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.175	0.205	4.450	5.200
B	0.170	0.210	4.320	5.330
C	0.500	—	12.700	—
D	0.135	—	3.430	—
E	0.125	0.165	3.180	4.190
F	0.080	0.105	2.040	2.660
G	0.016	0.021	0.407	0.533
H	0.045	0.055	1.150	1.390
I	0.095	0.105	2.420	2.660
J	0.015	0.020	0.380	0.500

Packing Options

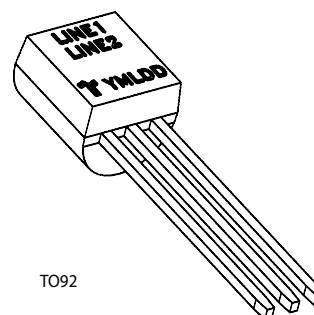
Part Number	Marking	Weight	Packing Mode	Base Quantity
S602ECS	S602ECS	0.170 g	Bulk	2500
S602ECSAP	S602ECS	0.170 g	Ammo Pack	2000
S602ECSR	S602ECS	0.170 g	Tape & Reel	2000

Part Numbering System

S602EC S xx

- SCR SERIES**
- VOLTAGE**
6: 600V
- CURRENT**
02: 1.5A
- PACKING TYPE**
Blank: Bulk
RP: Reel Pack
AP: Ammo Pack
- SENSITIVITY**
S: 100µA Sensitive SCR
- PACKAGE TYPE**
EC: TO-92

Part Marking System



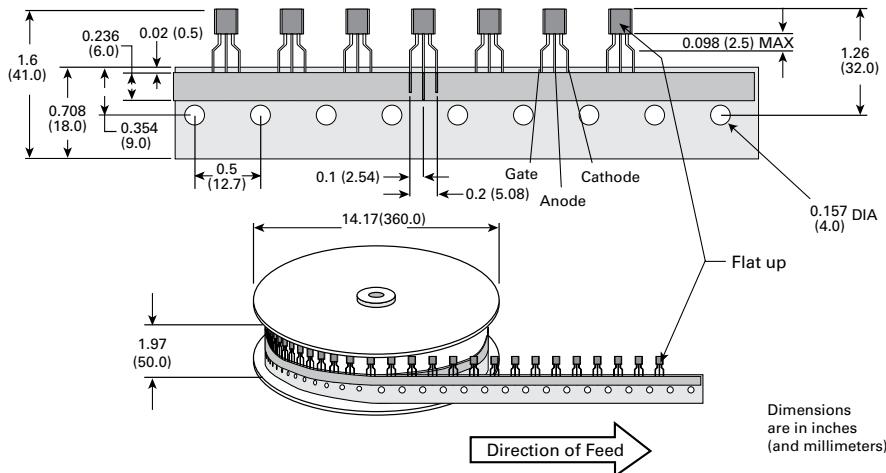
TO92

Thyristors

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TO-92 (3-lead) Reel Pack (RP) Radial Leaded Specifications

Meets all EIA-468-C Standards



TO-92 (3-lead) Ammo Pack (AP) Radial Leaded Specifications

Meets all EIA-468-C Standards

