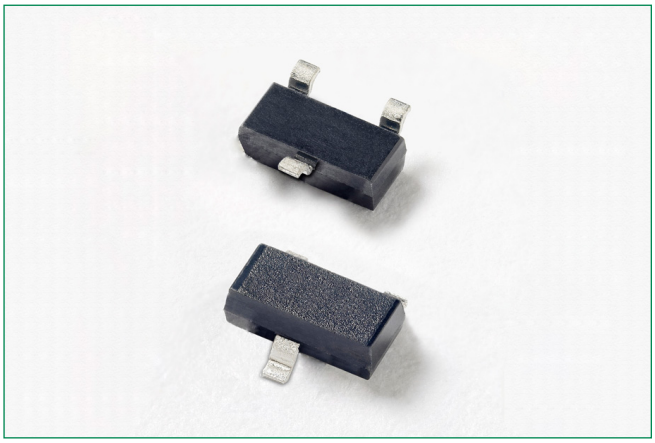
SxX8BBS Series

EV Series 0.8 Amp Sensitive SCRs

HF RoHS



Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	0.8	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	200	µA

Description

This new sensitive SCR component series offers 600V V_{DRM} and 0.8A $I_{T(RMS)}$ capability in the smallest package size in the industry, SOT23. It is specifically designed for GFCI (Ground Fault Circuit Interrupter) applications. All SCRs junctions are glass-passivated to ensure long term reliability and parametric stability.

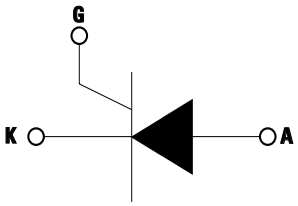
Features

- Very compact SOT23 SMT package
- Surge current capability up to 12A @ 60Hz
- Blocking voltage (V_{DRM}/V_{RRM}) capability - up to 600V
- High dv/dt noise immunity
- Improved turn-off time (t_q) < 25 µsec
- Sensitive gate for direct microprocessor interface
- RoHS compliant and Halogen-Free

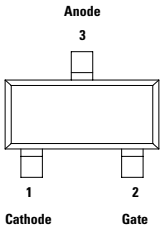
Applications

The SxX8BBS series is specifically designed for GFCI (Ground Fault Circuit Interrupter) and applications.

Schematic Symbol



Pin out



Absolute Maximum Ratings

Symbol	Parameter			Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	Pw=100µs		700	V
$I_{T(RMS)}$	RMS on-state current (full sine wave)		T_C = 80°C	0.8	A
$I_{T(AV)}$	Average on-state current		T_C = 80°C	0.51	A
I_{TSM}	Non repetitive surge peak on-state current (Single cycle, T_J initial = 25°C)		f= 50Hz	10	A
			f= 60Hz	12	A
I^2t	I^2t Value for fusing	t_p = 10 ms	f= 50 Hz	0.5	A^2s
		t_p = 8.3 ms	f= 60 Hz	0.6	A^2s
di/dt	Critical rate of rise of on-state current I_G = 10mA	60 Hz	T_J = 125°C	80	A/µs
I_{GM}	Peak Gate Current	t_p = 20 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	Limit	Value	Unit
I_{GT}	DC Gate Trigger Current	V_D = 6V, R_L = 100 Ω	MIN.	50	µA
			MAX.	200	µA
V_{GT}	DC Gate Trigger Voltage	V_D = 6V, R_L = 100 Ω	MAX.	0.8	V
V_{GRM}	Peak Reverse Gate Voltage	I_{RG} = 10µA	MIN.	8	V
I_H	Holding Current	Initial Current = 20mA	MAX.	10	mA
(dv/dt)s	Critical Rate-of-Rise of Off-State Voltage	T_J = 125°C V_D = 67%V_{DRM} /V_{RRM} Exp. Waveform, R_{GK} =1 kΩ	MIN.	50	V/µs
V_{GD}	Gate Non-Trigger Voltage	V_D = V_{DRM}, R_{GK} =1 kΩ T_J = 125°C	MIN.	0.2	V
t_q	Turn-Off Time	I_T=0.5A	MAX.	25	µs
t_{gt}	Turn-On Time	I_G=10mA,Pw= 15µsec, I_T = 1.6A(pk)	TYP.	2.0	µs

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

Symbol	Description	Test Conditions	Limit	Value	Unit
V_{TM}	Peak On-State Voltage	I_{TM} = 1.6A (pk)	MAX.	1.70	V
I_{DRM}/I_{RRM}	V_{DRM}/V_{RRM}	T_J = 25°C	MAX.	5	µA
		T_J = 125°C	MAX.	100	µA

Thermal Resistances

Symbol	Description	Value	Unit
$R_{\Theta(JC)}$	Junction to case (AC)	45	°C/W
$R_{\Theta(J-A)}$	Junction to ambient	220	°C/W

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

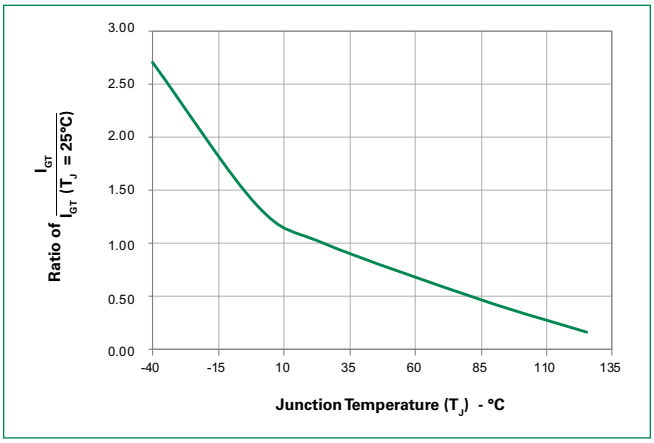

Figure 2:
Normalized DC Holding Current vs. Junction Temperature

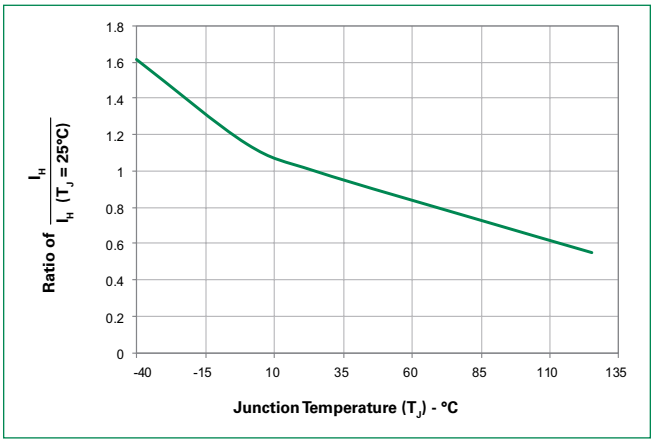

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Figure 3:
Normalized DC Gate Trigger Voltage vs. Junction Temperature

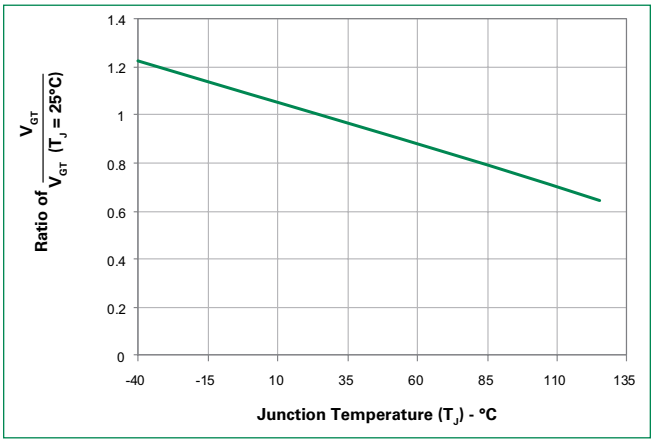


Figure 4:
On-State Current vs. On-State Voltage (Typical)

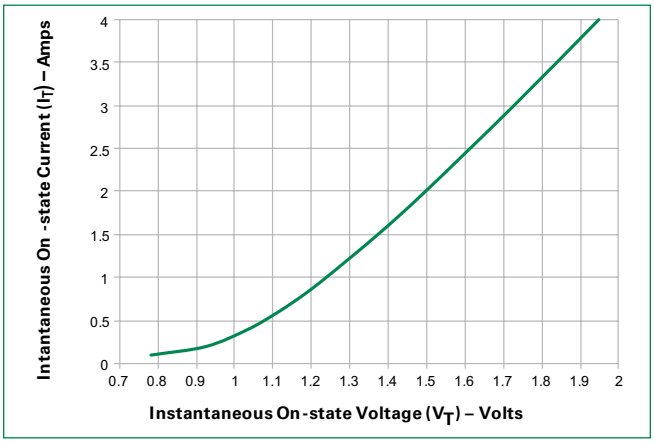


Figure 5:
Power Dissipation (Typical) vs. RMS On-State Current

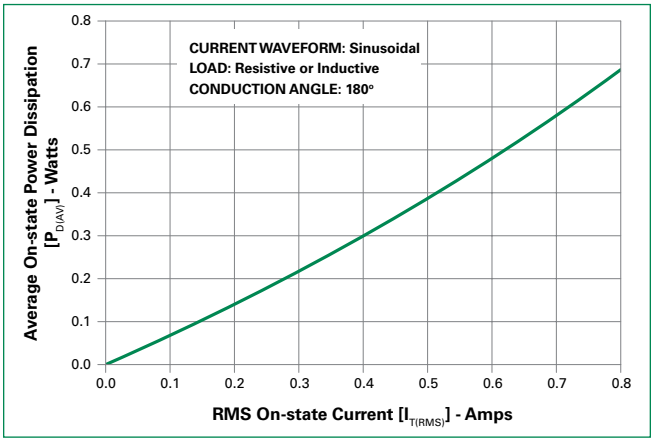


Figure 6:
Maximum Allowable Case Temperature vs. On-State Current

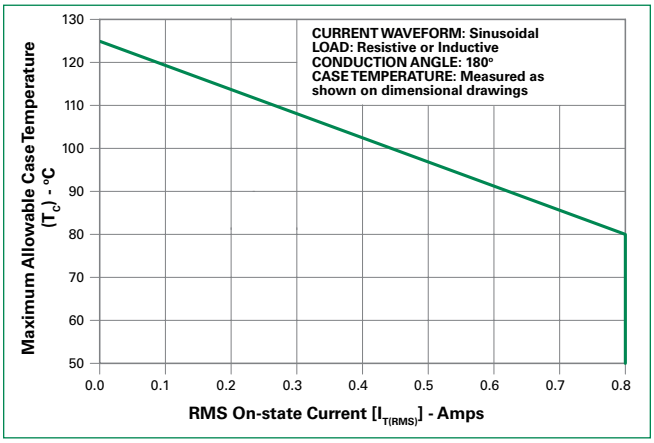
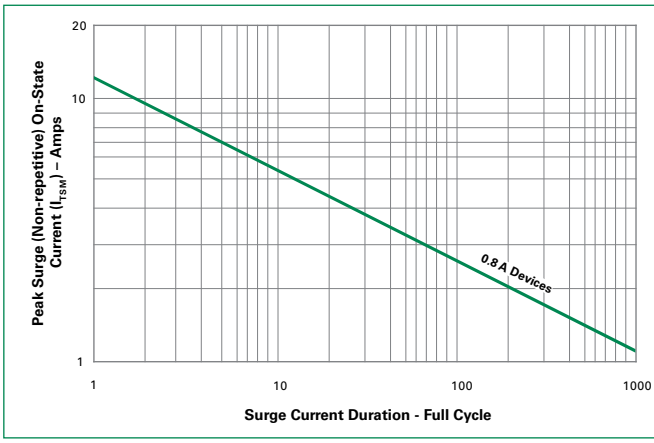


Figure 7: Surge Peak On-State Current vs. Number of Cycles



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.

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Figure 8:
Static dv/dt vs. RGK vs. Junction Temperature

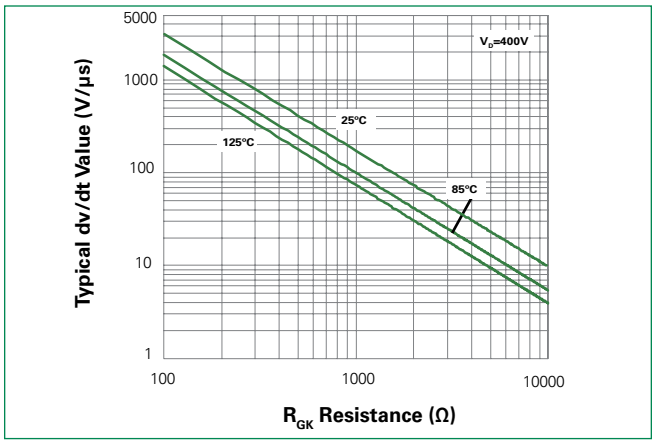
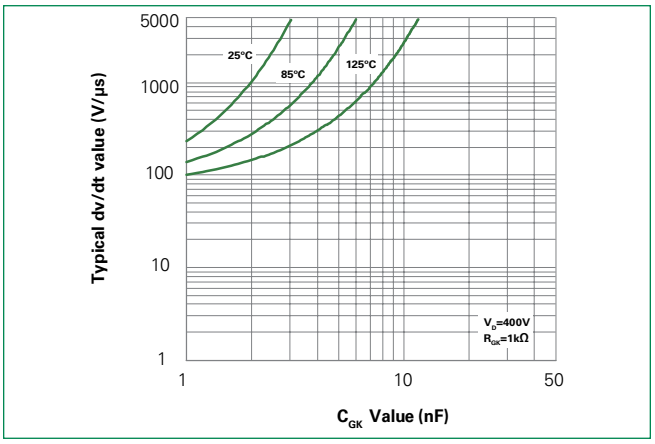
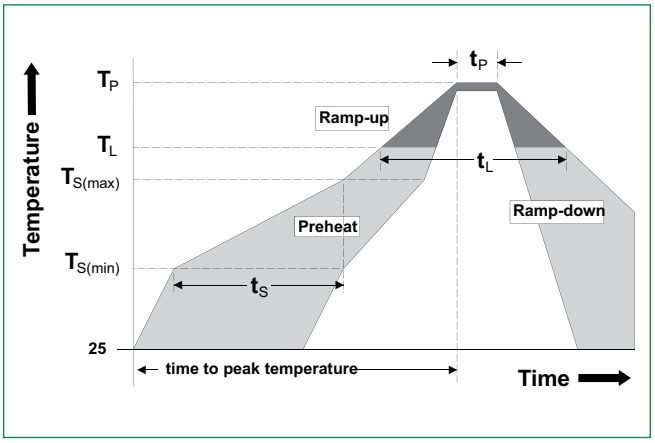


Figure 9:
Static dv/dt vs. CGK vs. Juntion Temperature



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 – 120 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		3°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)		30 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		260°C



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Physical Specifications

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

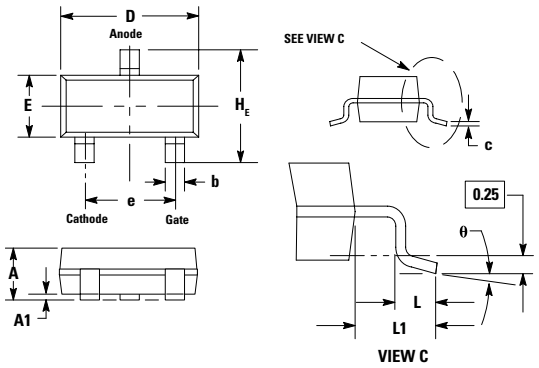
Design Considerations

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.

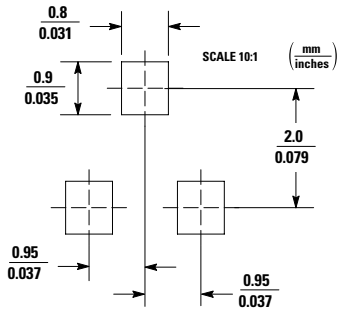
Reliability/Environmental Tests

Test	Specifications and Conditions
HTRB (AC Blocking)	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ V_{DRM} @ 125°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 100 cycles; -55°C to +150°C; 15-min dwell-time
H3TRB	EIA / JEDEC, JESD22-A101 1008 hours; 160V - DC: 85°C; 85% rel humidity
UHAST	ESD22-A118, 96hours, 130°C, 85%RH
Resistance to Solder Heat	MIL-STD-750 Method 2031, 260°C, 10s
Solderability	ANSI/J-STD-002, category 3, Test A
Moisture Sensitivity Level	Level 1, JEDEC-J-STD-020D

Dimensions – SOT-23



SOLDERING FOOTPRINT



Dimensions	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.04	0.04	0.04	0.89	1.02	1.12
A1	0.00	0.00	0.01	0.01	0.10	0.15
b	0.02	0.02	0.02	0.38	0.46	0.51
c	0.00	0.01	0.01	0.08	0.13	0.18
D	0.11	0.11	0.12	2.80	2.90	3.04
E	0.05	0.05	0.06	1.19	1.30	1.40
e	0.07	0.08	0.08	1.78	1.91	2.06
L	0.02	0.02	0.02	0.40	0.49	0.60
L1	0.01	0.02	0.03	0.36	0.53	0.74
H	0.08	0.09	0.10	2.10	2.30	2.64
Θ	0°	-	10°	0°	-	10°

Product Selector

Part Number	Voltage	Gate Sensitivity	Package
	600V		
S6X8BBS	X	200 µA	SOT-23

Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
S6X8BBSRP	6X8	0.01g	Tape & Reel	3000

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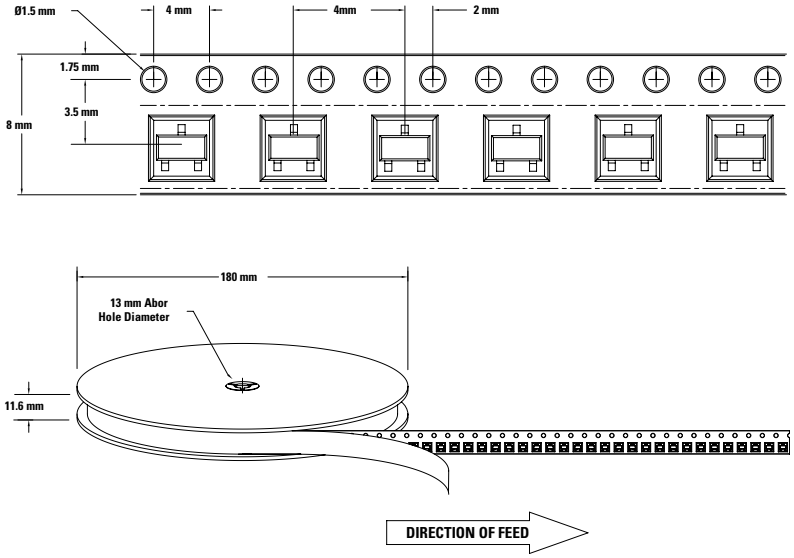
SOT-23 Reel Pack (RP) Specifications

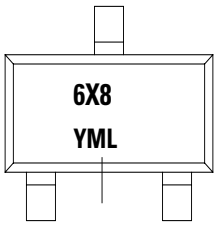


Part Numbering System

S x X8 B B S xx

- **Series** — **S:** SCR
- **Voltage** — **6:** 600V
- **Current** — **X8:** 0.8A
- **Package Type** — BB: SOT-23
- **Sensitivity & Type** — **S:** 200µA Sensitive SCR
- **Packing Type** — **RP:** Reel Pack

Part Marking System



Date Code Marking
Y: Year Code
M: Month Code
L: Location Code

Revised: GD. 08/03/21

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Littelfuse:
S6X8BBSRP