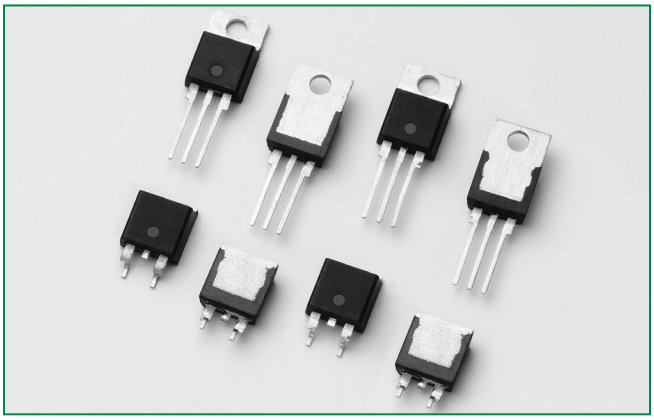
SVxx12xx series

HF RoHS



Description

This SVxx12xx high junction temperature SCR series is ideal for uni-directional switch applications such as phase control in heating, motor speed controls, converters/ rectifiers, inrush current control and capacitive discharge ignitions.

These SCRs have a low gate current trigger level of 6mA, 10mA maximum at approximately 1.5V.

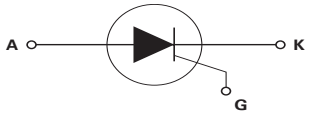
Features & Benefits

- Halogen free and RoHS compliant
- 150°C maximum junction temperature
- Surge capability up to 120 A at 60 Hz half cycle
- High dv/dt performance

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	6 to 10	mA

Schematic Symbol



Applications

Typical applications include AC Generator (ACG) rectifiers, battery voltage regulators and generic converters and inrush current controller in various AC to DC applications. Additional applications include controls for power tools, home/brown good and white goods appliances.

Internally constructed isolated packages offered for ease of heat sinking with high isolation voltage.

Absolute Maximum Ratings

Symbol	Parameter	Test Conditions		Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	PW=100 µs		800	V
$I_{T(RMS)}$	RMS on-state current	SVxx12Lx	T_C = 110°C	12	A
		SVxx12Rx SVxx12Nx	T_C = 135°C		
$I_{T(AV)}$	Average on-state current	SVxx12Lx	T_C = 110°C	7.6	A
		SVxx12Rx SVxx12Nx	T_C = 135°C		
I_{TSM}	Peak non-repetitive surge current (single half cycle, T_J (initial) = 25°C)		f = 50Hz	100	A
			f = 60Hz	120	
I^2t	I^2t Value for fusing		t_p = 8.3 ms	60	A^2s
di/dt	Critical rate of rise of on-state current	f = 60Hz; T_J = 150°C		100	A/µs
I_{GM}	Peak gate current	T_J = 150°C		4	A
$P_{G(AV)}$	Average gate power dissipation	T_J = 150°C		0.8	W
T_{stg}	Storage temperature range			-40 to 150	°C
T_J	Operating junction temperature range			-40 to 150	

Note: xx=voltage/10, x=sensitivity

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

Symbol	Test Conditions		SVxx12x1	SVxx12x2	Unit
I_{GT}	V_D = 12V R_L = 60 Ω	MAX.	6	10	mA
		MIN.	2	5	
V_{GT}	V_D = 12V R_L = 60 Ω	MAX.	1.5	1.5	V
dv/dt	V_D = 67% V_{DRM}; gate open; T_J = 125°C	MIN.	400	800	V/µs
	V_D = 67% V_{DRM}; gate open; T_J = 150°C		200	400	
V_{GD}	V_D = V_{DRM} R_L = 3.3 kΩ T_J = 125°C	MIN.	0.2	0.2	V
I_H	I_T = 200mA (initial)	MAX.	22	35	mA
t_q	I_T = 2A; t_p = 50µs; dv/dt = 5V/µs; di/dt = 30A/µs	MAX.	25	25	µs
t_{gt}	I_G = 2 x I_{GT} PW = 15µs I_T = 24A	TYP.	2.6	2.6	µs

Note: xx=voltage/10, x=package

Static Characteristics

Symbol	Test Conditions			Value	Unit
V_{TM}	Component I_T = 24A; t_p = 380 µs		MAX.	1.6	V
I_{DRM} / I_{RRM}	V_{DRM} = V_{RRM}	T_J = 25°C	MAX.	10	µA
		T_J = 125°C		500	
		T_J = 150°C		2000	

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(JC)}$	Junction to case (AC)	SVxx12Lx	2.5	°C/W
		SVxx12Rx SVxx12Nx	1.1	

Note: xx=voltage/10, x=sensitivity

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

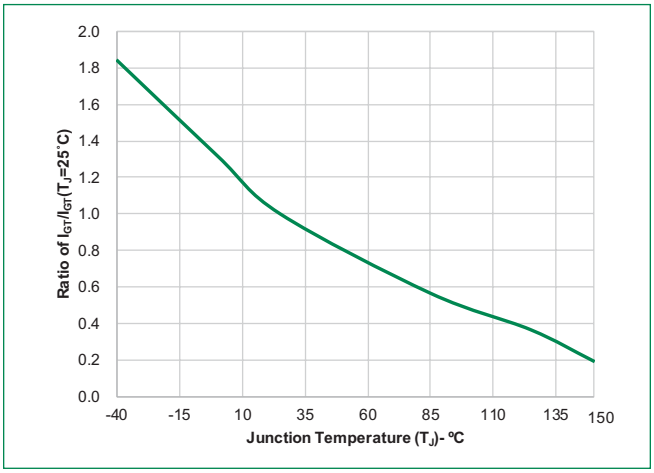

Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature

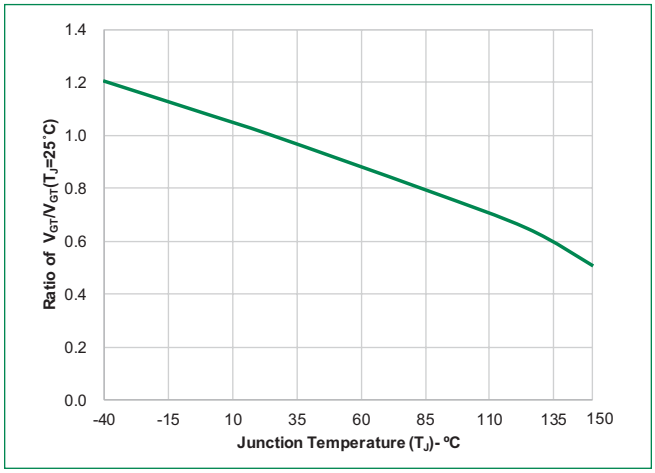

Figure 3: Normalized DC Holding Current vs. Junction Temperature

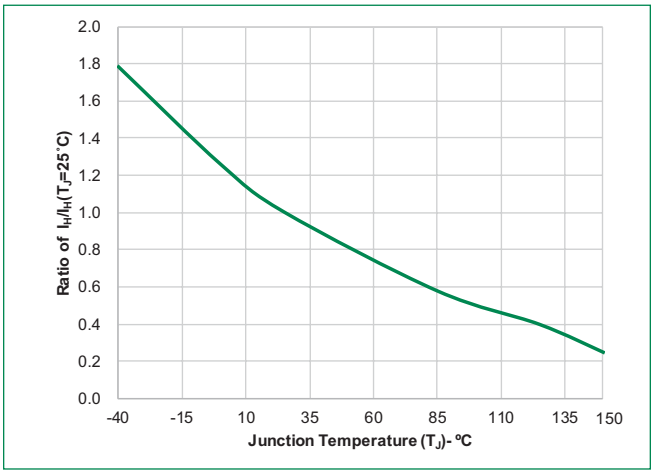

Figure 4: On-State Current vs. On-State Voltage (Typical)

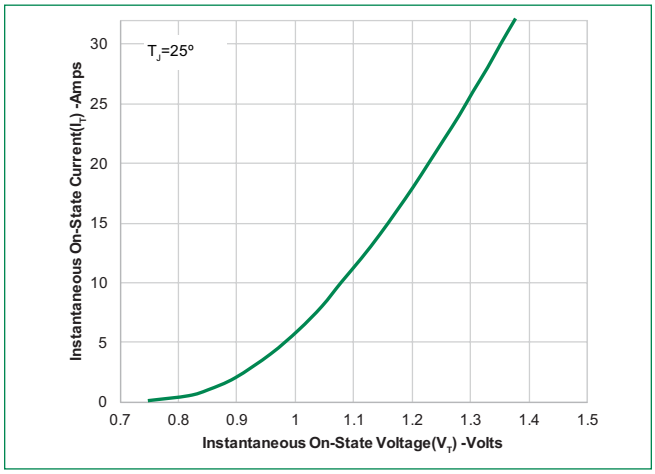

Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

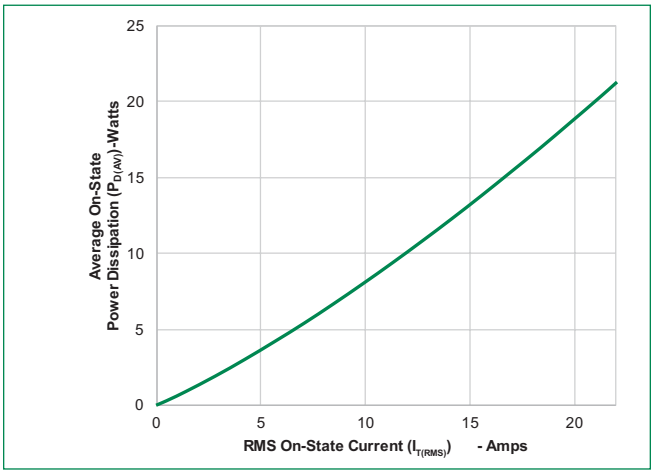

Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current

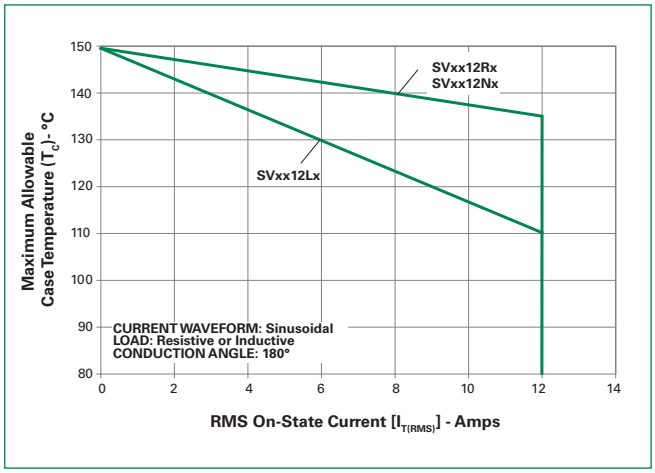

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Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current

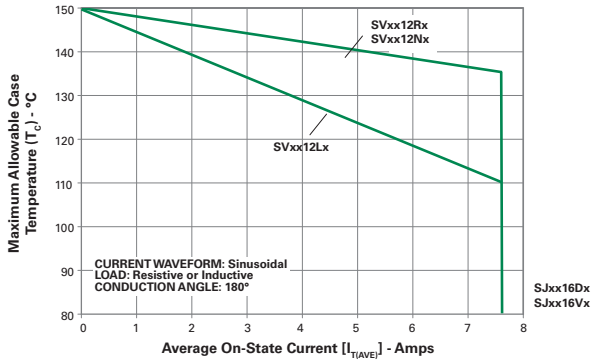


Figure 8: Peak Capacitor Discharge Current

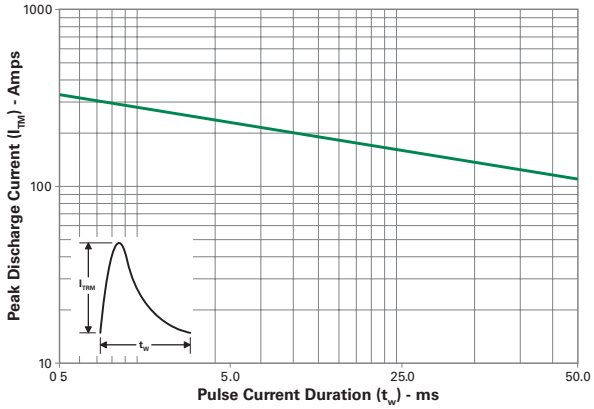


Figure 9: Peak Capacitor Discharge Current Derating

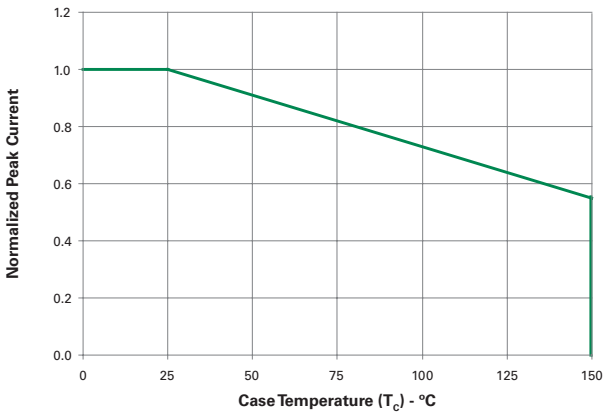
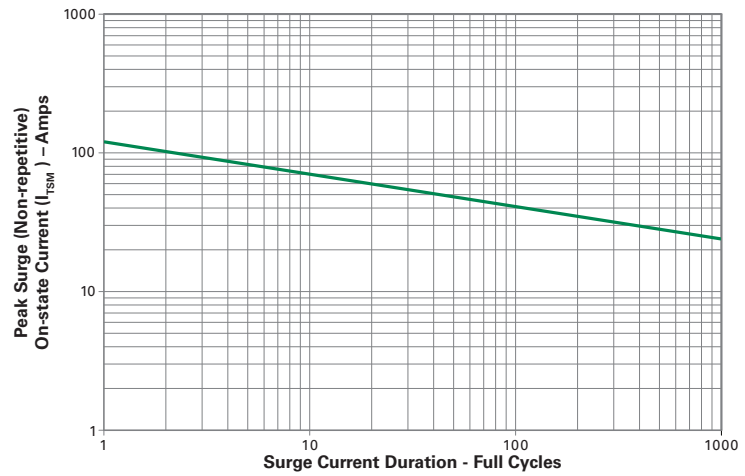


Figure 10: Surge Peak On-State Current vs. Number of Cycles



SUPPLY FREQUENCY: 60 Hz Sinusoidal
LOAD: Resistive
RMS On-State Current: [$I_{T(RMS)}$]: Maximum Rated Value at Specified 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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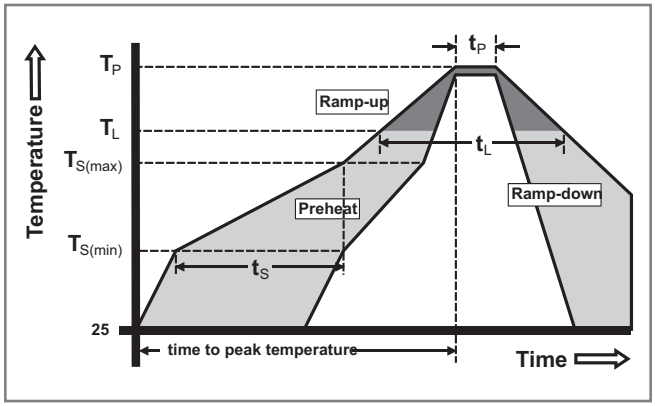
Soldering Parameters

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 (t_L)	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.

Environmental Specifications

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 150°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 100 cycles; -55°C to +150°C; 15-min dwell-time
Temperature/ Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 160V - 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
Moisture Sensitivity Level	Level 1, JEDEC-J-STD-020D

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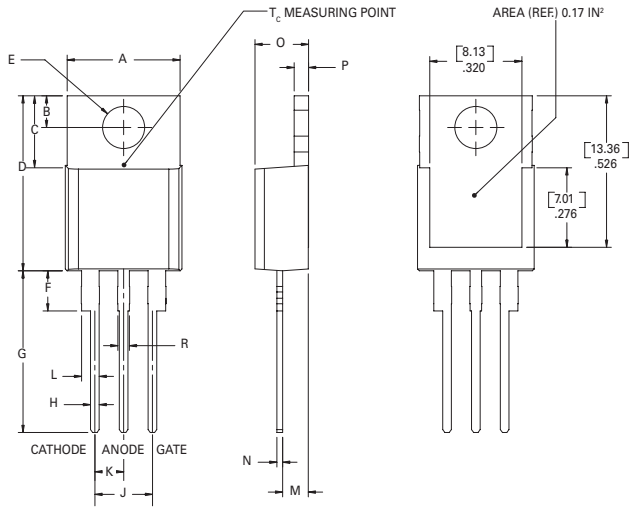
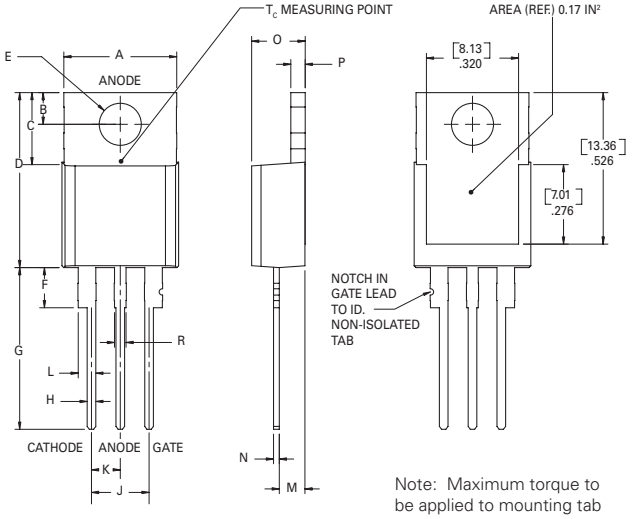
Dimensions — TO-220AB (L-Package) — Isolated Mounting Tab



Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.91
M	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

Dimensions — TO-220AB (R-Package) — Non-Isolated Mounting Tab Common with Center Lead



Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.91
M	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

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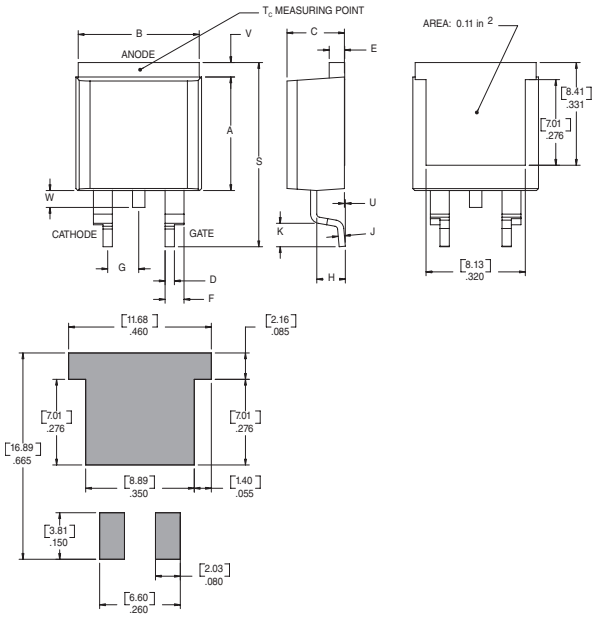
Dimensions — TO- 263AB (N-package) — D²-Pak Surface Mount



Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.360	0.370	9.14	9.40
B	0.380	0.420	9.65	10.67
C	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
E	0.045	0.060	1.14	1.52
F	0.060	0.075	1.52	1.91
G	0.095	0.105	2.41	2.67
H	0.092	0.102	2.34	2.59
J	0.018	0.024	0.46	0.61
K	0.090	0.110	2.29	2.79
S	0.590	0.625	14.99	15.88
V	0.035	0.045	0.89	1.14
U	0.002	0.010	0.05	0.25
W	0.040	0.070	1.02	1.78

Product Selector

Part Number	Voltage	Gate Sensitivity	Type	Package
	600V			
SVxx12L1	X	6mA	Standard SCR	TO-220L
SVxx12R1	X	6mA	Standard SCR	TO-220R
SVxx12N1	X	6mA	Standard SCR	TO-263
SVxx12L2	X	10mA	Standard SCR	TO-220L
SVxx12R2	X	10mA	Standard SCR	TO-220R
SVxx12N2	X	10mA	Standard SCR	TO-263

Note: xx = Voltage/10

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