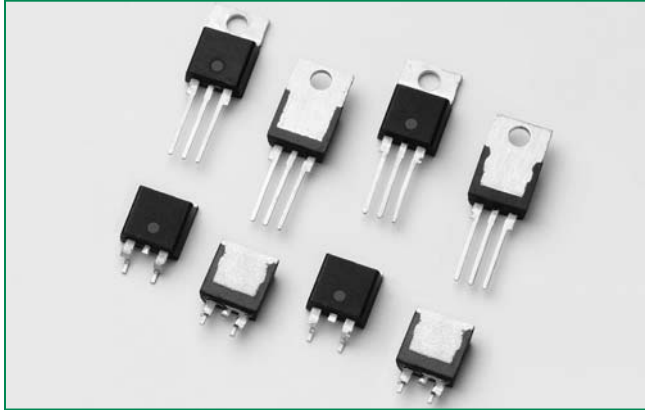


RoHS Sxx15x & Sxx16x Series



Description

Excellent unidirectional switches for phase control applications such as heating and motor speed controls. Standard phase control SCRs are triggered with few milliamperes of current at less than 1.5V potential.

Features & Benefits

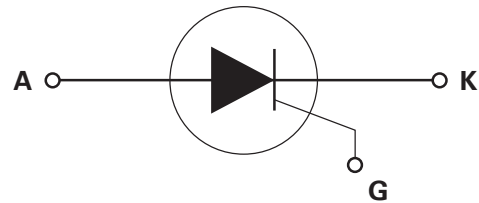
- RoHS compliant
- Glass – passivated junctions
- Voltage capability up to 1000 V
- Surge capability up to 225 A

Applications

Typical applications are capacitive discharge systems for strobe lights, nailers, staplers and gas engine ignition. Also controls for power tools, home/brown goods and white goods appliances.

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

Schematic Symbol



Agency Approval

Agency	Agency File Number
	L Package: E71639

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	15 & 16	A
V_{DRM}/V_{RRM}	400 to 1000	V
I_{GT}	30	mA

Absolute Maximum Ratings – Standard SCRs

Symbol	Parameter	Test Conditions	Value	Unit
$I_{T(RMS)}$	RMS on-state current	Sxx15L $T_c = 90^\circ\text{C}$	15	A
		Sxx16R Sxx16N $T_c = 110^\circ\text{C}$	16	
I_{TSM}	Peak non-repetitive surge current	single half cycle; $f = 50\text{Hz}$; T_j (initial) = 25°C	188	A
		single half cycle; $f = 60\text{Hz}$; T_j (initial) = 25°C	225	
I^2t	I^2t Value for fusing	$t_p = 8.3 \text{ ms}$	210	A^2s
di/dt	Critical rate of rise of on-state current	$f = 60 \text{ Hz}$; $T_j = 125^\circ\text{C}$	125	$\text{A}/\mu\text{s}$
I_{GM}	Peak gate current	$T_j = 125^\circ\text{C}$	3	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125^\circ\text{C}$	0.6	W
T_{stg}	Storage temperature range		-40 to 150	$^\circ\text{C}$
T_j	Operating junction temperature range		-40 to 125	$^\circ\text{C}$

Note: xx = voltage

15/16A SCRs

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

Symbol	Test Conditions	Value		Unit
		Sxx15x	Sxx16x	
I_{GT}	$V_D = 12\text{V}; R_L = 60\ \Omega$	MAX.	30	mA
		MIN.	1	
V_{GT}		MAX.	1.5	V
dv/dt	$V_D = V_{DRM}$; gate open; $T_J = 100^\circ\text{C}$	400V	450	V/ μs
		600V	425	
		800V	400	
	$V_D = V_{DRM}$; gate open; $T_J = 125^\circ\text{C}$	1000V	200	
		400V	350	
		600V	325	
	800V	300		
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3\ \text{k}\Omega$ $T_J = 110^\circ\text{C}$	MIN.	0.2	V
I_H	$I_T = 20\text{mA}$ (initial)	MAX.	40	mA
t_q	$I_T=2\text{A}; t_p=50\mu\text{s}; dv/dt=5\text{V}/\mu\text{s}; di/dt=-30\text{A}/\mu\text{s}$	MAX.	35	μs
t_{gt}	$I_G = 2 \times I_{GT}$ $\text{PW} = 15\mu\text{s}$ $I_T = 12\text{A}$	TYP.	2	μs

Note: xx = voltage, x = package
(1) $I_T=2\text{A}; t_p=50\mu\text{s}; dv/dt=5\text{V}/\mu\text{s}; di/dt=-30\text{A}/\mu\text{s}$

Static Characteristics

Symbol	Test Conditions		Value	Unit
V_{TM}	15A Device $I_T = 30\text{A}; t_p = 380\ \mu\text{s}$		MAX.	1.6
	16A Device $I_T = 32\text{A}; t_p = 380\ \mu\text{s}$			
I_{DRM} / I_{RRM}	$V_{DRM} = V_{RRM}$	$T_J = 25^\circ\text{C}$	400 - 600V	10
			800 - 1000V	20
		$T_J = 100^\circ\text{C}$	400 - 600V	500
			800V	1000
			1000V	3000
		$T_J = 125^\circ\text{C}$	400 - 600V	1000
			800V	2000

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	Sxx16R/ Sxx16N	1.1
		Sxx15L	2.5
$R_{\theta(J-A)}$	Junction to ambient	Sxx16R	40
		Sxx15L	50

Note: xx = voltage

Physical Specifications

Terminal Finish	100% Matte Tin-plated
Body Material	UL recognized epoxy meeting flammability classification 94V-0
Lead Material	Copper Alloy

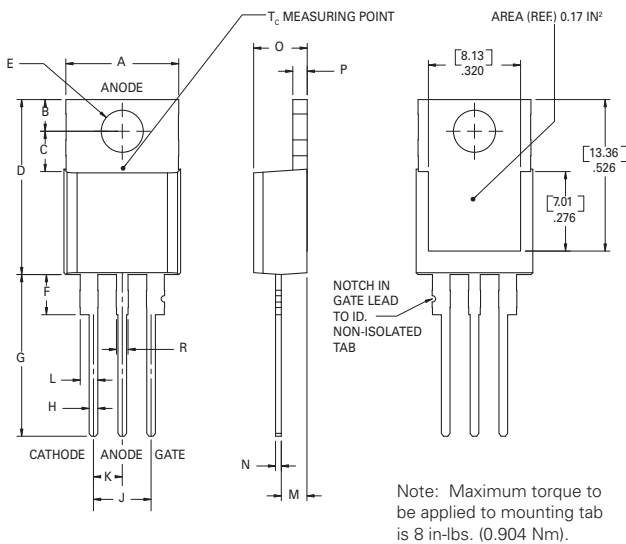
Design Considerations

Careful selection of the correct device 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 device 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 @ 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
Thermal Shock	MIL-STD-750, M-1056 10 cycles; 0°C to 100°C; 5-min dwell-time at each temperature; 10 sec (max) transfer time between temperature
Autoclave	EIA / JEDEC, JESD22-A102 168 hours (121°C at 2 ATMs) and 100% R/H
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

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



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

Product Selector

Part Number	Voltage				Gate Sensitivity	Type	Package
	400V	600V	800V	1000V			
Sxx15L	X	X	X	X	30mA	Standard SCR	TO-220L
Sxx16R	X	X	X	X	30mA	Standard SCR	TO-220R
Sxx16N	X	X	X	X	30mA	Standard SCR	TO-263

Note: xx = Voltage

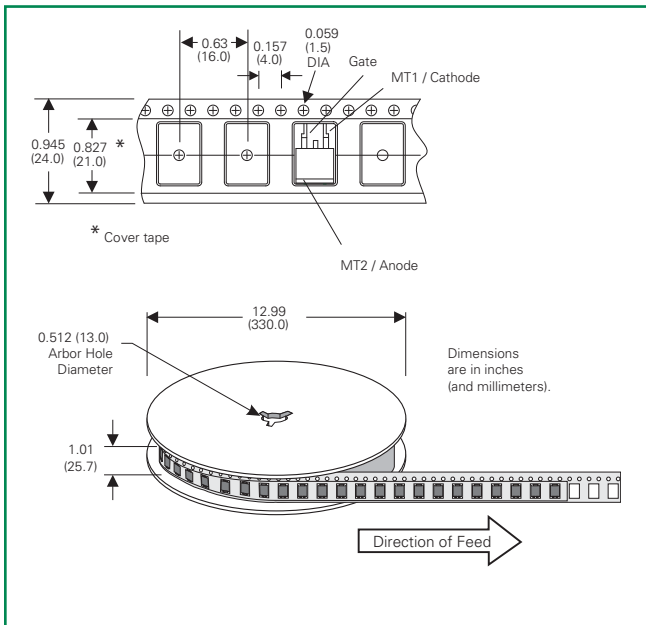
Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Sxx15L	Sxx15L	2.2 g	Bulk	500
Sxx15LTP	Sxx15L	2.2 g	Tube	500
Sxx16R	Sxx16R	2.2 g	Bulk	500
Sxx16RTP	Sxx16R	2.2 g	Tube	500
Sxx16NTP	Sxx16N	1.6 g	Tube	500
Sxx16NRP	Sxx16N	1.6 g	Embossed Carrier	500

Note: xx = Voltage

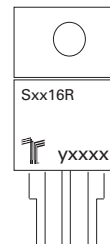
TO-263 Embossed Carrier Reel Pack (RP) Specs

Meets all EIA-481-2 Standards



Part Marking System

TO-220 AB (R, and L Packages)
 TO-263 AA (N Package)



Part Numbering System

