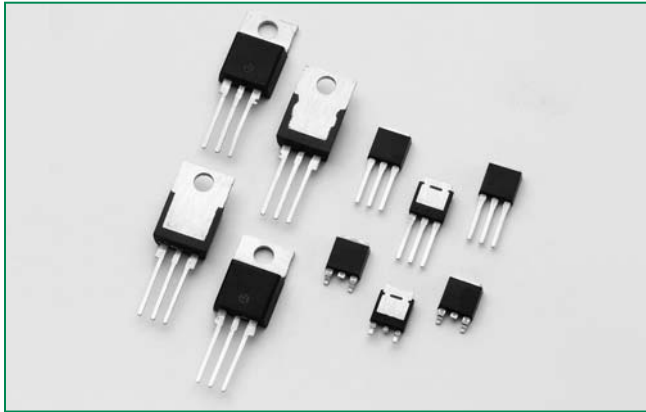


**RoHS** **Sxx12x Series**



**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.

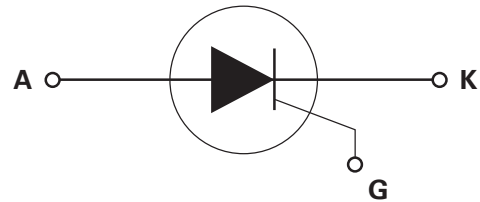
**Features & Benefits**

- RoHS compliant
- Glass – passivated junctions
- Voltage capability up to 1000 V
- Surge capability up to 120 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.

**Schematic Symbol**



**Main Features**

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
$V_{DRM}/V_{RRM}$	400 to 1000	V
$I_{GT}$	20	mA

**Absolute Maximum Ratings**

Symbol	Parameter	Test Conditions		Value	Unit
		Sxx12R Sxx12D Sxx12V	$T_c = 105^\circ\text{C}$		
$I_{T(RMS)}$	RMS on-state current			12	A
$I_{TSM}$	Peak non-repetitive surge current	single half cycle; $f = 50\text{Hz}$ ; $T_j$ (initial) = $25^\circ\text{C}$		100	A
		single half cycle; $f = 60\text{Hz}$ ; $T_j$ (initial) = $25^\circ\text{C}$		120	
$I^2t$	$I^2t$ Value for fusing	$t_p = 8.3 \text{ ms}$		60	$\text{A}^2\text{s}$
$di/dt$	Critical rate of rise of on-state current	$f = 60\text{Hz}$ ; $T_j = 125^\circ\text{C}$		100	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current	$T_j = 125^\circ\text{C}$		2	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125^\circ\text{C}$		0.5	W
$T_{stg}$	Storage temperature range			-40 to 150	$^\circ\text{C}$
$T_j$	Operating junction temperature range			-40 to 125	

Note: xx = voltage

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

Symbol	Test Conditions		Value	Unit	
$I_{GT}$	$V_D = 12V$ $R_L = 60 \Omega$		MAX.	20	mA
$V_{GT}$			MIN.	1	
				MAX.	1.5
dv/dt	$V_D = V_{DRM}$ ; gate open; $T_J = 100^\circ\text{C}$	400V	MIN.	350	V/ $\mu\text{s}$
		600V		300	
		800V		250	
		1000V		100	
	$V_D = V_{DRM}$ ; gate open; $T_J = 125^\circ\text{C}$	400V		250	
		600V		225	
800V		200			
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3 \text{ k}\Omega$ $T_J = 125^\circ\text{C}$		MIN.	0.2	V
$I_H$	$I_T = 200\text{mA}$ (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	$\mu\text{s}$
$t_{gt}$	$I_G = 2 \times I_{GT}$ $PW = 15\mu\text{s}$ $I_T = 20\text{A}$		TYP.	2	$\mu\text{s}$

**Static Characteristics**

Symbol	Test Conditions		Value	Unit		
$V_{TM}$	$I_T = 24\text{A}$ ; $t_p = 380 \mu\text{s}$		MAX.	1.6	V	
$I_{DRM} / I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_J = 25^\circ\text{C}$	400 – 600V	MAX.	10	$\mu\text{A}$
			800 – 1000V		20	
		$T_J = 100^\circ\text{C}$	400 – 800V		500	
			1000V		3000	
		$T_J = 125^\circ\text{C}$	400 – 800V		1000	

**Thermal Resistances**

Symbol	Parameter		Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	Sxx12R	1.5	$^\circ\text{C}/\text{W}$
		Sxx12V	1.6	
		Sxx12D	1.4	
$R_{\theta(J-A)}$	Junction to ambient	Sxx12R	40	$^\circ\text{C}/\text{W}$
		Sxx12V	70	

Note: xx = voltage

**Physical Specifications**

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

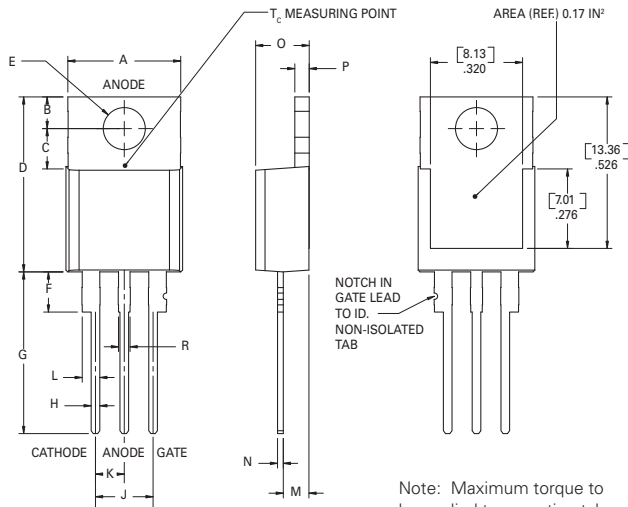
**Design Considerations**

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
<b>AC Blocking</b>	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°C for 1008 hours
<b>Temperature Cycling</b>	MIL-STD-750, M-1051, 100 cycles; -40°C to +150°C; 15-min dwell-time
<b>Temperature/Humidity</b>	EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC: 85°C; 85% rel humidity
<b>High Temp Storage</b>	MIL-STD-750, M-1031, 1008 hours; 150°C
<b>Low-Temp Storage</b>	1008 hours; -40°C
<b>Thermal Shock</b>	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
<b>Autoclave</b>	EIA / JEDEC, JESD22-A102 168 hours (121°C at 2 ATMs) and 100% R/H
<b>Resistance to Solder Heat</b>	MIL-STD-750 Method 2031
<b>Solderability</b>	ANSI/J-STD-002, category 3, Test A
<b>Lead Bend</b>	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			
Sxx12R	X	X	X	X	20mA	Sensitive SCR	TO-220R
Sxx12V	X	X	X	X	20mA	Standard SCR	TO-251
Sxx12D	X	X	X	X	20mA	Standard SCR	TO-252

Note: xx = voltage

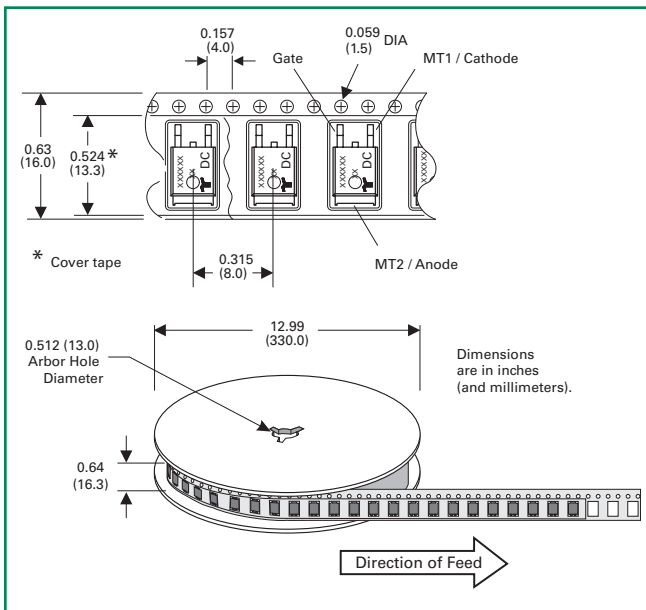
## Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Sxx12R	Sxx12R	2.2 g	Bulk	500
Sxx12RTP	Sxx12R	2.2 g	Tube	500
Sxx12DTP	Sxx12D	0.3 g	Tube	750
Sxx12DRP	Sxx12D	0.3 g	Embossed Carrier	2500
Sxx12VTP	Sxx12V	0.4 g	Tube	750

Note: xx = Voltage

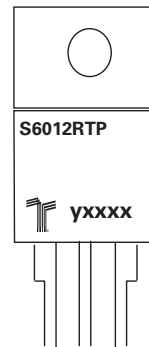
## TO-252 Embossed Carrier Reel Pack (RP) Specifications

### Meets all EIA-481-2 Standards



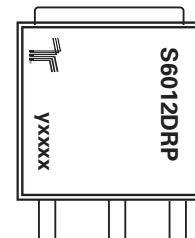
## Part Marking System

### TO-220AB (R Package)



### TO-251AA – (V Package)

### TO-252AA – (D Package)



## Part Numbering System

