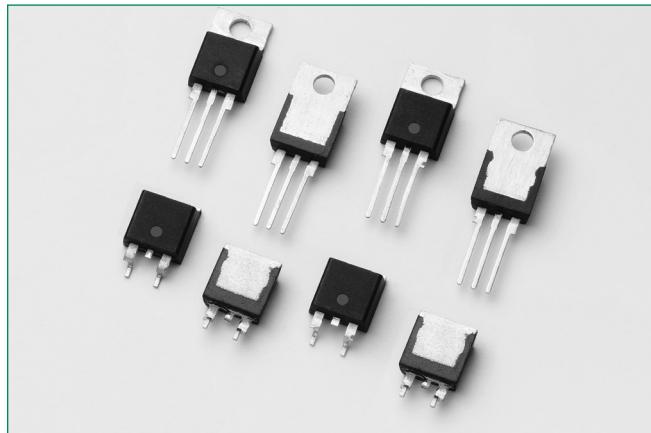
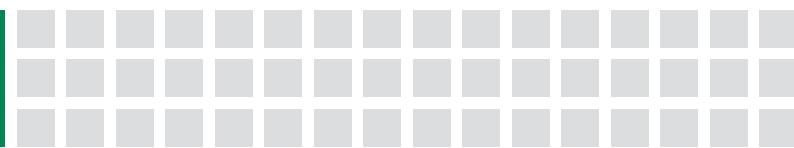


**SVxx16xxQ series**

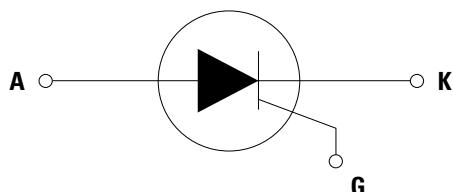
16 Amp High Junction Temperature SCRs

**Agency Approval**

Agency	Agency File Number
	L Packages: E71639

**Main Features**

Symbol	Value	Unit
$I_{T(RMS)}$	16	A
$V_{DRM}/V_{RRM}$	600	V
$I_{GT}$	6 to 10	mA

**Schematic Symbol****Description**

The SVxx16xxQ high junction temperature SCR series are ideal for uni-directional switch applications such as phase control in heating, motor speed controls, converters/rectifiers and inrush current controllers.

These SCRs have a low gate current, (IGT) trigger level of 6mA and 10mA maximum at approximately 1.5V for SVxx16x1Q and SVxx16x2Q, respectively.

**Features & Benefits**

- Halogen free and RoHS compliant
- 150°C maximum junction temperature
- Surge capability up to 225A at 60 Hz half cycle
- High dv/dt performance
- Low turn off time
- UL Recognized to UL 1557 as an Electrically Isolated Semiconductor Device

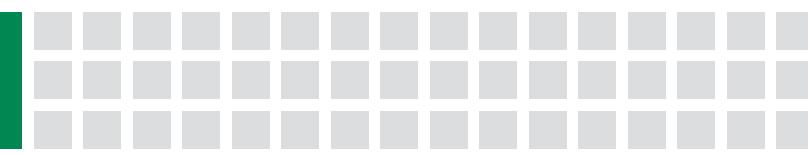
**Applications**

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

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

**SVxx16xxQ series**

16 Amp High Junction Temperature SCRs

**Absolute Maximum Ratings — Standard SCRs**

Symbol	Parameter	Test Conditions		Value	Unit
$V_{DSM}/V_{RSM}$	Peak non-repetitive blocking voltage	$P_W = 100 \mu\text{s}$		800	V
$I_{T(RMS)}$	RMS on-state current	$SVxx16LxQ$	$T_c = 110^\circ\text{C}$	16	A
		$SVxx16RxQ$ $SVxx16NxQ$	$T_c = 135^\circ\text{C}$	16	
$I_{T(AV)}$	Average on-state current	$SVxx16LxQ$	$T_c = 110^\circ\text{C}$	10.2	A
		$SVxx16RxQ$ $SVxx16NxQ$	$T_c = 135^\circ\text{C}$	10.2	
$I_{TSM}$	Peak non-repetitive surge current	single half cycle; $f = 50\text{Hz}$ ; $T_j(\text{initial}) = 25^\circ\text{C}$		188	A
		single half cycle; $f = 60\text{Hz}$ ; $T_j(\text{initial}) = 25^\circ\text{C}$		225	
$I^2t$	$I^2t$ Value for fusing	$t_p = 8.3 \text{ ms}$		210	$\text{A}^2\text{s}$
$dI/dt$	Critical rate of rise of on-state current	$f = 60 \text{ Hz}; T_j = 150^\circ\text{C}$		100	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current	$T_j = 150^\circ\text{C}$		4	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 150^\circ\text{C}$		0.8	W
$T_{stg}$	Storage temperature range			-40 to 150	$^\circ\text{C}$
$T_j$	Operating junction temperature range			-40 to 150	$^\circ\text{C}$

Note: xx=voltage/10, x=sensitivity

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

Symbol	Test Conditions		$SVxx16x1Q$	$SVxx16x2Q$	Unit	
$I_{GT}$	$V_D = 12\text{V}; R_L = 60 \Omega$	MIN.	2	5	mA	
		MAX.	6	10		
$V_{GT}$	$V_D = 67\% V_{DRM}$ ; gate open; $T_j = 125^\circ\text{C}$	MAX.	1.5	1.5	V	
		MIN.	400	800		
$dv/dt$	$V_D = 67\% V_{DRM}$ ; gate open; $T_j = 150^\circ\text{C}$		200	400	$\text{V}/\mu\text{s}$	
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3 \text{ k}\Omega$ $T_j = 150^\circ\text{C}$	MIN.	0.2	0.2	V	
$I_H$	$I_T = 200\text{mA}$ (initial)	MAX.	25	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.	12	12	$\mu\text{s}$	
$t_{gt}$	$I_G = 2 \times I_{GT}$ $P_W = 15\mu\text{s}$ $I_T = 32\text{A}$	TYP.	2.6	2.6	$\mu\text{s}$	

Note: xx=voltage/10, x=package

**Static Characteristics**

Symbol	Test Conditions		Value	Unit
$V_{TM}$	$I_T = 32\text{A}$ ; $t_p = 380 \mu\text{s}$	MAX.	1.7	V
			10	$\mu\text{A}$
		MAX.	1000	
			3000	

**Thermal Resistances**

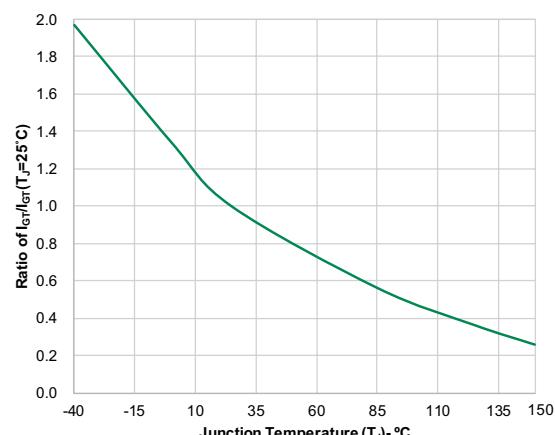
Symbol	Parameter		Value	Unit
$R_{\Theta(JC)}$	Junction to case (AC)	$SVxx16RxQ$ $SVxx16NxQ$ $SVxx16LxQ$	1.0 2.5	$^\circ\text{C}/\text{W}$

Note: xx=voltage/10, x=sensitivity

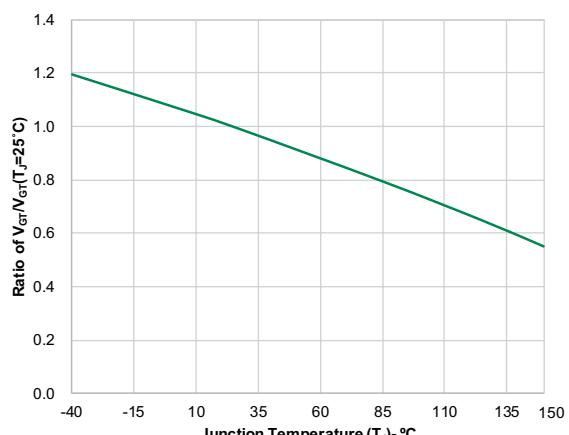
# SVxx16xxQ series

## 16 Amp High Junction Temperature SCRs

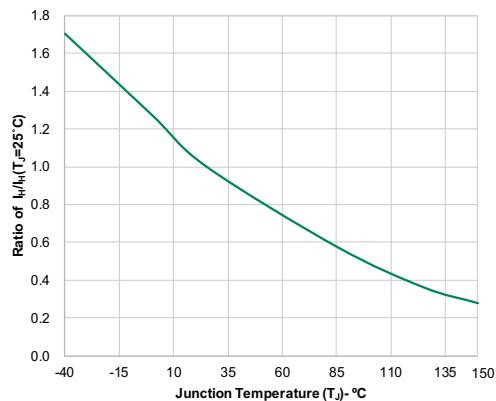
**Figure 1: Normalized DC Gate Trigger Current vs. Junction Temperature**



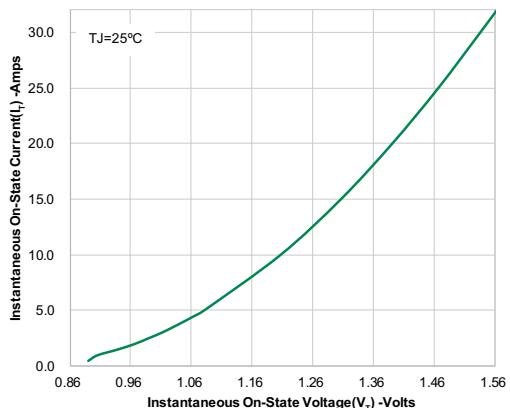
**Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature**



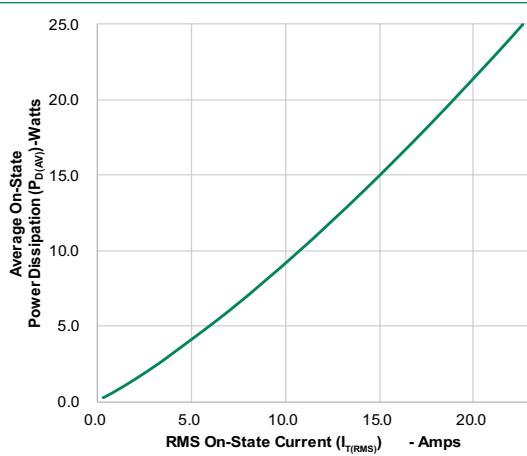
**Figure 3: Normalized DC Holding Current vs. Junction Temperature**



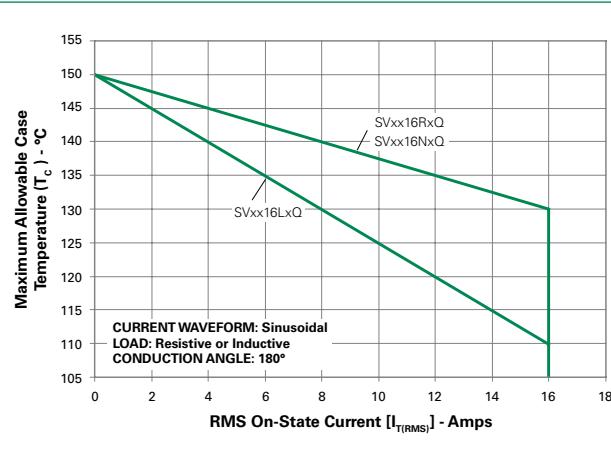
**Figure 4: On-State Current vs. On-State Voltage (Typical)**



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



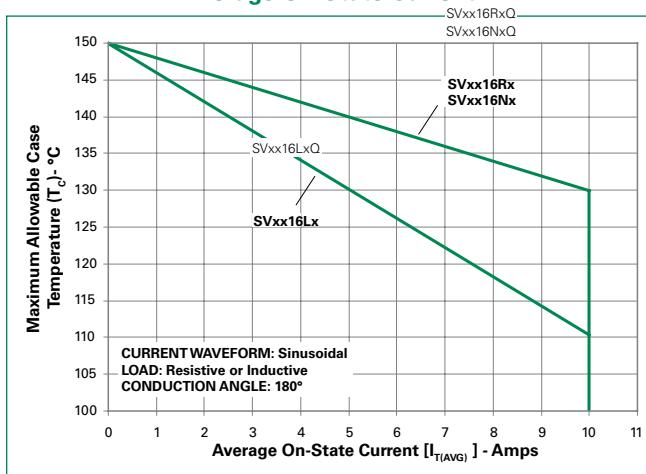
**Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current**



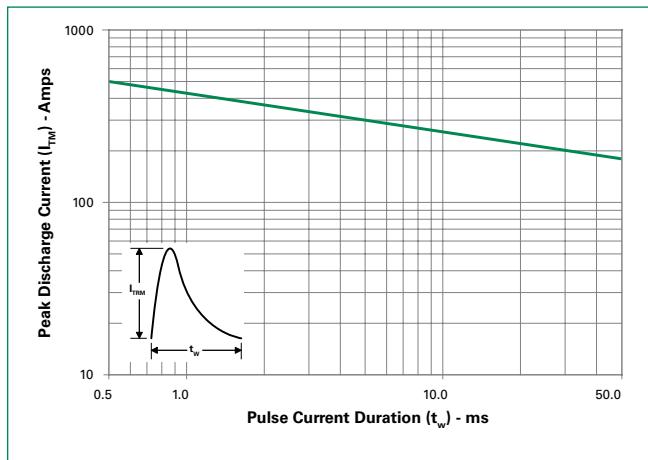
# SVxx16xxQ series

16 Amp High Junction Temperature SCRs

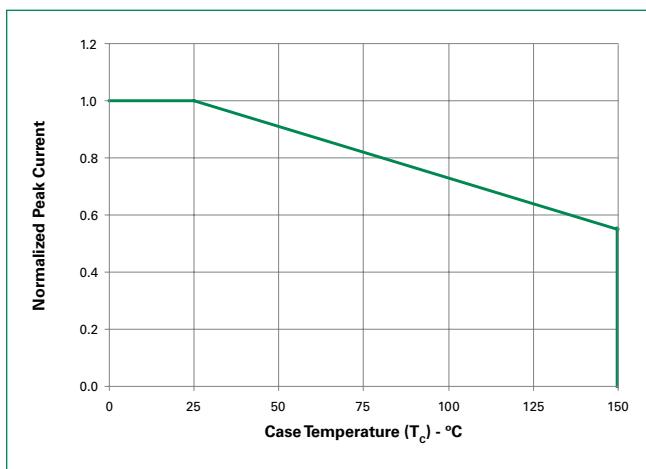
**Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current**



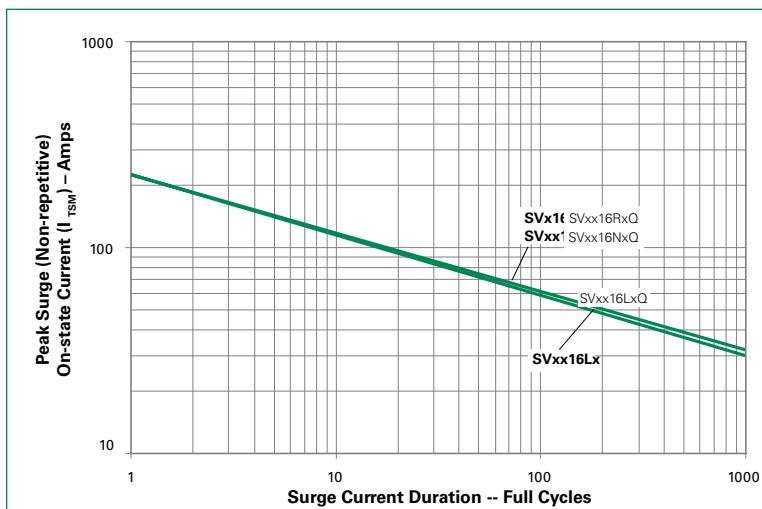
**Figure 8: Peak Capacitor Discharge Current**



**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:

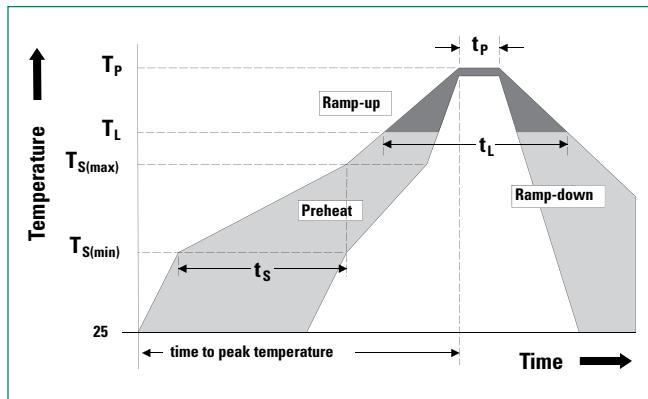
1. Gate control may be lost during and immediately following surge current interval.
2. Overload may not be repeated until junction temperature has returned to steady-state rated value.

# SVxx16xxQ series

16 Amp High Junction Temperature SCRs

## 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 <sup>+0/-5</sup> °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

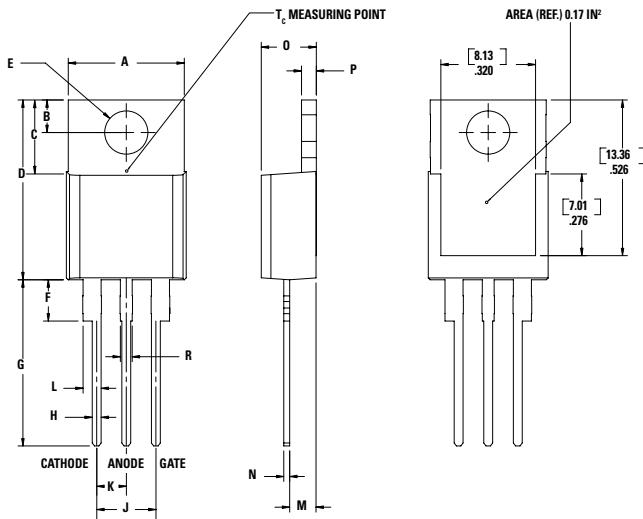
Careful selection of the correct component for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the component rating. Other 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

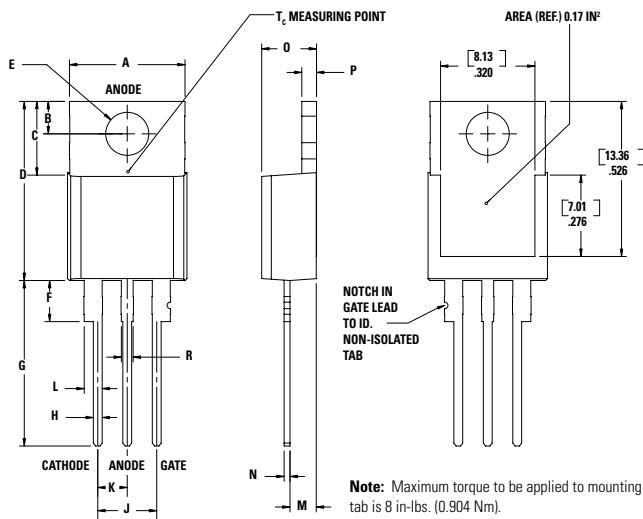
Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 150°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 1000 cycles; -55°C to +150°C; 15-min dwell-time
Temperature/Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 160V - DC: 85°C; 85% rel humidity
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

**SVxx16xxQ series**

16 Amp High Junction Temperature SCRs

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

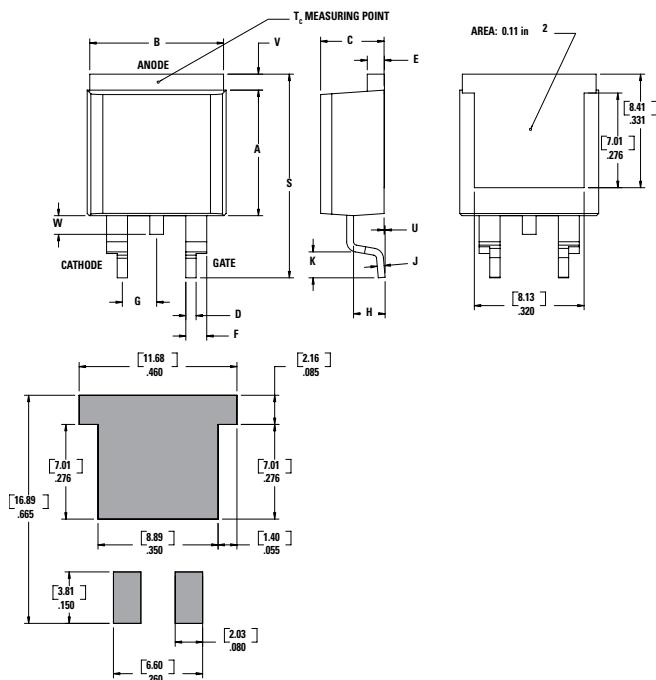
Dimension	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	0.380	0.420	9.65	10.67
<b>B</b>	0.105	0.115	2.67	2.92
<b>C</b>	0.230	0.250	5.84	6.35
<b>D</b>	0.590	0.620	14.99	15.75
<b>E</b>	0.142	0.147	3.61	3.73
<b>F</b>	0.110	0.130	2.79	3.30
<b>G</b>	0.540	0.575	13.72	14.61
<b>H</b>	0.025	0.035	0.64	0.89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

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

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

**SVxx16xxQ series**

16 Amp High Junction Temperature SCRs

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

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

**Product Selector**

Part Number	Voltage 600V	Gate Sensitivity	Type	Package
SVxx16L1Q	X	6mA	Standard SCR	TO-220L
SVxx16R1Q	X	6mA	Standard SCR	TO-220R
SVxx16N1Q	X	6mA	Standard SCR	TO-263
SVxx16L2Q	X	10mA	Standard SCR	TO-220L
SVxx16R2Q	X	10mA	Standard SCR	TO-220R
SVxx16N2Q	X	10mA	Standard SCR	TO-263

Note: xx = Voltage/10, x=sensitivity

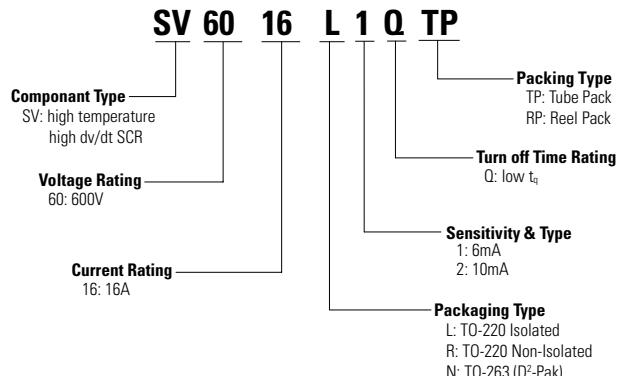
**Packing Options**

Part Number	Marking	Weight	Packing Mode	Base Quantity
SVxx16LxQTP	SVxx16LxQ	2.2g	Tube	1000 (50 per tube)
SVxx16RxQTP	SVxx16RxQ	2.2g	Tube	1000 (50 per tube)
SVxx16NxQTP	SVxx16NxQ	1.6g	Tube	1000 (50 per tube)
SVxx16NxQRP	SVxx16NxQ	1.6g	Embossed Carrier	500

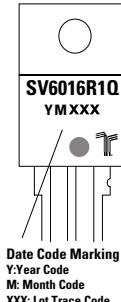
Note: xx=voltage/10, x=sensitivity

**SVxx16xxQ series**

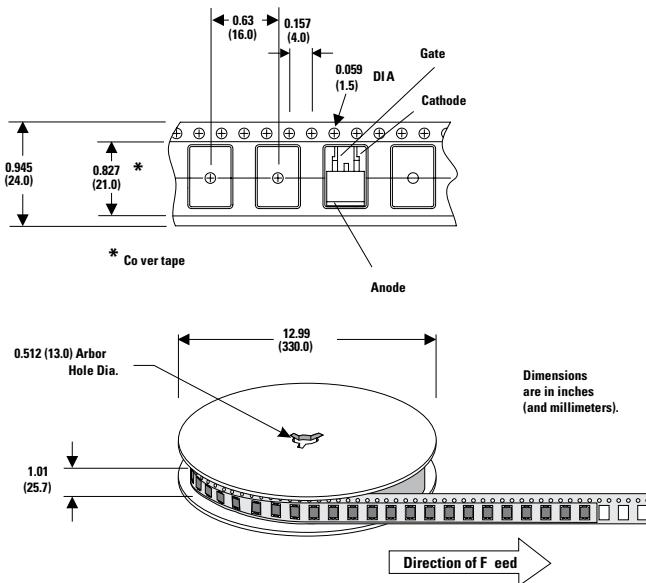
16 Amp High Junction Temperature SCRs

**Part Numbering System****Part Marking System**

T0-220 AB - (L and R Package)  
T0-263 AB - (N Package)

**TO-263 Embossed Carrier Reel Pack (RP) Specifications**

Meets all EIA-481-2 Standards



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