



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

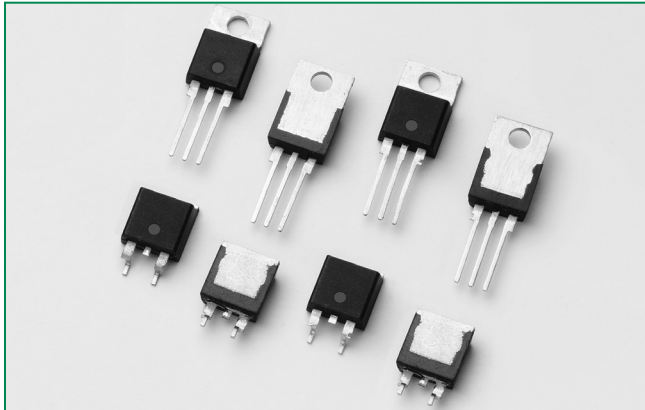
Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



**SJxx16xx series**



**Description**

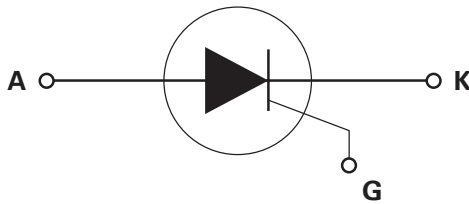
This SJxx16xx high junction temperature SCR series is ideal for uni-directional switch applications such as phase control in heating, motor speed controls, converters/rectifiers and inrush current controllers.

These SCR's have a low gate current trigger level of 6mA, 10mA or 30mA maximum at approximately 1.5V

**Features & Benefits**

- Halogen free and RoHS compliant
- Surge capability up to 225A at 60 Hz half cycle
- 150°C maximum junction temperature

**Schematic Symbol**



**Applications**

Typical applications include AC Generator (ACG) rectifiers, battery voltage regulators, 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 are offered for ease of heat sinking with high isolation voltage.

**Main Features**

Symbol	Value	Unit
$I_{T(RMS)}$	16	A
$V_{DRM}/V_{RRM}$	400 or 600	V
$I_{GT}$	6 to 30	mA

**Absolute Maximum Ratings – Standard SCR's**

Symbol	Parameter	Test Conditions	Value	Unit
$V_{DRM}/V_{RSM}$	Peak non-repetitive blocking voltage	$P_w = 100 \mu s$	$V_{DRM}/V_{RRM} + 100$	V
$I_{T(RMS)}$	RMS on-state current	SJxx16Lx $T_c = 110^\circ C$	16	A
		SJxx16Rx SJxx16Nx $T_c = 135^\circ C$	16	
$I_{T(AV)}$	Average on-state current	SJxx16Lx $T_c = 110^\circ C$	10	A
		SJxx16Rx SJxx16Nx $T_c = 135^\circ C$	10	
$I_{TSM}$	Peak non-repetitive surge current	single half cycle; $f = 50Hz$ ; $T_J$ (initial) = $25^\circ C$	188	A
		single half cycle; $f = 60Hz$ ; $T_J$ (initial) = $25^\circ C$	225	
$I^2t$	$I^2t$ Value for fusing	$t_p = 8.3 ms$	210	$A^2s$
$di/dt$	Critical rate of rise of on-state current	$f = 60 Hz ; T_J = 150^\circ C$	125	$A/\mu s$
$I_{GM}$	Peak gate current	$T_J = 150^\circ C$	3	A
$P_{G(AV)}$	Average gate power dissipation	$T_J = 150^\circ C$	0.6	W
$T_{stg}$	Storage temperature range		-40 to 150	$^\circ C$
$T_J$	Operating junction temperature range		-40 to 150	$^\circ C$

Note: xx=voltage/10, x=sensitivity

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

Symbol	Test Conditions		SJxx16x	SJxx16x1	SJxx16x2	Unit
$I_{GT}$	$V_D = 12\text{V}; R_L = 60\ \Omega$	MIN.	8	2	5	mA
		MAX.	30	6	10	
$V_{GT}$		MAX.	1.5	1.5	1.5	V
dv/dt	$V_D = 67\%V_{DRM}; \text{gate open}; T_J = 125^\circ\text{C}$	MIN.	800	70	500	V/ $\mu\text{s}$
	$V_D = 67\%V_{DRM}; \text{gate open}; T_J = 150^\circ\text{C}$		400	-	200	
$V_{GD}$	$V_D = V_{DRM}; R_L = 3.3\ \text{k}\Omega; T_J = 110^\circ\text{C}$	MIN.	0.2	0.2	0.2	V
$I_H$	$I_T = 200\text{mA}$ (initial)	MAX.	75	15	35	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.	40	40	40	$\mu\text{s}$
$t_{gt}$	$I_G = 2 \times I_{GT}; PW = 15\ \mu\text{s}; I_T = 32\text{A}$	TYP.	2	2	2	$\mu\text{s}$

Note: xx=voltage/10, x=package

### Static Characteristics

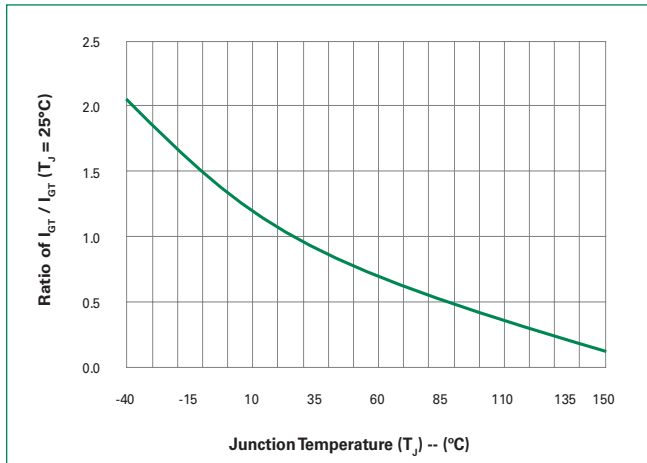
Symbol	Test Conditions		Value	Unit	
$V_{TM}$	Component $I_T = 32\text{A}; t_p = 380\ \mu\text{s}$	MAX.	1.6	V	
$I_{DRM} / I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_J = 25^\circ\text{C}$	MAX.	10	$\mu\text{A}$
		$T_J = 125^\circ\text{C}$		1000	
		$T_J = 150^\circ\text{C}$		3000	

### Thermal Resistances

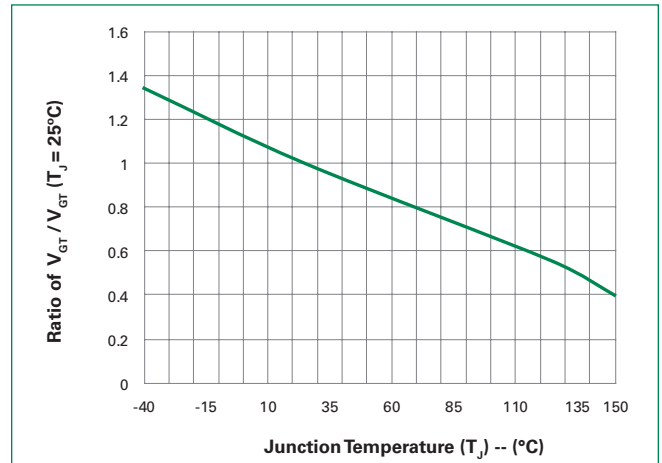
Symbol	Parameter		Value	Unit
$R_{\theta(JC)}$	Junction to case (AC)	SJxx16Rx	1.0	$^\circ\text{C}/\text{W}$
		SJxx16Nx		
		SJxx16Lx	2.5	

Note: xx=voltage/10, x=sensitivity

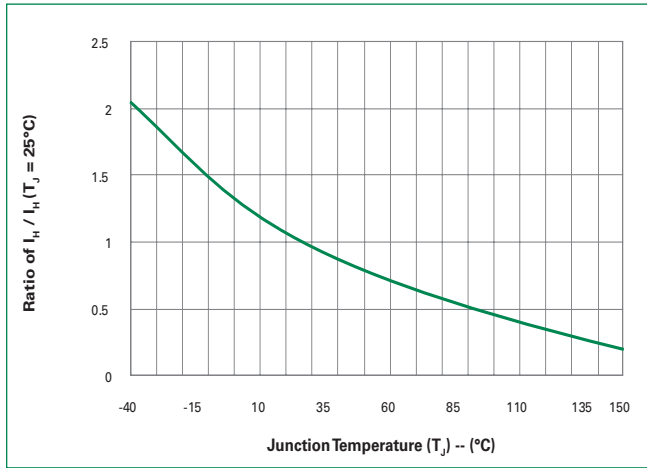
**Figure 1: Normalized DC Gate Trigger Current vs. Junction Temperature**



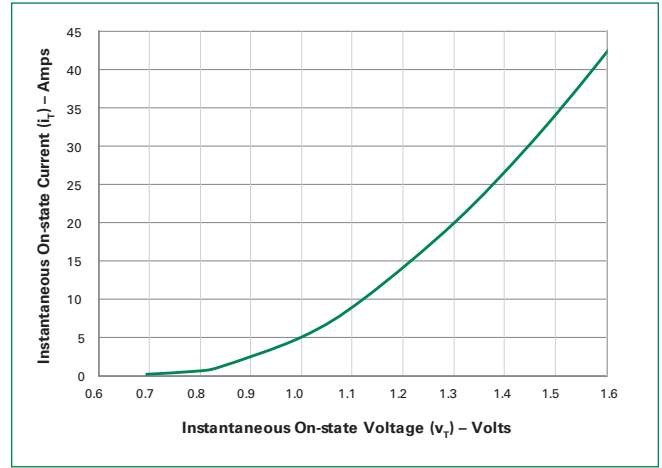
**Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature**



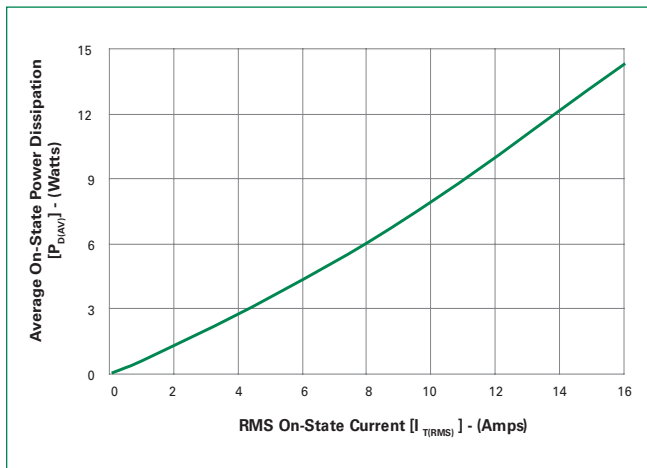
**Figure 3: Normalized DC Holding Current vs. Junction Temperature**



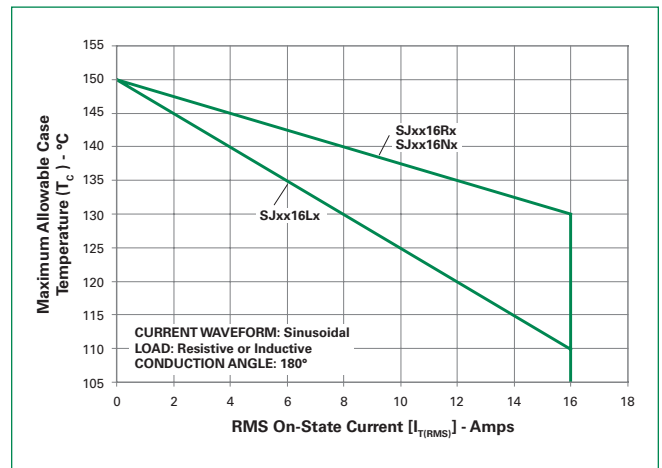
**Figure 4: On-State Current vs. On-State Voltage (Typical)**



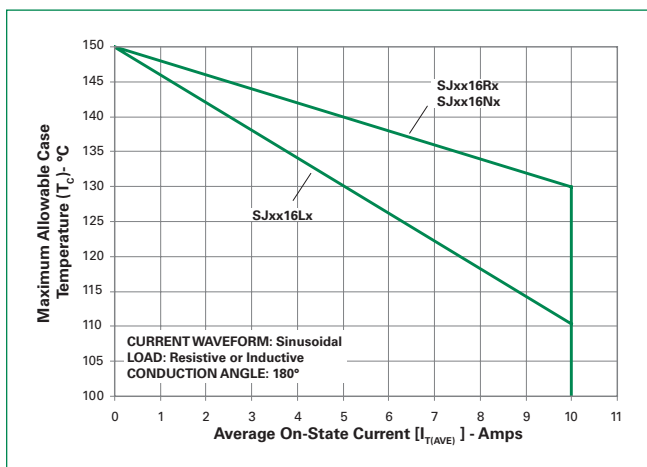
**Figure 5: Power Dissipation (Typical) vs. RMS On-State Current**



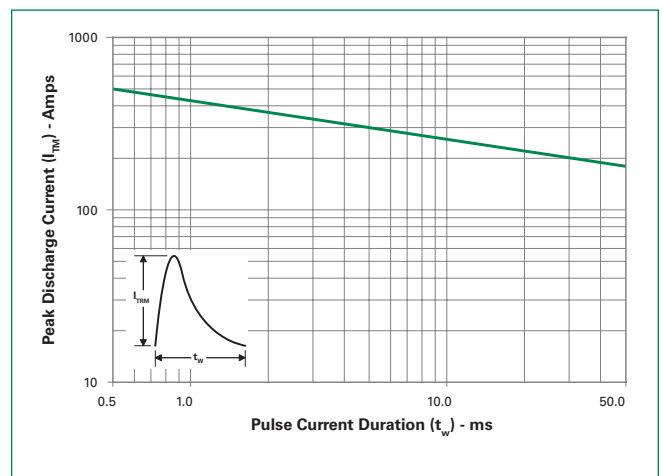
**Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current**



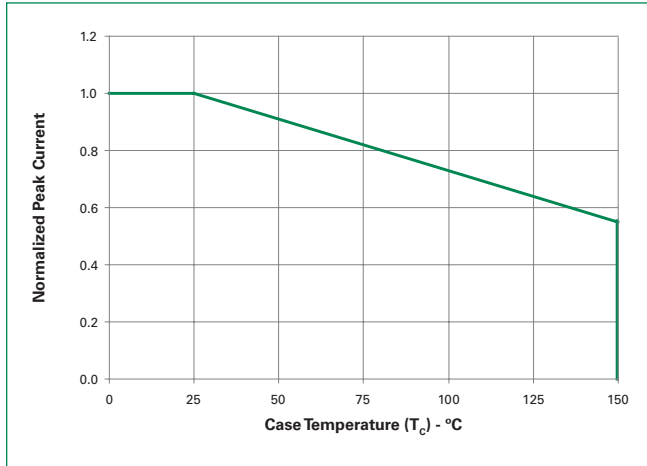
**Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current**



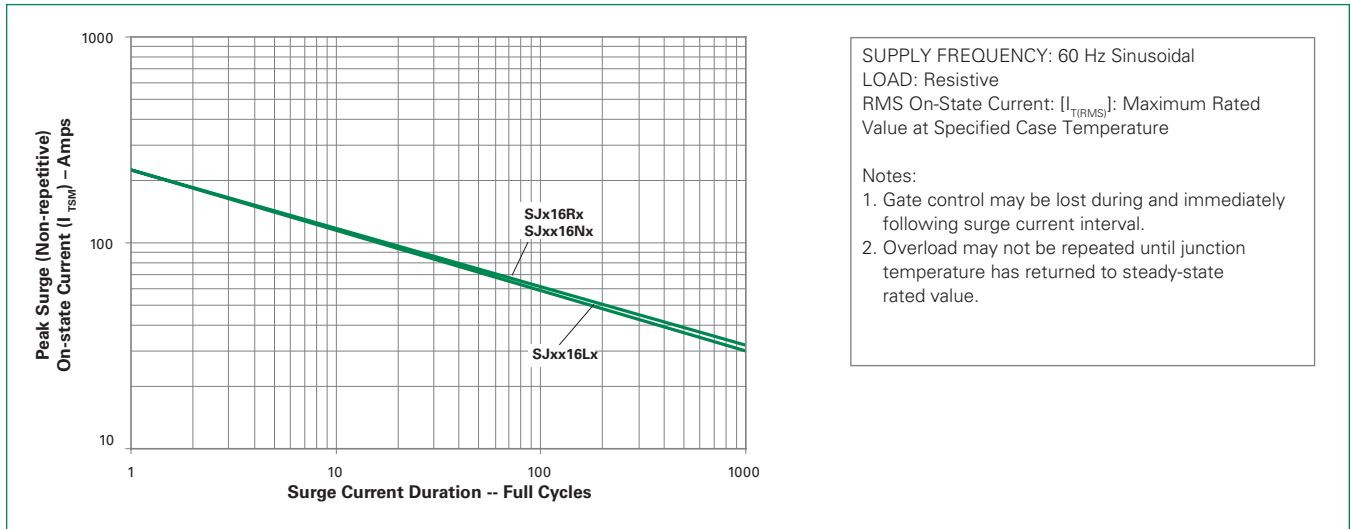
**Figure 8: Peak Capacitor Discharge Current**



**Figure 9: Peak Capacitor Discharge Current Derating**



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

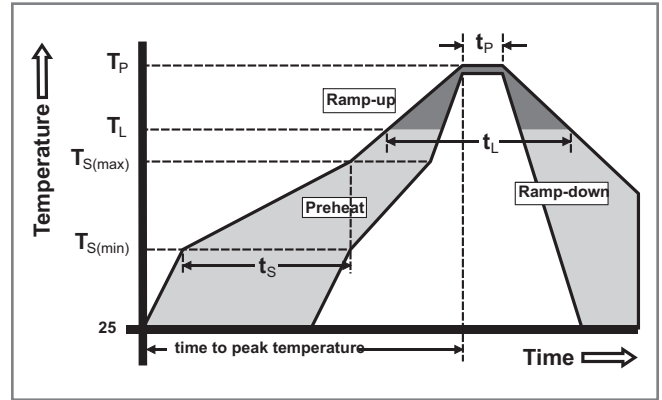


SUPPLY FREQUENCY: 60 Hz Sinusoidal  
 LOAD: Resistive  
 RMS On-State Current: [I<sub>T(RMS)</sub>]: Maximum Rated Value at Specified Case Temperature

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.

**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**

<b>Terminal Finish</b>	100% Matte Tin-plated
<b>Body Material</b>	UL recognized compound meeting flammability rating V-0.
<b>Lead Material</b>	Copper Alloy

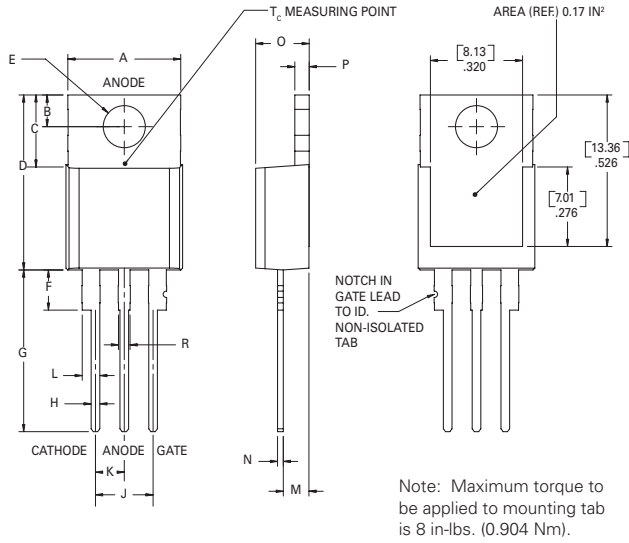
**Design Considerations**

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**

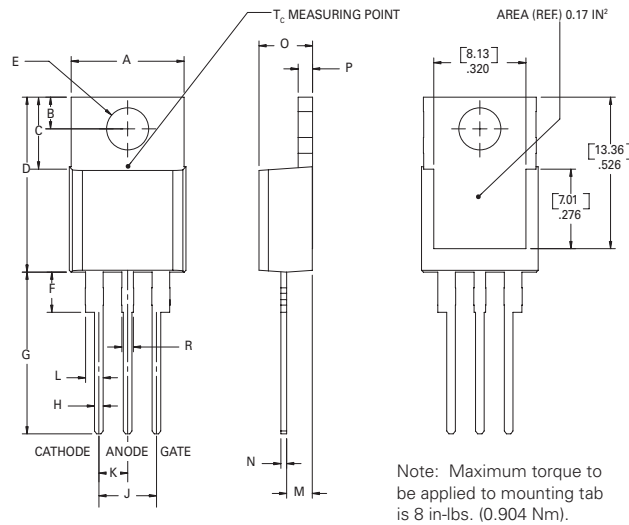
Test	Specifications and Conditions
<b>AC Blocking</b>	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 150°C for 1008 hours
<b>Temperature Cycling</b>	MIL-STD-750, M-1051, 100 cycles; -55°C to +150°C; 15-min dwell-time
<b>Temperature/Humidity</b>	EIA / JEDEC, JESD22-A101 1008 hours; 160V - DC: 85°C; 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>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
<b>Moisture Sensitivity Level</b>	Level 1, JEDEC-J-STD-020D

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



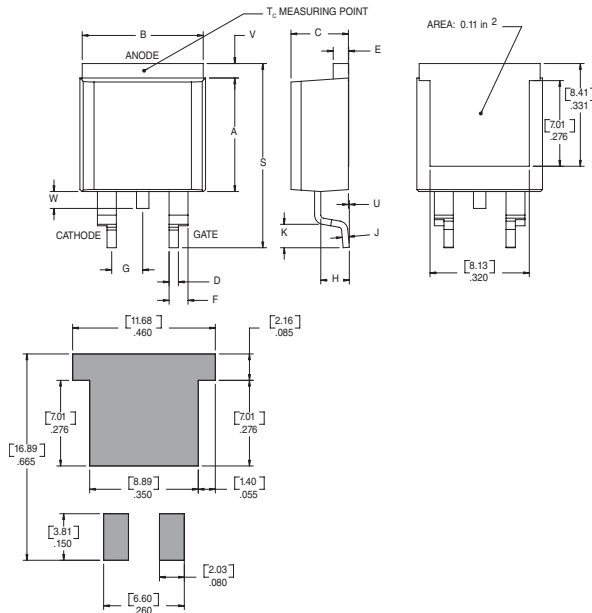
Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	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

### 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- 263AB (N-package) — D<sup>2</sup>-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
	400V	600V			
SJxx16L	X	X	30mA	Standard SCR	TO-220L
SJxx16R	X	X	30mA	Standard SCR	TO-220R
SJxx16N	X	X	30mA	Standard SCR	TO-263
SJxx16L1	X	X	6mA	Standard SCR	TO-220L
SJxx16R1	X	X	6mA	Standard SCR	TO-220R
SJxx16N1	X	X	6mA	Standard SCR	TO-263
SJxx16L2	X	X	10mA	Standard SCR	TO-220L
SJxx16R2	X	X	10mA	Standard SCR	TO-220R
SJxx16N2	X	X	10mA	Standard SCR	TO-263

Note: xx = Voltage/10

**Packing Options**

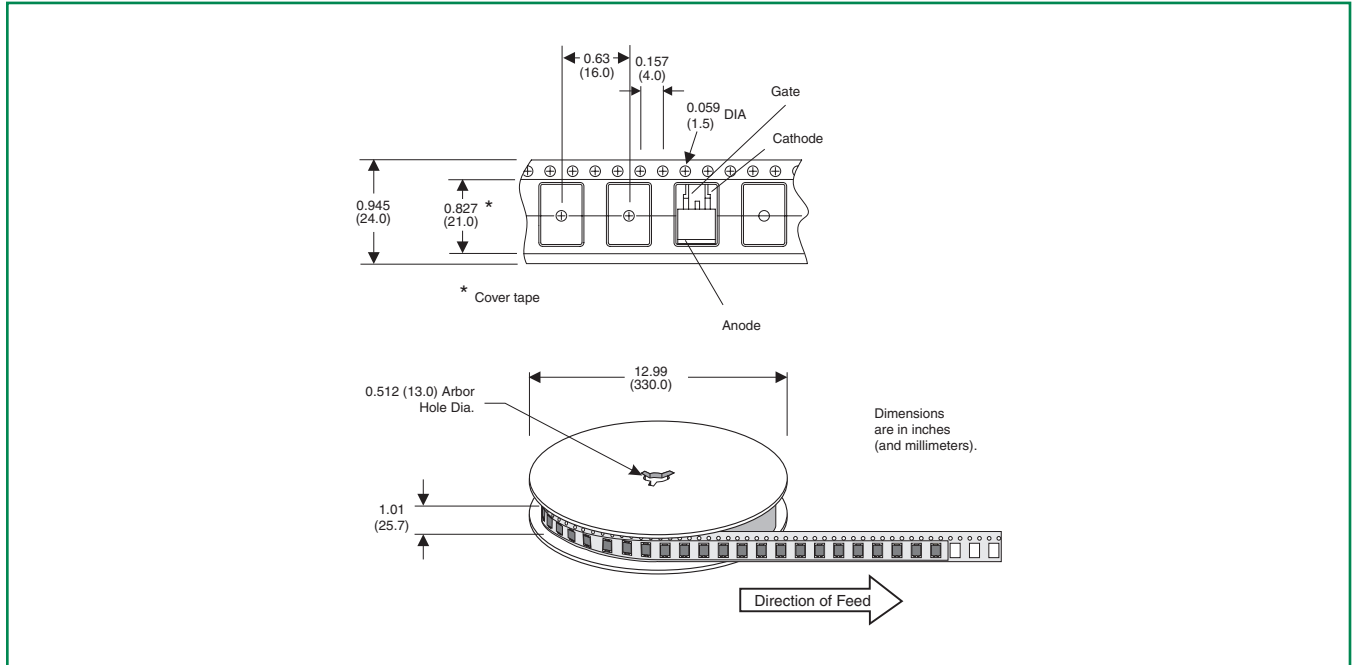
Part Number	Marking	Weight	Packing Mode	Base Quantity
SJxx16LxTP	SJxx16Lx	2.2g	Tube	500 (50 per tube)
SJxx16RxTP	SJxx16Rx	2.2g	Tube	500 (50 per tube)
SJxx16NxTP	SJxx16Nx	1.6g	Tube	500 (50 per tube)
SJxx16NxRP	SJxx16Nx	1.6g	Embossed Carrier	500

Note: xx=voltage/10, x=sensitivity

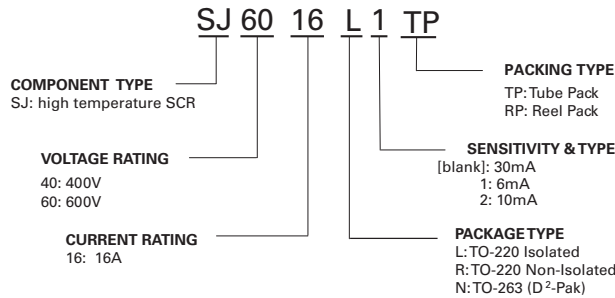


**TO-263 Embossed Carrier Reel Pack (RP) Specifications**

Meets all EIA-481-2 Standards

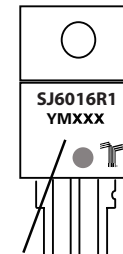


**Part Numbering System**



**Part Marking System**

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



Date Code Marking  
Y: Year Code  
M: Month Code  
XXX: Lot Trace Code

**Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications.**

Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.