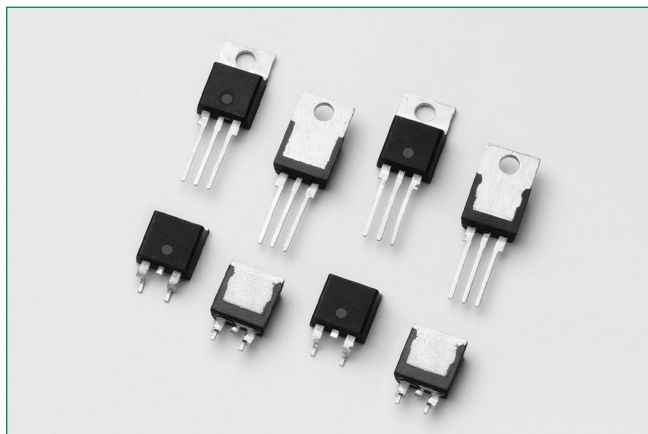


# SJxx25xxA Series

## 25 Amps High Junction Temperature SCRs



### Agency Recognitions

Agency	Agency File Number
	E71639

\* - L Package Only

### Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	25	A
$V_{DRM}/V_{RRM}$	400 or 600	V
$I_{GT}$	6, 10 or 35	mA

### Description

This SJxx25xxA high 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 SCRs have a low gate current trigger level of 6mA, 10mA or 35mA maximum at approximately 1.5V.

### Features & Benefits

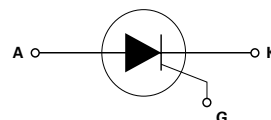
- Halogen-free and RoHS-compliant
- 150°C maximum junction temperature
- Surge capability up to 350 A at 60 Hz half cycle
- AEC-Q101 qualified
- Automotive Level manufacture control

### Applications

Typical applications include AC Generator (ACG) rectifiers, battery voltage regulators, generic converters, inrush current controller in various AC to DC applications and soft starter for low power AC motor. 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 highest isolation voltage.

### Schematic Symbol



### Absolute Maximum Ratings

Symbol	Parameter	Test Conditions	Value	Unit
$V_{DSM}/V_{RSM}$	Peak non-repetitive blocking voltage	PW=100 $\mu$ s	$V_{DRM}/V_{RRM} + 100$	V
$I_{T(RMS)}$	RMS on-state current	SJxx25LxA $T_c = 100^\circ\text{C}$ SJxx25RxA $T_c = 125^\circ\text{C}$ SJxx25NxA	25	A
$I_{T(AV)}$	Average on-state current	SJxx25LxA $T_c = 100^\circ\text{C}$ SJxx25RxA $T_c = 125^\circ\text{C}$ SJxx25NxA	16	A
$I_{TSM}$	Peak non-repetitive surge current	single half cycle; f = 50Hz; $T_j$ (initial) = 25°C	300	A
		single half cycle; f = 60Hz; $T_j$ (initial) = 25°C	350	
$I^2t$	$I^2t$ Value for fusing	$t_p = 8.3$ ms	510	A <sup>2</sup> s
di/dt	Critical rate of rise of on-state current	f = 60Hz ; $T_j = 150^\circ\text{C}$	125	A/ $\mu$ s
$I_{GM}$	Peak gate current	$T_j = 150^\circ\text{C}$	3	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 150^\circ\text{C}$	0.6	W
$T_{stg}$	Storage temperature range	-	-40 to 150	°C
$T_j$	Operating junction temperature range	-	-40 to 150	°C

Note: xx=voltage/10, x=sensitivity

# SJxx25xxA Series

## 25 Amps High Junction Temperature SCRs

### Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise specified)

Symbol	Test Conditions		Value			Unit
			SJxx25xA	SJxx25x1A	SJxx25x2A	
I <sub>GT</sub>	V <sub>D</sub> = 12V R <sub>L</sub> = 60 Ω	MAX.	35	6	10	mA
		MIN.	8	2	5	
V <sub>GT</sub>	V <sub>D</sub> = 12V R <sub>L</sub> = 60 Ω	MAX.	1.5			V
dv/dt	V <sub>D</sub> = 67% V <sub>DRM</sub> ; gate open; T <sub>J</sub> = 125°C	MIN.	800	70	500	V/μs
	V <sub>D</sub> = 67% V <sub>DRM</sub> ; gate open; T <sub>J</sub> = 150°C		400	-	200	
V <sub>GD</sub>	V <sub>D</sub> = V <sub>DRM</sub> R <sub>L</sub> = 3.3 kΩ T <sub>J</sub> = 125°C	MIN.	0.2			V
I <sub>H</sub>	I <sub>T</sub> = 400mA (initial)	MAX.	75	15	35	mA
t <sub>q</sub>	I <sub>T</sub> = 2A; t <sub>p</sub> = 50μs; dv/dt = 5V/μs; di/dt = 30A/μs	MAX.	40			μs
t <sub>gt</sub>	I <sub>G</sub> = 2 × I <sub>GT</sub> PW = 15μs I <sub>T</sub> = 50A	TYP.	2			μs

Note: xx=voltage/10, x=package

### Static Characteristics

Symbol	Test Conditions		Value	Unit
V <sub>TM</sub>	Component I <sub>T</sub> = 50A; t <sub>p</sub> = 380 μs	MAX.	1.6	V
I <sub>DRM</sub> / I <sub>RRM</sub>	V <sub>DRM</sub> = V <sub>RRM</sub>	T <sub>J</sub> = 25°C	10	μA
		T <sub>J</sub> = 125°C	1000	
		T <sub>J</sub> = 150°C	3000	

### Thermal Resistances

Symbol	Parameter		Value	Unit
R <sub>θ(JC)</sub>	Junction to case (AC)	SJxx25RxA	1.0	°C/W
		SJxx25NxA		
		SJxx25LxA	2.3	

Note: xx=voltage/10, x=sensitivity

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

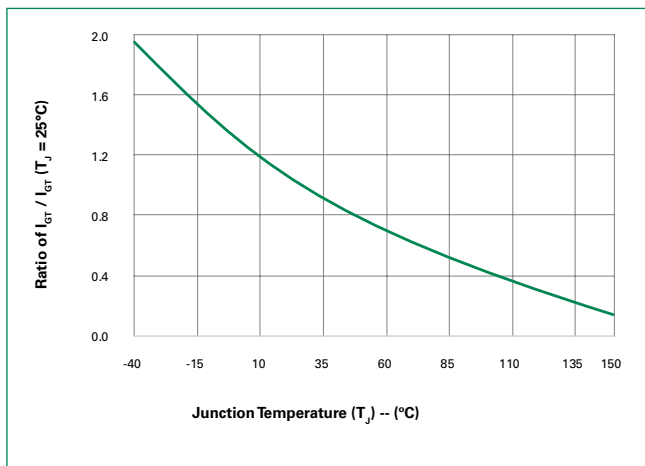
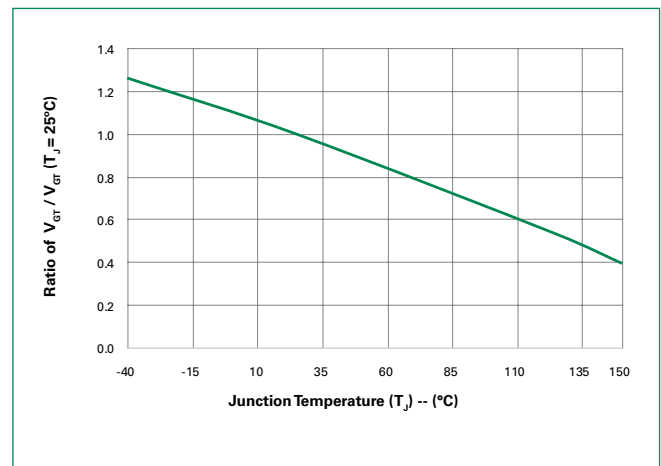


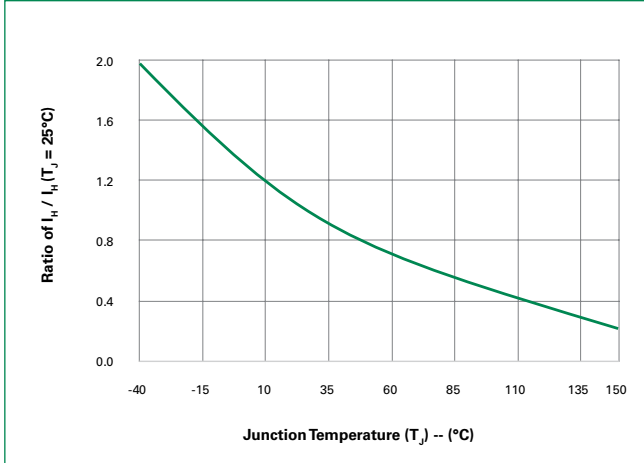
Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature



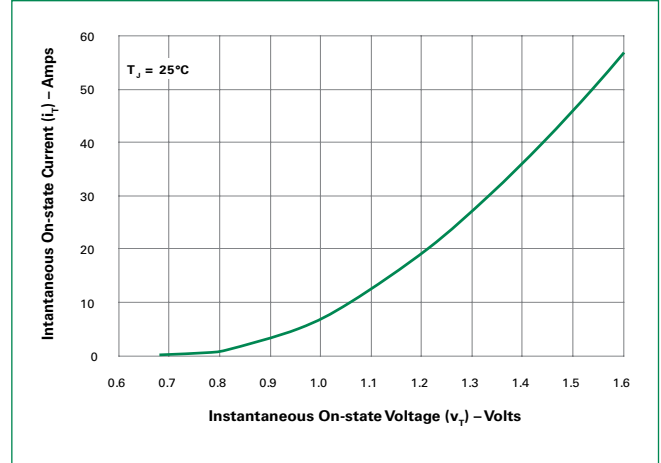
# SJxx25xxA Series

## 25 Amps High Junction Temperature SCRs

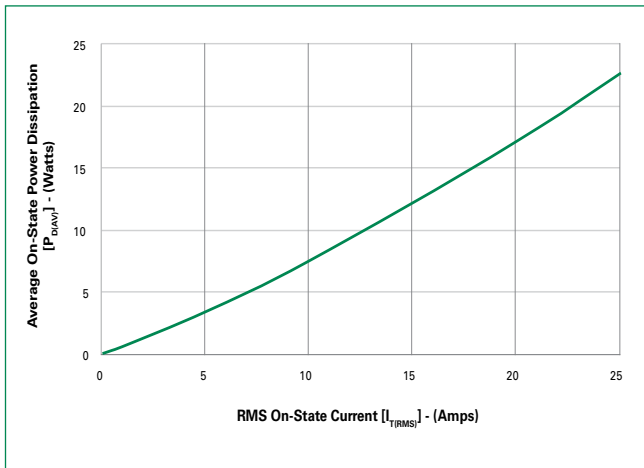
**Figure 3: Normalized DC Holding Current vs. Junction Temperature**



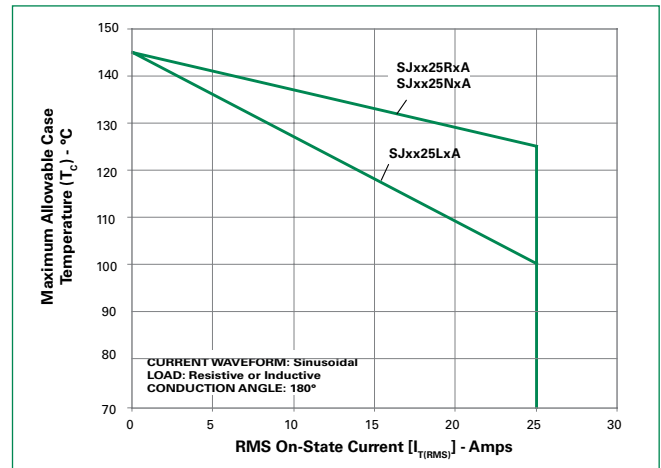
**Figure 4: On-State Current vs. On-State Voltage (Typical)**



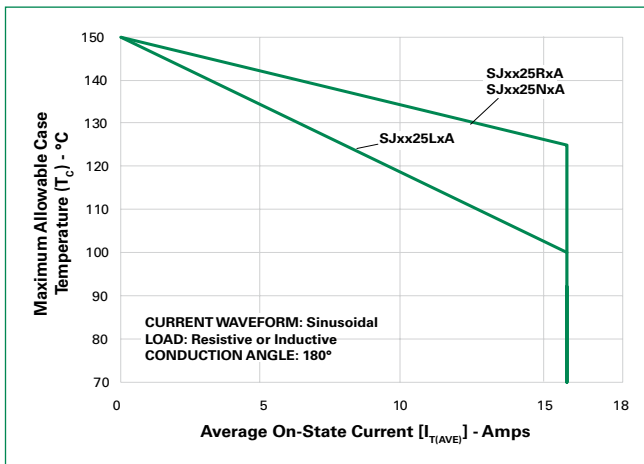
**Figure 5: Power Dissipation (Typical) vs. RMS On-State Current**



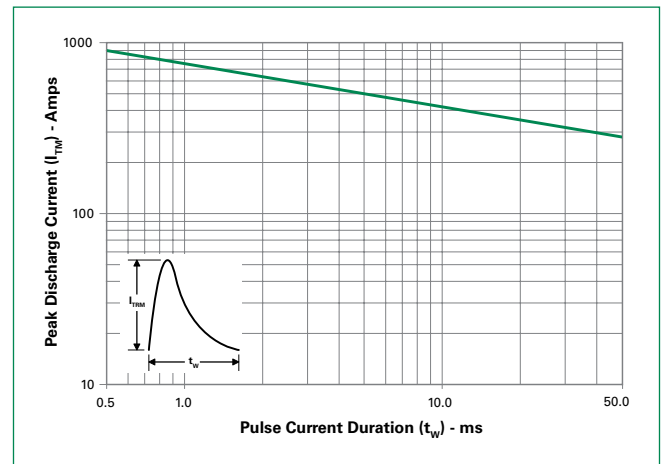
**Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current**



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



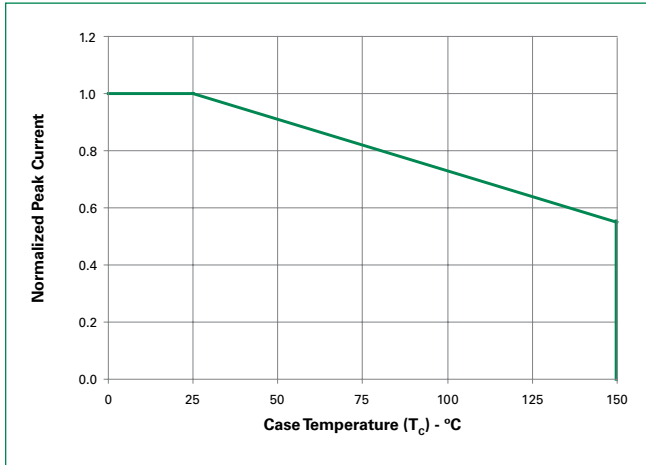
**Figure 8: Peak Capacitor Discharge Current**



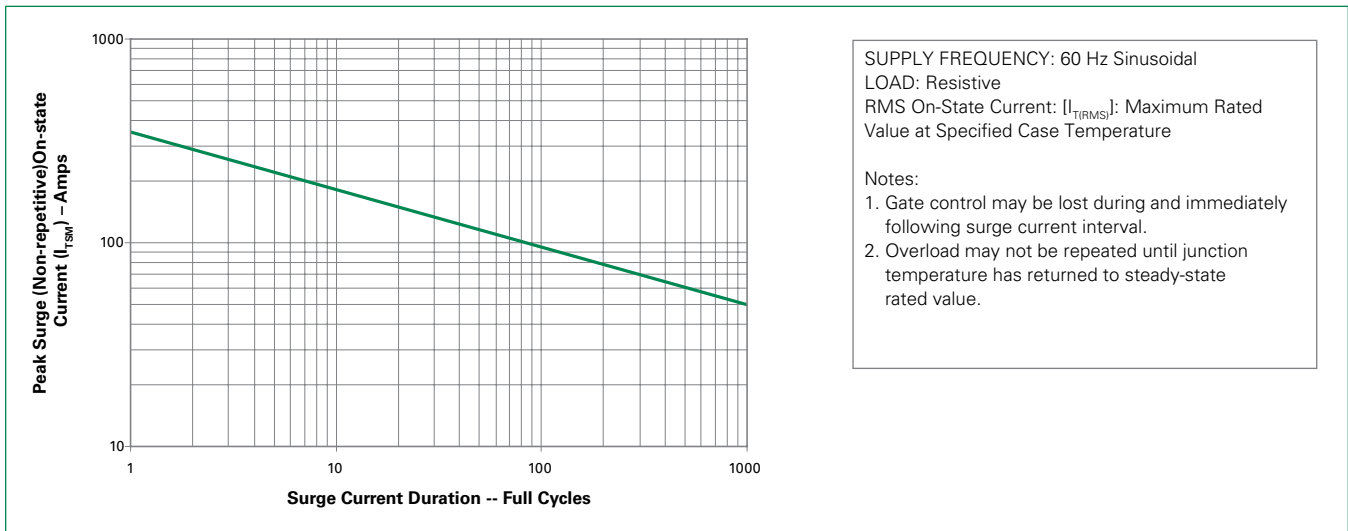
# SJxx25xxA Series

## 25 Amps High Junction Temperature SCRs

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



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

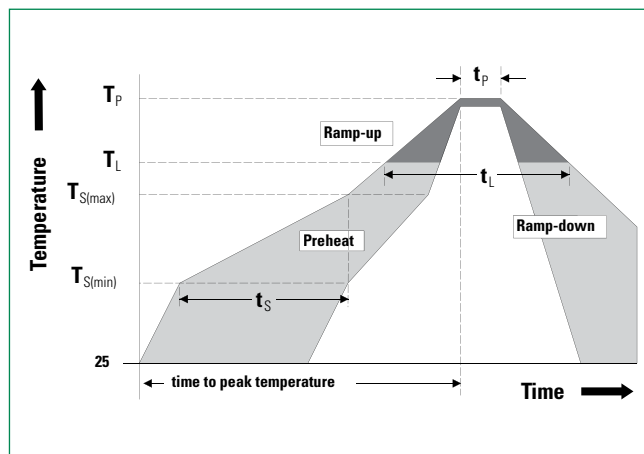


# SJxx25xxA Series

## 25 Amps High Junction Temperature SCRs

### Soldering Parameters

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus Temp) (<math>T_L</math>) to peak</b>		5°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		5°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		5°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		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.

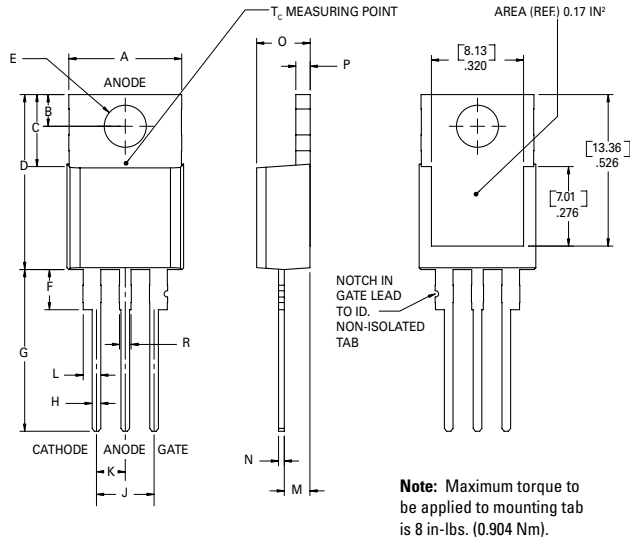
### Environmental Specifications

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

# SJxx25xxA Series

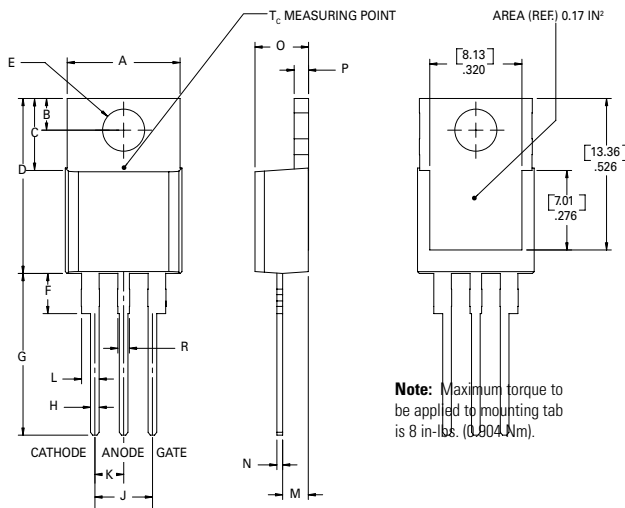
## 25 Amps High Junction Temperature SCRs

### 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

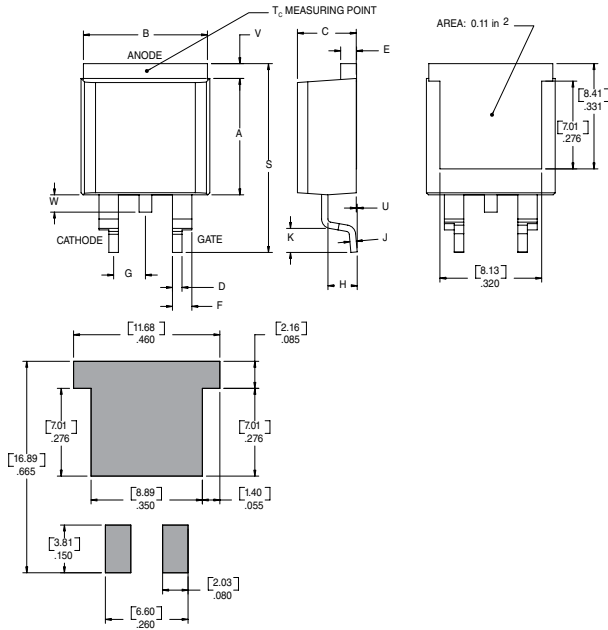


Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060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

# SJxx25xxA Series

## 25 Amps High Junction Temperature SCRs

### 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

### Product Selector

Part Number	Voltage		Gate Sensitivity	Type	Package
	400V	600V			
SJxx25LA	X	X	35mA	Standard SCR	TO-220L
SJxx25RA	X	X	35mA	Standard SCR	TO-220R
SJxx25NA	X	X	35mA	Standard SCR	TO-263
SJxx25L1A	X	X	6mA	Standard SCR	TO-220L
SJxx25R1A	X	X	6mA	Standard SCR	TO-220R
SJxx25N1A	X	X	6mA	Standard SCR	TO-263
SJxx25L2A	X	X	10mA	Standard SCR	TO-220L
SJxx25R2A	X	X	10mA	Standard SCR	TO-220R
SJxx25N2A	X	X	10mA	Standard SCR	TO-263

Note: xx = Voltage/10

### Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
SJxx25LxATP	SJxx25LxA	2.2g	Tube	1000 (50 per tube)
SJxx25RxATP	SJxx25RxA	2.2g	Tube	1000 (50 per tube)
SJxx25NxATP	SJxx25NxA	1.6g	Tube	1000 (50 per tube)
SJxx25NxARP	SJxx25NxA	1.6g	Embossed Carrier	500

Note: xx=voltage/10, x=sensitivity