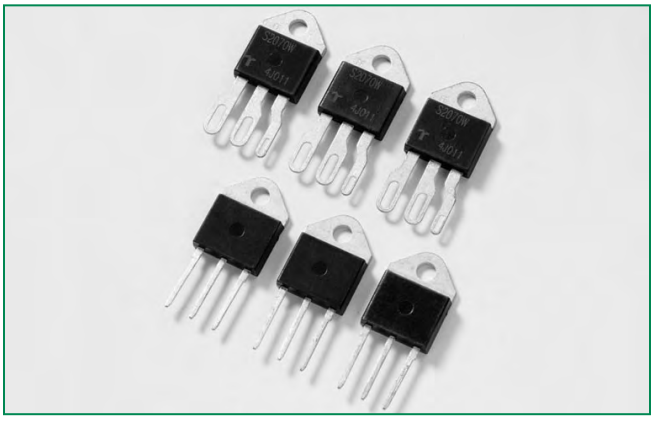
Littelfuse
Expertise Applied | Answers Delivered

Teccor® brand Thyristors
65 / 70 Amp Standard SCRs

Sxx65x & Sxx70x Series

RoHS



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 950 A

Agency Approval

Agency	Agency File Number
c UL us	J & K Packages: E71639

Applications

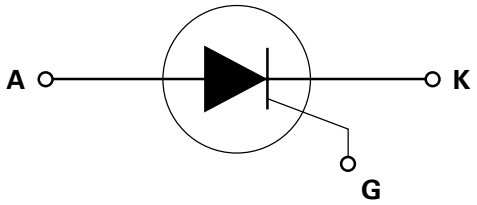
Typical applications are AC solid-state switches, industrial power tools, exercise equipment, white goods and commercial appliances.

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

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	65 & 70	A
V_{DRM}/V_{RRM}	400 to 1000	V
I_{GT}	50	mA

Schematic Symbol



Absolute Maximum Ratings

Symbol	Parameter	Test Conditions		Value	Unit
$I_{T(RMS)}$	RMS on-state current	Sxx65J Sxx65K	T_C = 75°C	65	A
		Sxx70W	T_C = 80°C	70	
$I_{T(AV)}$	Average on-state current	Sxx65J Sxx65K	T_C = 75°C	41.0	A
		Sxx70W	T_C = 80°C	45.0	A
I_{TSM}	Peak non-repetitive surge current	single half cycle; f = 50Hz; T_J (initial) = 25°C		800	A
		single half cycle; f = 60Hz; T_J (initial) = 25°C		950	
I^2t	I^2t Value for fusing	t_p = 8.3 ms		3745	A^2s
di/dt	Critical rate of rise of on-state current	f = 60Hz ; T_J = 125°C		200	A/µs
I_{GM}	Peak gate current	T_J = 125°C P_W = 15 µS Max		5.0	A
$P_{G(AV)}$	Average gate power dissipation	T_J = 125°C		1.0	W
T_{stg}	Storage temperature range			-40 to 150	°C
T_J	Operating junction temperature range			-40 to 125	°C

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Electrical Characteristics (T_J = 25°C, unless otherwise specified)

Symbol	Test Conditions			Value	Unit
I_{GT}	V_D = 12V; R_L = 30 Ω		MAX.	50	mA
			MIN.	5	
V_{GT}			MAX.	2.0	V
dv/dt	$V_D = V_{DRM}$; gate open; T_J = 100°C	400V	MIN.	650	V/µs
		600V		600	
		800V		500	
		1000V		250	
	$V_D = V_{DRM}$; gate open; T_J = 125°C	400V		550	
		600V		500	
		800V		475	
V_{GD}	$V_D = V_{DRM}$; R_L = 3.3 kΩ; T_J = 125°C		MIN.	0.2	V
I_H	I_T = 400mA (initial)		MAX.	80	mA
t_q	(1)		MAX.	35	µs
t_{gt}	I_G = 2 x I_{GT}; PW = 15µs; I_T = 140A		TYP.	2.5	µs

Note :
(1) I_T=2A; t_p=50µs; dv/dt=5V/µs; di/dt=-30A/µs

Static Characteristics

Symbol	Test Conditions			Value	Unit
V_{TM}	65A Device I_T = 130A; t_p = 380µs		MAX.	1.8	V
	70A Device I_T = 140A; t_p = 380µs				
I_{DRM} / I_{RRM}	V_{DRM} / V_{RRM}	T_J = 25°C	400 – 800V	20	µA
			1000 V	30	
		T_J = 100°C	400 – 600V	1500	
			800V	2000	
			1000V	5000	
		T_J = 125°C	400V – 600V	3000	
			800V	5000	

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	Sxx65J Sxx65K	0.86	°C/W
		Sxx70W	0.6	

Note: xx = voltage

Additional Information

Datasheet | **Resources** | **Samples**

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

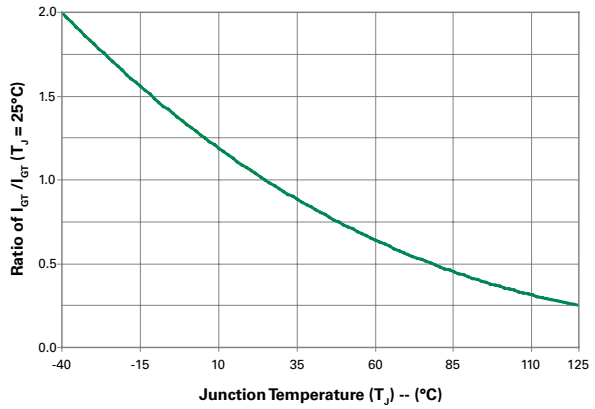


Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature

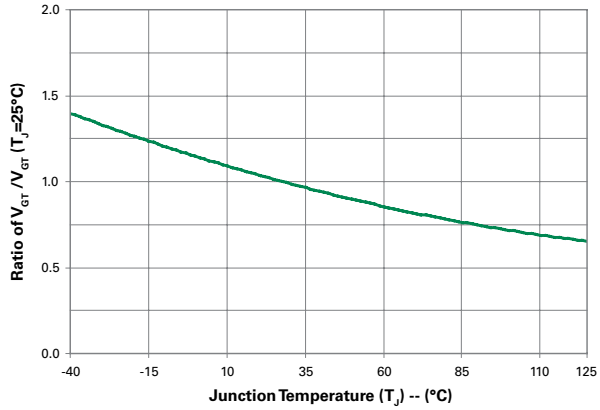


Figure 3: Normalized DC Holding Current vs. Junction Temperature

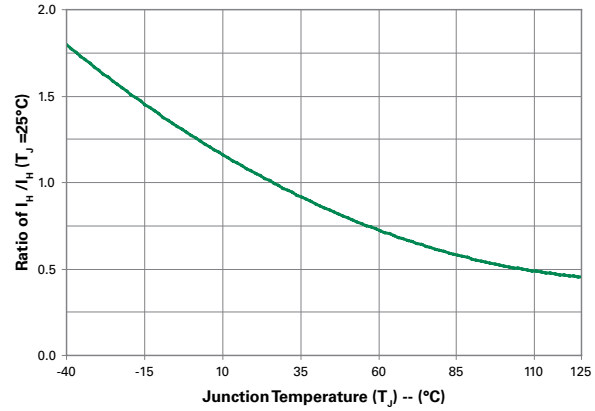


Figure 4: On-State Current vs. On-State Voltage (Typical)

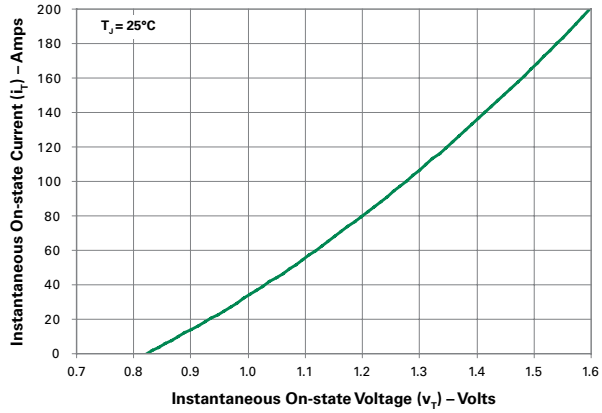


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

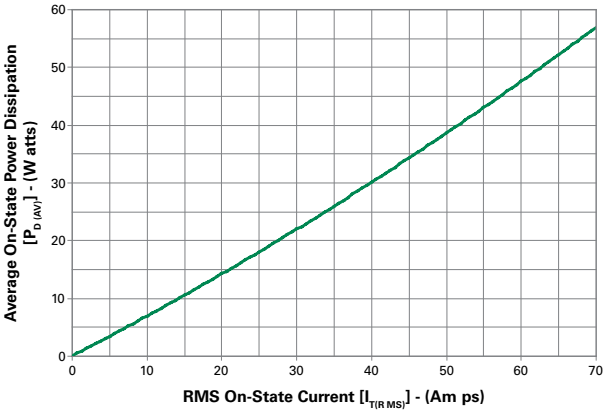
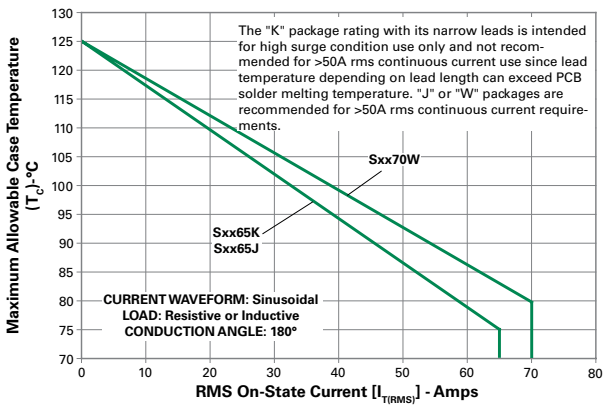


Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current



Note: xx = voltage

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

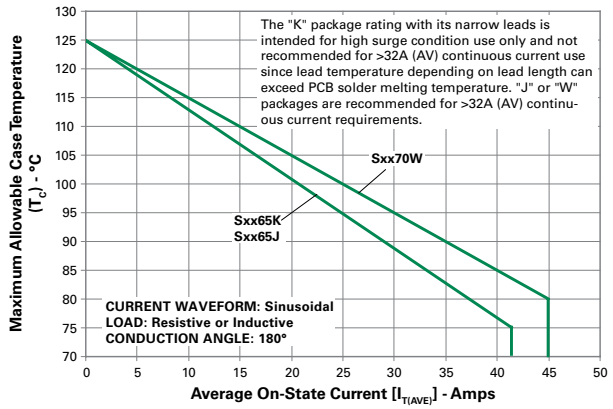


Figure 8: Peak Capacitor Discharge Current

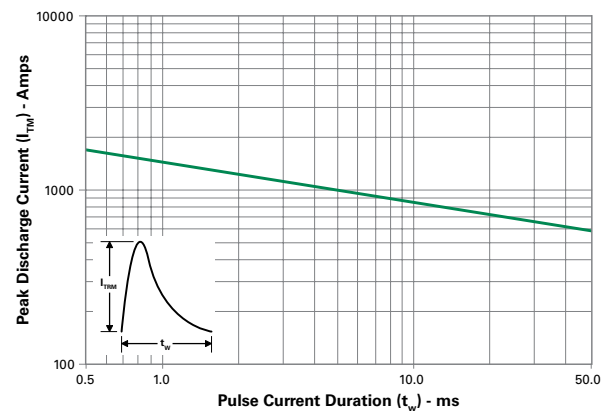


Figure 9: Peak Capacitor Discharge Current Derating

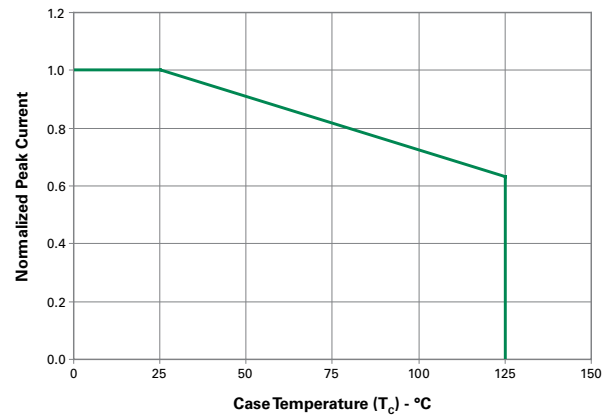
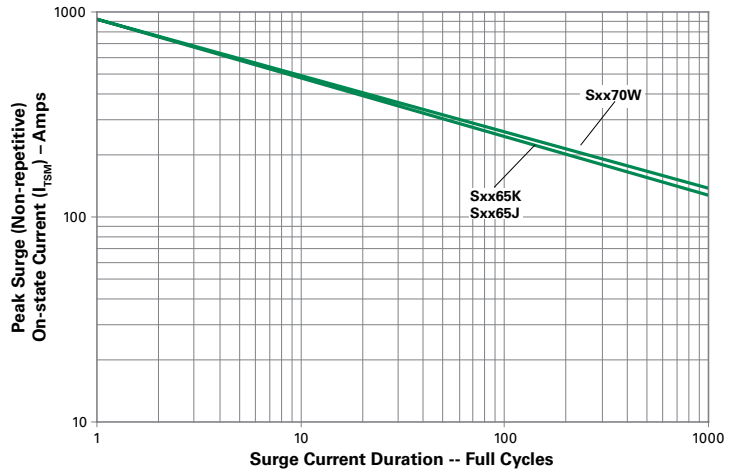


Figure 10: Surge Peak On-State Current vs. Number of Cycles



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.

Note: xx = Voltage

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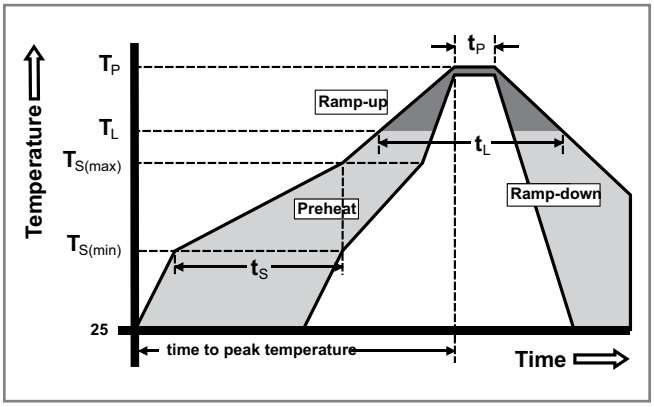
Soldering Parameters

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
	-Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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	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
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

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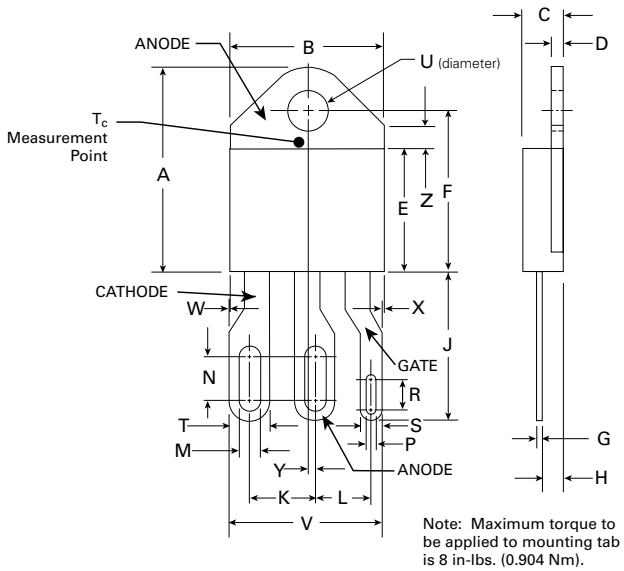
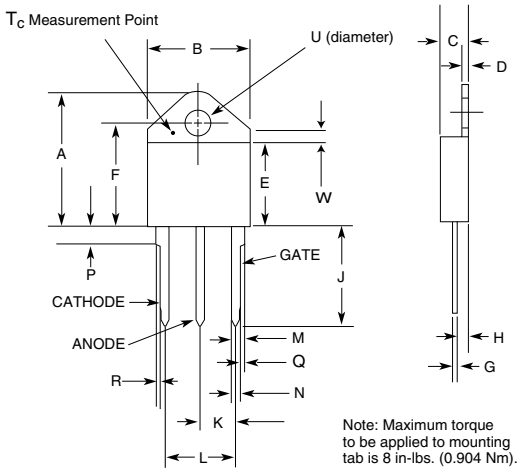
Dimensions – TO-218X (W Package) — Non-Isolated Mounting Tab common with Center Lead



Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.810	0.835	20.57	21.21
B	0.610	0.630	15.49	16.00
C	0.178	0.188	4.52	4.78
D	0.055	0.070	1.40	1.78
E	0.487	0.497	12.37	12.62
F	0.635	0.655	16.13	16.64
G	0.022	0.029	0.56	0.74
H	0.075	0.095	1.91	2.41
J	0.575	0.625	14.61	15.88
K	0.256	0.264	6.50	6.71
L	0.220	0.228	5.58	5.79
M	0.080	0.088	2.03	2.24
N	0.169	0.177	4.29	4.49
P	0.034	0.042	0.86	1.07
R	0.113	0.121	2.87	3.07
S	0.086	0.096	2.18	2.44
T	0.156	0.166	3.96	4.22
U	0.164	0.165	4.10	4.20
V	0.603	0.618	15.31	15.70
W	0.000	0.005	0.00	0.13
X	0.003	0.012	0.07	0.30
Y	0.028	0.032	0.71	0.81
Z	0.085	0.095	2.17	2.42

Dimensions – TO-218AC (K Package) — Isolated Mounting Tab



Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

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B	0.610	0.630	15.49	16.00
C	0.178	0.188	4.52	4.78
D	0.055	0.070	1.40	1.78
E	0.487	0.497	12.37	12.62
F	0.635	0.655	16.13	16.64
G	0.022	0.029	0.56	0.74
H	0.075	0.095	1.91	2.41
J	0.575	0.625	14.61	15.88
K	0.211	0.219	5.36	5.56
L	0.422	0.437	10.72	11.10
M	0.058	0.068	1.47	1.73
N	0.045	0.055	1.14	1.40
P	0.095	0.115	2.41	2.92
Q	0.008	0.016	0.20	0.41
R	0.008	0.016	0.20	0.41
U	0.164	0.165	4.10	4.20
W	0.085	0.095	2.17	2.42

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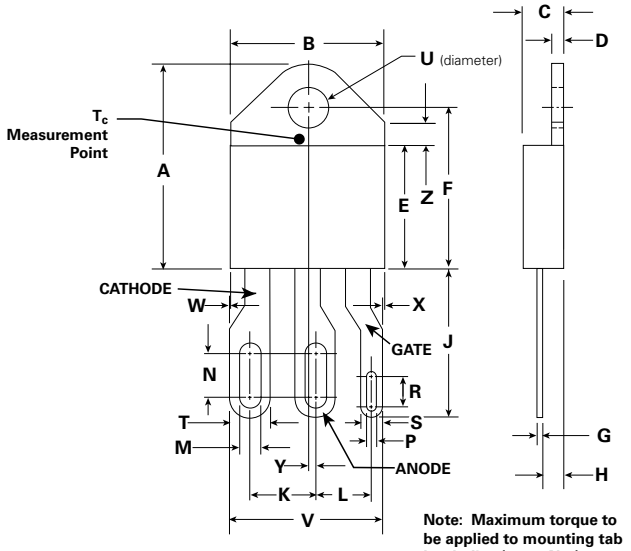
65 / 70 Amp Standard SCRs

Dimensions – TO-218X (J Package) — Isolated Mounting Tab



Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

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M	0.080	0.088	2.03	2.24
N	0.169	0.177	4.29	4.49
P	0.034	0.042	0.86	1.07
R	0.113	0.121	2.87	3.07
S	0.086	0.096	2.18	2.44
T	0.156	0.166	3.96	4.22
U	0.164	0.165	4.10	4.20
V	0.603	0.618	15.31	15.70
W	0.000	0.005	0.00	0.13
X	0.003	0.012	0.07	0.30
Y	0.028	0.032	0.71	0.81
Z	0.085	0.095	2.17	2.42

Product Selector

Part Number	Voltage				Gate Sensitivity	Type	Package
	400V	600V	800V	1000V			
Sxx65K	X	X	X	X	50mA	Standard SCR	TO-218AC
Sxx65J	X	X	X		50mA	Standard SCR	TO-218X
Sxx70W	X	X	X		50mA	Standard SCR	TO-218X

Note: xx = Voltage

Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Sxx65KTP	Sxx65K	4.40g	Tube	250 (25 per tube)
Sxx65JTP	Sxx65J	5.23g	Tube	250 (25 per tube)
Sxx70WTP	Sxx70W	5.23g	Tube	250 (25 per tube)

Note: xx = Voltage

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Part Numbering System

S 60 65 K 81

DEVICE TYPE
S: SCR

VOLTAGE RATING
40: 400V
60: 600V
80: 800V
K0: 1000V

CURRENT RATING
65: 65A
70: 70A

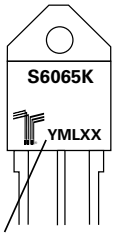
PACKAGE TYPE
K: TO-218AC (Isolated)
J: TO-218X (Isolated)
W: TO-218X (Non-isolated)

SENSITIVITY & TYPE
[blank]: 50mA

Lead Form Dimensions
xx: Lead Form Option

Part Marking System

TO-218AC - (K Package)
TO-218X - (J Package)
TO-218X - (W Package)



Date Code Marking
Y:Year Code
M: Month Code
L: Location Code
XX: Lot Serial Code

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