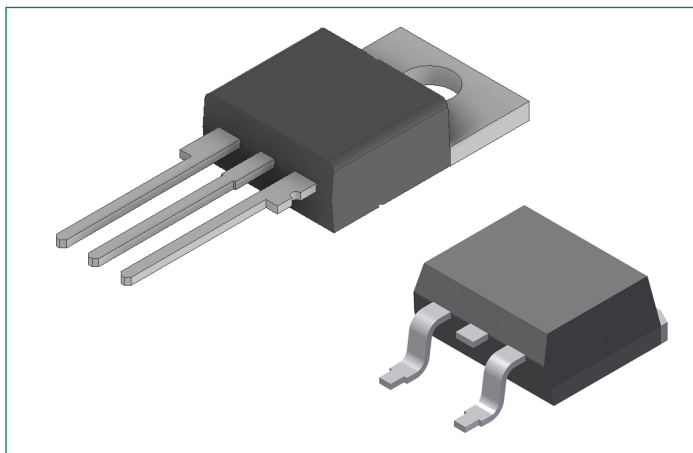


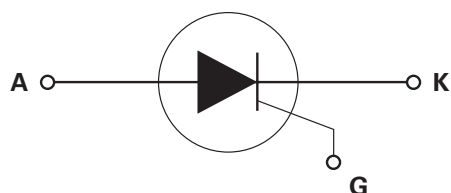
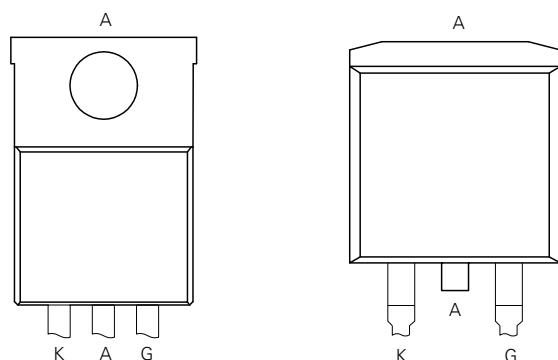
SVxx50xx Series

50 A High Junction Temperature SCRs

HF **RoHS**



Pinout Diagram TO-220AB



K: Cathode; **A:** Anode; **G:** Gate

Description:

This SVxx50xx high temperature SCR series is ideal for unidirectional switch applications such as phase controls, motor speed controls, Solid State Relays, and inrush current controls.

Standard phase control SCRs are triggered with few milliamperes of current at less than 1.5 V potential.

Features:

- Halogen-free and RoHS-compliant
- 150°C maximum junction temperature
- High dv/dt performance up to 1000 V/μs
- Surge capability up to 550 A at 60 Hz half cycle
- Mechanically and thermally robust TO-220 clip-attach assembly

Applications:

Typical applications are AC solid-state switches, phase controller, voltage regulator, and inrush current limit circuit.

Product Summary

Characteristic	Value	Unit
$I_{T(RMS)}$	50	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	15	mA

Maximum Ratings

Symbol	Characteristics	Conditions	Value	Units
V_{DSM}/V_{RSM}	Peak Non-repetitive Blocking Voltage	Pulse width = 100 μ s	700	V
$I_{T(RMS)}$	RMS On-state Current	$T_C = 110^\circ\text{C}$	50	A
$I_{T(AV)}$	Average On-state Current	$T_C = 110^\circ\text{C}$	31.5	A
I_{TSM}	Non-repetitive Surge Peak On-state Current (Single Half-cycle; T_J (initial) = 25°C)	$f = 50 \text{ Hz}; t = 10 \text{ ms}$	456	A
		$f = 60 \text{ Hz}; t = 8.3 \text{ ms}$	550	
I^2T	I^2T Value for Fusing	$t_p = 8.3 \text{ ms}$	1255	A^2s
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_{GTM}	Peak Gate Trigger Current	$t_p = 20 \mu\text{s}; T_J = 150^\circ\text{C}$	4	A
$P_{G(AV)}$	Average Gate Power Dissipation	$T_J = 150^\circ\text{C}$	1	W
T_{stg}	Storage Temperature	–	–40 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature	–	–40 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Characteristics	Value	Units
$R_{th(JC)}$	Thermal Resistance, Junction to Case (AC)	0.7	$^\circ\text{C}/\text{W}$

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

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
I_{GT}	DC Gate Trigger Current	$V_D = 12 \text{ V}, R_L = 60 \Omega$	–	–	15	mA
V_{GT}	DC Gate Trigger Voltage	$V_D = 12 \text{ V}, R_L = 60 \Omega$	–	–	1.3	V
V_{GD}	Gate Non-trigger Voltage	$V_D = V_{DRM}, R_L = 3.3 \text{ k}\Omega, T_J = 150^\circ\text{C}$	0.2	–	–	V
I_H	Holding Current	$I_T = 400 \text{ mA}$ (initial)	–	–	50	mA
dv/dt	Critical Rate-of-rise of Off-stage Voltage	$V_D = 2/3 V_{DRM}, \text{ Gate Open}, T_J = 150^\circ\text{C}$	1000	–	–	$\text{V}/\mu\text{s}$
		$V_D = V_{DRM}, \text{ Gate Open}, T_J = 150^\circ\text{C}$	500	–	–	
t_q	Turn-off Time	$I_T = 2 \text{ A}; t_p = 50 \mu\text{s}; dv/dt = 5 \text{ V}/\mu\text{s}; di/dt = 30 \text{ A}/\mu\text{s}$	–	–	25	μs
t_{gt}	Turn-on Time	$I_G = 2 \times I_{GT}, P_W = 15 \mu\text{s}, I_T = 100 \text{ A}$	–	2	–	μs

Static Characteristics

Symbol	Characteristics	Conditions	Maximum Value	Units
V_{TM}	Peak On-state Voltage	$I_{TM} = 100 \text{ A } t_p = 380 \mu\text{s}$	1.6	V
V_{TO}	Threshold Voltage	$T_J = 150^\circ\text{C}$	0.8	V
RD	Dynamic Resistance	$T_J = 150^\circ\text{C}$	9	$\text{m}\Omega$
I_{DRM}/I_{RRM}	Off-state Current, Peak Repetitive	$T_J = 25^\circ\text{C}$	5	μA
		$T_J = 150^\circ\text{C}$	5	mA

Characteristic Curves

Fig. 1. Normalized DC Gate Trigger Current vs. Junction Temperature

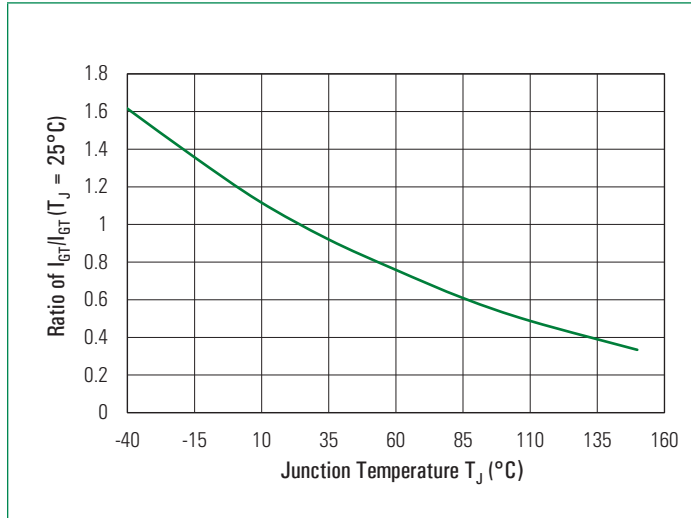


Fig. 2. Normalized DC Gate Trigger Voltage vs. Junction Temperature

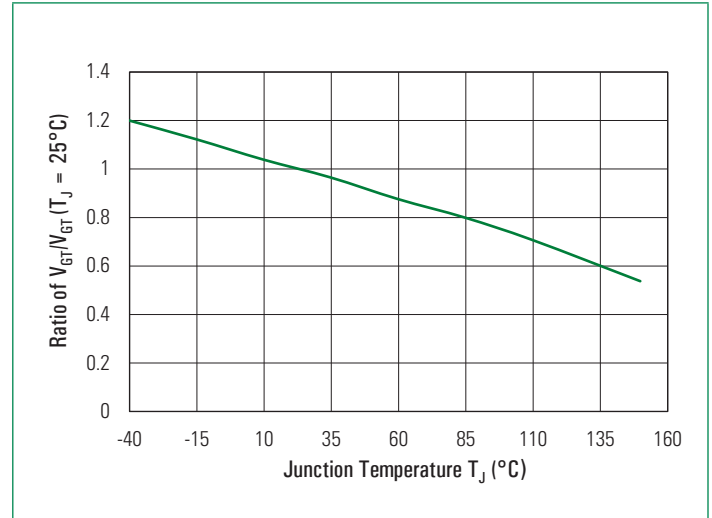


Fig. 3. Normalized DC Holding Current vs. Junction Temperature

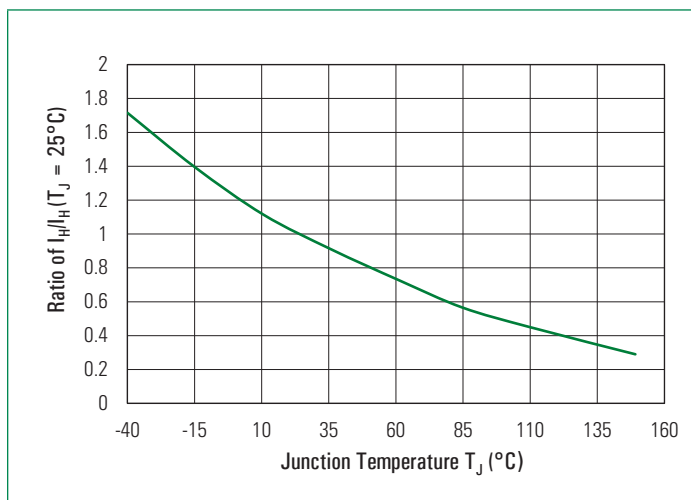


Fig. 4. On-state Current vs. On-state Voltage (Typical)

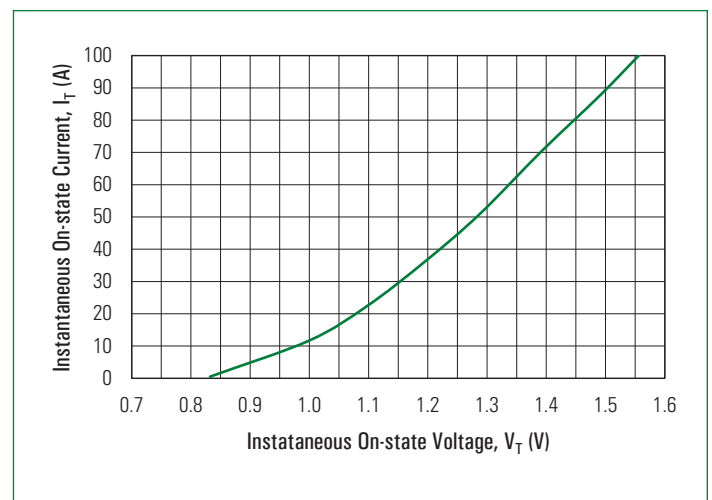


Fig. 5. Power Dissipation (Typical) vs. RMS On-state Current

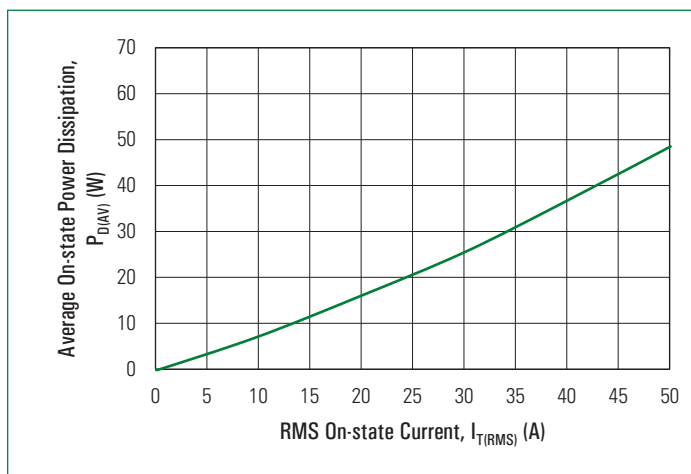


Fig. 6. Maximum Allowable Case Temperature vs. RMS On-state Current

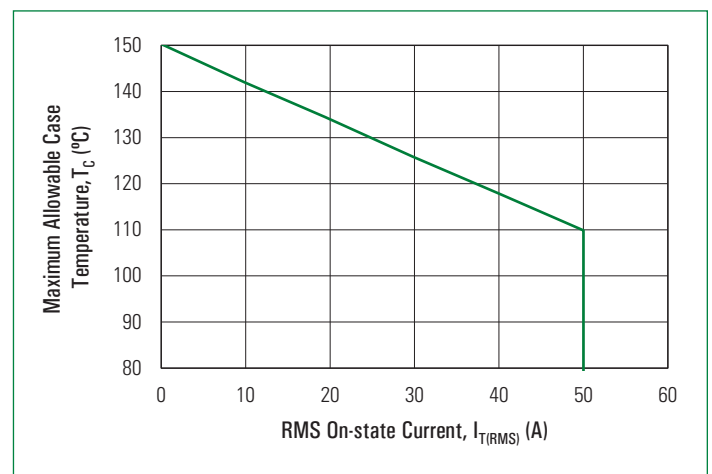


Fig. 7. Maximum Allowable Case Temperature vs. Average On-state Current

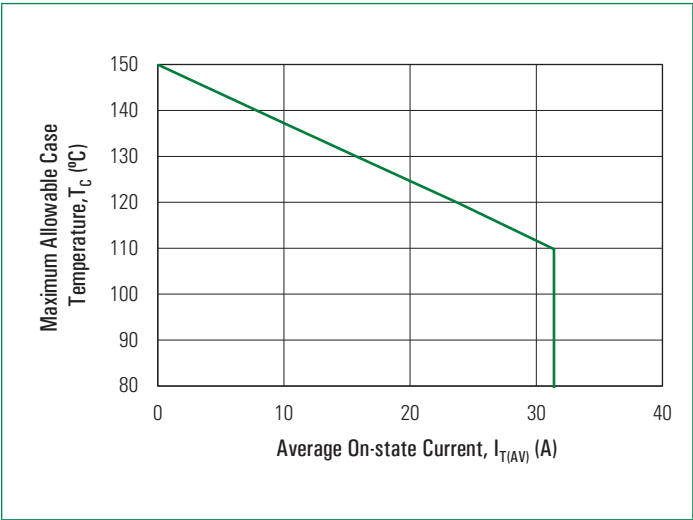
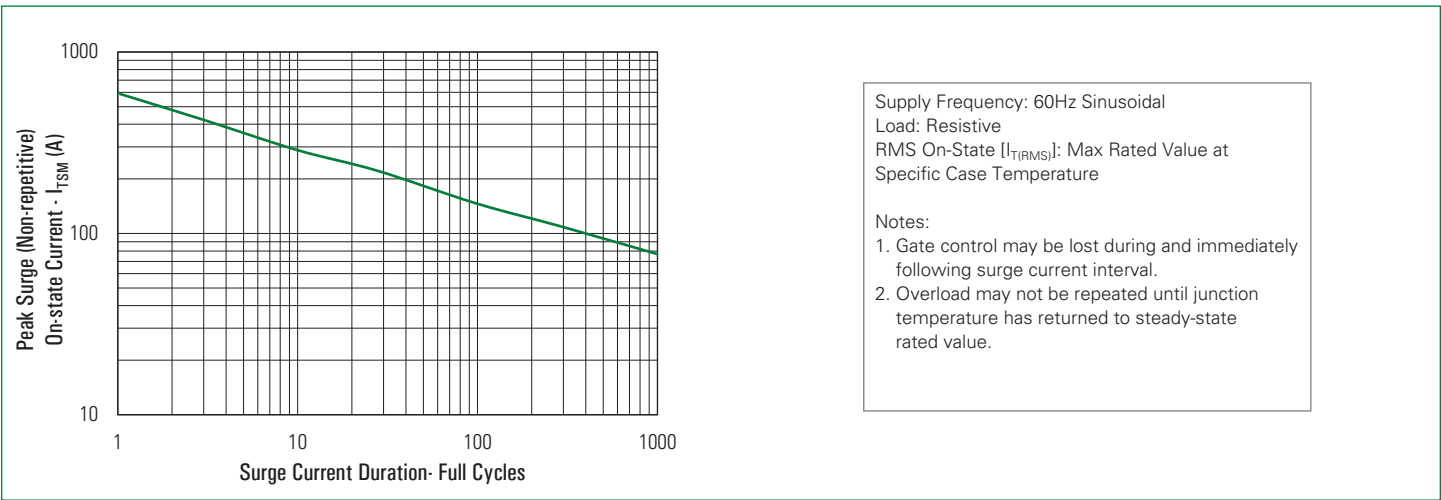


Fig. 8. Peak Capacitor Discharge Current Derating

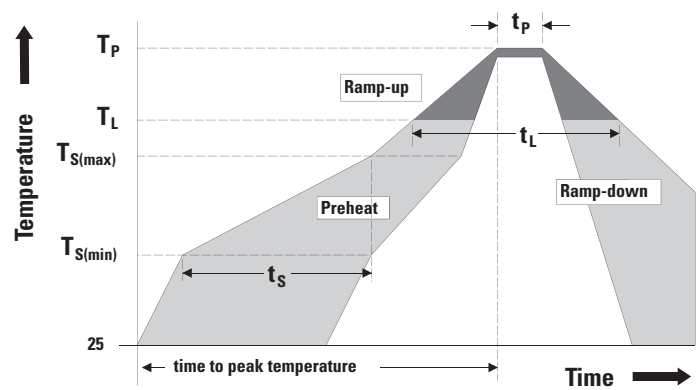


Soldering Parameters

Characteristic		Value
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 seconds
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 ^{+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

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 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.



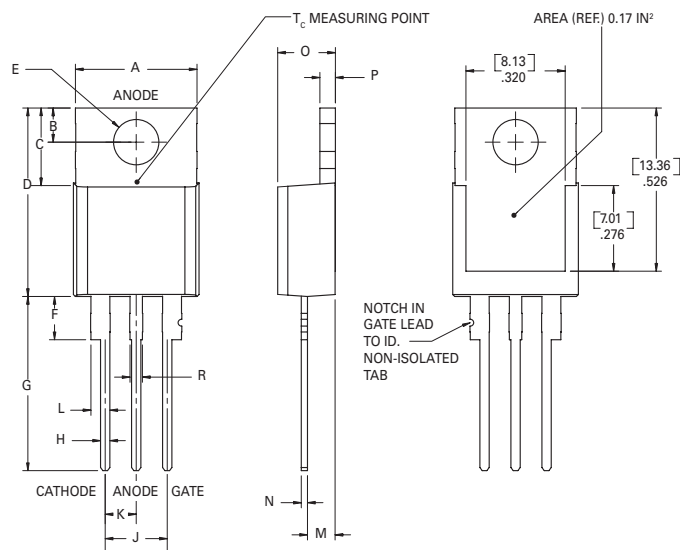
Environmental Specifications

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 150°C for 1008 hours
Temperature/Humidity	EIA / JEDEC, JESD22-A101, 1008 hours; 160 V - DC: 85°C; 85% relative humidity
Temperature Cycling	MIL-STD-750, M-1051, 1000 cycles; -55°C to +150°C; 15-min dwell-time
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
UHAFT	JESD22A-118, 96 hours, 130°C, 85% relative humidity
IOL	MIL-STD-750: Method 1037

Physical Specifications

Characteristic	Value
Terminal Finish	100% Matte Tin-plated
Body Material	UL Recognized compound meeting flammability rating V-0
Terminal Material	Copper Alloy

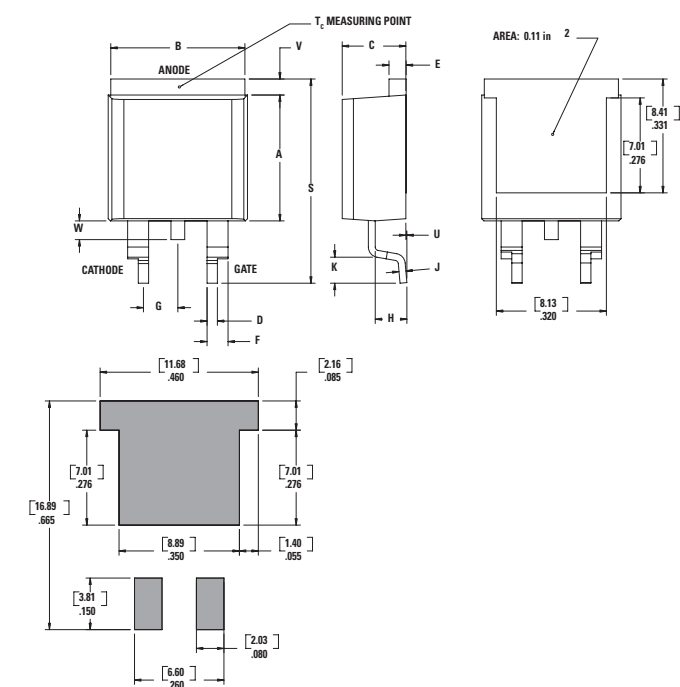
Package Dimensions TO-220AB (R-Package) – Non-isolated Mounting Tab Common with Center Lead



Note: Maximum Torque to be applied to mounting tab is 8 inch lbs. (0.904 Nm)

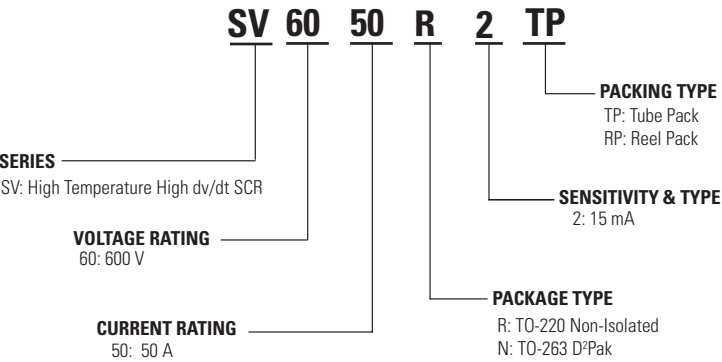
Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	9.65	10.67	0.380	0.420
B	2.67	2.92	0.105	0.115
C	5.84	6.35	0.230	0.250
D	14.99	15.75	0.590	0.620
E	3.61	3.73	0.142	0.147
F	2.79	3.30	0.110	0.130
G	13.72	14.60	0.540	0.575
H	0.64	0.89	0.025	0.035
J	4.95	5.21	0.195	0.205
K	2.41	2.67	0.095	0.105
L	1.52	1.91	0.060	0.075
M	2.16	2.41	0.085	0.095
N	0.46	0.61	0.018	0.024
O	4.52	4.78	0.178	0.188
P	1.14	1.52	0.045	0.060
R	0.97	1.22	0.038	0.048

Package Dimensions TO-263AB (N-Package) – D²Pak Surface Mount

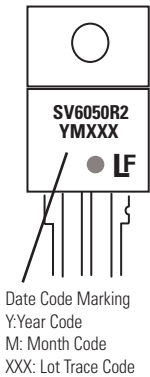


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	9.14	9.40	0.360	0.370
B	9.65	10.67	0.380	0.420
C	4.52	4.78	0.178	0.188
D	0.64	0.89	0.025	0.035
E	1.14	1.52	0.045	0.060
F	1.52	1.91	0.060	0.075
G	2.41	2.67	0.095	0.105
H	2.34	2.59	0.092	0.102
J	0.46	0.61	0.018	0.024
K	2.29	2.79	0.090	0.110
S	14.99	15.88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

Part Numbering and Marking



TO-220 AB - (R Package)



Product Selector

Part Number	Voltage (600 V)	Gate Sensitivity	Type	Package
SV6050R2TP	X	15 mA	Standard SCR	TO-220R
SV6050N2TP	X	15 mA	Standard SCR	TO-263
SV6050N2RP	X	15 mA	Standard SCR	TO-263

Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q.
SV6050R2TP	SV6050R2	2.2 g	Tube Pack	1000 (50 per tube)
SV6050N2TP	SV6050N2	1.6 g	Tube Pack	1000 (50 per tube)
SV6050N2RP	SV6050N2	1.6 g	Embossed Carrier	500

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