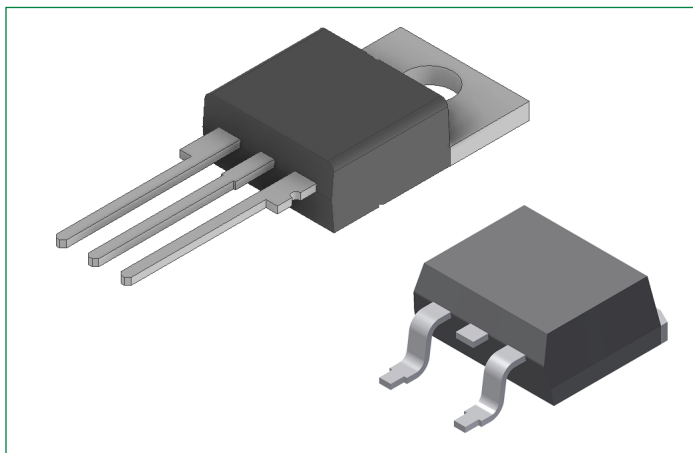


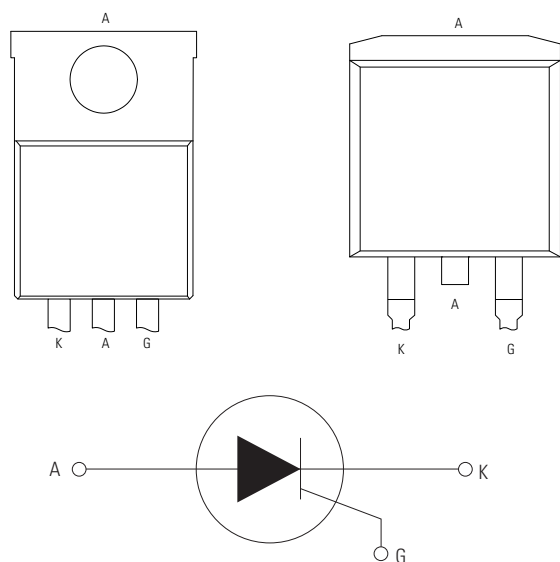
SVxx50xx Series

50 A High Junction Temperature SCRs

HF **RoHS**



Pinout Diagram TO-220AB and TO-263AB



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

Description:

SVxx50xx is a 600 V, 50 A high-temperature SCR series available in TO-220AB and TO-263 packages. The device combines high junction temperature capability, strong surge current withstand, and high dv/dt immunity to enable reliable power control and protection in demanding industrial applications.

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

Benefits:

- Simplified thermal management
- Improved surge withstand capability
- Robust operation in noisy electrical environments
- Supports fast load current transients
- Increased system lifetime

Applications:

- AC solid-state switches
- Overvoltage crowbar protection circuits
- Inrush current limit circuits
- Rectifiers and voltage regulators
- Phase control and motor speed control circuits

Product Summary

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

Maximum Ratings ($T_{vj} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristics	Conditions		Value	Units
V_{RSM} / V_{DSM}	Non-Repetitive Peak Reverse / Peak Off-State Voltage	Pulse width = 100 μ s		700	V
$I_{T(AV)}$	Average On-state Current	$T_C = 110\text{ }^{\circ}\text{C}$		31.5	A
$I_{T(RMS)}$	R.M.S On-State Current	$T_C = 110\text{ }^{\circ}\text{C}$		50	A
I_{TSM}	Non-Repetitive Surge On-State Current	$t_p = 10\text{ ms}$, $f = 50\text{ Hz}$; Single Half-cycle	$T_{vj} = 25\text{ }^{\circ}\text{C}$	456	A
		$t_p = 8.3\text{ ms}$, $f = 60\text{ Hz}$; Single Half-cycle	$T_{vj} = 25\text{ }^{\circ}\text{C}$	550	
I^2t	I^2t Value	$t_p = 8.3\text{ ms}$		1255	A^2s
$di/dt_{(cr)}$	Critical Rate of Rise of On-State Current	$f = 60\text{ Hz}$; $T_{vj} = 150\text{ }^{\circ}\text{C}$		100	$A/\mu s$
I_{GTM}	Peak Gate Trigger Current	$t_p = 20\text{ }\mu s$; $T_{vj} = 150\text{ }^{\circ}\text{C}$		4	A
$P_{G(AV)}$	Average Gate Power Dissipation	$T_{vj} = 150\text{ }^{\circ}\text{C}$		1	W
T_{stg}	Storage Temperature Range	–		–40 to 150	$^{\circ}\text{C}$
T_{vj}	Virtual Junction Temperature Range	–		–40 to 150	$^{\circ}\text{C}$

Electrical Characteristics - Static ($T_{vj} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
V_{TM}	Peak Sinusoidal On-State Voltage	$I_{TM} = 100\text{ A}$, $t_p = 380\text{ }\mu\text{s}$	–	–	1.6	V
V_{GT}	Gate Trigger Voltage	$V_D = 12\text{ V}$, $R_L = 60\text{ }\Omega$	–	–	1.3	V
V_{GD}	Gate Non-Trigger Voltage	$V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$, $T_{vj} = 150\text{ }^{\circ}\text{C}$	0.2	–	–	V
$V_{(TO)}$	Threshold Voltage	$T_{vj} = 150\text{ }^{\circ}\text{C}$	–	–	0.8	V
r_T	Slope Resistance	$T_{vj} = 150\text{ }^{\circ}\text{C}$	–	–	9	$\text{m}\Omega$
I_{GT}	Gate Trigger Current	$V_D = 12\text{ V}$, $R_L = 60\text{ }\Omega$	–	–	15	mA
I_{DRM}/I_{RRM}	Off-State Current, Peak Repetitive	$T_{vj} = 25\text{ }^{\circ}\text{C}$	–	–	5	μA
		$T_{vj} = 150\text{ }^{\circ}\text{C}$	–	–	5	mA
I_H	Holding Current	$I_T = 400\text{ mA}$ (initial)	–	–	50	mA

Electrical Characteristics - Dynamic ($T_{vj} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
dv/dt	Critical Rate-of-rise of Off-stage Voltage	$V_D = 2/3 V_{DRM}$, Gate Open, $T_{vj} = 150\text{ }^{\circ}\text{C}$	–	–	1000	$\text{V}/\mu\text{s}$
		$V_D = V_{DRM}$, Gate Open, $T_{vj} = 150\text{ }^{\circ}\text{C}$	–	–	500	
t_q	Circuit-Commutated Turn-Off Time	$I_T = 2\text{ A}$; $t_p = 50\text{ }\mu\text{s}$; $dv/dt = 5\text{ V}/\mu\text{s}$; $di/dt = 30\text{ A}/\mu\text{s}$	–	–	25	μs
t_{gt}	Gate-Controlled Turn-On Time	$I_G = 2 \times I_{GT}$, $P_W = 15\text{ }\mu\text{s}$, $I_T = 100\text{ A}$	–	2	–	μs

Thermal Characteristics

Symbol	Characteristics	Value	Units
$R_{th(j-c)}$	Thermal Resistance Junction to Case	0.7	K/W

Characteristic Curves

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

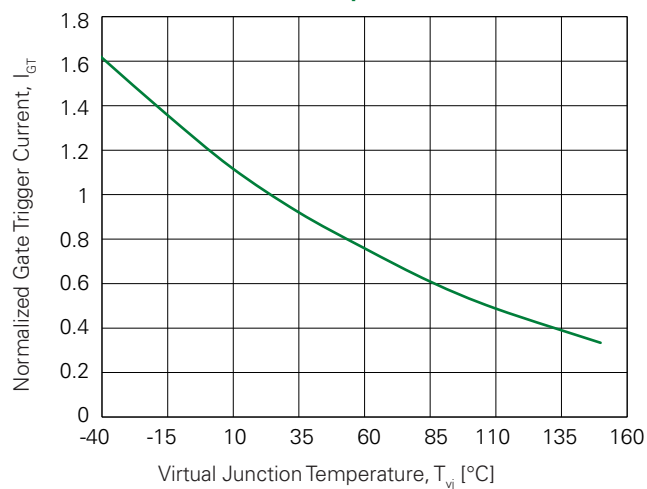


Fig. 2. Normalized Gate Trigger Voltage vs. Virtual Junction Temperature

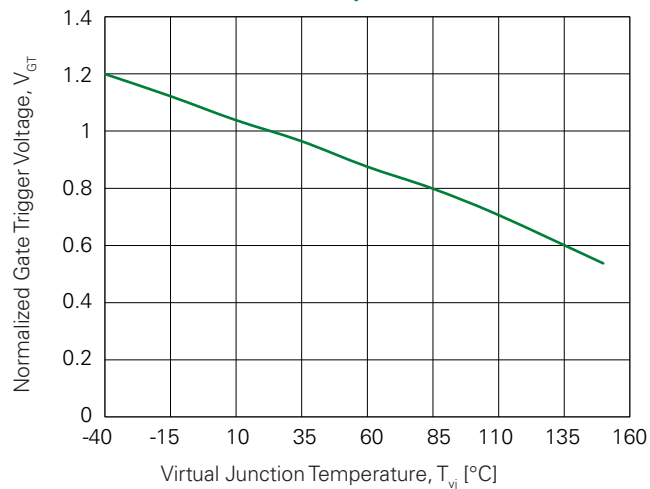


Fig. 3. Normalized Holding Current vs. Virtual Junction Temperature

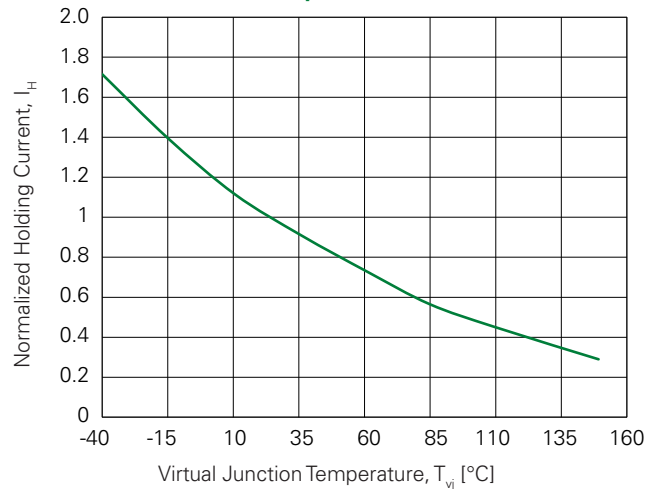


Fig. 4. Typical On-State Current vs. On-State Voltage

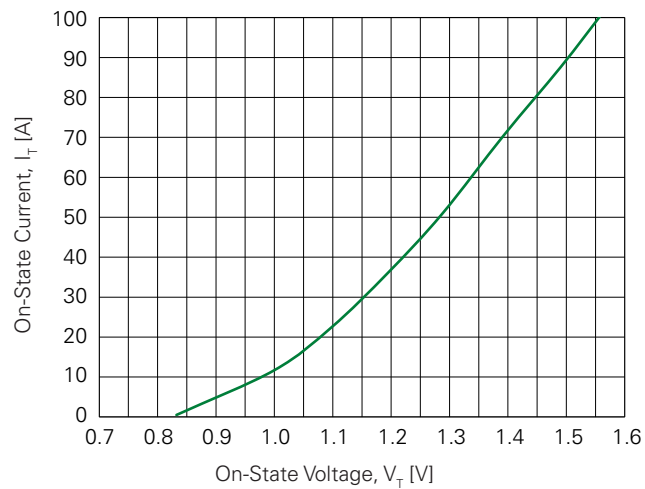


Fig. 5. Average On-State Power Dissipation vs. RMS On-State Current

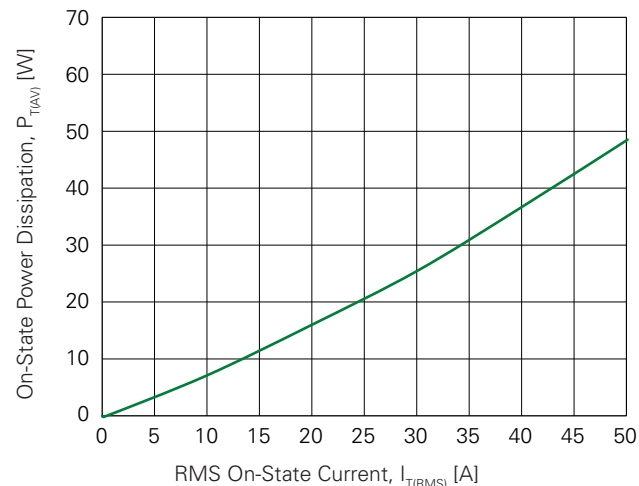
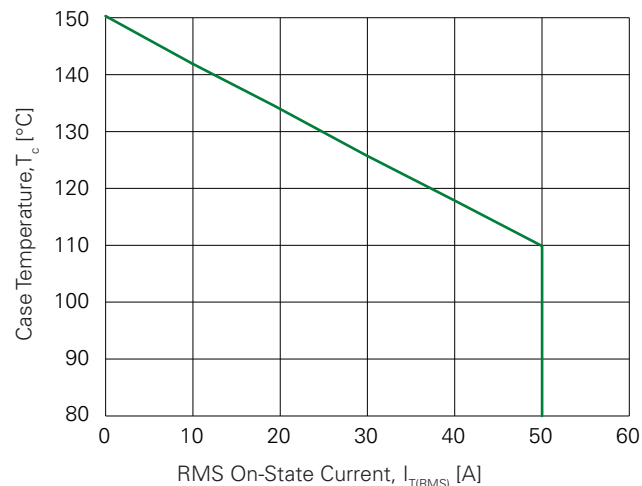


Fig. 6. Maximum Case Temperature vs. RMS On-State Current



Characteristic Curves

Fig. 7. Maximum Case Temperature vs. Average On-State Current

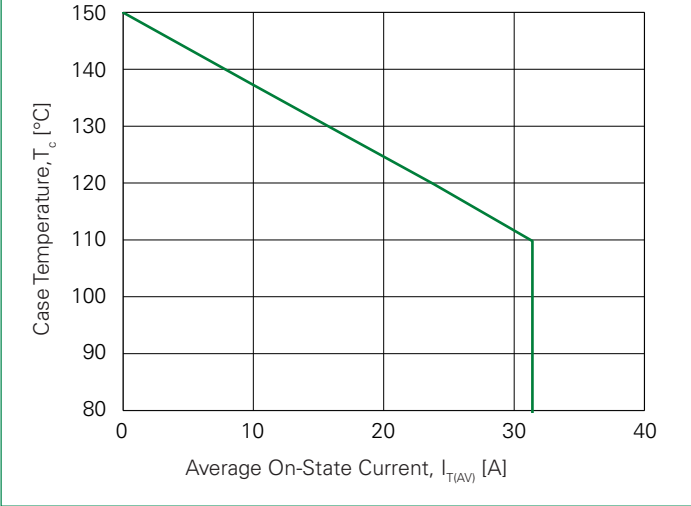
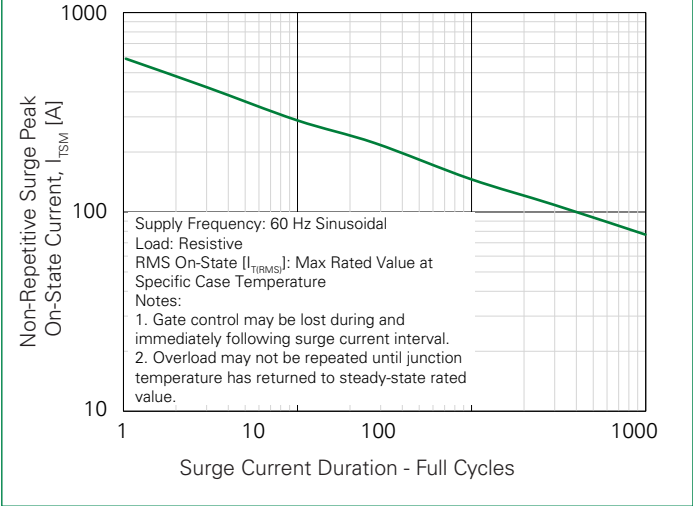


Fig. 8. Non-Repetitive Surge Peak On-State Current vs. Number of Cycles

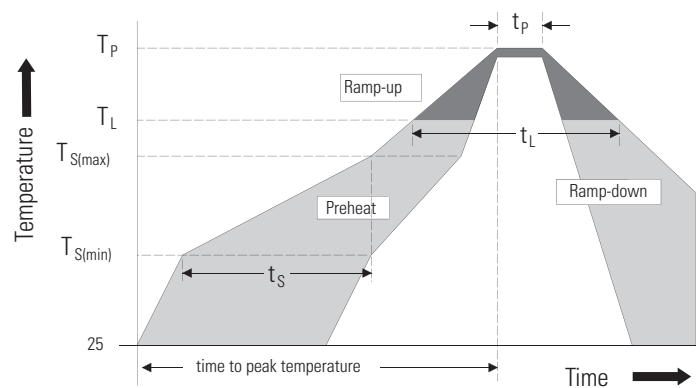


Soldering Parameters

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.



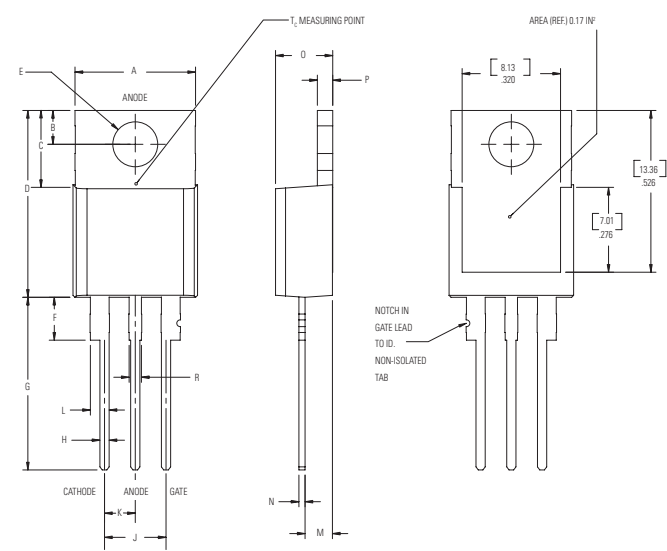
Environmental Specifications

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
UHASt	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

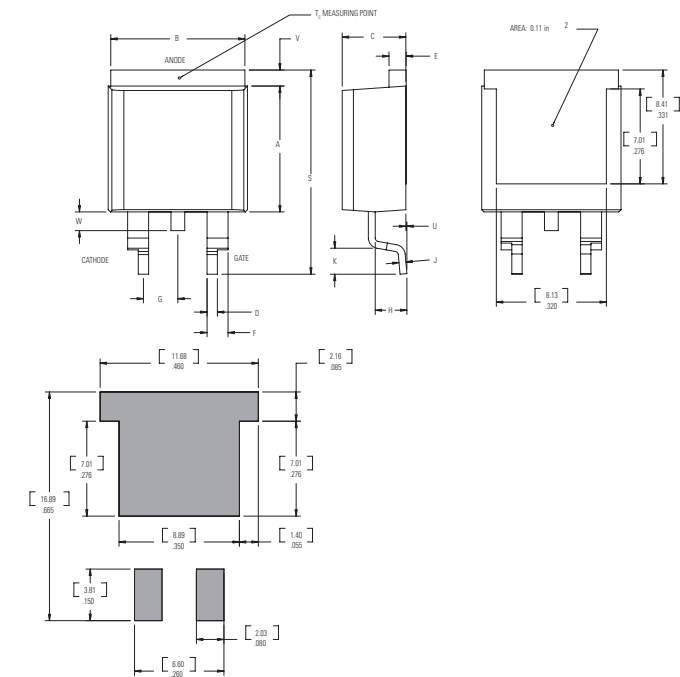
Package Dimensions TO-220AB (R-Package) – Non-isolated Mounting Tab Common with Center Lead



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

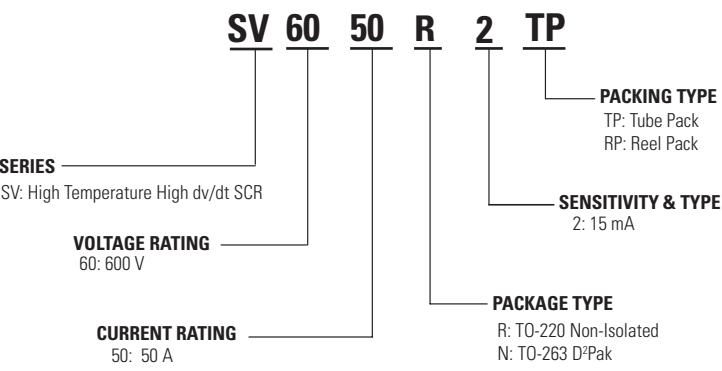
Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	9.65	10.67	0.380	0.420
B	2.67	2.92	0.105	0.115
C	5.84	6.35	0.230	0.250
D	14.99	15.75	0.590	0.620
E	3.61	3.73	0.142	0.147
F	2.79	3.30	0.110	0.130
G	13.72	14.60	0.540	0.575
H	0.64	0.89	0.025	0.035
J	4.95	5.21	0.195	0.205
K	2.41	2.67	0.095	0.105
L	1.52	1.91	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

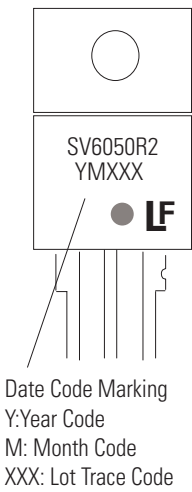


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	9.14	9.40	0.360	0.370
B	9.65	10.67	0.380	0.420
C	4.52	4.78	0.178	0.188
D	0.64	0.89	0.025	0.035
E	1.14	1.52	0.045	0.060
F	1.52	1.91	0.060	0.075
G	2.41	2.67	0.095	0.105
H	2.34	2.59	0.092	0.102
J	0.46	0.61	0.018	0.024
K	2.29	2.79	0.090	0.110
S	14.99	15.88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