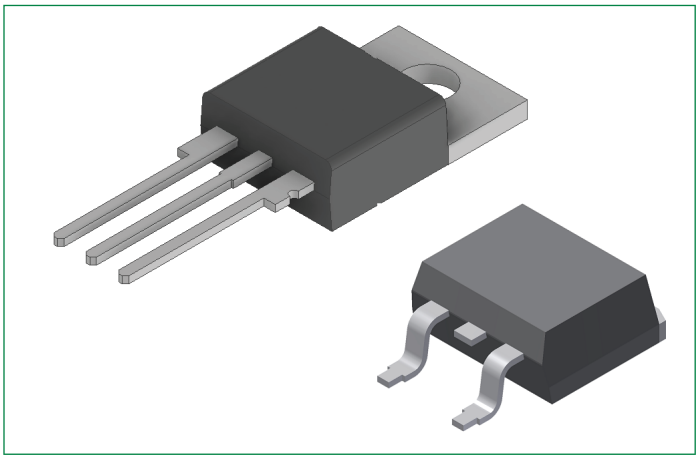
Sxx30x Series

30 A Standard SCRs

RoHS



Description:

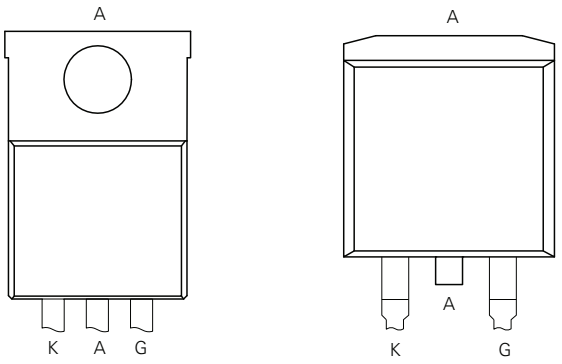
This 30A SCR series comprises excellent unidirectional switches which are designed for applications such as solid state relays, industrial power tools, and high power motor control.

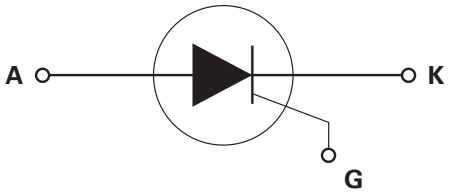
Standard phase control SCRs are triggered with a few milliamperes of current at less than 1.3 V potential.

Features:

- Voltage capability up to 1200 V
- Halogen-free and RoHS-compliant
- Glass-passivated junctions
- Mechanically and thermally robust TO-220 clip-attach assembly
- Surge capability up to 290 A

Pinout Diagram TO-220AB and TO-263AB





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

Applications:

Typical applications include AC solid-state switches, industrial power tools, softstarter, DC motor control, and power converters.

Product Summary

Characteristic	Value	Unit
$I_{T(RMS)}$	30	A
V_{DRM}/V_{RRM}	1200	V
I_{GT}	30	mA

Revised: TK.01/08/2025

Maximum Ratings

Symbol	Characteristics	Conditions	Value	Units
$I_{T(RMS)}$	RMS On-state Current	T_c = 100 °C	30	A
$I_{T(AV)}$	Average On-state Current	T_c = 100 °C	19	A
I_{TSM}	Non-repetitive Surge Peak On-state Current (Single Half-cycle; T_{vj} (initial) = 25 °C)	f = 50 Hz	240	A
		f = 60 Hz	290	
I^2t	I^2t Value for Fusing	t_p = 8.3 ms	346	A^2s
di/dt	Critical Rate of Rise of On-state Current	f = 60 Hz; T_{vj} = 125 °C	150	A/µs
I_{GM}	Peak Gate Current	T_{vj} = 125 °C	4	A
$P_{G(AV)}$	Average Gate Power Dissipation	T_{vj} = 125 °C	0.5	W
T_{stg}	Storage Temperature Range	–	–40 to 150	°C
T_{vj}	Operating Junction Temperature Range	–	–40 to 125	°C
V_{DSM}/V_{RSM}	Non-repetitive Surge Peak Off-state Voltage	Pulse width = 100 µs	1400	V

Thermal Characteristics

Symbol	Characteristics		Value	Units
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (AC)	Sxx30R/ Sxx30N	0.6	K/W

Electrical Characteristics (T_{vj} = 25 °C, unless otherwise specified)

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
I_{GT}	DC Gate Trigger Current	V_D = 12 V, R_L = 30 Ω	5	–	30	mA
V_{GT}	DC Gate Trigger Voltage	V_D = 12 V, R_L = 30 Ω	–	0.75	1.3	V
V_{GD}	Gate Non-trigger Voltage	$V_D = V_{DRM}$, R_L = 3.3 kΩ, T_{vj} = 125 °C	0.2	–	–	V
I_H	Holding Current	I_T = 400 mA (initial)	–	–	70	mA
dv/dt	Critical Rate-of-rise of Off-stage Voltage	V_D = 2/3 $V_{DRM,}$ Gate Open, T_{vj} = 125 °C	1000	1500	–	V/µs
		$V_D = V_{DRM,}$ Gate Open, T_{vj} = 125 °C	500	1000	–	
t_q	Turn-off Time	I_T = 2 A; t_p = 50 µs; dv/dt = 5 V/µs; di/dt = 30 A/µs	–	25	35	µs
t_{gt}	Turn-on Time	I_G = 2 x $I_{GT,}$ P_W = 15 µs, I_T = 60 A	–	2.5	–	µs

Static Characteristics

Symbol	Characteristics	Conditions	Maximum Value	Units
V_{TM}	Peak On-state Voltage	I_T = 60 A; t_p = 380 µs	1.85	V
I_{DRM}/I_{RRM}	Off-state Current, Peak Repetitive	T_{vj} = 25 °C, V_D=V_{DRM}/V_{RRM}	5	µA
		T_{vj} = 125 °C, V_D=V_{DRM}/V_{RRM}	3	mA

Characteristic Curves

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

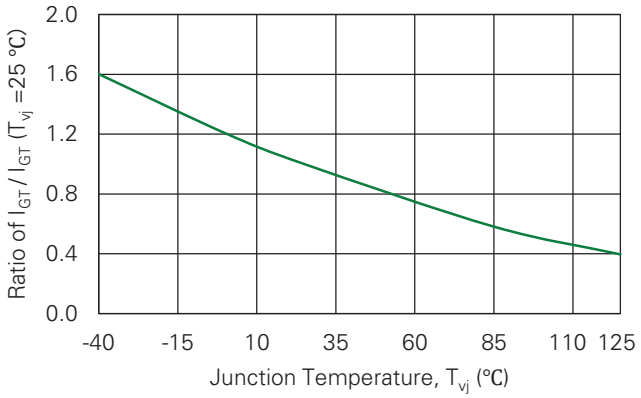


Fig. 2. Normalized DC Gate Trigger Voltage vs. Junction Temperature

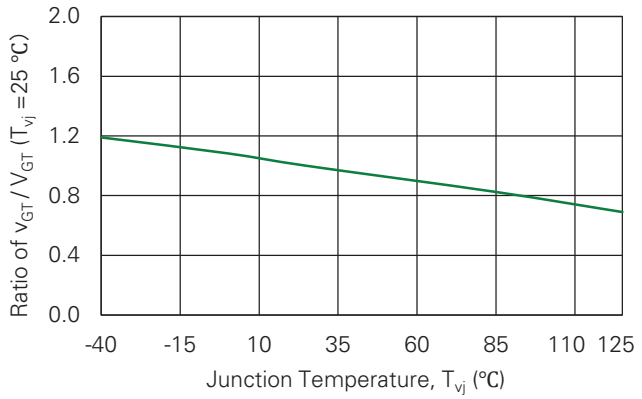


Fig. 3. Normalized DC Holding Current vs. Junction Temperature

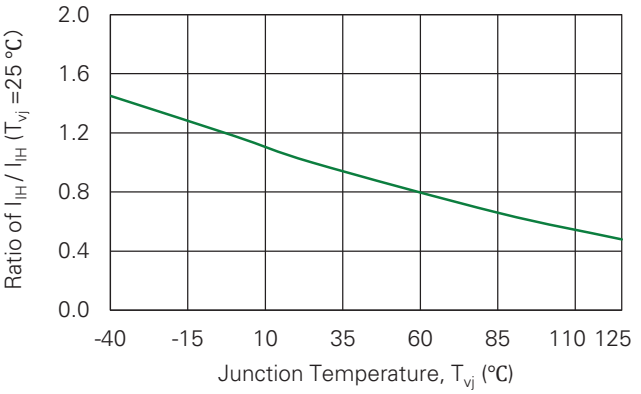


Fig. 4. Typical On-state Current vs. On-state Voltage

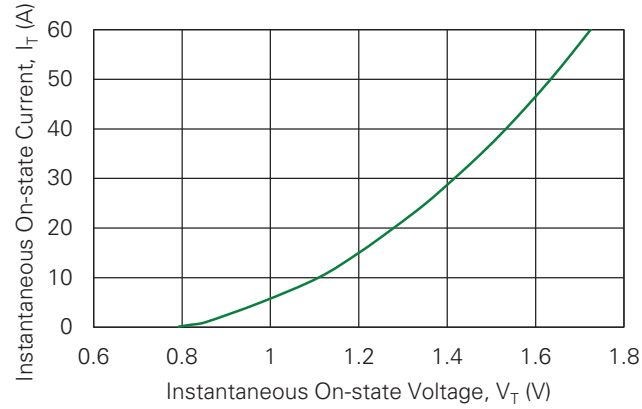


Fig. 5. Typical Power Dissipation vs. RMS On-state Current

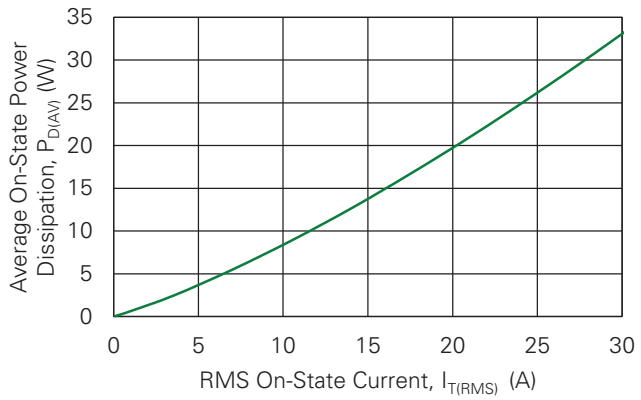


Fig. 6. Maximum Allowable Case Temperature vs. RMS On-state Current

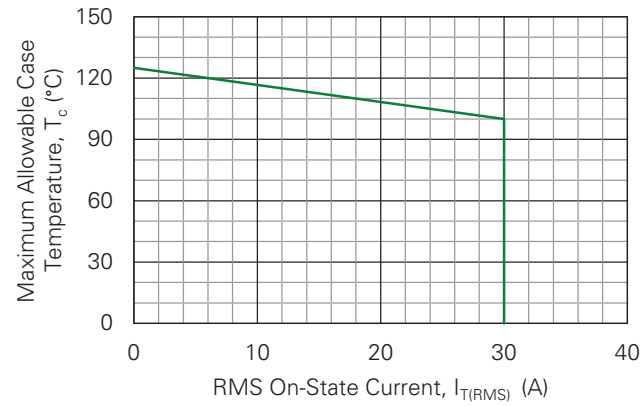


Fig. 7. Maximum Allowable Case Temperature vs. Average On-state Current

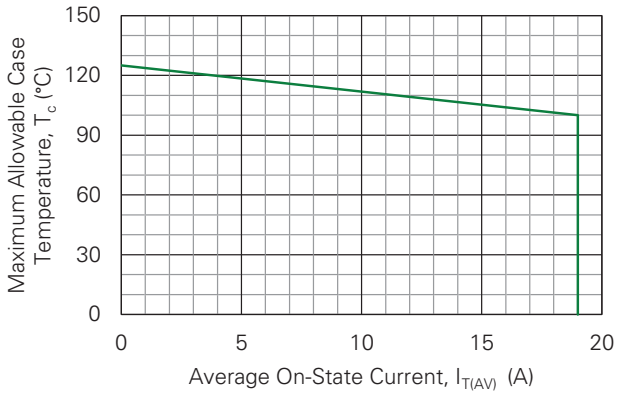
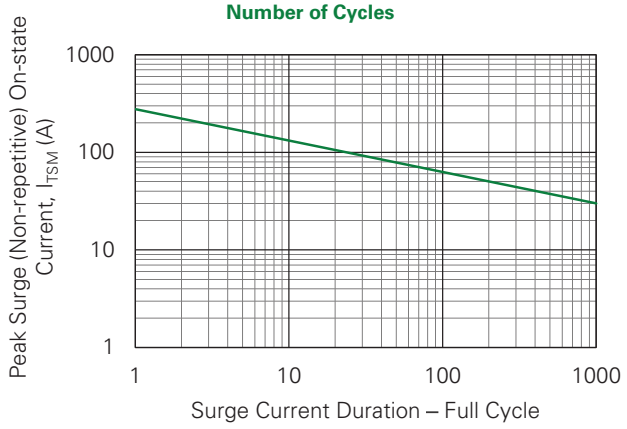


Fig. 8. Surge Peak On-state Current vs. Number of Cycles

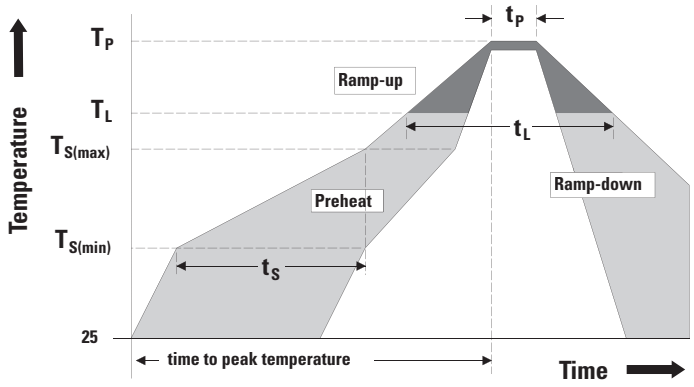


Supply Frequency: 60Hz Sinusoidal
Load: Resistive
RMS On-State [$I_{T(RMS)}$]: Max Rated Value at Specific Case Temperature

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

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 secconds
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.

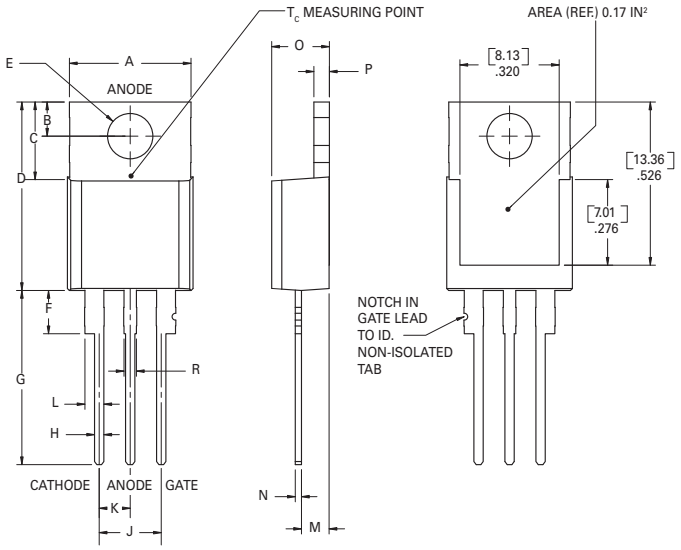
Environmental Specifications

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°C for 1008 hours
Temperature/Humidity	EIA / JEDEC, JESD22-A101, 1008 hours; 320 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
High Temp Storage	MIL-STD-750, M-1031,1008 hours, 150°C
Low Temp Storage	1008 hours, -40°C

Physical Specifications

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

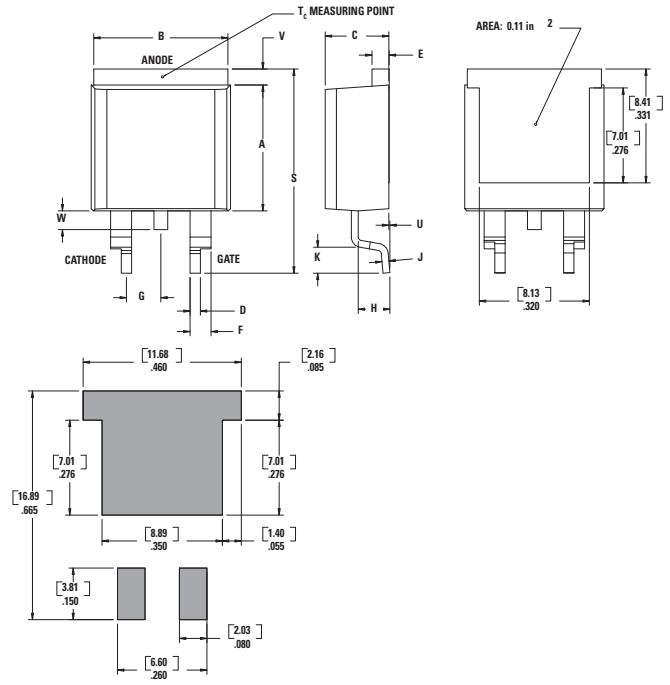
Package Dimensions TO-220AB (R-Package) – Non-isolated Mounting Tab Common with Center Lead



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

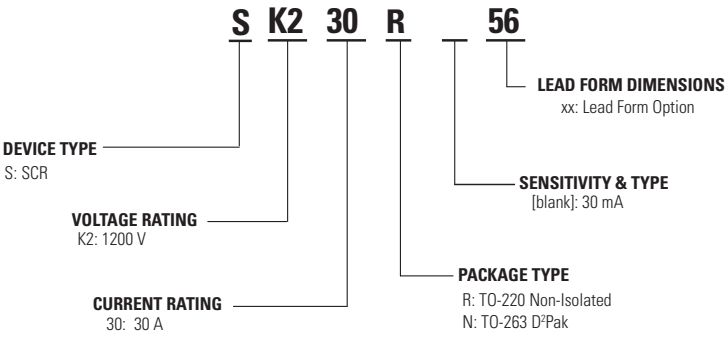
Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	9.65	10.67	0.380	0.420
B	2.67	2.92	0.105	0.115
C	5.84	6.35	0.230	0.250
D	14.99	15.75	0.590	0.620
E	3.61	3.73	0.142	0.147
F	2.79	3.30	0.110	0.130
G	13.72	14.60	0.540	0.575
H	0.64	0.89	0.025	0.035
J	4.95	5.21	0.195	0.205
K	2.41	2.67	0.095	0.105
L	1.52	1.91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

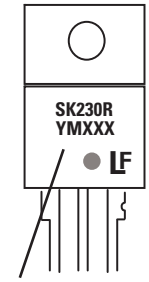


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	9.14	9.40	0.360	0.370
B	9.65	10.67	0.380	0.420
C	4.52	4.78	0.178	0.188
D	0.64	0.89	0.025	0.035
E	1.14	1.52	0.045	0.060
F	1.52	1.91	0.060	0.075
G	2.41	2.67	0.095	0.105
H	2.34	2.59	0.092	0.102
J	0.46	0.61	0.018	0.024
K	2.29	2.79	0.090	0.110
S	14.99	15.88	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)
TO-263 AB - (N Package)



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

Product Selector

Part Number	Voltage (1200 V)	Gate Sensitivity	Type	Package
Sxx30R	X	30 mA	Standard SCR	TO-220R
Sxx30N	X	30 mA	Standard SCR	TO-263

Note: xx = Voltage

Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q.
Sxx30RTP	Sxx30R	2.2 g	Tube Pack	1000 (50 per tube)
Sxx30NRP	Sxx30N	1.6 g	Embossed Carrier	500

Note: xx = Voltage

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

Meets all EIA-481-2 Standards