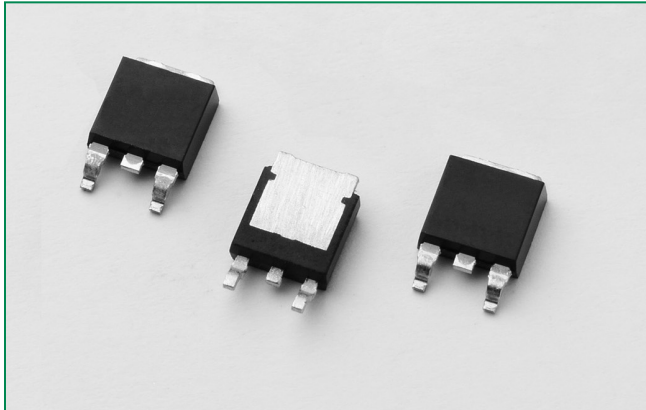


SRR6016xx Series

RoHS



Description

Excellent unidirectional switches for phase control and general switching applications such as heating, motor control controls, converters / rectifiers and capacitive discharge ignitions.

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 600 V
- Surge capability up to 160 A

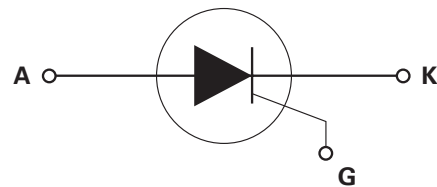
Applications

Typical applications includes capacitive discharge system for motorcycle engine CDI, portable generator engine ignition, strobe lights and nailers, as well as generic rectifiers, battery voltage regulators and converters. Also controls for power tools, home/brown good and white goods appliances.

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	16	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	6	mA

Schematic Symbol



Absolute Maximum Ratings – Standard SCRs

Symbol	Parameter	Test Conditions	SRR6016x1	Unit
$I_{T(RMS)}$	RMS on-state current	$T_c = 100^\circ\text{C}$	16	A
$I_{T(AV)}$	Average on-state current	$T_c = 100^\circ\text{C}$	10.24	A
I_{TSM}	Peak non-repetitive surge current	single half cycle; $f = 50\text{Hz}$; T_j (initial) = 25°C	132	A
		single half cycle; $f = 60\text{Hz}$; T_j (initial) = 25°C	160	
I^2t	I^2t Value for fusing	$t_p = 8.3 \text{ ms}$	107	A^2s
di/dt	Critical rate-of-rise of on-state current	$f = 60 \text{ Hz } T_j = 125^\circ\text{C}$	100	$\text{A}/\mu\text{s}$
I_{GM}	Peak gate current	$T_j = 125^\circ\text{C}$	2	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125^\circ\text{C}$	0.5	W
T_{stg}	Storage temperature range		-40 to 150	$^\circ\text{C}$
T_j	Operating junction temperature range		-40 to 125	$^\circ\text{C}$

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

Symbol	Test Conditions		SRR6016x1	Unit
I_{GT}	$V_D = 12\text{V}$ $R_L = 60\ \Omega$	MIN.	1.5	mA
		MAX.	6	mA
V_{GT}	$V_D = 12\text{V}$ $R_L = 60\ \Omega$	MAX.	1.5	V
dv/dt	$V_D = V_{DRM}$; gate open; $T_J = 100^\circ\text{C}$	MIN.	300	V/ μs
	$V_D = V_{DRM}$; gate open; $T_J = 125^\circ\text{C}$		225	
V_{GD}	$V_D = V_{DRM}$; $R_L = 3.3\ \text{k}\Omega$; $T_J = 125^\circ\text{C}$	MIN.	0.2	V
I_H	$I_T = 200\text{mA}$ (initial)	MAX.	40	mA
t_q	(1)	MAX.	35	μs
t_{gt}	$I_G = 2 \times I_{GT}$; $PW = 15\mu\text{s}$; $I_T = 20\text{A}$	TYP.	2	μs

NOTE: (1) $I_T=2\text{A}$; $t_p=50\mu\text{s}$; $dv/dt=5\text{V}/\mu\text{s}$; $di/dt=-30\text{A}/\mu\text{s}$

Static Characteristics

Symbol	Test Conditions		Value	Unit
V_{TM}	$I_T = 32\text{A}$; $t_p = 380\ \mu\text{s}$	MAX.	1.8	V
I_{DRM} / I_{RRM}	V_{DRM} / V_{RRM}	$T_J = 25^\circ\text{C}$	10	μA
		$T_J = 110^\circ\text{C}$	500	
		$T_J = 125^\circ\text{C}$	1000	

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	1.50	$^\circ\text{C}/\text{W}$

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

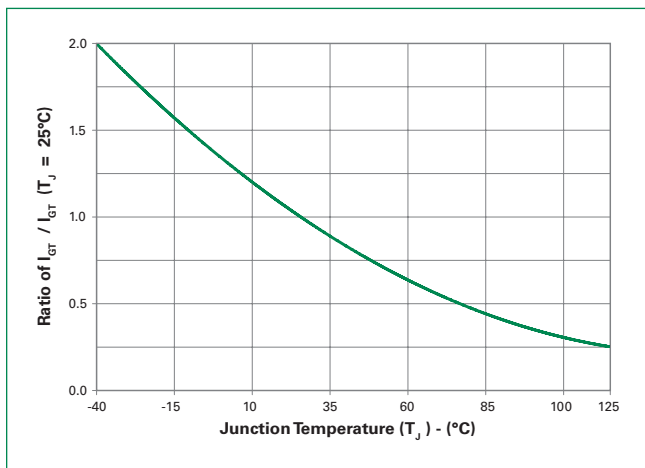


Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature

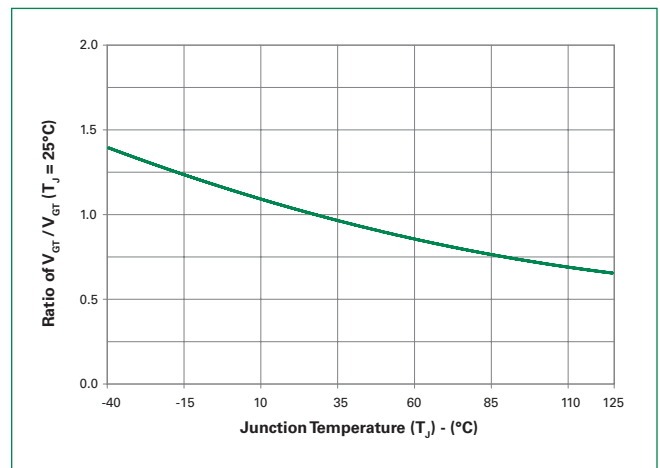


Figure 3: Normalized DC Holding Current vs. Junction Temperature

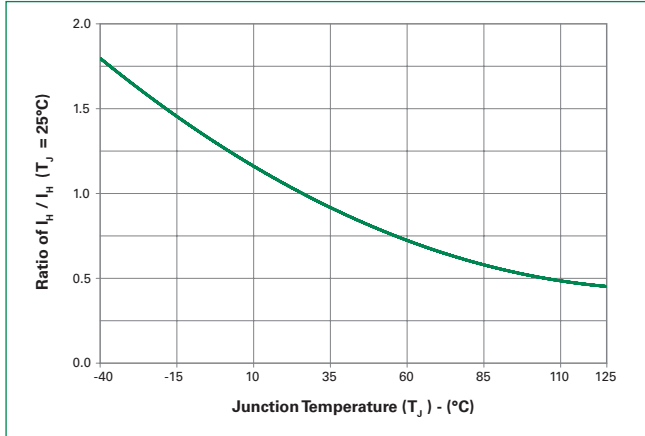


Figure 4: On-State Current vs. On-State Voltage (Typical)

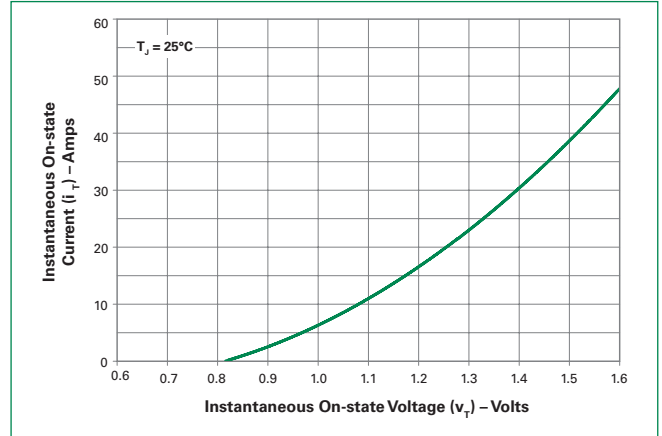


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

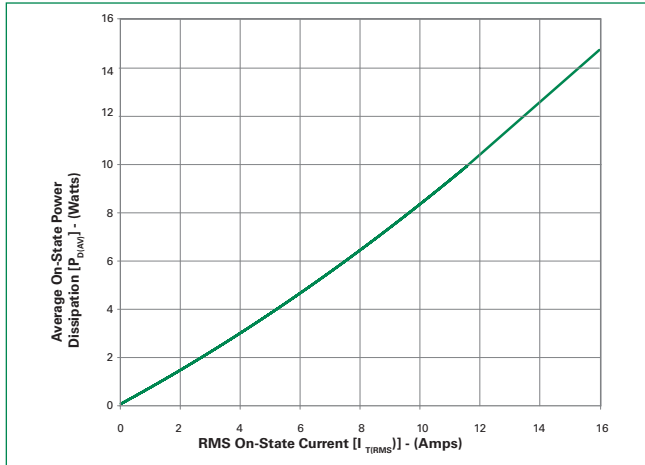


Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current

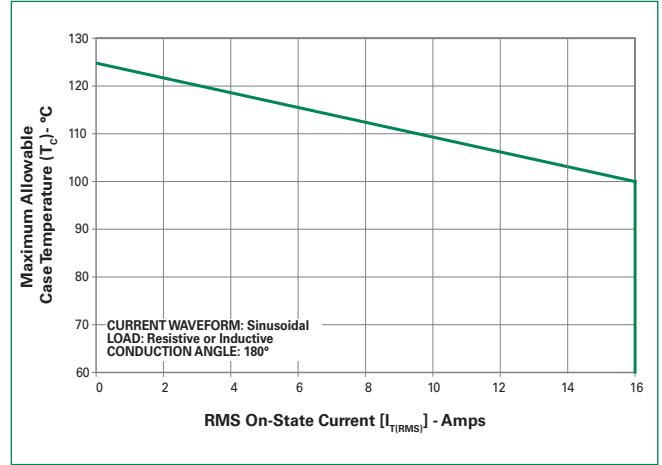


Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current

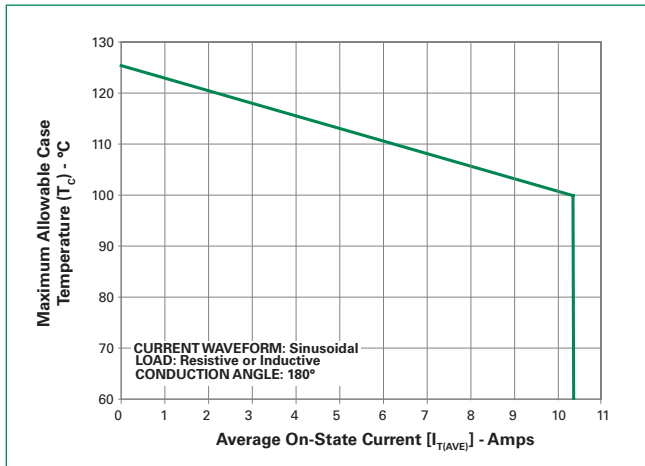


Figure 8: Peak Capacitor Discharge Current

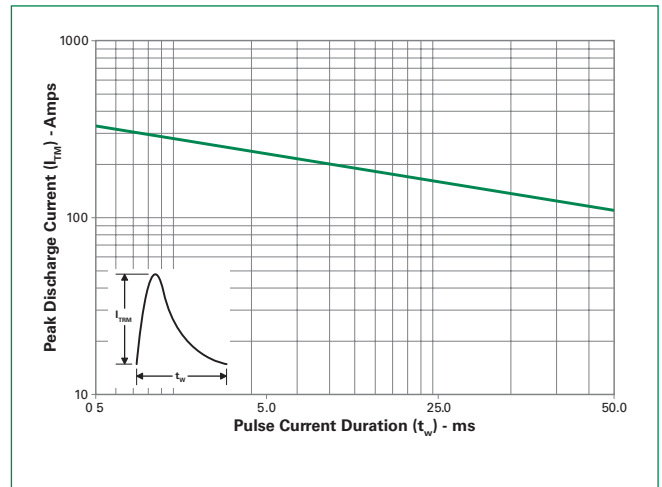


Figure 9: Peak Capacitor Discharge Current Derating

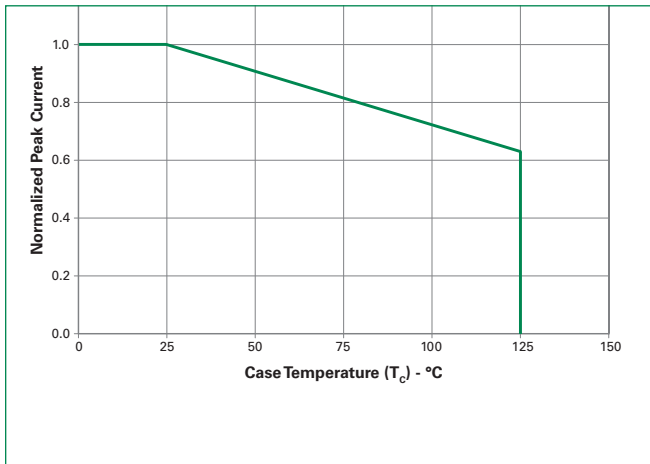
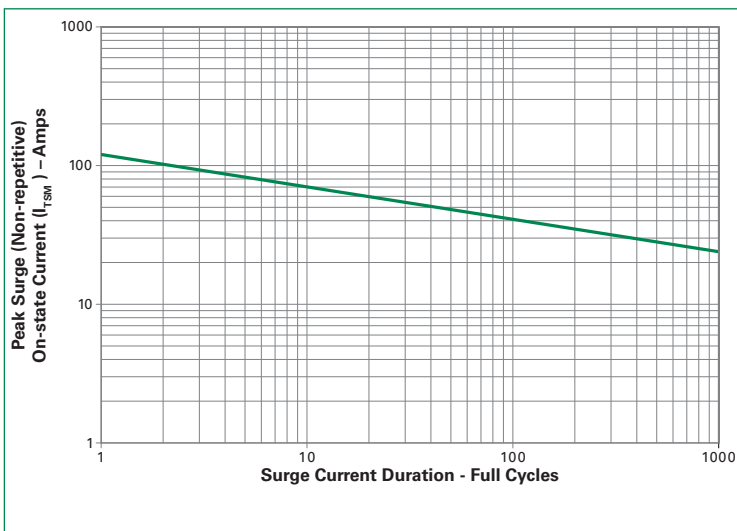


Figure 10: Surge Peak On-State Current vs. Number of Cycles

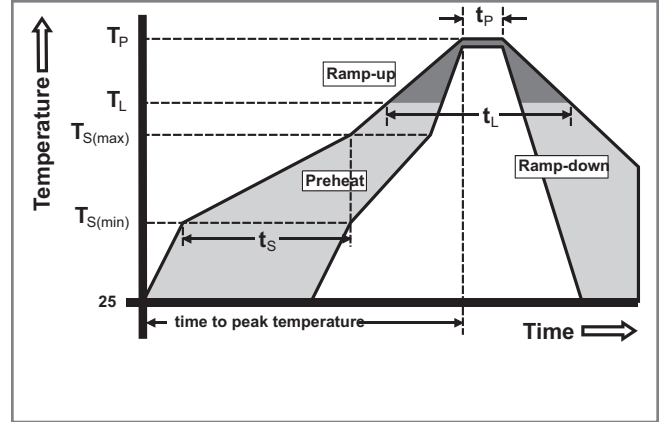


SUPPLY FREQUENCY: 60 Hz Sinusoidal
LOAD: Resistive
RMS On-State Current: [$I_{T(RMS)}$]: Maximum Rated Value at Specified Case Temperature

- 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.

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 Material	UL recognized epoxy meeting flammability classification V-0
Lead Material	Copper Alloy

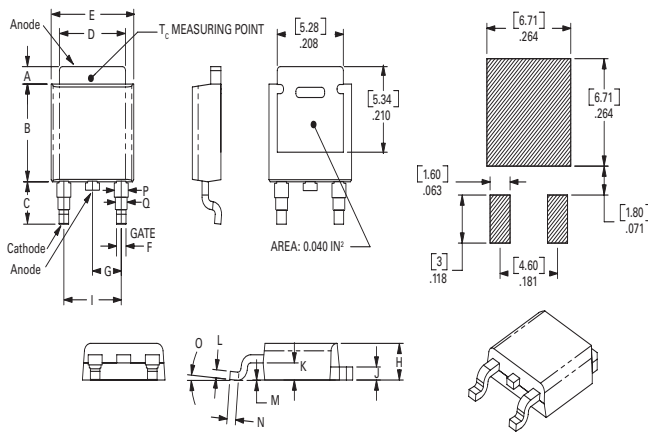
Design Considerations

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

Dimensions — TO-252AA (D-Package) — D-PAK Surface Mount

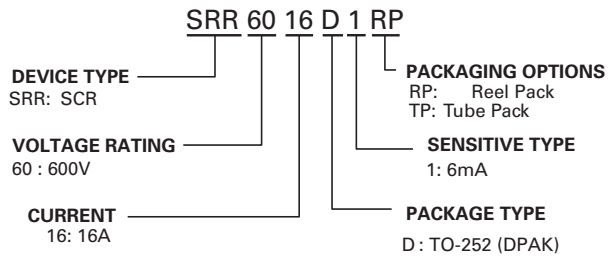


Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.040	0.043	0.050	1.02	1.09	1.27
B	0.235	0.243	0.245	5.97	6.16	6.22
C	0.106	0.108	0.113	2.69	2.74	2.87
D	0.205	0.208	0.213	5.21	5.29	5.41
E	0.255	0.262	0.265	6.48	6.65	6.73
F	0.027	0.031	0.033	0.69	0.80	0.84
G	0.087	0.090	0.093	2.21	2.28	2.36
H	0.085	0.092	0.095	2.16	2.33	2.41
I	0.176	0.179	0.184	4.47	4.55	4.67
J	0.018	0.020	0.023	0.46	0.51	0.58
K	0.038	0.040	0.044	0.97	1.02	1.12
L	0.018	0.020	0.023	0.46	0.51	0.58
M	0.000	0.000	0.004	0.00	0.00	0.10
N	0.021	0.026	0.027	0.53	0.67	0.69
O	0°	0°	5°	0°	0°	5°
P	0.042	0.047	0.052	1.06	1.20	1.32
Q	0.034	0.039	0.044	0.86	1.00	1.11

Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
SRR6016D1TP	SRR6016D1	0.3 g	Tube	750 (75 per tube)
SRR6016D1RP	SRR6016D1	0.3 g	Embossed Carrier	2500

Part Numbering System



Part Marking System

