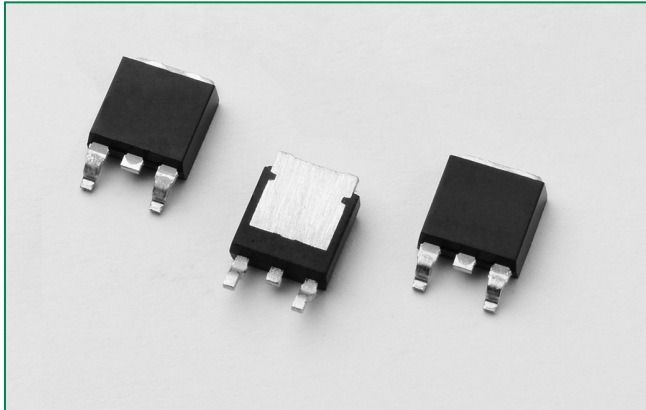


**SRR6016xx Series**

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

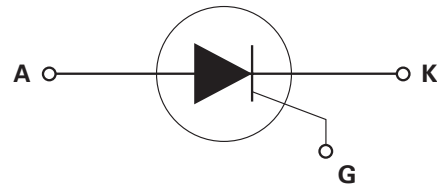
**Applications**

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) = $25^\circ\text{C}$	132	A
		single half cycle; $f = 60\text{Hz}$ ; $T_j$ (initial) = $25^\circ\text{C}$	160	
$I^2t$	$I^2t$ Value for fusing	$t_p = 8.3 \text{ ms}$	107	$\text{A}^2\text{s}$
$di/dt$	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/ $\mu\text{s}$
	$V_D = V_{DRM}$ ; 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	$\mu\text{s}$
$t_{gt}$	$I_G = 2 \times I_{GT}$ ; $PW = 15\mu\text{s}$ ; $I_T = 20\text{A}$	TYP.	2	$\mu\text{s}$

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

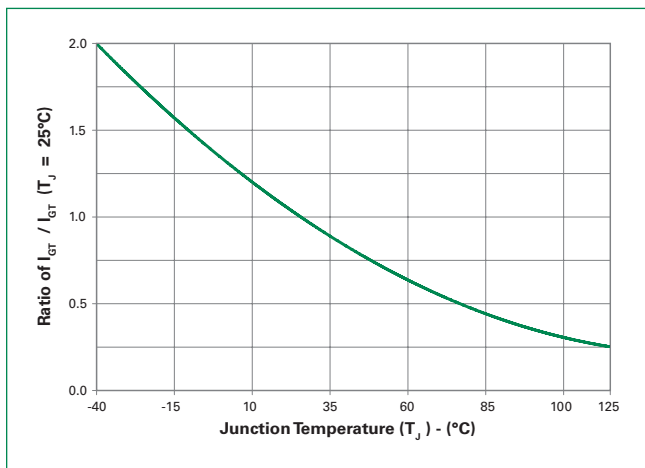
**Static Characteristics**

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	$\mu\text{A}$
		$T_J = 110^\circ\text{C}$	500	
		$T_J = 125^\circ\text{C}$	1000	

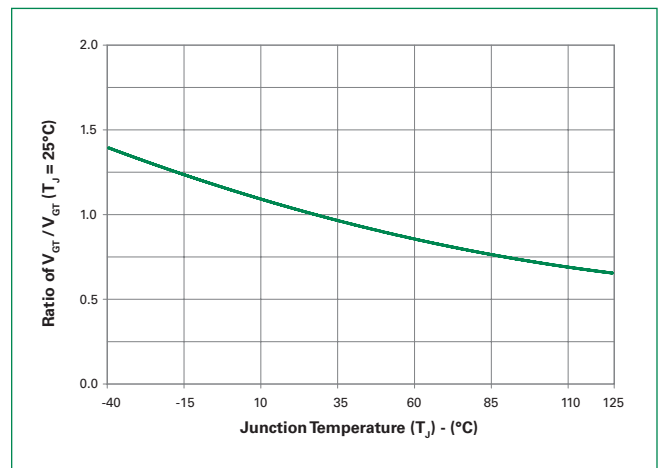
**Thermal Resistances**

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

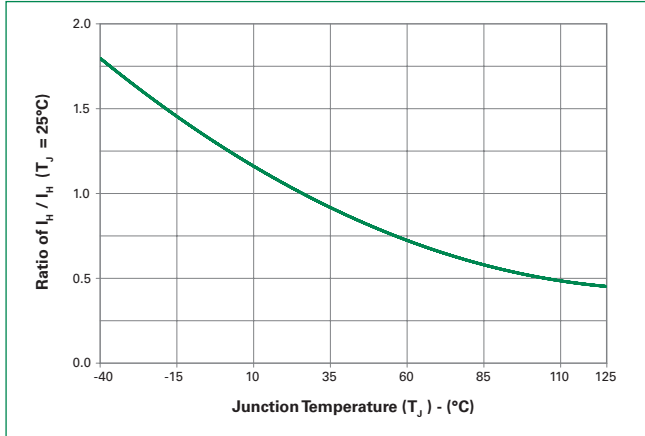
**Figure 1: Normalized DC Gate Trigger Current vs. Junction Temperature**



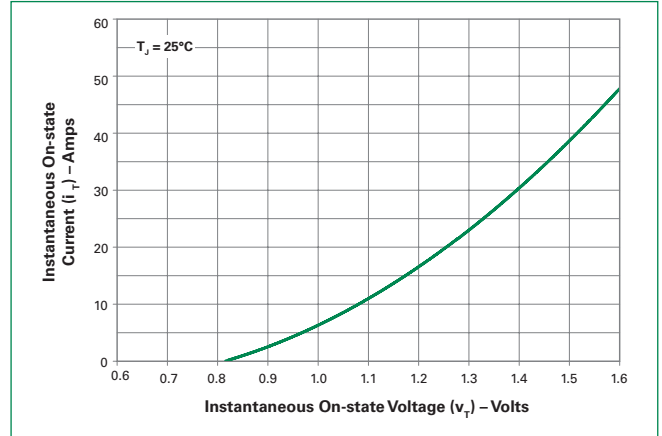
**Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature**



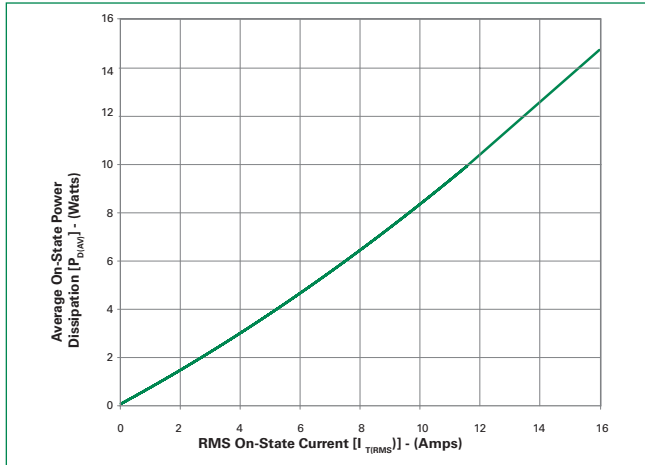
**Figure 3: Normalized DC Holding Current vs. Junction Temperature**



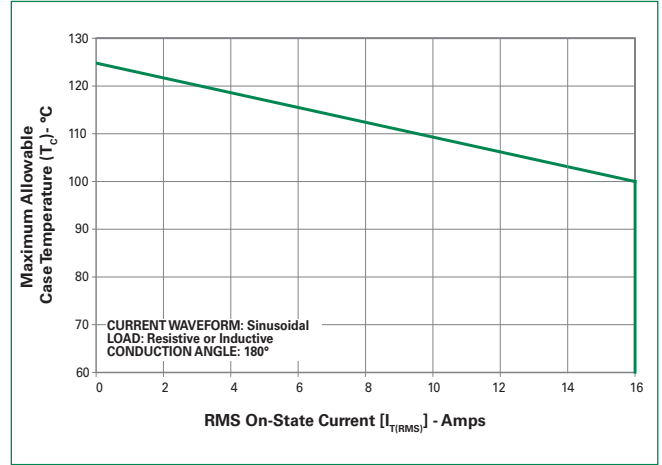
**Figure 4: On-State Current vs. On-State Voltage (Typical)**



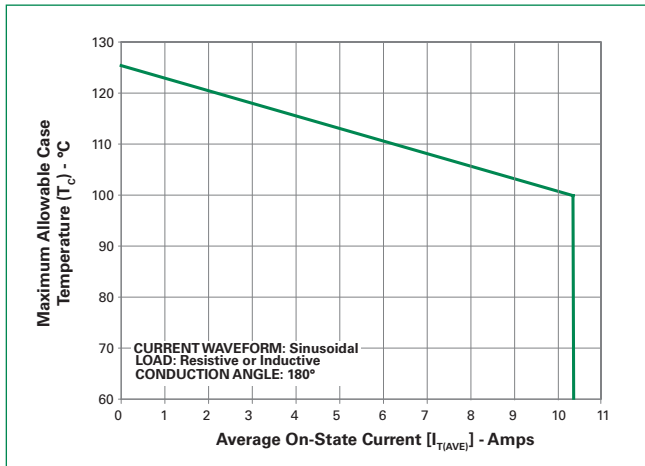
**Figure 5: Power Dissipation (Typical) vs. RMS On-State Current**



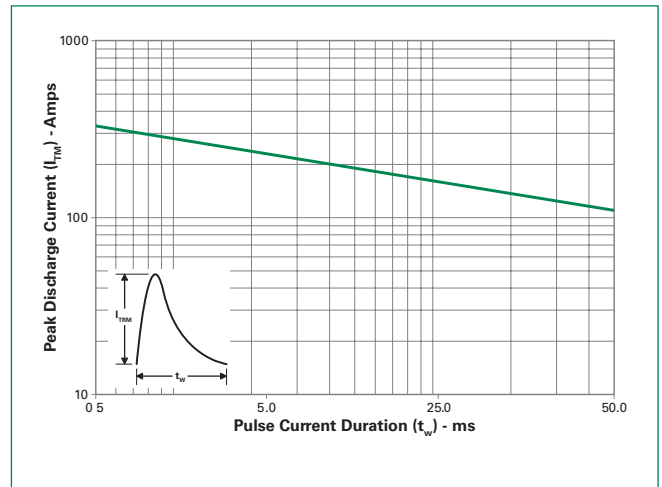
**Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current**



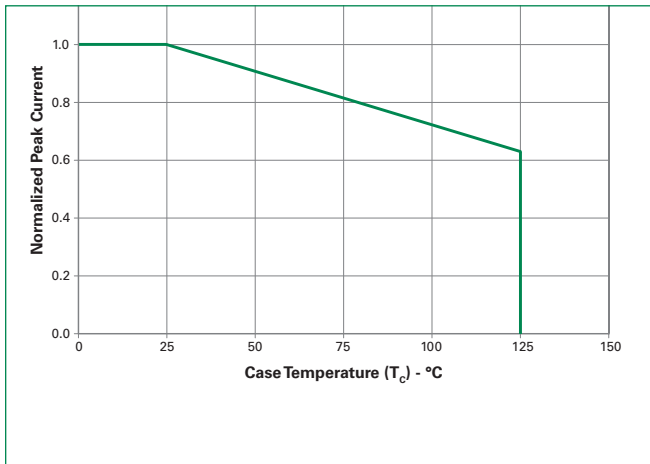
**Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current**



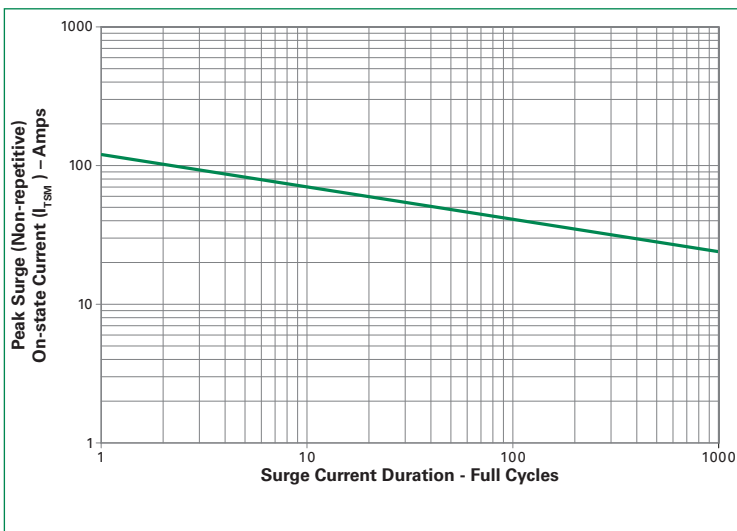
**Figure 8: Peak Capacitor Discharge Current**



**Figure 9: Peak Capacitor Discharge Current Derating**



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

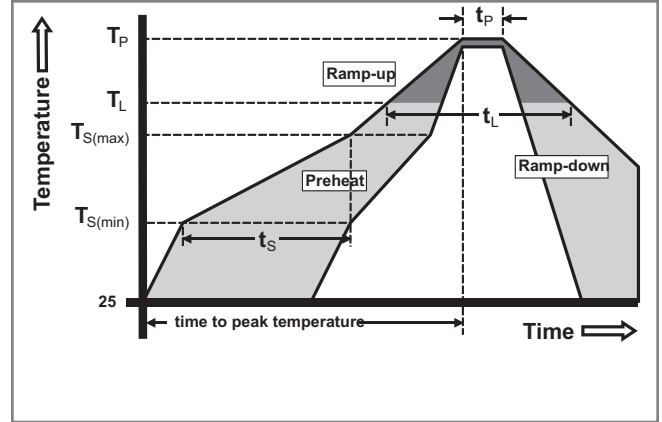


SUPPLY FREQUENCY: 60 Hz Sinusoidal  
 LOAD: Resistive  
 RMS On-State Current: [ $I_{T(RMS)}$ ]: Maximum Rated Value at Specified Case Temperature

- 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 <sup>+0/-5</sup> °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**

<b>Terminal Finish</b>	100% Matte Tin-plated
<b>Body Material</b>	UL recognized epoxy meeting flammability classification V-0
<b>Lead Material</b>	Copper Alloy

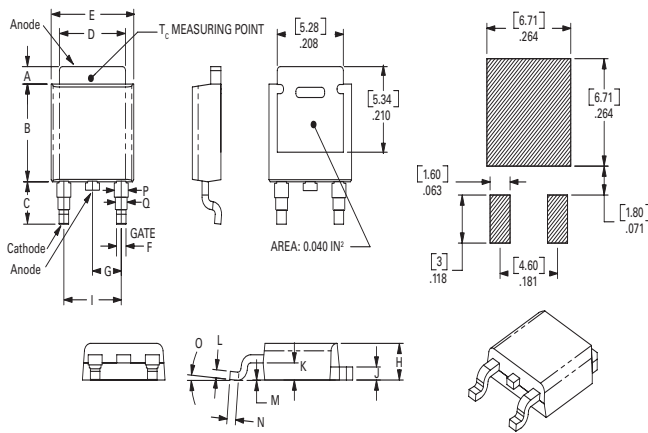
**Design Considerations**

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
<b>AC Blocking</b>	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°C for 1008 hours
<b>Temperature Cycling</b>	MIL-STD-750, M-1051, 100 cycles; -40°C to +150°C; 15-min dwell-time
<b>Temperature/Humidity</b>	EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC: 85°C; 85% rel humidity
<b>High Temp Storage</b>	MIL-STD-750, M-1031, 1008 hours; 150°C
<b>Low-Temp Storage</b>	1008 hours; -40°C
<b>Resistance to Solder Heat</b>	MIL-STD-750 Method 2031
<b>Solderability</b>	ANSI/J-STD-002, category 3, Test A
<b>Lead Bend</b>	MIL-STD-750, M-2036 Cond E

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

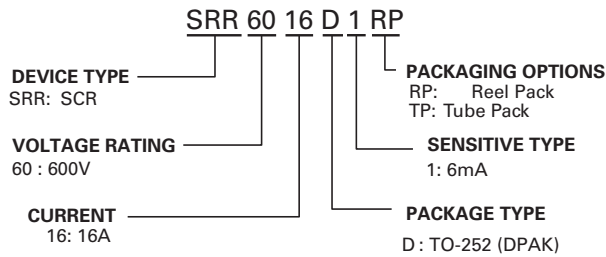


Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.040	0.043	0.050	1.02	1.09	1.27
B	0.235	0.243	0.245	5.97	6.16	6.22
C	0.106	0.108	0.113	2.69	2.74	2.87
D	0.205	0.208	0.213	5.21	5.29	5.41
E	0.255	0.262	0.265	6.48	6.65	6.73
F	0.027	0.031	0.033	0.69	0.80	0.84
G	0.087	0.090	0.093	2.21	2.28	2.36
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

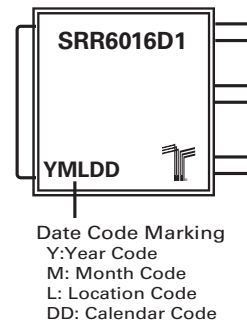
**Packing Options**

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**



**TO-252 Embossed Carrier Reel Pack (RP) Specifications**

Meets all EIA-481-2 Standards

