Littelfuse
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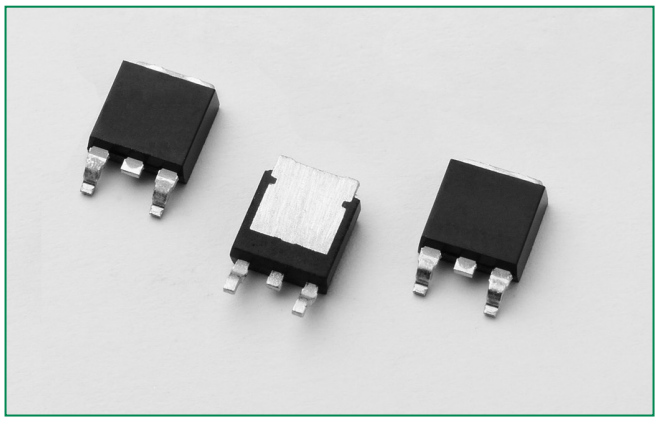
Teccor® brand Thyristors
12 Amp Standard SCR

SRR6012xx Series

RoHS



Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	6	mA

Description

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

Sensitive gate SCRs are easily triggered with microAmps of current as furnished by sense coils, proximity switches, and microprocessors.

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

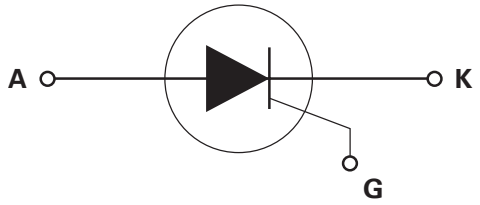
Features & Benefits

- RoHS compliant
- Glass – passivated junctions
- Voltage capability up to 600 V
- Surge capability up to 120 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.

Schematic Symbol



Absolute Maximum Ratings — Standard SCRs

Symbol	Parameter	Test Conditions	SRR6012x1	Unit
$I_{T(RMS)}$	RMS on-state current	T_C = 105°C	12	A
$I_{T(AV)}$	Average on-state current	T_C = 105°C	7.68	A
I_{TSM}	Peak non-repetitive surge current	single half cycle; f = 50Hz; T_J (initial) = 25°C	100	A
		single half cycle; f = 60Hz; T_J (initial) = 25°C	120	
I^2t	I^2t Value for fusing	t_p = 8.3 ms	60	A^2s
di/dt	Critical rate-of-rise of on-state current	f = 60 Hz T_J = 125°C	100	A/µs
I_{GM}	Peak gate current	T_J = 125°C	2	A
$P_{G(AV)}$	Average gate power dissipation	T_J = 125°C	0.5	W
T_{stg}	Storage temperature range		-40 to 150	°C
T_J	Operating junction temperature range		-40 to 125	°C

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Electrical Characteristics (T_J = 25°C, unless otherwise specified) – Standard SCRs

Symbol	Test Conditions		SRR6012x1	Unit
I_{GT}	V_D = 12V R_L = 60 Ω	MIN.	1.5	mA
		MAX.	6	mA
V_{GT}	V_D = 12V R_L = 60 Ω	MAX.	1.5	V
dv/dt	$V_D = V_{DRM}$; gate open; T_J = 100°C	MIN.	300	V/µs
	$V_D = V_{DRM}$; gate open; T_J = 125°C		225	
V_{GD}	$V_D = V_{DRM}$; R_L = 3.3 kΩ; T_J = 125°C	MIN.	0.2	V
I_H	I_T = 200mA (initial)	MAX.	30	mA
t_q	(1)	MAX.	35	µs
t_{gt}	I_G = 2 x I_{GT}; PW = 15µs; I_T = 20A	TYP.	2	µs

NOTE: (1) I_T=2A; t_p=50µs; dv/dt=5V/µs; di/dt=-30A/µs

Static Characteristics

Symbol	Test Conditions		Value	Unit
V_{TM}	I_T = 24A; t_p = 380 µs	MAX.	1.8	V
I_{DRM} / I_{RRM}	V_{DRM} / V_{RRM}	T_J = 25°C	10	µA
		T_J = 100°C	200	
		T_J = 125°C	500	

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	1.45	°C/W

Figure 1: Normalized DC Gate Trigger Current vs. Junction Temperature (Sensitive SCR)

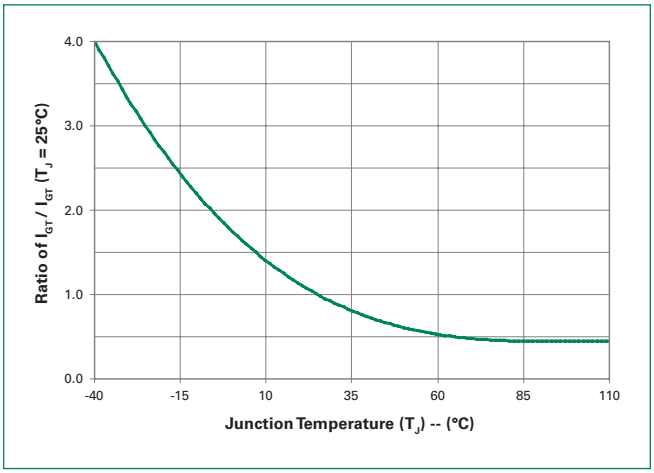

Figure 2: Normalized DC Gate Trigger Current vs. Junction Temperature (Standard SCR)

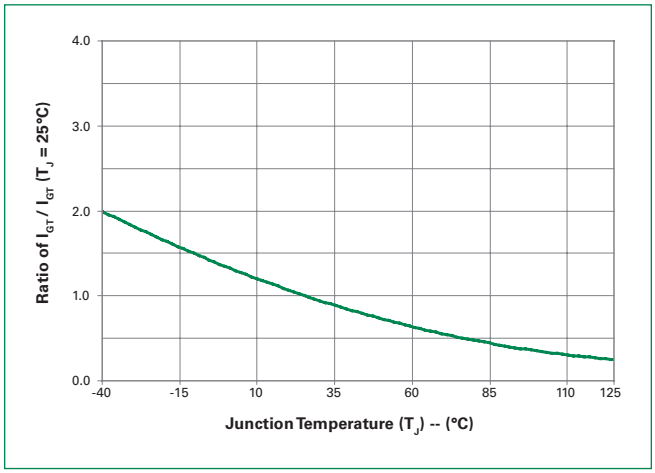

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Figure 3: Normalized DC Gate Trigger Voltage vs. Junction Temperature

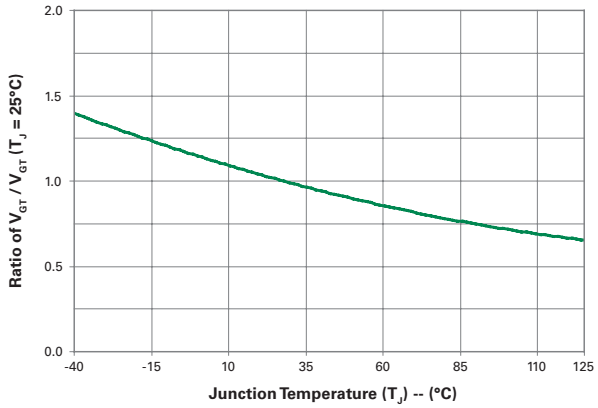

Figure 4: Normalized DC Holding Current vs. Junction Temperature

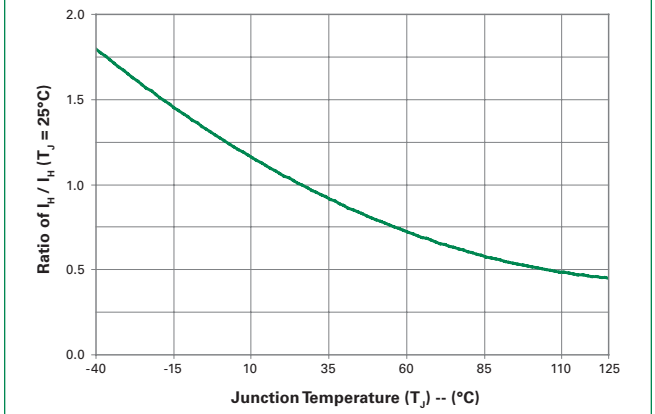

Figure 5: On-State Current vs. On-State Voltage (Typical)

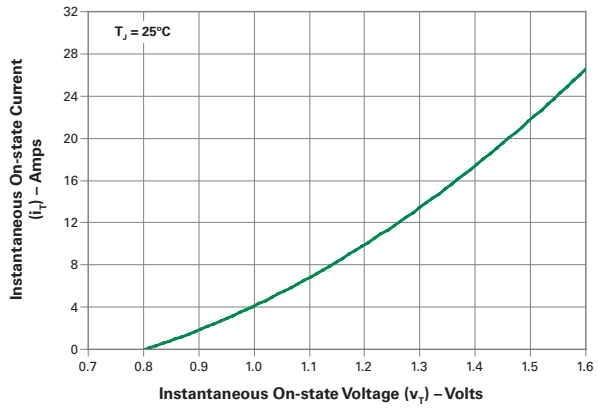

Figure 6: Power Dissipation (Typical) vs. RMS On-State Current

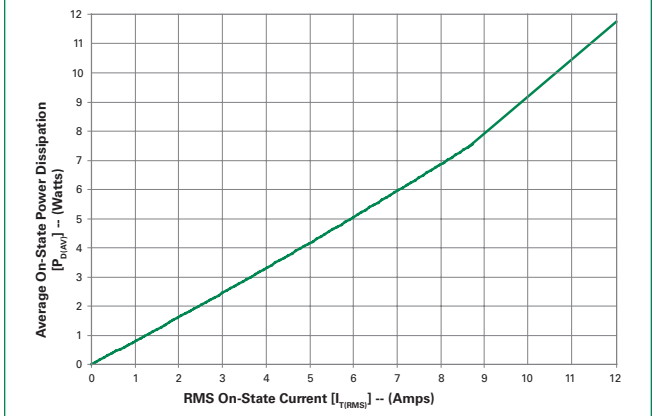

Figure 7: Maximum Allowable Case Temperature vs. RMS On-State Current

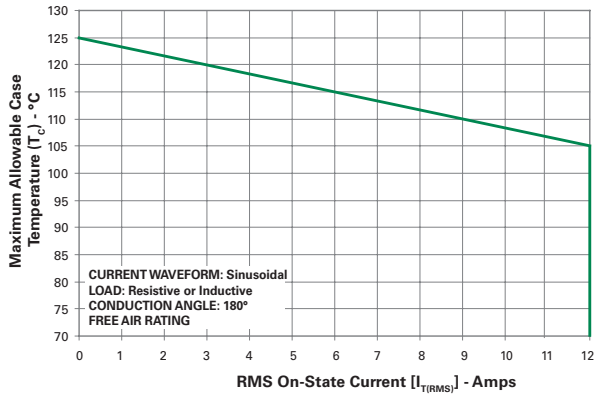

Figure 8: Maximum Allowable Case Temperature vs. Average On-State Current

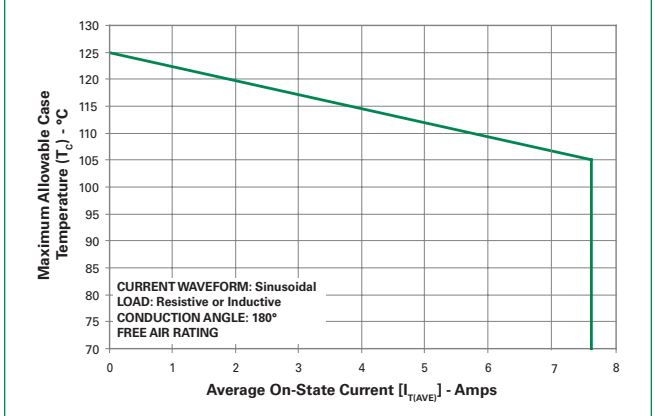

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Figure 9: Peak Capacitor Discharge Current

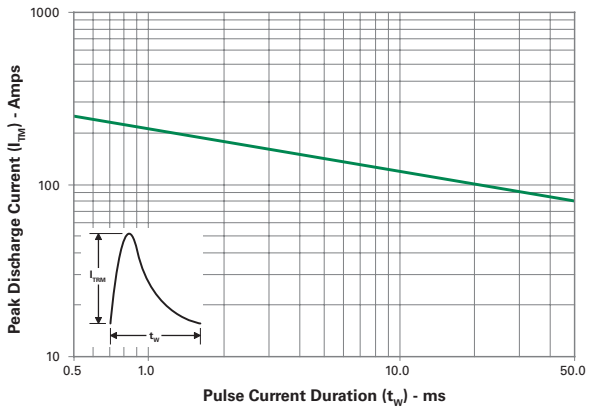


Figure 10: Peak Capacitor Discharge Current Derating

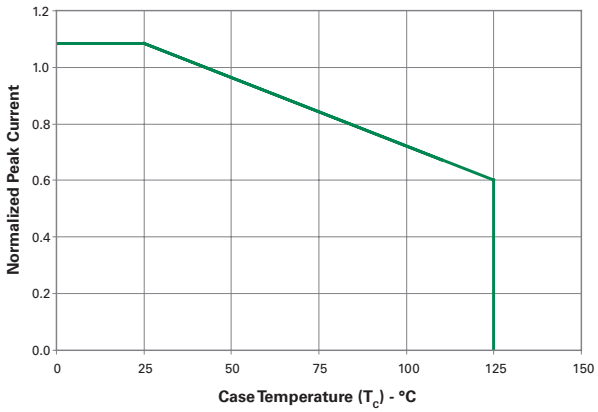
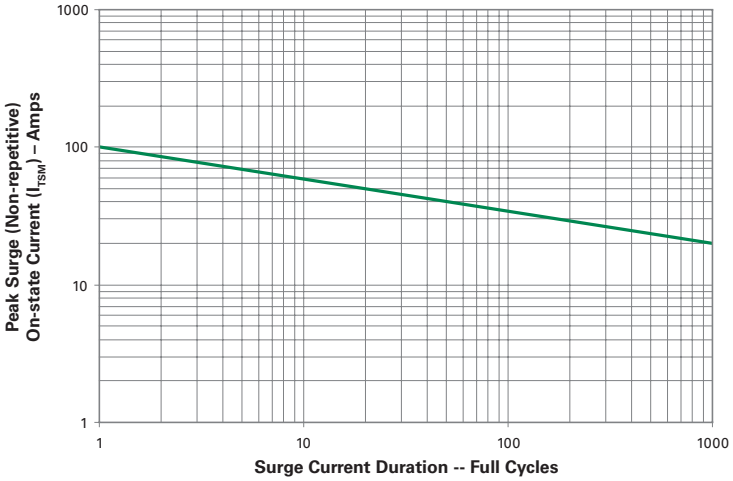


Figure 11: Surge Peak On-State Current vs. Number of Cycles



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.

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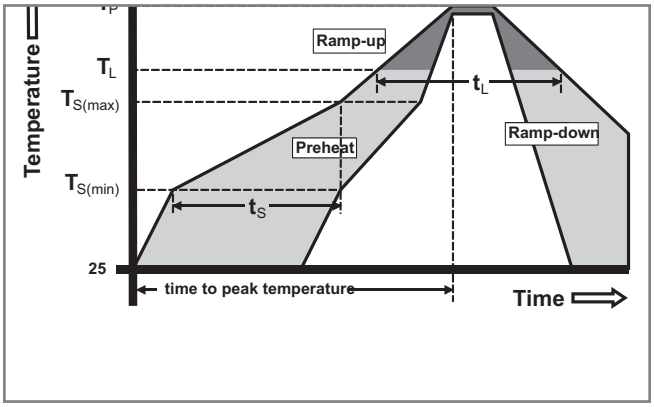
Soldering Parameters

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
Autoclave	EIA / JEDEC, JESD22-A102 168 hours (121°C at 2 ATMs) and 100% R/H
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

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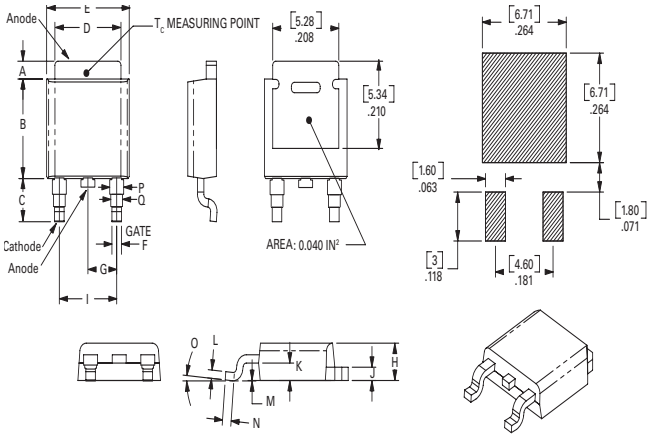
Dimensions — TO-252AA (D-Package) — D-PAK Surface Mount



Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.037	0.040	0.043	0.94	1.01	1.09
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	0.035	0.037	0.039	0.90	0.95	1.00
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
SRR6012D1TP	SRR6012D1	0.3 g	Tube	750 (75 per tube)
SRR6012D1RP	SRR6012D1	0.3 g	Embossed Carrier	2500

Part Numbering System

SRR 60 12 D 1 RP

DEVICE TYPE
SRR: SCR

VOLTAGE RATING
60 : 600V

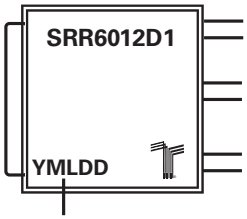
CURRENT
12: 12A

PACKAGE TYPE
D : TO-252 (DPAK)

SENSITIVE TYPE
1: 6mA

PACKAGING OPTIONS
RP: Reel Pack
TP: Tube Pack

Part Marking System



Date Code Marking
Y:Year Code
M: Month Code
L: Location Code
DD: Calendar Code

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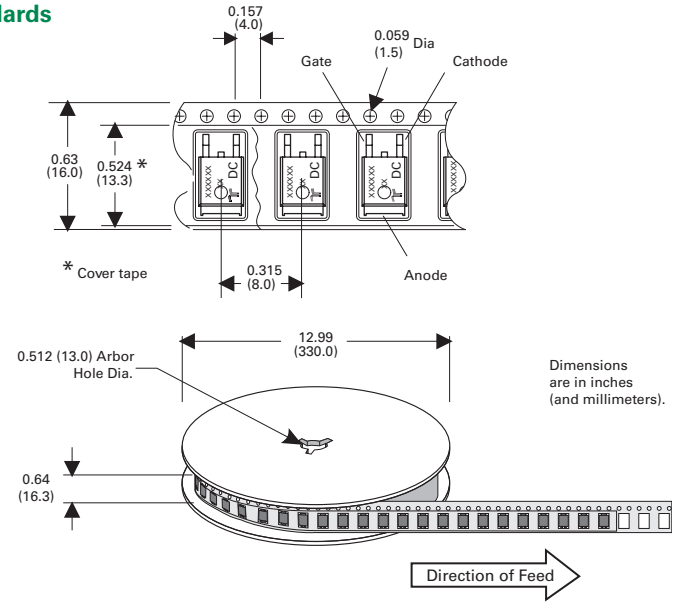
TO-252 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



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