Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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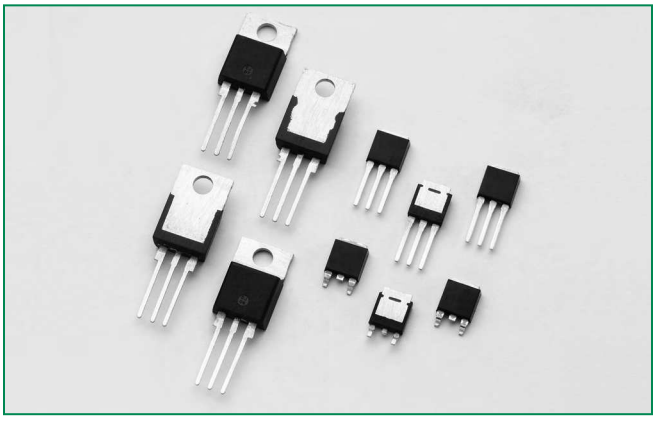
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Littelfuse
Expertise Applied | Answers Delivered

Teccor® brand Thyristors
12 Amp Standard SCRs

Sxx12x Series



Agency Approval

Agency	Agency File Number
	L Package: E71639

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	400 to 1000	V
I_{GT}	20	mA

Additional Information

Datasheet | Resources | Samples

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

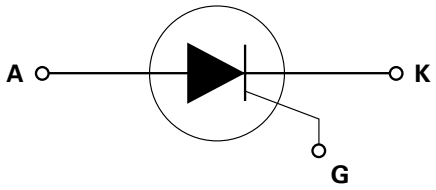
- RoHS compliant
- Glass – passivated junctions
- Voltage capability up to 1000 V
- Surge capability up to 120 A

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.

Internally constructed isolated packages are offered for ease of heat sinking with highest isolation voltage.

Schematic Symbol



Revised: 05/02/16

Absolute Maximum Ratings

Symbol	Parameter	Test Conditions		Value	Unit
$I_{T(RMS)}$	RMS on-state current	Sxx12L	T_C = 72°C	12	A
		Sxx12R Sxx12D Sxx12V	T_C = 105°C		
$I_{T(AV)}$	Average on-state current	Sxx12L	T_C =72°C	7.6	A
		Sxx12R Sxx12D Sxx12V	T_C =105°C		
I_{TSM}	Peak non-repetitive surge current (single half cycle, T_J (initial) = 25°C)	Sxx12L Sxx12R	f = 50Hz	120	A
			f = 60Hz	130	
		Sxx12D Sxx12V	f = 50Hz	100	
			f = 60Hz	120	
I^2t	I^2t Value for fusing	Sxx12L Sxx12R	t_p = 8.3 ms	70	A^2s
		Sxx12D Sxx12V		60	
di/dt	Critical rate of rise of on-state current	f = 60Hz; 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	

Note: xx = voltage

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

Symbol	Test Conditions			Value	Unit
I_{GT}	V_D = 12V R_L = 60 Ω		MAX.	20	mA
			MIN.	1	
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	400V	MIN.	350	V/µs
		600V		300	
		800V		250	
		1000V		100	
	$V_D = V_{DRM}$; gate open; T_J = 125°C	400V		250	
		600V		225	
		800V		200	
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.	40	mA
t_q	I_T = 2A; t_p = 50µs; dv/dt = 5V/µs; di/dt = 30A/µs		MAX.	35	µs
t_{gt}	$I_G = 2 \times I_{GT}$ PW = 15µs I_T = 20A		TYP.	2	µs

Revised: 05/02/16

Static Characteristics

Symbol	Test Conditions			Value	Unit
V_{TM}	I_T = 24A; t_p = 380 µs		MAX.	1.6	V
I_{DRM} / I_{RRM}	V_{DRM} = V_{RRM}	T_J = 25°C	400 – 600V	10	µA
			800 – 1000V	20	
		T_J = 100°C	400 – 800V	500	
			1000V	3000	
		T_J = 125°C	400 – 800V	1000	

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	Sxx12L	3.2	°C/W
		Sxx12R	1.5	
		Sxx12V	1.6	
		Sxx12D	1.4	
$R_{\theta(J-A)}$	Junction to ambient	Sxx12L	50	°C/W
		Sxx12R	40	
		Sxx12V	70	

Note: xx = voltage

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

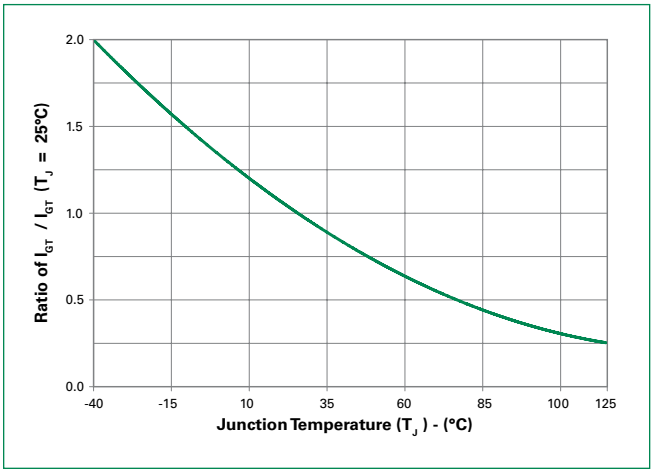


Figure 2: Normalized DC Gate Trigger Voltage vs. Junction Temperature

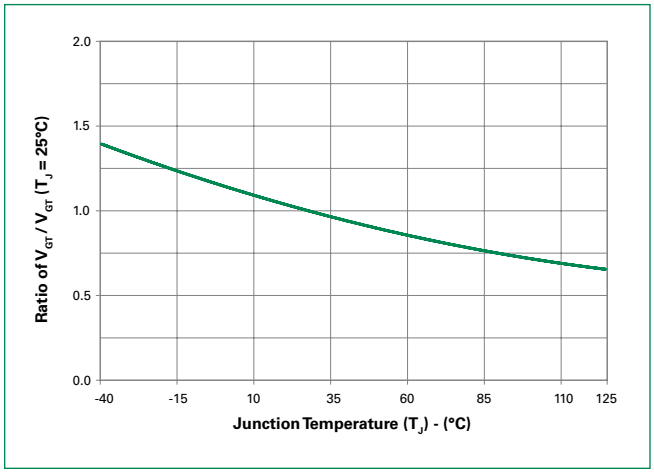


Figure 3: Normalized DC Holding Current vs. Junction Temperature

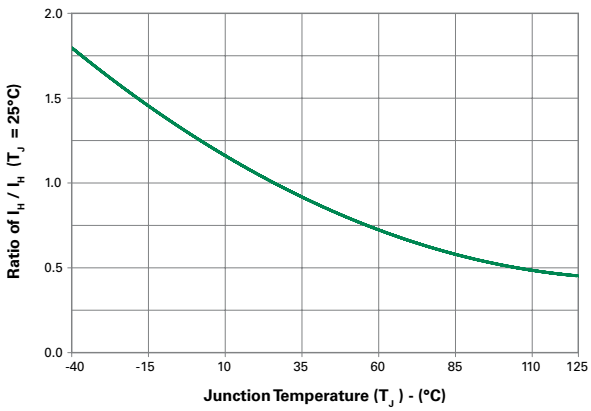


Figure 4: On-State Current vs. On-State Voltage (Typical)

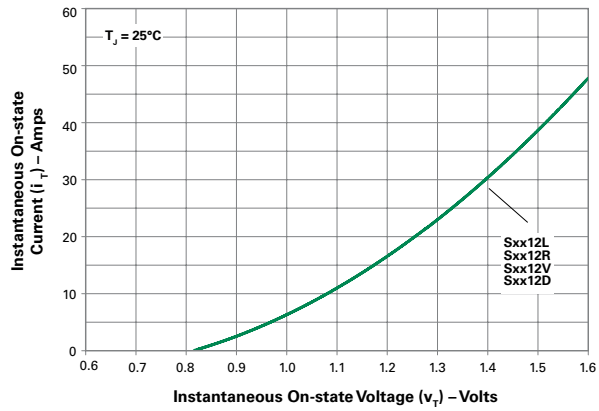


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

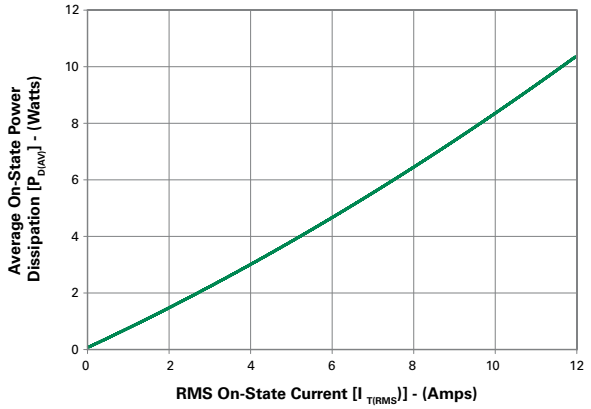


Figure 6: Maximum Allowable Case Temperature vs. RMS On-State Current

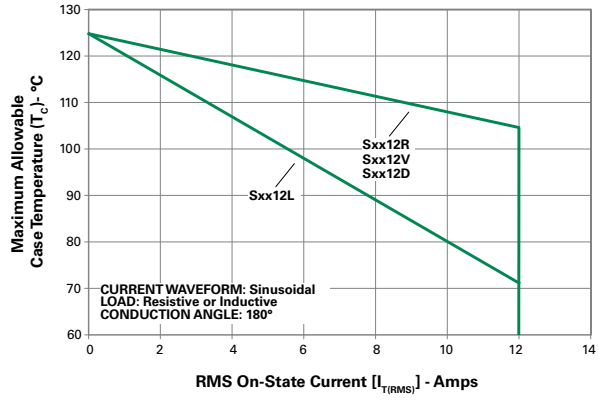


Figure 7: Maximum Allowable Case Temperature vs. Average On-State Current

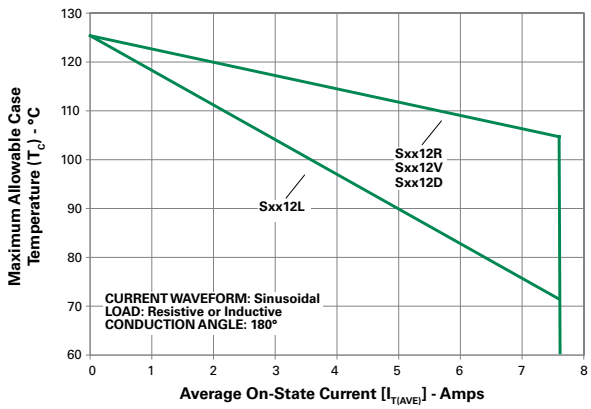
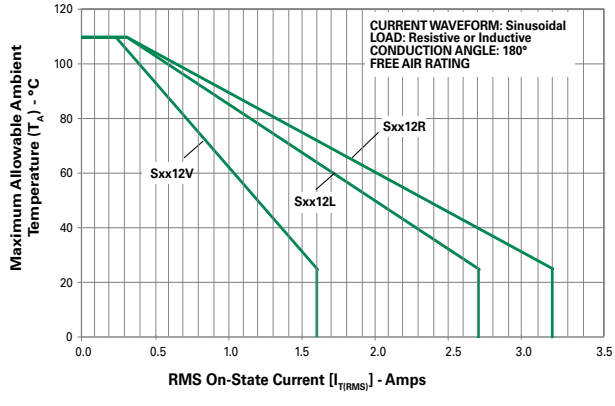


Figure 8: Maximum Allowable Ambient Temperature vs. RMS On-State Current



Note: xx = voltage

Revised: 05/02/16

Figure 9: Maximum Allowable Ambient Temperature vs. Average On-State Current

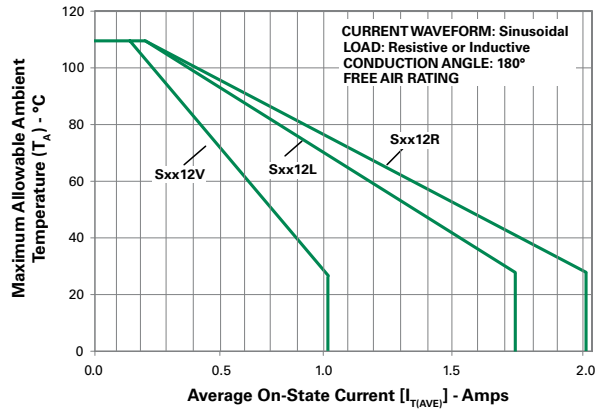


Figure 10: Peak Capacitor Discharge Current

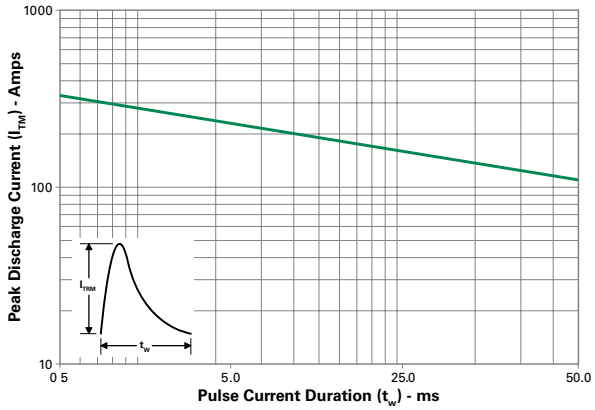


Figure 11: Peak Capacitor Discharge Current Derating

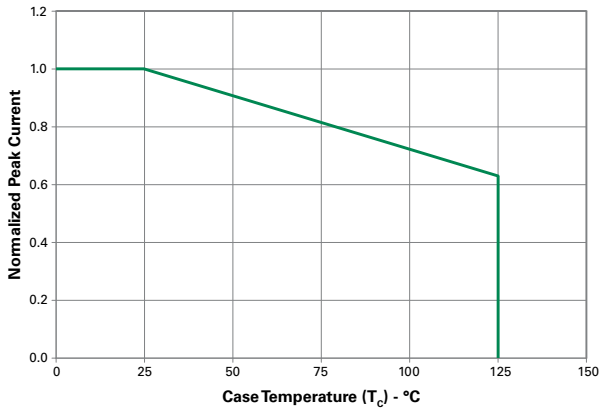
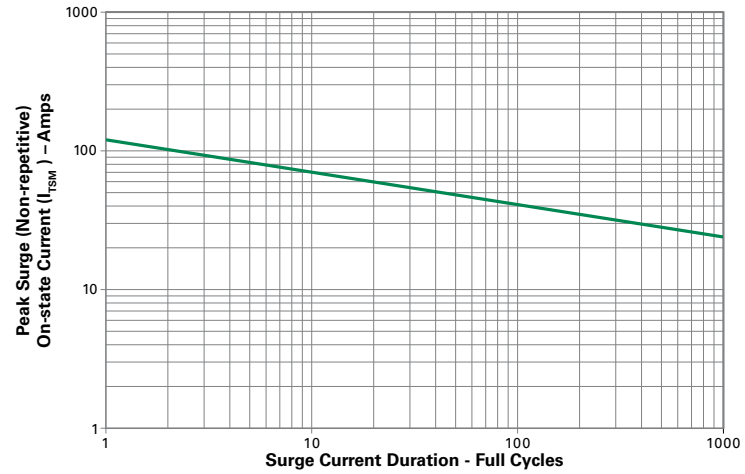


Figure 12: Surge Peak On-State Current vs. Number of Cycles



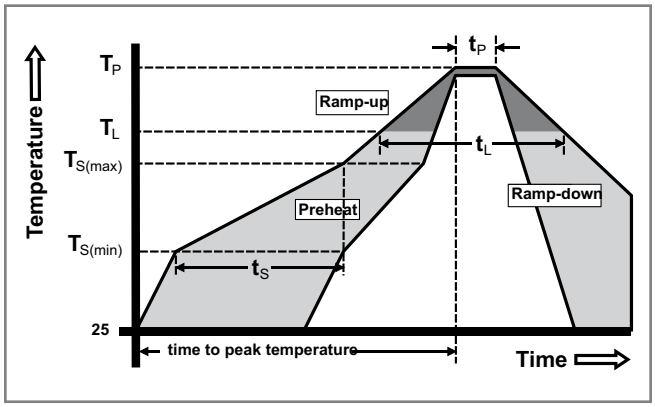
SUPPLY FREQUENCY: 60 Hz Sinusoidal
LOAD: Resistive
RMS On-State Current: [$I_{T(RMS)}$]: Maximum Rated Value at Specified Case Temperature

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.

Revised: 05/02/16

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 94V-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.

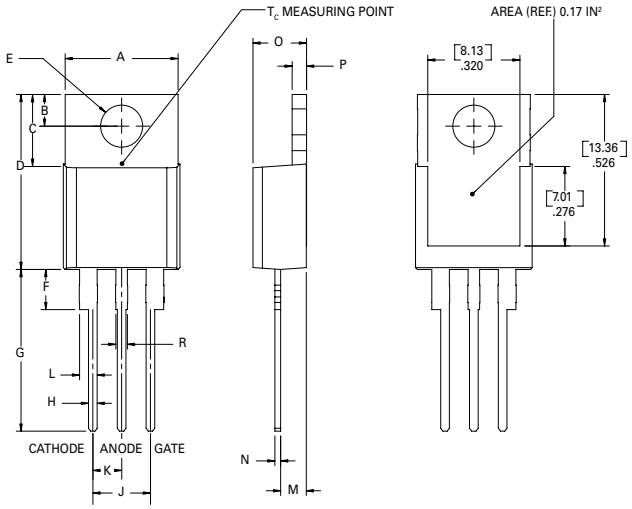
Environmental Specifications

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

Revised: 05/02/16

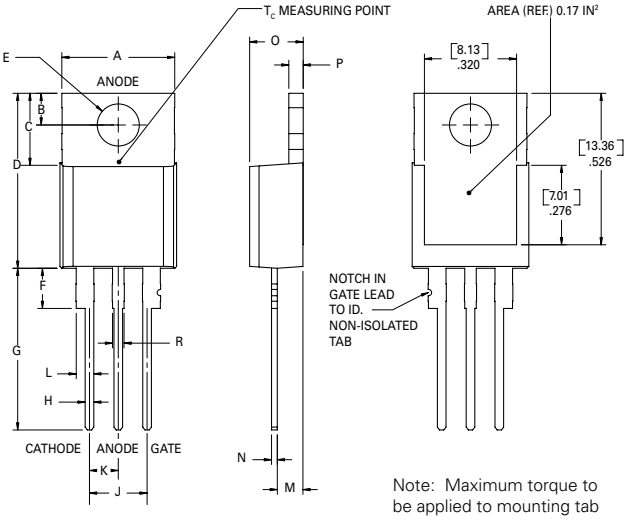
Teccor® brand Thyristors
12 Amp Standard SCRs

Dimensions — TO-220AB (L-Package) — Isolated Mounting Tab



Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.91
M	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

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



Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.91
M	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

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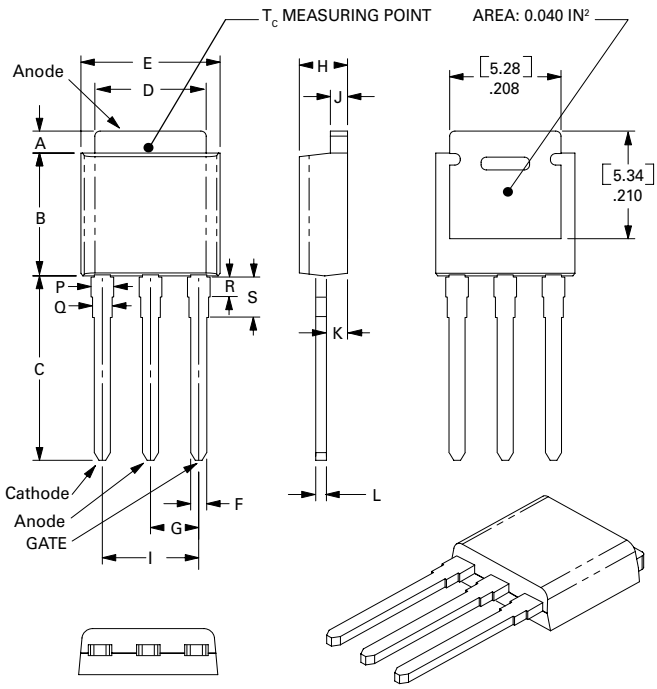
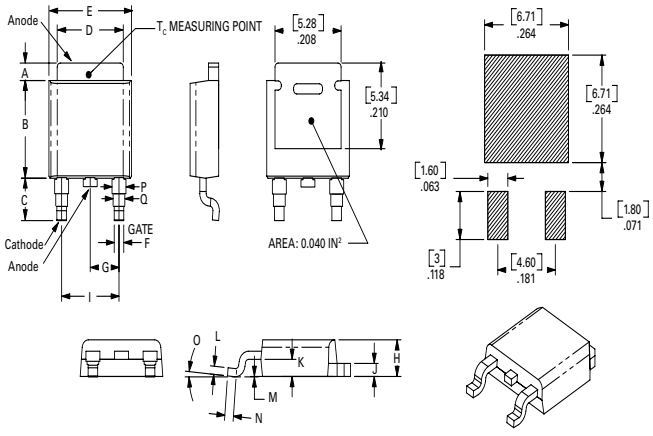
Dimensions — TO-251AA (V/I-Package) — V/I-PAK Through Hole



Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.040	0.044	0.050	1.02	1.11	1.27
B	0.235	0.242	0.245	5.97	6.15	6.22
C	0.350	0.361	0.375	8.89	9.18	9.53
D	0.205	0.208	0.213	5.21	5.29	5.41
E	0.255	0.262	0.265	6.48	6.66	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	2.34	2.41
I	0.176	0.180	0.184	4.47	4.57	4.67
J	0.018	0.020	0.023	0.46	0.51	0.58
K	0.038	0.040	0.044	0.97	1.01	1.12
L	0.018	0.020	0.023	0.46	0.52	0.58
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
R	0.034	0.039	0.044	0.86	1.00	1.11
S	0.074	0.079	0.084	1.86	2.00	2.11

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

Revised: 05/02/16

Littelfuse
Expertise Applied | Answers Delivered

Teccor® brand Thyristors
12 Amp Standard SCRs

Product Selector

Part Number	Voltage				Gate Sensitivity	Type	Package
	400V	600V	800V	1000V			
Sxx12L	X	X	X	X	20mA	Sensitive SCR	TO-220L
Sxx12R	X	X	X	X	20mA	Sensitive SCR	TO-220R
Sxx12V	X	X	X	X	20mA	Standard SCR	TO-251
Sxx12D	X	X	X	X	20mA	Standard SCR	TO-252

Note: xx = voltage

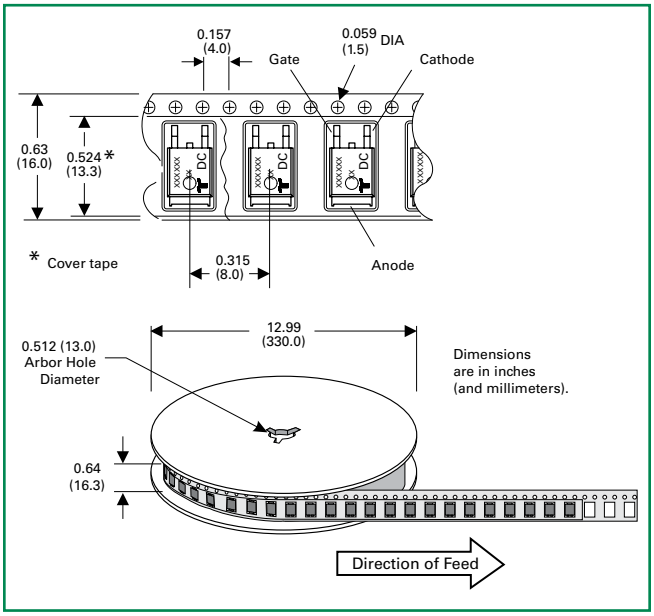
Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Sxx12LTP	Sxx12L	2.2 g	Tube	500 (50 per tube)
Sxx12RTP	Sxx12R	2.2 g	Tube	500 (50 per tube)
Sxx12DTP	Sxx12D	0.3 g	Tube	750 (75 per tube)
Sxx12DRP	Sxx12D	0.3 g	Embossed Carrier	2500
Sxx12VTP	Sxx12V	0.4 g	Tube	750 (75 per tube)

Note: xx = Voltage

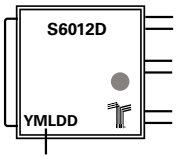
TO-252 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



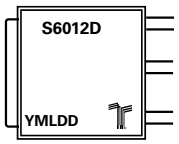
Part Marking System

TO-251AA - (V Package)

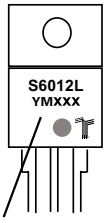


Date Code Marking
Y:Year Code
M: Month Code
L: Location Code
DD: Calendar Code

TO-252AA - (D Package)

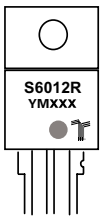


TO-220 AB - (L Package)



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

TO-220 AB - (R Package)



Part Numbering System

S 60 12 R 56

- DEVICE TYPE — S: SCR
- VOLTAGE RATING — 40: 400V; 60: 600V; 80: 800V; K0: 1000V
- CURRENT RATING — 12: 12A
- PACKAGE TYPE — L: TO-220 Isolated; R: TO-220 Non-Isolated; V: TO-251 (V-I-Pak); D: TO-252 (D-Pak)
- SENSITIVITY & TYPE — (blank): 20mA
- LEAD FORM DIMENSIONS — xx: Lead Form Option

Revised: 05/02/16