

## SMART POWER PROTECTOR FOR AC PORTS



### DESCRIPTION

The SP511301A is a unique multi-function resettable protective module, specifically designed for the small power AC port overall safety protection.

### FEATURES

- Dual Protection: Over-Voltage and Over-Current
- High Voltage Endurance
- Fast Response Time
- Compliant with IEC 60738 Thermistors: Directly Heated Positive Temperature Coefficient
- Compliant with IEC 61643: Low Voltage Power Distribution Systems - Requirements and Tests
- Compliant with UL 1434 Thermistors
- Compliant with UL 1449\_ED3 Surge Protective Devices
- RoHS & REACH Compliant

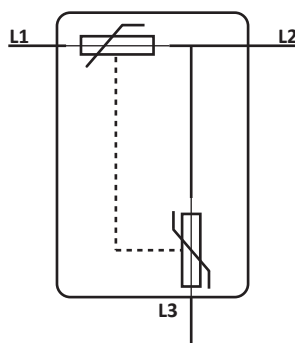
### APPLICATIONS

- Small Power Charger
- Small Power Energy Saving Lights
- Other Small AC Power Equipment

### MECHANICAL CHARACTERISTICS

- Approximate Weight: 2.75 grams
- Lead-Free

## CIRCUIT DIAGRAM



**TYPICAL DEVICE CHARACTERISTICS**
**MAXIMUM RATINGS @ 25°C Unless Otherwise Specified**

PARAMETER	SYMBOL	VALUE	UNITS
Rated Voltage (RMS)	$U_R$	220	Volts
Maximum Voltage (RMS)	$U_{Max}$	240	Volts
Operating Temperature Range	$T_W$	-40 ~ +60	°C

**ELECTRICAL CHARACTERISTICS @ 25°C Unless Otherwise Specified**

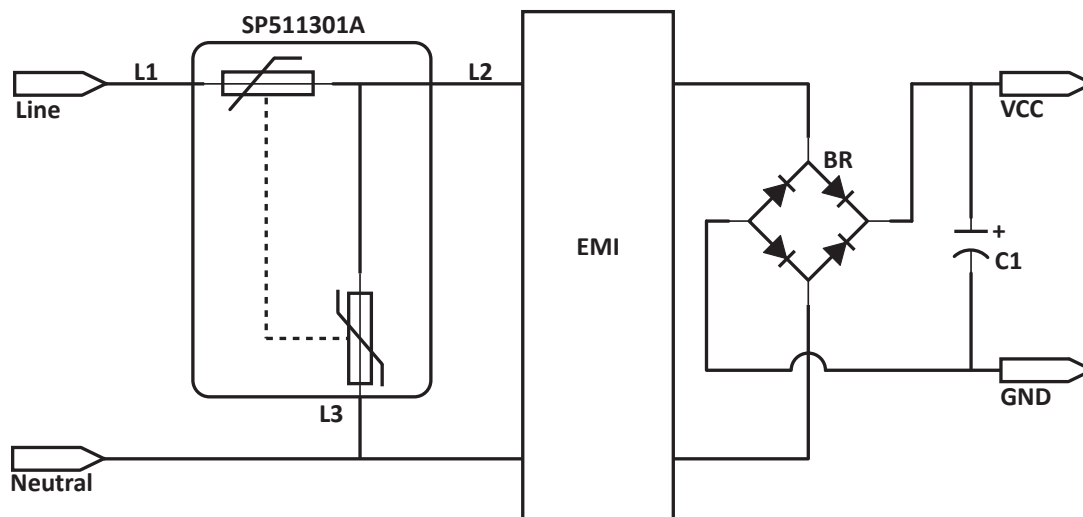
PARAMETER	SYMBOL	VALUE	UNITS
Rated Working Voltage	$U_R$	220	Volts AC
Maximum Continuously Working Voltage	$U_{MAX}$	240	Volts AC
Resistance of Internal Series PTC	$R_{25}$	6±20%	Ohms
PTC Hold Current @ 25°C, 230V <sub>AC</sub>	$I_{HD}$	≤ 400	mA
PTC Hold Current @ 60°C, 230V <sub>AC</sub>	$I_{HD}$	≤ 300	mA
PTC Trip Current: 230V <sub>AC</sub>	$I_{SW}$	≥ 800	mA
PTC Residual Current: 230V <sub>AC</sub>	$I_{RES}$	≤ 12	mA
PTC Switching Time: 230V <sub>AC</sub> , 2A	$t_{SW}$	≤ 4	Seconds
PTC Recovery Time @ 25°C, in Still Air	$t_R$	< 90	Seconds
PTC Over-Current Withstanding @ 25°C, 230V <sub>AC</sub>	$I_{SMAX}$	< 20	Amps
PTC Over-Temperature Protection	$T_{OTP}$	> 125	°C
Embedded MOV Varistor Voltage @ 1mA	$U_{1mA}$	> 450	V <sub>DC</sub>
Limit-Current, Over Voltage Withstanding: $R_s = 100\Omega$ , UL 1449ED3	$U_{OV}$	> 480	V <sub>AC</sub>
Lightning Surge Protection Level: 1.25/50µs Waveform, $R_s = 2\Omega$	$V_{LS}$	≤ 4	KVp
Clamping Output Voltage @ 4kV, 1.25/50µs Waveform, $R_s = 2\Omega$	$V_{CLP}$	< 1.1	KVp
Temporary Overvoltage Withstanding: 600V <sub>AC</sub> , 1A, 1 second	$N$	> 20	Times
Leakage Current @ 230V <sub>AC</sub> , 25°C	$I_{LK}$	< 10	µA
Coating Dielectric Strength @ 25°C, V <sub>DC</sub>	$U_{INS}$	≥ 1500	V <sub>DC</sub>

## TYPICAL DEVICE CHARACTERISTICS

ENVIRONMENTAL TESTING		
PARAMETER	CONDITIONS	CRITERIA
Terminal Strength	Pull the pin axially, stepping add the force to 9.8N, keep 10 seconds, then measure the resistance.	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
Solderability	Dip Soldering, Temperature 235°C	Good Soldering
Solder Heat Withstand	Dip Soldering, Temperature 350°C, Dip Time 3.5±0.5 seconds, then measure the device resistance.	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
Vibration	Fix the device on the testing plate. Vibrate along X-axis and Y-axis respectively. Frequency 10Hz to 55Hz within 1 minute.; Displacement 0.75mm, time 45 minutes, then measure the device resistance	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
Collision	Fix the device on the collision plate. Acceleration 10m/s <sup>2</sup> , time 11ms. Frequency 60-80 cycle/minute along X-axis and Y-axis respectively, 1000 cycles, then measure the resistance	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
Constant Humidity and Temperature	Place the device in the condition 40°C 90%-95%, 48 hours, then measure the resistance	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
High Temperature	Place the device at 70°, then measure the resistance	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
Low Temperature	Place the device at -40°C, then measure the resistance	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$
Temperature Change	Place the device alternately between low temperature (-40°C) and high temperature (70°C), 2 minute transfer, 5 cycles, then measure the resistance	$ \Delta R_{25}/R_{25}  \leq 20\%$ $ \Delta U_{1mA}/U_{1mA}  \leq 20\%$

After the environmental testing, keep the device in still air for 2 hours under normal atmospheric conditions, then being to verify the other parameters.

**FIGURE 1**  
TYPICAL PROTECTION CIRCUIT



Layout safety spacing requirements (in accordance with requirements of 4KV 1.25/50µs lightning protection level):

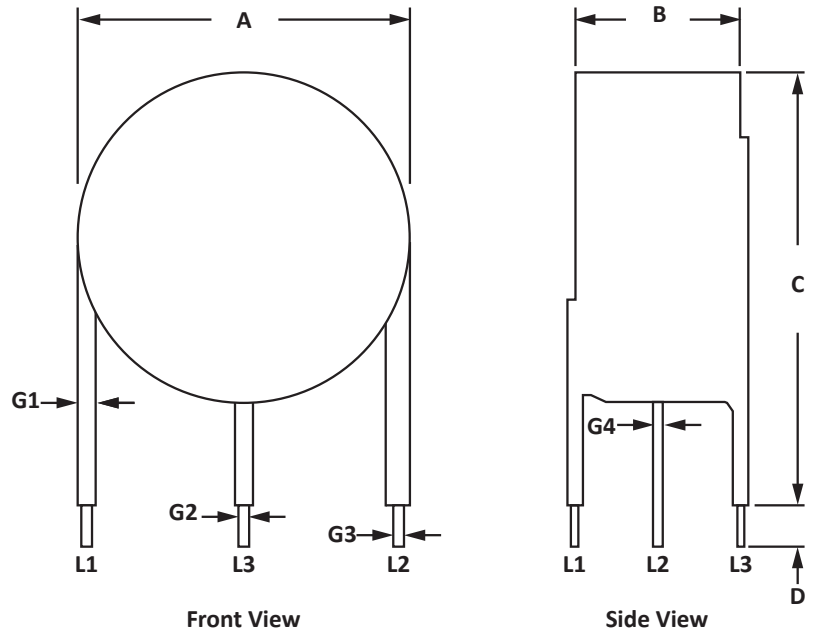
- The spacing between pad edge of pin L1 and L2 is 5mm minimum.
- The spacing between pad edge of pin L1 and pin L3 is 6mm minimum.
- The spacing between pad edge of pin L2 and pin L3 is 3mm minimum and preferably increasing insulation by slotting.

**PACKAGE OUTLINE AND PAD LAYOUT INFORMATION**

OUTLINE DIMENSIONS				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	13	-	0.51
B	-	8	-	0.31
C	-	16	-	0.63
D	3.0	3.5	0.12	0.14
E	4.6	5.6	0.18	0.22
F	3.4	4.4	0.13	0.17
G1	0.5	0.7	0.02	0.03
G2	0.5	0.7	0.02	0.03
G3	0.5	0.7	0.02	0.03
G4	0.2	0.4	0.008	0.016
J1	2.5	3.5	0.10	0.14
J2	2.0	3.0	0.08	0.12

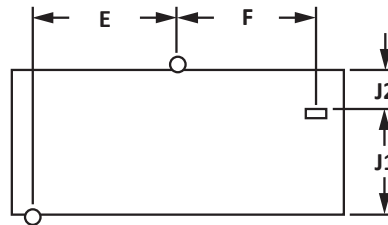
**NOTES**

1. L1 - Line in.
2. L2 - Line out.
3. L3 - Neutral.



Front View

Side View



Bottom View

**ORDERING INFORMATION**

BASE PART NUMBER	MARKING
SP511301A	Part Number and Date Code

## COMPANY INFORMATION

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### COMPANY PROFILE

In business more than 20 years, ProTek Devices™ is a privately-held company located in Tempe, Arizona, that offers a product line of transient voltage suppressors (TVS); avalanche breakdown diodes; steering diode TVS arrays and other surge suppressor component products. These TVS devices protect electronic systems from the effects of lightning, electrostatic discharge (ESD), nuclear electromagnetic pulses (NEMP), inductive switching and EMI / RFI. ProTek Devices also offers high performance interface and linear products that include analog switches; multiplexers; LED drivers; audio control ICs; RF and related high frequency products. The analog devices work in a host of consumer; industrial; automotive and other applications.

### CONTACT US

#### Corporate Headquarters

2929 South Fair Lane  
Tempe, Arizona 85282  
USA

#### By Telephone

General: 602-431-8101  
Sales: & Marketing: 602-414-5109  
Customer Service: 602-414-5114  
Product Technical Support: 602-414-5107

#### By Fax

General: 602-431-2288

#### By E-mail:

Sales: [sales@protekdevices.com](mailto:sales@protekdevices.com)  
Customer Service: [service@protekdevices.com](mailto:service@protekdevices.com)  
Technical Support: [support@protekdevices.com](mailto:support@protekdevices.com)

#### ProTek Devices (Asia Pacific) Pte. Ltd.

8 Ubi Road 2, #06-19  
Zervex  
Singapore - 408538  
Tel: +65-67488312  
Fax: +65-67488313

#### Web

[www.protekdevices.com](http://www.protekdevices.com)

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