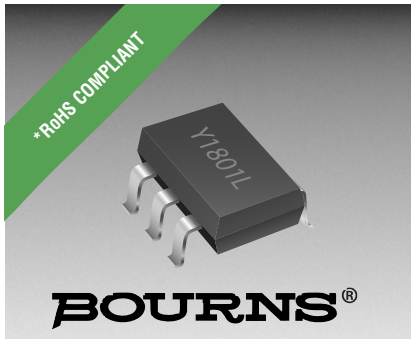




**THE DATASHEET OF  
TISP4P015L1NR-S**





# TISP4P015L1N THRU TISP4P035L1N

## LOW CAPACITANCE BIDIRECTIONAL THYRISTOR OVERVOLTAGE PROTECTOR

### TISP4P0xxL1N Overvoltage Protector Series

Designed for ADSL, ADSL2, VDSL, VDSL2 protection

Ion-Implanted Breakdown Region  
- Precise and Stable Voltage

Low Voltage Overshoot Under Surge

Low Off-State Capacitance

Device Name	V <sub>DRM</sub> V	V <sub>(BO)</sub> V
TISP4P015L1N	8	15
TISP4P020L1N	12	20
TISP4P025L1N	16	25
TISP4P035L1N	24	35

Rated for International Surge Wave Shapes

Wave Shape	Standard	I <sub>PPSM</sub> A
8/20	IEC 61000-4-5	30
10/1000	GR-1089-CORE	18

#### Description

This range of devices is designed to protect xDSL line-driver interfaces from overvoltages up to rated limits. Overvoltages are normally caused by a.c. power-system or lightning-flash disturbances which are induced or conducted onto the telephone line. These symmetrical protectors are two-terminal thyristor-crowbar devices. They can be used to protect between conductors, or a pair of devices can be deployed to protect from line to ground.

When placed between the xDSL line driver IC and the transformer, this protector will clamp and switch into a low-impedance state, safely diverting the energy transferred by the xDSL coupling transformer. The low capacitance design makes this device suitable for designs from ADSL all the way up to 30 MHz VDSL2.

Telecom ports need protection against Common Mode (Longitudinal) and Differential (Metallic) surges, to comply with international standards such as ITU-T K.20, K.21 or K.45, Telcordia GR-1089-CORE and YD/T. Common Mode surges are resisted by the galvanic isolation of the coupling transformer which is commonly rated to 2 kV or greater. Differential surges can be transmitted by the transformer, and can stress the Line Driver Interface IC. As the xDSL interface circuit is designed to operate from 3 kHz to 30 MHz, nearby high frequency events - such as cable flashover or primary protection activation - can generate damaging conditions for the interface requiring this type of protection.

Please contact your Bourns representative if the protection voltage you require is not listed.

#### How to Order

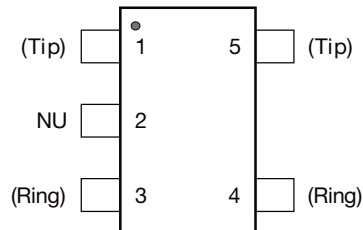
Device	Package	Carrier	Order As	Reel Quantity
TISP4P0xxL1N	SOT23-5	Embossed Tape Reeled	TISP4P0xxL1NR-S	10,000

Insert xx corresponding to device name.



**WARNING Cancer and Reproductive Harm**  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

#### SOT23-5 Package (Top View)



Terminal typical application names shown in parenthesis.  
NU - Non-usable; no external electrical connection should be made to this terminal.

MD-SOT23-5-001-a

#### Device Symbol



SD-TISP4-002-a

OCTOBER 2009 - REVISED JANUARY 2018

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

Specifications are subject to change without notice. Users should verify actual device performance in their specific applications. The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# TISP4P0xxL1N Overvoltage Protector Series

**BOURNS®**

## Absolute Maximum Ratings, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

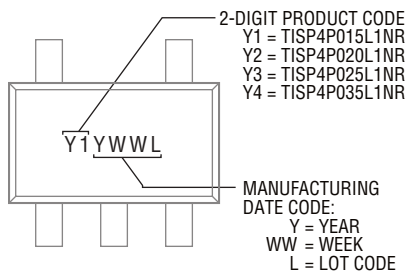
Rating	Symbol	Value	Unit
Repetitive peak off-state voltage	$V_{\text{DRM}}$	'4P015L1N ±8 '4P020L1N ±12 '4P025L1N ±16 '4P035L1N ±24	V
Non-repetitive peak impulse current (see Notes 1, 2 and 3) 8/20 $\mu\text{s}$ (IEC 61000-4-5, 1.2/50 $\mu\text{s}$ voltage, 8/20 current combination wave generator) 10/1000 $\mu\text{s}$ (GR-1089-CORE, 10/1000 $\mu\text{s}$ voltage wave shape)	$I_{\text{PPSM}}$	±30 ±18	A
Junction temperature	$T_J$	-40 to +150	$^\circ\text{C}$
Storage temperature range	$T_{\text{stg}}$	-65 to +150	$^\circ\text{C}$

- NOTES: 1. Initially the device must be in thermal equilibrium with  $T_J = 25\text{ }^\circ\text{C}$ .  
 2. The surge may be repeated after the device returns to its initial conditions.  
 3. Rated currents only apply if pins 1 & 5 (Tip) are connected together and pins 3 & 4 (Ring) are connected together.

## Electrical Characteristics, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Parameter	Test Conditions	Min	Typ	Max	Unit
$I_{\text{DRM}}$ Repetitive peak off-state current	$V_D = V_{\text{DRM}}$			±1	$\mu\text{A}$
$V_{(\text{BO})}$ Breakover voltage	$dv/dt = \pm 250\text{ V/ms}$ , $R_{\text{SOURCE}} = 300\ \Omega$			±15 ±20 ±25 ±35	V
$I_H$ Holding current	$I_T = \pm 5\text{ A}$ , $di/dt = \pm 30\text{ mA/ms}$		±30 ±10		mA
$C_O$ Off-state capacitance	$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = 2\text{ V}$		6.5 6 5.5 3.5		pF
$\Delta C$ Delta-capacitance	$f = 1\text{ MHz}$ , $V_d = 1\text{ V rms}$ , $V_D = 1\text{ V to } V_{\text{DRM}}$		2 2.5 3 2		pF

### Typical Part Marking



### Environmental Specifications

Moisture Sensitivity Level..... 1  
 ESD Classification (HBM)..... 3B

OCTOBER 2009 – REVISED JANUARY 2018

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

## Parameter Measurement Information

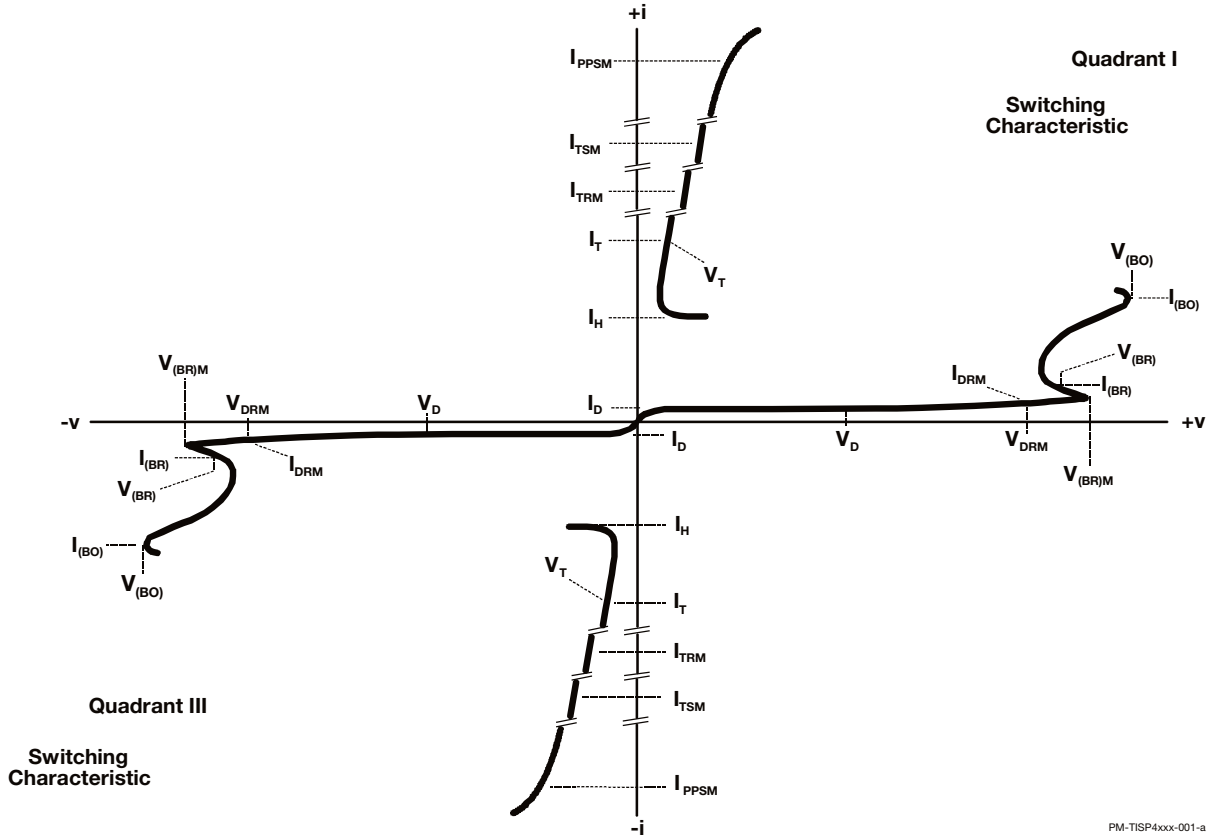
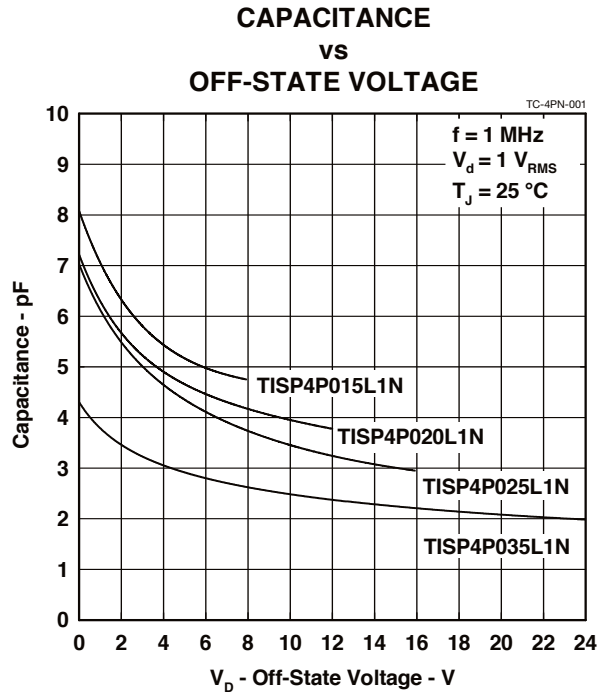


Figure 1. Voltage-Current Characteristic for Tip and Ring Terminals  
All Measurements are Referenced to the Ring Terminal

PM-TISP4xxx-001-a

## Typical Characteristics



# TISP4P0xxL1N Overvoltage Protector Series

**BOURNS®**

## VDSL Application Examples

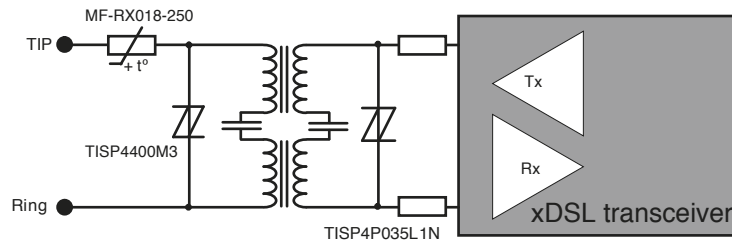


Figure 3.

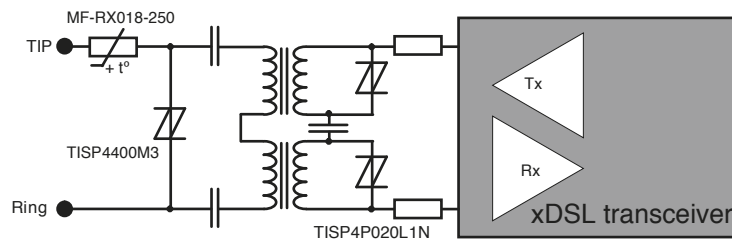


Figure 4.

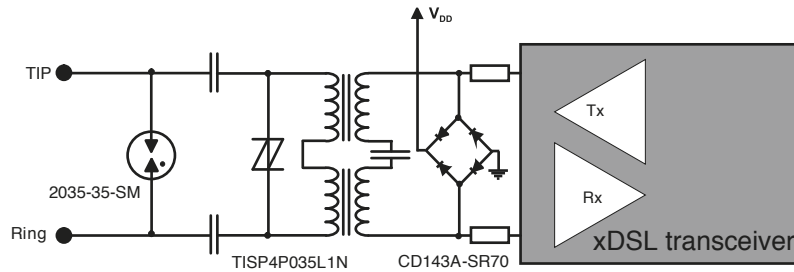
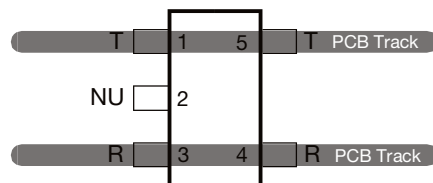


Figure 5.

## Recommended PCB Layout



MD-SOT223-5-xxx

Figure 6.

OCTOBER 2009 – REVISED JANUARY 2018

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

"TISP" is a trademark of Bourns Ltd., a Bourns Company, and is Registered in the U.S. Patent and Trademark Office.

"Bourns" is a registered trademark of Bourns, Inc. in the U.S. and other countries.

This legal disclaimer applies to purchasers and users of Bourns® products manufactured by or on behalf of Bourns, Inc. and its affiliates (collectively, “Bourns”).

Unless otherwise expressly indicated in writing, Bourns® products and data sheets relating thereto are subject to change without notice. Users should check for and obtain the latest relevant information and verify that such information is current and complete before placing orders for Bourns® products.

The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain types of applications are based on Bourns’ knowledge of typical requirements in generic applications. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user’s application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Users should always verify the actual performance of the Bourns® product in their specific devices and applications, and make their own independent judgments regarding the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification. Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in nuclear, lifesaving, life-critical or life-sustaining applications, nor in any other applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage. Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any Bourns® products in such unauthorized applications might not be safe and thus is at the user’s sole risk. Life-critical applications include devices identified by the U.S. Food and Drug Administration as Class III devices and generally equivalent classifications outside of the United States.

Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products’ data sheets in the section entitled “Applications.” Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user’s sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or “automotive grade” does not by itself mean that Bourns has approved such product for use in an automotive application.

Bourns® standard products are not tested to comply with United States Federal Aviation Administration standards generally or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aircraft or space applications. Bourns expressly identifies Bourns® standard products that are suitable for use in aircraft or space applications on such products’ data sheets in the section entitled “Applications.” Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard product in an aircraft or space application might not be safe and thus is not recommended, authorized or intended and is at the user’s sole risk.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

Users shall not sell, transfer, export or re-export any Bourns® products or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor shall they use Bourns® products or technology in any facility which engages in activities relating to such devices. The foregoing restrictions apply to all uses and applications that violate national or international prohibitions, including embargos or international regulations. Further, Bourns® products and Bourns technology and technical data may not under any circumstance be exported or re-exported to countries subject to international sanctions or embargoes. Bourns® products may not, without prior authorization from Bourns and/or the U.S. Government, be resold, transferred, or re-exported to any party not eligible to receive U.S. commodities, software, and technical data.

To the maximum extent permitted by applicable law, Bourns disclaims (i) any and all liability for special, punitive, consequential, incidental or indirect damages or lost revenues or lost profits, and (ii) any and all implied warranties, including implied warranties of fitness for particular purpose, non-infringement and merchantability.

*For your convenience, copies of this Legal Disclaimer Notice with German, Spanish, Japanese, Traditional Chinese and Simplified Chinese bilingual versions are available at:*

*Web Page:* <http://www.bourns.com/legal/disclaimers-terms-and-policies>

*PDF:* <http://www.bourns.com/docs/Legal/disclaimer.pdf>

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View TISP4P015L1NR-S on WIN SOURCE](#)

 [Bourns Inc. Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management