

TISP4xxxL3AJ Overvoltage Protector Series

BOURNS®

Description

These devices are designed to limit overvoltages on the telephone line. Overvoltages are normally caused by a.c. power system or lightning flash disturbances which are induced or conducted on to the telephone line. A single device provides 2-point protection and is typically used for the protection of 2-wire telecommunication equipment (e.g. between the Ring and Tip wires for telephones and modems). Combinations of devices can be used for multi-point protection (e.g. 3-point protection between Ring, Tip and Ground).

The protector consists of a symmetrical voltage-triggered bidirectional thyristor. Overvoltages are initially clipped by breakdown clamping until the voltage rises to the breakover level, which causes the device to crowbar into a low-voltage on state. This low-voltage on state causes the current resulting from the overvoltage to be safely diverted through the device. The high crowbar holding current helps prevent d.c. latchup as the diverted current subsides.

The TISP4xxxL3 range consists of fifteen voltage variants to meet various maximum system voltage levels (58 V to 320 V). They are guaranteed to voltage limit and withstand the listed international lightning surges in both polarities. These protection devices are in an SMAJ (JEDEC DO-214AC with J-bend leads) plastic package. These devices are supplied in embossed tape reel carrier pack. For alternative voltage and holding current values, consult the factory. For higher rated impulse currents, the 50 A 10/1000 TISP4xxxM3AJ series in SMA and the 100 A 10/1000 TISP4xxxH3BJ series in SMB are available.

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

Rating	Symbol	Value	Unit
Repetitive peak off-state voltage, (see Note 1)	'4070	± 58	V
	'4080	± 65	
	'4090	± 70	
	'4125	± 100	
	'4145	± 120	
	'4165	± 135	
	'4180	± 145	
	'4220	± 160	
	'4240	± 180	
	'4260	± 200	
	'4290	± 230	
	'4320	± 240	
	'4350	± 275	
	'4360	± 290	
	'4395	± 320	
Non-repetitive peak on-state pulse current (see Notes 2, 3 and 4)	I_{TSP}	125	A
2/10 μs (GR-1089-CORE, 2/10 μs voltage wave shape)		100	
8/20 μs (IEC 61000-4-5, combination wave generator, 1.2/50 voltage, 8/20 current)		65	
10/160 μs (FCC Part 68, 10/160 μs voltage wave shape)		50	
5/310 μs (ITU-T K.20/21/45, K.44 10/700 μs voltage wave shape)		50	
5/310 μs (FTZ R12, 10/700 μs voltage wave shape)		40	
10/560 μs (FCC Part 68, 10/560 μs voltage wave shape)		30	
10/1000 μs (GR-1089-CORE, 10/1000 μs voltage wave shape)			
Non-repetitive peak on-state current (see Notes 2, 3 and 4)	I_{TSM}	18	A
20 ms (50 Hz) full sine wave		7	
1 s (50 Hz) full sine wave		1.6	
1000 s 50 Hz/60 Hz a.c.			
Junction temperature	T_J	-40 to +150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-65 to +150	$^\circ\text{C}$

NOTES: 1. For voltage values at lower temperatures, derate at 0.13 %/ $^\circ\text{C}$.

2. Initially, the TISP4xxxL3 must be in thermal equilibrium with $T_J = 25^\circ\text{C}$

3. The surge may be repeated after the TISP4xxxL3 returns to its initial conditions.

4. EIA/JESD51-2 environment and EIA/JESD51-3 PCB with standard footprint dimensions connected with 5 A rated printed wiring track widths. Derate current values at -0.61 %/ $^\circ\text{C}$ for ambient temperatures above 25°C .

JULY 2000 – REVISED JULY 2019

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.

TISP4xxxL3AJ Overvoltage Protector Series

BOURNS®

Recommended Operating Conditions

Component		Min	Typ	Max	Unit
R _S	series resistor for FCC Part 68, 10/560 type A surge survival	12			Ω
	series resistor for FCC Part 68, 9/720 type B surge survival	0			Ω
	series resistor for GR-1089-CORE first-level and second-level surge survival	23			Ω
	series resistor for K.20, K.21 and K.45 1.5 kV, 10/700 surge survival	0			Ω
	series resistor for K.20, K.21 and K.45 coordination with a 400 V primary protector	7			Ω

Electrical Characteristics, T_A = 25 °C (Unless Otherwise Noted)

Parameter	Test Conditions	Min	Typ	Max	Unit
I _{DRM} Repetitive peak off-state current	V _D = V _{DRM} T _A = 25 °C T _A = 85 °C			±5 ±10	μA
V _(BO) Breakover voltage	dv/dt = ±250 V/ms, R _{SOURCE} = 300 Ω '4070 '4080 '4090 '4125 '4145 '4165 '4180 '4220 '4240 '4260 '4290 '4320 '4350 '4360 '4395			±70 ±80 ±90 ±125 ±145 ±165 ±180 ±220 ±240 ±260 ±290 ±320 ±350 ±360 ±395	V
I _(BO) Breakover current	dv/dt = ±250 V/ms, R _{SOURCE} = 300 Ω			±0.8	A
I _H Holding current	I _T = ±5 A, di/dt = +/-30 mA/ms	±0.15		±0.60	A
dv/dt Critical rate of rise of off-state voltage	Linear voltage ramp, Maximum ramp value < 0.85V _{DRM}	±5			kV/μs
I _D Off-state current	'4070, V _D = ±52 V '4080, V _D = ±59 V '4090, V _D = ±63 V '4125, V _D = ±90 V '4145, V _D = ±108 V '4165, V _D = ±122 V '4180, V _D = ±131 V '4220, V _D = ±144 V '4240, V _D = ±162 V '4260, V _D = ±180 V '4290, V _D = ±207 V '4320, V _D = ±216 V '4350, V _D = ±248 V '4360, V _D = ±261 V '4395, V _D = ±288 V			±2	μA
I _D Off-state current	V _D = ±50 V			±10	μA

JULY 2000 – REVISED JULY 2019

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.

TISP4xxxL3AJ Overvoltage Protector Series

BOURNS®

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

Parameter	Test Conditions	Min	Typ	Max	Unit
C _{off} Off-state capacitance	f = 1 MHz, V _d = 1 V rms, V _D = ±1V		53	64	pF
	4070 thru '4090		40	48	
	'4125 thru '4220		33	40	
	f = 1 MHz, V _d = 1 V rms, V _D = ±50 V	25	30		
	4070 thru '4090	18	22		
	'4125 thru '4220	14	17		

Thermal Characteristics

Parameter	Test Conditions	Min	Typ	Max	Unit
$R_{\theta JA}$ Junction to free air thermal resistance	EIA/JESD51-3 PCB, $I_T = I_{TSM(1000)}$, $T_A = 25\text{ }^{\circ}\text{C}$, (see Note 75)			115	$^{\circ}\text{C/W}$
	265 mm x 210 mm populated line card, 4-layer PCB, $I_T = I_{TSM(1000)}$, $T_A = 25\text{ }^{\circ}\text{C}$		52		

NOTE 5: EIA/JESD51-2 environment and PCB has standard footprint dimensions connected with 5 A rated printed wiring track widths.

JULY 2000 – REVISED JULY 2019

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.

Parameter Measurement Information

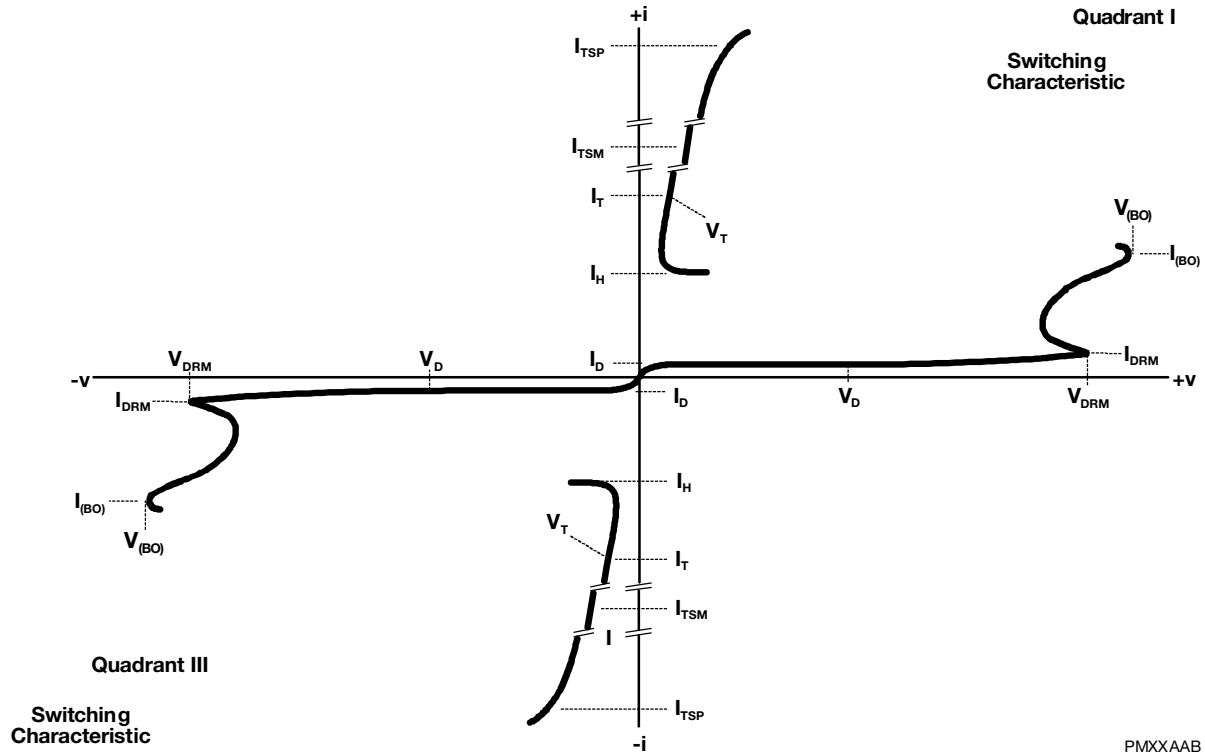


Figure 1. Voltage-Current Characteristic for T and R Terminals
All Measurements are Referenced to the R Terminal

PMXXAAB

JULY 2000 – REVISED JULY 2019

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.

Typical Characteristics

**OFF-STATE CURRENT
vs
JUNCTION TEMPERATURE**

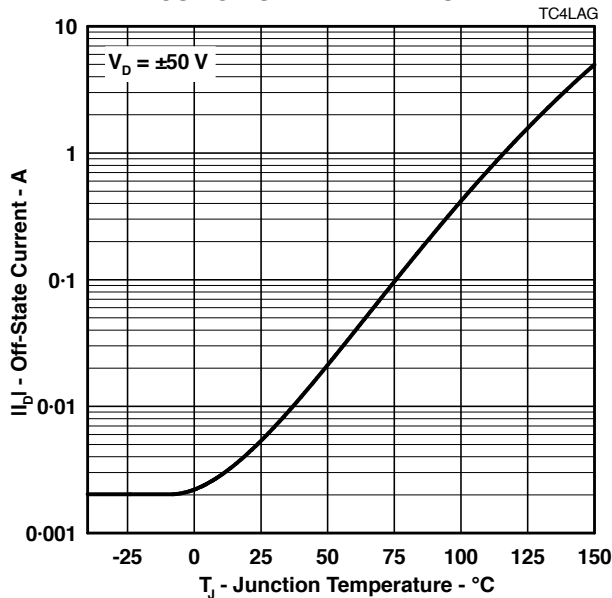


Figure 2.

**NORMALIZED BREAKOVER VOLTAGE
vs
JUNCTION TEMPERATURE**

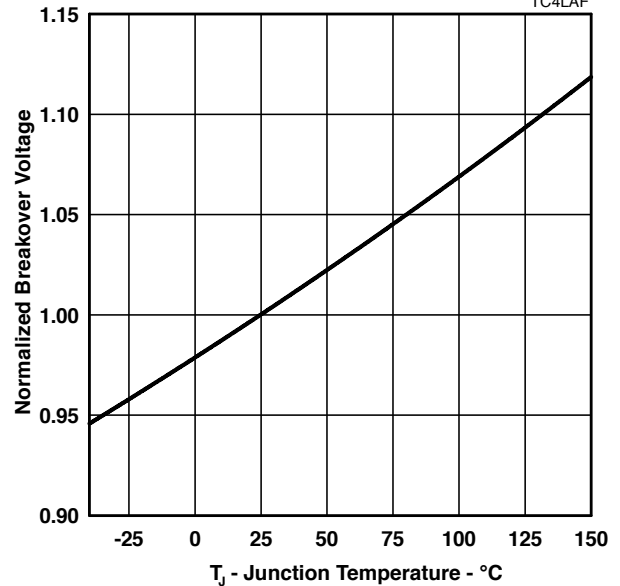


Figure 3.

**ON-STATE CURRENT
vs
ON-STATE VOLTAGE**

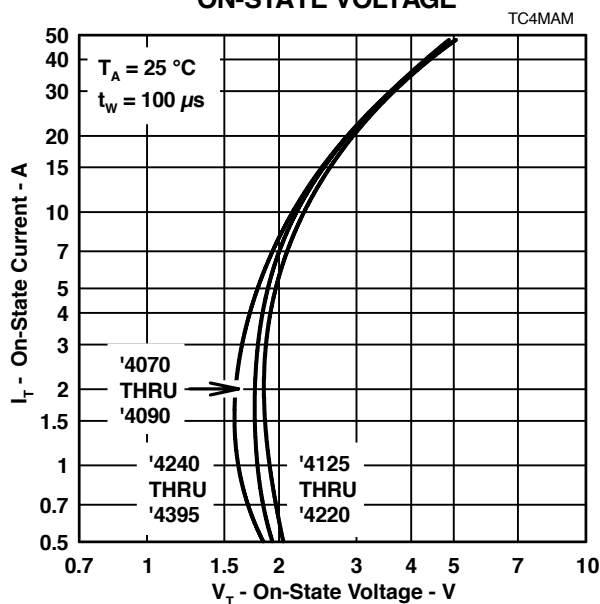


Figure 4.

**NORMALIZED HOLDING CURRENT
vs
JUNCTION TEMPERATURE**

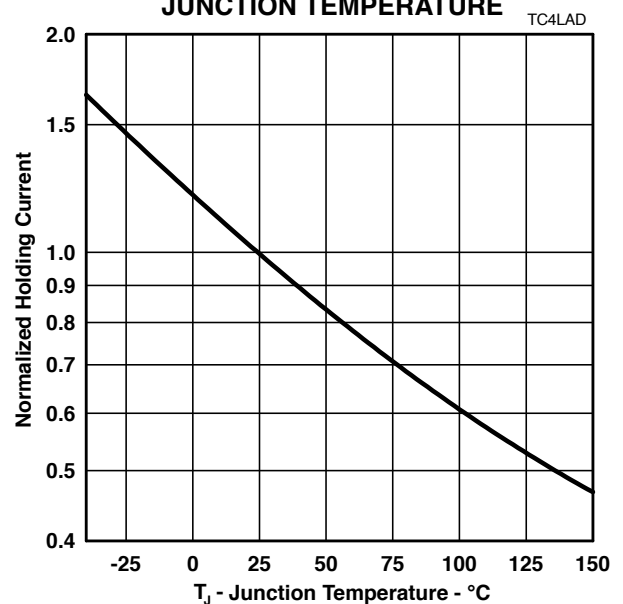


Figure 5.

JULY 2000 – REVISED JULY 2019

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.

Typical Characteristics

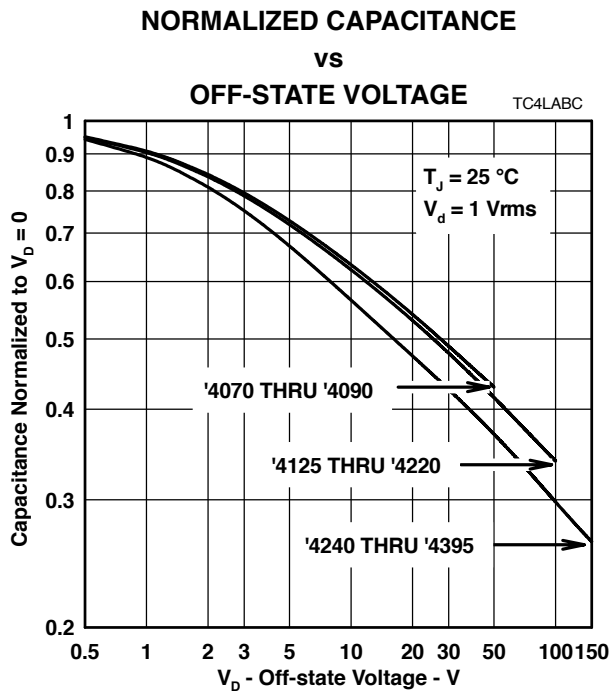


Figure 6.

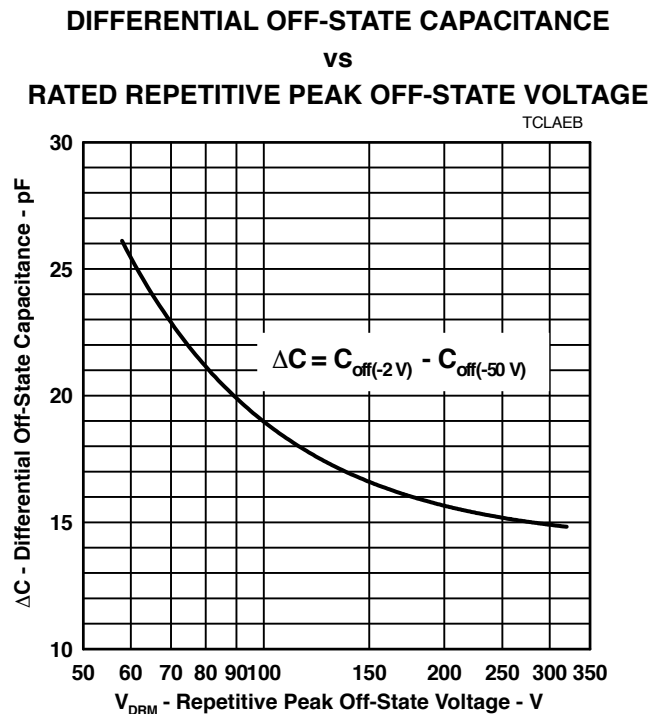


Figure 7.

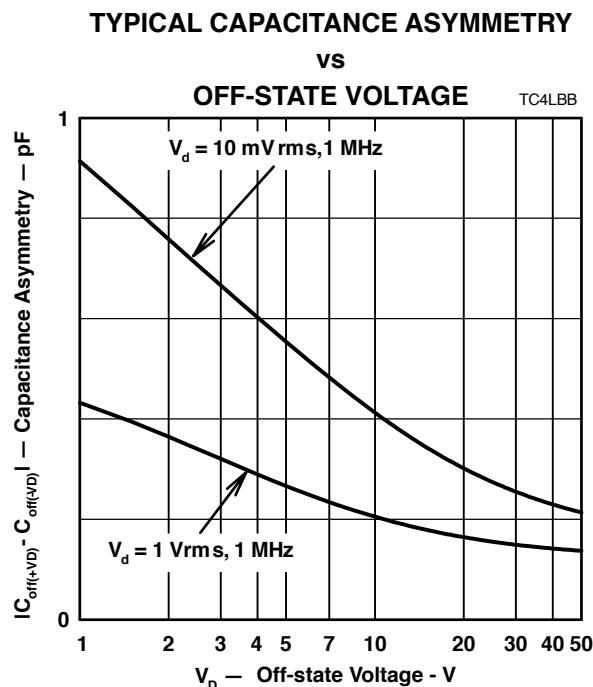


Figure 6.

JULY 2000 – REVISED JULY 2019

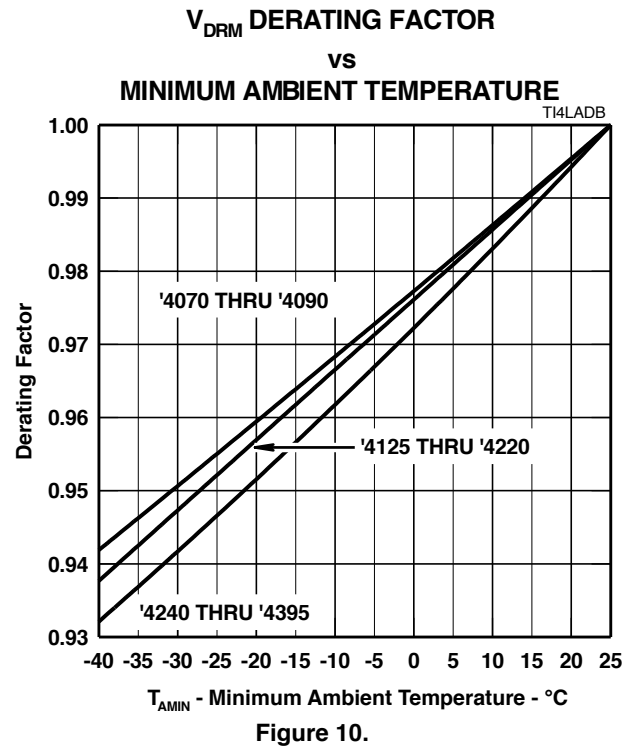
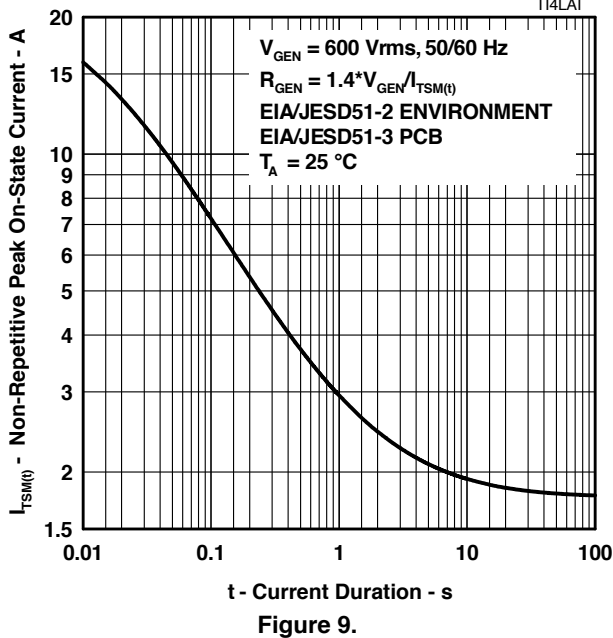
Specifications are subject to change without notice.

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.

Rating and Thermal Information

NON-REPETITIVE PEAK ON-STATE CURRENT VS CURRENT DURATION



BOURNS®

Asia-Pacific: Tel: +886-2 2562-4117 • Email: asiacus@bourns.com

Europe: Tel: +36 88 885 877 • Email: eurocus@bourns.com

The Americas: Tel: +1-951 781-5500 • Email: americus@bourns.com

www.bourns.com

JULY 2000 – REVISED JULY 2019

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.

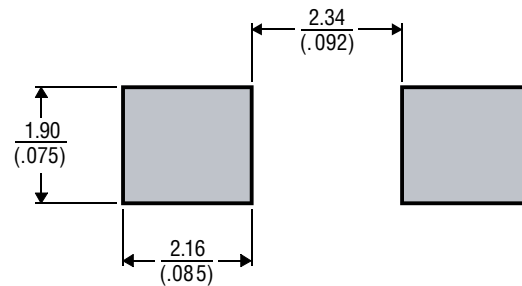
TISP4xxxL3AJ Overvoltage Protector Series

BOURNS®

MECHANICAL DATA

Recommended Printed Wiring Land Pattern Dimensions

SMA Land Pattern



DIMENSIONS ARE: $\frac{\text{MILLIMETERS}}{(\text{INCHES})}$

MDXXBIC

Device Symbolization Code

Devices will be coded as below. As the device parameters are symmetrical, terminal 1 is not identified.

Device	Symbolization Code
TISP4070L3	4070L
TISP4080L3	4080L
TISP4090L3	4090L
TISP4125L3	4125L
TISP4145L3	4145L
TISP4165L3	4165L
TISP4180L3	4180L
TISP4220L3	4220L
TISP4240L3	4240L
TISP4260L3	4260L
TISP4290L3	4290L
TISP4320L3	4320L
TISP4350L3	4350L
TISP4360L3	4360L
TISP4395L3	4395L

Carrier Information

For production quantities, the carrier will be embossed tape reel pack. Evaluation quantities may be shipped in bulk pack or embossed tape.

Carrier	Standard Quantity
Embossed Tape Reel Pack	5,000

JULY 2000 – REVISED JULY 2019

“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.

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.

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>